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Publications

International Conference on Green Capitalism Reimagined: Evolving Ecosystems of Commerce and Sustainability (ICGCREECS)

Editors

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Dr. T.Anitha
Dr. K.Shyamala
Dr. Vimala Vasudevan

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Editorial Message

It gives us immense pleasure to present this Special Issue of our ISSN-indexed journal featuring selected peer-reviewed papers from the International Conference on Green Capitalism Reimagined: Evolving Ecosystems of Commerce and Sustainability (ICGCREECS)], held on 7th & 8th January 2026 at Shrimathi Devkunvar Nanalal Bhatt Vaishnav college for women, Chromepet, Chennai.

The conference brought together academicians, researchers, industry experts and practitioners from diverse disciplines to share innovative ideas, research findings and emerging trends. The overwhelming response and quality of submissions reflected the growing importance of interdisciplinary collaboration in addressing contemporary challenges.

All manuscripts included in this special issue have undergone a rigorous review process conducted by subject experts and members of the editorial team to ensure academic integrity, originality and relevance. The selected papers represent significant contributions to their respective fields and offers valuable insight for researchers, educators, policymakers and industry professionals.

The Editorial Board extends its sincere appreciation to the conference organizers, authors, reviewers and editorial team members whose dedication and commitment made this publication possible. Their collective efforts have helped create a scholarly platform that promotes knowledge dissemination and research excellence.

We hope that this special issue will serve as a useful resource for the academic and research community and inspire further exploration and innovation in the areas addressed by the conference.

We congratulate all contributing authors and thank our readers for their continued support.

Editors

Dr. D.Lalitha
Dr. T.Anitha
Dr. K.Shyamala
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Publications

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Sustainable Banking Practices: Impact, Challenges and Opportunities

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Abstract

Sustainable banking practices have increased prominently in the recent times as financial institutions realises the importance of integrating ESGs into their businesses. This paper aims to examine various sustainable banking practices that includes sustainable lending, green finance, responsible banking and also examines their contribution towards sustainable development and financial stability. The paper aims to insights the effectiveness of sustainable banking practices in promoting environmental sustainability, social inclusion and long term financial resilience. As the result the sustainable finance has emerged as the key driver of the said transformation, which includes investment practices that helps in generating positive environmental and social impacts along with the financial returns. Sustainable banking which is also known as ethical banking or green banking, refers to the practice of integrating ESG criteria into decision making process that are related to finance. The aim of this approach is promoting sustainable development by considering the long-term effect of banking operations on environment, society &on the economy. Sustainable banking encompasses various aspects such as responsible lending, ethical investments, climate risk management, and promoting financial inclusion. As the world is facing irreversible changes in the environment and in the system of earth, it is impossible and risky to ignore the threat of the climate change. Or we can also say that the increasing awareness towards ESGs is result of global challenges such as change in climate, social inequality and failure of corporate governance.

***Keywords**: ESG, green finance, sustainable banking practices, sustainable*

Introduction

The sustainability in business implies to the organisation's strategy to reduce negative impact on the environment from their operations in the market. ESG (Environment, Social and

governance) metrics analyse an organisation's sustainability practices. As the world is facing irreversible changes in the environment and in the system of earth, it is impossible and risky to ignore the threat of the climate change. Or we can also say that the increasing awareness towards ESGs is result of global challenges such as change in climate, social inequality and failure of corporate governance. And these have highlighted the requirement for a more sustainable approach towards finance. As the result the sustainable finance has emerged as the key driver of the said transformation, which includes investment practices that helps in generating positive environmental and social impacts along with the financial returns. Sustainable banking which is also known as ethical banking or green banking, refers to the practice of integrating ESG criteria into decision making process that are related to finance.

Scope of sustainable banking

Sustainable banking also known as ethical banking or green banking, is the practice of integrating ESG criteria into decision making process that are related to finance. The aim ofthis approach is promoting sustainable development by considering the long-term impact of banking activities on the environment. Society and on the economy. Sustainable banking encompasses various aspects such as responsible lending, ethical investments, climate risk management, and promoting financial inclusion. The role of Sustainable banking is not just limited merely with compliance of rules and regulations but extends in taking measures proactively to address the environmental & social challenges and ensuring the financial stability and profitability at the same time. This includes assessing the environmental and social dangers associated with lending and investment sports, attractive with stakeholders to recognize their concerns, and adopting sustainable enterprise practices at some stage in the banking operations.

Literature Review

Vikas, Gautam. (2023). "The study aimed to design and test a conceptual framework for examining the drivers of customer intentions to use sustainable banking practices and services, using the theory of planned behaviour and environmental knowledge as constructs. "Salim. K &etl.(2023). "The research paper examines the relationship between corporate environmental performance (CEP) and corporate social performance (CSP) on bank stability, finding that CEP is negatively related to bank stability, while CSP does not have a significant relationship. Sharma D., Pansey P. (2023). "The paper explores the concept and extent of green banking, recent sustainable development initiatives by banks in

India, and the challenges they face in implementing green banking practices. The research findings suggest a pressing need for increased awareness and adoption of green banking practices in India, given the current scenario characterized by innovative technologies, in order to enhance sustainability and create a more environmentally-friendly future"

Joaquin, Espinosa-Garcia. (2023)."The paper focuses on sustainable development beyond climate change, encompassing equality, justice, and risk sharing for long-term socioeconomic change. It discusses the causes of unsustainability and explores nine types of innovative sustainable financing for individuals and businesses." Mittal. S. & etl. (2023). "The research paper focuses on the importance of banking institutions in promoting sustainable economic growth through lending practices. It emphasizes the need for banks to prioritize lending to green initiatives to reduce carbon footprint and support the goals of the COP 26 United Nations Climate Change Conference. The study recommends that banks increase their green financing to provide impetus for creating sustainable infrastructure"

Mir. A. A., Bhat. (2022). The researchers examine the practices and importance of green banking in promoting environmental sustainability and achieving UN Sustainable Development Goals. It also emphasizes the role of banks in proactively improving their environmental performance and supporting low-carbon economics, while also benefiting the banks, industries, and the environment at large. Moufty. S. & etl, (2022). The paper examines sustainability disclosure in the banking sector in the European Union (EU) and the United States, finding that EU banks have higher sustainability disclosure compared to US banks. The study also reveals that banks in both regions are primarily concerned with the direct social impact of their operations, followed by the indirect environmental impact of their products and services

Mukta, Mani. (2022). "The research paper analyzes the sustainability reporting practices of the top 10 Indian banks, focusing on stakeholder inclusiveness, credibility, materiality, and sustainability. Only four out of the 10 banks have adopted international sustainability reporting frameworks and identified material issues in their reports. The findings of this study are valuable for banks and policymakers as it provides a comprehensive understanding of the sustainability practices of the Indian banking sector in comparison to international practices and guidelines, with a specific emphasis on sustainability reporting.

Objectives of the Study

1. Examine the importance and evolution of sustainable banking practices.
2. Assess the objective of sustainable banking initiatives
3. Identify Challenges and Opportunities of sustainable banking practices.
4. Offer Recommendations for Future Action: Drawing on insights from the analysis, the paper will provide recommendations for policymakers, investors, financial institutions, and other stakeholders to further advance impact investing and maximize its potential to drive positive change.

Objectives of Sustainable Banking

- Financial Stability: It aims to improve financial stability by promoting strong practices of risk management, developing trust among stakeholders & mitigating the risk related to environmental degradation, social inequality and failures in governance
- Environmental Protection: It seeks to contribute towards protection of environment and conservation efforts by financing projects related to renewable energy, supporting practices of sustainable agriculture and promoting resource efficiency.
- Social Impact: By promoting financial inclusion, supporting development initiatives of community &addressing challenges of society like poverty, inequality and access to education and healthcare the sustainable banking aims to generate positive social impact.
- Green Loans: These loans are designed to finance projects that are environmentally sustainable like renewable energy, improves energy efficiency, green buildings, sustainable buildings and technology measures. These loans offer favourable terms like lower interest rate or longer repayment periods so as to encourage investment in green projects
- Social Impact Loans: These loans are designed to finance those projects which address social issues and helps in promoting positive social outcomes. Example includes loans for affordable housing, community health centres, educational programmes, microfinance programs and community businesses that aims to reduce poverty, creating jobs and empowering marginalized communities.
- Green Bonds: They are instruments of debt that are issued by the govt., municipalities, corporations or financial institutions so as to raise money for the projects that are environmentally sustainable.

- Role of Banks in Facilitating Green Investments: Bank plays an important role in promoting green investment by providing financial products, services and expertise that supports measures of sustainability. Few important roles of banking in this context are:
    - Financing Renewable Energy Projects: Banks provide loans and financing for renewable energy such as solar, wind, hydroelectric and geothermal power plants. This financial support is important for the development & for expansion of clean energy products.
    - Green Bonds Issuance: Banks may issue special green bonds to fund environmental projects. This type of bonds attracts the investors who are interested in supporting sustainable initiatives and the money so received is earmarked for the projects that have positive impact on environment.

Responsible banking initiatives

Principles of Responsible Banking: The United Nations Environment Programme Finance Initiative (UNEP FI) in collaboration with the banks from all over the world has developed the principles for Responsible Banking which provides a framework to banks to align their strategies and operations with the sustainability objectives of the society. The principle are as follows: Alignment: Alignment of bank strategies with the goals of the society and Paris Agreement on climate change and other relevant international framework. Impact and Target Setting: Setting of ambitious targets to increase the positive impact and reducing negative impact on people and environment. Clients and Customers: To ensure sustainable practices and behaviours banks should work responsibly with clients and customers. Stakeholders: In order to attain societal objectives, it is important to engage stakeholder.

Challenges and Opportunities: The challenges and opportunities related to sustainable banking practices are as follows:

Lack of awareness and understanding: The main problem related to sustainable banking practices is the lack of awareness and understanding of the principles of sustainable banking among the stakeholders. therefore, it is important to educate the stakeholders about the benefits and importance of these practices.

Complexity of ESG Integration: Integration of ESG factors into corporate governance can be challenging and may require adjustments to risk management, investment strategies and products. Banks may also face requirements to identify relevant ESG indicators, collect existing data and follow appropriate reporting and reporting procedures.

Short-term Financial Pressures: Banks may face resistance to sustainable practices due to short term financing cost or trade-offs. Especially in businesses with high capitals or weak revenues streams, it will be difficult to balance ESG considerations with financial performance objectives.

Regulatory Uncertainty: The rapidly changing regulatory environment and inconsistent standards across regions make it difficult for banks to implement sustainable practices.

Opportunities

- Enhanced Risk Management: Integrating ESG factors into risk management processes allows banks to identify and mitigate environmental and social risks. By engaging in sustainable decisions making, banks can improve their ability to cope with long term risks such as climate change or the impact of conflict.
- Innovation and Product Differentiation: Sustainable banking provides opportunities for innovation and product differentiation. Creating ESG conscious products and services, such as green bonds, sustainable investment funds or related loans, can attract both consumers and investors.
- Cost Reduction and Efficiency Gains: Implementing sustainable practices can lead to cost reductions and efficiency gains over the long term. For example, investments in energy-efficient technologies, renewable energy sources, and sustainable supply chain management can reduce operational expenses and resource consumption.
- Access to New Markets and Customers: Embracing sustainable banking practices can open doors to new markets and customer segments. Growing demand for sustainable finance solutions from institutional investors, millennial, and socially responsible consumers presents opportunities for banks to expand their customer base and market share.

Conclusion

Key Findings: Implications for Sustainable Development and Financial Stability: The implications of these findings are significant for sustainable development and financial stability: Sustainable banking practices contribute to the achievement of environmental, social, and governance (ESG) objectives, such as climate mitigation, social inclusion, and responsible governance. By integrating ESG considerations into their operations, banks can enhance resilience to long-term risks, foster trust among stakeholders, and contribute to the transition to a more sustainable and inclusive economy. Promoting sustainable banking practices can enhance financial stability by reducing systemic risks associated with environmental degradation, social inequality, and governance failures.

Recommendations for Banks and Policymakers:

Several recommendations can be made for banks and policy makers: Banks should prioritize the adoption of sustainable banking practices, including ESG integration, stakeholder engagement, and transparency, to enhance long-term financial performance and mitigate risks. Banks should invest in robust data management systems, stakeholder engagement mechanisms, and sustainability reporting frameworks to track and communicate their ESG performance effectively. Policymakers should develop supportive regulatory frameworks, incentives, and capacity-building initiatives to promote sustainable finance and responsible banking practices. Collaboration among banks, regulators, investors, and civil society stakeholders is essential to drive collective action, share best practices, and address common challenges in advancing sustainable banking agendas. In conclusion, sustainable banking practices are not only essential for achieving environmental and social objectives but also contribute to long-term financial stability and resilience. By embracing sustainability as a strategic imperative and collaborating with stakeholders, banks and policymakers can foster a more sustainable and inclusive financial system that benefits society, the economy, and the environment.

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Comparative Analysis of Non Performing Assets Related to Private Sector Bank

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Introduction

The banking system in India comprises commercial and cooperative banks, of which the former accounts for more than 90 per cent of banking system's assets. Besides a few foreign and Indian private banks, the commercial banks comprise nationalized banks (majority equity holding is with the Government), the State Bank of India (SBI) (majority equity holding being with the Reserve Bank of India) and the associate banks of SBI (majority holding being with State Bank of India). These banks, along with regional rural banks, constitute the public sector (state owned) banking system in India The banking industry has undergone a sea change after the first phase of economic liberalization in 1991 and hence credit management. Asset quality was not prime concern in Indian banking sector till 1991, but was mainly focused on performance objectives such as opening wide networks/branches, development of rural areas, priority sector lending, higher employment generation, etc. While the primary function of banks is to lend funds as loans to various sectors such as agriculture, industry, personal loans, housing loans etc., but in recent times the banks have become very cautious in extending loans. The reason being mounting nonperforming assets (NPAs) and nowadays these are one of the major concerns for banks in India. Bankers are the custodians and distributors of the liquid capital of the country. Therefore most important function of the banking system is to mobilize the savings of the people by accepting deposits from the public. The banker becomes the trustee of the surplus balances of the public. Deposit mobilization promotes the economic prosperity by controlling the money circulation and canalizing for development and productive purposes. In order to mobilize deposits, the commercial banks undertake deposit mobilization through various deposit schemes suited to the different sections of the people. The deposits along with other sources of funds namely capital, reserves and borrowings, form the sources of funds for the banks. The lending and investment activities of the bank are based on the sources of funds.

Review of Literature

Kumar (2016) in his study on A Comparative study of NPA of Old Private Sector Banks and Foreign Banks has said that Non-performing Assets (NPAs) have become a nuisance and headache for the Indian banking sector for the past several years. One of the major issues challenging the performance of commercial banks in the late 90s adversely affecting was the accumulation of huge non-performing assets (NPAs).

Selvarajan & Vadivalagan (2015) in A Study on Management of Non-Performing Assets in Priority Annual Research Journal of SCMS, Pune Vol. 4, March 2016 ISSN 2348–0661 Print © 2015 Symbiosis Centre for Management Studies, Pune ` Annual Research Journal of Symbiosis Centre for Management Studies, Pune Vol. 4, March 2016 113 Sector reference to Indian Bank and Public Sector Banks (PSBs) find that the growth of Indian Bank's lending to Priority sector is more than that of the Public Sector Banks as a whole. Indian Bank has slippages in controlling of NPAs in the early years of the decade.

Singh (2014) in his paper entitled Recovery of NPAs in Indian commercial banks says that the origin of the problem of burgeoning NPA's lies in the system of credit risk management by the banks. Banks are required to have adequate preventive measures in fixing pre-sanctioning appraisal responsibility and an effective post-disbursement supervision. Banks should continuously monitor loans to identify accounts that have potential to become non-performing.

Gupta (2016) in her study A Comparative Study of Non-Performing Assets of SBI & Associates & Other Public Sector Banks had concluded that each bank should have its own independence credit rating agency which should evaluate the financial capacity of the borrower before credit facility and credit rating agencies should regularly evaluate the financial condition of the clients.

Objectives of the Study

- To study the status of Non Performing Assets of Indian Scheduled Commercial Banks in India
- To study the impact of NPAs on Banks

Scope of the Study

The study could suggest measures for the banks to avoid future NPAs & to reduce existing NPAs. o The study may help the government in creating & implementing new strategies to control NPA.

Sources of Data

The data collected is mainly secondary in nature. The sources of data for this thesis include the literature published by Indian Bank and the Reserve Bank of India, various magazines, Journals, Books dealing with the current banking scenario and research papers.

Methodology of Study

For our study, we have considered Non Performing Assets in Scheduled Commercial Banks which includes public sector banks, private sector banks and foreign banks which are listed in the Second Schedule of the Reserve Bank of India Act, 1934. The study is based on secondary data. The paper discusses the conceptual framework of NPA and it also highlights the trends, status and impact of NPA on scheduled commercial banks during the period of 14 years i.e. from 2000 to 2014. Several reputed research journal including research paper and articles have been used by the researchers. Moreover, RBI Report on Trend and Progress of Banking in India for various years, websites and a book on banking has been referred during the study.

Year	Gross Advance	Gross NPAs	Gross NPAs
2020-2021	6809.58	708.61	10.4
2021-2022	7780.43	687.17	8.8
2022-2023	9020.26	648.12	7.2
2023-2024	11526.82	593.73	5.2
2024-2025	12326.81	612-83	6.3

Total NPAs increases in banking sector with a parallel increase in non-priority sector NPAs but priority sector NPAs increases comparatively lower than non-priority sector NPAs. Corporate debt restructuring increases rapidly from 2013 in the banking sector as well as nonpriority sector NPAs increased substantially which demands huge provisioning, reduces profitability and erodes capital. In case of State Bank of India, total NPAs increases parallel with non-priority sector NPAs, but priority sector NPAs seems to be under control. Corporate

debt restructuring in State Bank of India shows a declining mode and is totally under control. Total NPAs increases in Public Sector Banks with a parallel increase in non-priority sector NPAs and priority sector NPAs increases comparatively lower than non-priority sector NPAs which demands a close supervision on Non-priority sector NPAs. Corporate debt restructuring increases rapidly from 2013 in the Public Sector Banks as well as non-priority sector NPAs increases substantially thereby indicating that the objective of restructuring to reduce NPAs has failed.

Conclusion

Total NPAs increases in private sector banks with a parallel increase in non-priority sector NPAs, but priority sector NPAs increases comparatively lower than non-priority sector NPAs. Corporate debt restructuring in private sector banks shows a declining mode and is totally under control. Public Sector Banks has higher NPAs in priority sector through the years than the SBI and private sector banks. Non-priority sector NPAs, corporate debt restructuring shows higher figure in public sector banks than SBI and private sector banks that leads to lack of capital adequacy in Public Sector Banks. Corporate debt restructuring in the banking sector increases mainly due to its increase in other Public Sector Banks. SBI, private sector banks have much lower restructuring figures along with total NPAs figure than Public Sector Banks, which ensures comparatively better position for them in the industry. NPAs have no significant impact on GDP and Inflation. A positive correlation 17 is found between corporate debt restructuring and NPAs which reflects that the objective of restructuring to reduce the NPAs has failed.

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Artificial Intelligence to Improve Banking Sector Cybersecurity

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Abstract

As information technology develops further, cybercriminals are using a variety of internet venues to commit crimes. In order to combat these online dangers, financial organizations, especially in Artificial intelligence (AI) are being used more as a solution in the banking industry. The banking sector has a lot of potential to expand and innovate thanks to artificial intelligence. However, in order for AI to be trusted, its activities must be transparent and explicable.AI tools help make better decisions by providing insightful information about consumer behavior. Robo-advisory services, which are AI-powered automated platforms, are one type of AI application. Additionally, AI helps banks improve their fraud detection and cyber security procedures by safeguarding personal information and spotting fraudulent transactions. Notwithstanding these advantages, AI system deployment and upkeep are expensive, and the growing automation trend could lead to job displacement.

***Keywords**: Artificial Intelligence, Cyber Threats, Data Security, Financial Services, Risk Assessment.*

Introduction

Artificial intelligence (AI) has been developed to replicate the functions of the human brain, allowing it to address a diverse array of challenges with a thorough, human-like methodology. As internet computing and intricate distribution systems continue to grow, the issues related to data privacy and security have become increasingly significant. The foundational infrastructure that underpins cyber systems is susceptible to breaches and numerous threats, complicating the ability of physical devices such as sensors and detectors to adequately monitor or safeguard these systems. In this scenario, there is an urgent demand for

high-performance, flexible, and resilient cyber security solutions. The banking industry has been employing AI for numerous years, swiftly incorporating it into various applications. This paper investigates the role of AI in banking to combat cyber-attacks, emphasizing its application across different banking functions and analyzing the advantages and challenges linked to its implementation.

Investigating Artificial Intelligence

Artificial Intelligence (AI) represents a dynamic and adaptable technology aimed at emulating human cognitive functions, such as reasoning, learning, creativity, perception, and problem-solving. By incorporating advanced computational technologies, AI is continually advancing across various levels of sophistication, effectively handling large volumes of both structured and unstructured data. Often regarded as a cognitive technology, it replicates human thought processes by utilizing algorithms, principles, procedures, and problem-solving techniques to extract actionable insights from extensive datasets. Historically, traditional AI methods have concentrated on modeling human behavior, inference techniques, and knowledge representation. As time has progressed, AI has broadened its scope to address tasks including planning, movement, social and business interactions, communication, creative endeavors, and the recognition of objects and sounds. The fundamental techniques that drive these capabilities encompass text mining, recommendation systems, machine learning, deep learning, natural language processing (NLP), as well as predictive and prescriptive analytics. These technologies are also vital in enhancing cybersecurity measures and analyzing large datasets through NLP for effective interpretation. With innovations such as deep learning and reinforcement learning, AI has evolved beyond mere pattern recognition to engage in experience-driven sequential decision-making, significantly enhancing its ability to resolve complex issues.

Cybersecurity in Banking

A survey conducted in 2016 estimated that cybercrime inflicted a cost of around $450 billion on the global financial system, with businesses in Asia contributing over $81 billion to this total. Key components of these significant incidents include denial-of-service attacks, breaches of infrastructure, and issues related to data security. It is noteworthy that approximately 70% of CEOs within the capital markets and banking sectors view cyber threats as a substantial risk to their growth. Organizations in the financial services sector encounter security incidents 300 times more often than those in other industries, with 33% of large-scale cyber-attacks aimed at this particular sector.

The global banking and financial industry suffer annual losses estimated at about $360 billion due to cyber-attacks. The rising occurrence of ransomware attacks exacerbates this threat, particularly as financial institutions are the main targets. In light of these challenges, financial organizations are investigating the implementation of artificial intelligence to improve cyber security measures and more effectively counter cybercriminals. The development of robust security applications has become essential for protecting the banking industry against the ever-evolving landscape of cyber threats.

Cybersecurity Threats in Banking

The swift advancement of computing technology has yielded numerous advantages while simultaneously presenting significant challenges, particularly the emergence of complex cybercrimes. Traditional offenses such as fraud and theft have evolved in the digital era, resulting in an increase in cybercrimes across various platforms. Facilitated by technology that crosses national boundaries, these threats have become increasingly difficult to detect, prevent, and manage. Cybercriminals often utilize information technology to execute attacks, such as phishing, which specifically target organizational systems and are notoriously hard to recognize. This is where AI software plays a vital role, analyzing behavioral patterns across personal accounts and devices to identify anomalies. The evolution of security automation is becoming more sophisticated, with integrated tools providing essential benefits. AI enhances response times and boosts the productivity of skilled security engineers, optimizing the utilization of limited resources. Continuous research and development have propelled AI applications to tackle a variety of security threats, enabling real-time threat detection, adaptation, and response.

AI-driven security laboratories now proactively identify a broad spectrum of threats, reinforcing cyber-defense strategies. In the banking industry, ongoing assessment of responses to cybercrime emphasizes addressing threats posed by individual malicious actors and specific points of attack. By incorporating AI and machine learning, banks achieve unparalleled control, ensuring effective resource allocation. To strengthen cybersecurity within the financial sector, the exploration and implementation of AI-based solutions are imperative.

Applications of Artificial Intelligence

Artificial Intelligence (AI) strategies are formulated to manage extensive amounts of data and provide valuable insights across various sectors. In the banking industry, AI

applications can be categorized into three primary areas, each offering substantial opportunities for growth and innovation within the sector.

1. Enhancing Customer Interaction and Experience: This encompasses improvements in customer service, voice banking, robo-advisory services, biometric authentication, personalized offers, customer segmentation, and the implementation of chatbots to enhance customer engagement and satisfaction.
2. Enhancing Operational Efficiency: Artificial Intelligence improves the effectiveness of banking operations by utilizing predictive maintenance for IT systems, managing cases, automating data extraction, facilitating Know Your Customer (KYC) procedures, assessing credit scores, automating and optimizing processes, classifying documents, and more, thus streamlining operations and reducing costs.
3. Strengthening Security and Risk Management: AI is vital in improving security and managing risks by identifying and monitoring anti-money laundering (AML) activities, advanced risk management, ensuring data integrity, preventing cyber threats, overseeing compliance, tracking transaction fees, fraud prevention, and forecasting system capacity limits.

Moreover, AI presents new avenues for business growth and revenue generation in the banking sector, including investment analysis, personal finance management, asset allocation, lead generation, and other innovative solutions that establish new income streams.

The Role of Artificial Intelligence in the Banking Industry

The financial services sector is progressively integrating artificial intelligence (AI) strategies, especially in consumer-oriented digital operations. AI systems replicate human cognitive functions, reasoning, and decision-making processes, allowing banks to promote innovation, lower expenses, and enhance data management. This trend has propelled the growth of AI in financial management. Nevertheless, as noted by Nanette Byrnes in a technological review, certain areas such as counterfeit design detection, image recognition, natural language processing, and idea generation remain in the nascent stages of development despite swift technological progress.

Credit scoring, one of the pioneering uses of statistical modeling in finance, remains a primary concern for banks. Currently, financial institutions utilize statistical data, decision trees, regression models, and transactional information to evaluate customer credit risk and formulate

loan repayment strategies. AI greatly enhances the precision of credit scoring, reducing false positives and false negatives. This enables banks to provide customized payment plans and more effectively manage credit risks, thereby contributing to overall financial stability. This AI-driven methodology is particularly crucial for adhering to regulatory frameworks, such as the European Banking Authority's Regulatory Technical Standards. These regulations stress the importance of consistency in model outputs and risk-weighted exposure comparisons, ensuring that AI-enhanced credit scoring systems comply with industry standards and best practices.

AI in Customer Engagement: Automated Advisors and Grievance Handling

Robo-advisors are automated platforms that provide investment guidance and algorithm-based financial recommendations.

Through the collection and examination of user data, they provide tailored investment solutions that are adapted to personal preferences and financial goals. These systems utilize cutting-edge technologies, such as machine learning, natural language processing, AI algorithms, and cognitive systems, to improve the customer experience—especially for those who favor digital interactions and self-service options.

Financial institutions employ robo-advisors to offer investment advice, assisting clients in constructing diverse portfolios and investigating sector-specific opportunities. In addition to investment guidance, these digital advisors also furnish valuable insights into financial markets and wealth management, facilitating informed decision-making for customers.

Customer Grievances

Credit and financial institutions are tasked with delivering customer service in accordance with regulatory frameworks, ensuring that complaints are resolved within designated timeframes. Should customers remain unsatisfied with the response, they have the option to escalate their issues to national competent authorities (NCAs).

Considering the vast amount of data involved, AI is instrumental in managing and categorizing large quantities of unstructured text and addressing numerous customer inquiries. By automating the assignment of complaints to the relevant teams, AI facilitates quicker

decision-making and resolution. This results in better outcomes for both financial institutions and their clients. Furthermore, AI guarantees uniformity in complaint management, providing a more effective and precise process compared to conventional manual approaches, ultimately improving customer satisfaction and operational efficiency.

Artificial Intelligence for Security Objectives: Fraud Prevention

Artificial Intelligence (AI) is essential in identifying fraud and various financial crimes. Fraud generally divides into two main types: external and internal. External fraud refers to attacks aimed at banks or their customers, including unauthorized money transfers, online payment fraud, and identity theft. Conversely, internal fraud pertains to harmful actions carried out by employees.

To create efficient fraud detection systems, methods such as feature engineering, adaptive learning, and both supervised and unsupervised learning are utilized. These systems analyze past data, constantly adapting to identify and prevent fraudulent actions. It is also vital to maintain communication with Fraud Detection System (FDS) operators to ensure the system's effectiveness. AI-driven FDS solutions can quickly identify suspicious activities and initiate prompt actions, such as delaying or blocking fraudulent transactions.

These systems prove particularly beneficial during the customer profile creation phase, guaranteeing secure and precise identity verification. By implementing AI-based solutions, financial institutions can greatly minimize losses due to fraud while improving security. Furthermore, artificial intelligence plays a crucial role in combating financial crimes, including money laundering and the financing of terrorism. Anomaly detection, a fundamental capability of AI, is crucial in thwarting both fraud and cyber-attacks.

Utilization of AI in Addressing Cybersecurity Threats

Prior to the widespread adoption of chatbots, extensive studies investigated their function in customer service, especially their ability to handle account-related tasks and assist various business operations.

Prominent financial institutions, such as Bank of America, American Express, and credit card companies, have deployed chatbots to enable customers to access services swiftly,

resolve inquiries, and obtain more cost-effective support. These AI-driven systems have since become essential in improving customer experiences.

Despite their increasing prevalence, financial management chatbots are not as sophisticated or 'intelligent' as commonly perceived. Castelli et al. (2016) observe that many chatbots depend on decision trees, which allow them to manage specific inquiries but restrict their capacity to tackle complex or rare questions beyond standard customer issues (Kanabolo and Gundeti, 2019). While supervised learning methods are being utilized to boost their effectiveness, the technology has not yet reached genuine cognitive awareness.

To enhance customer interactions further, banks are connecting chatbots with external platforms like Facebook Messenger and mobile applications such as Barclays Launchpad, providing a more seamless and engaging service experience.

Advantages of Artificial Intelligence in the Banking Industry

AI technologies enable banks to effectively analyze customer behavior patterns, facilitating the creation of personalized investment strategies that have a direct influence on budgeting and financial planning.

By utilizing data, banks can offer insights into spending habits and recommend customized investment solutions. AI improves the comprehension of customer preferences by examining both traditional and supplementary data, thereby enhancing customer experiences and increasing employee productivity (Cidon et al., 2019).

A significant benefit of AI is its capacity to process large volumes of data and recognize patterns that are frequently missed by human analysts, rendering it an essential tool for fraud prevention. NA multitude of financial institutions are incorporating artificial intelligence and machine learning technologies to detect fraudulent activities as they occur. As online and mobile banking gain popularity due to their 24/7 availability, AI allows banks to monitor and analyze customer data, encompassing online transactions, offline activities, and website analytics.

Risk assessment, especially in loan approval processes, necessitates both precision and confidentiality. AI streamlines this intricate task by analyzing client data, including financial transactions, market trends, and other activities, to evaluate potential risks (Agarwal, 2019).

Moreover, AI is instrumental in safeguarding sensitive personal information and defending against various cyber threats. According to Sindhu and Namratha (2019), financial institutions are increasingly implementing AI to enhance security measures and acquire a deeper insight into customer behavior.

By automating customer service functions, AI diminishes the requirement for additional personnel, resulting in improved efficiency and cost savings. It speeds up task completion, boosts customer satisfaction, and enhances employee productivity. Additionally, AI assists in detecting suspicious activities and supports investigations to ensure financial security, thereby reinforcing fraud prevention initiatives and contributing to overall financial stability.

Challenges of Artificial Intelligence in the Banking Sector

Investing in and sustaining artificial intelligence (AI) necessitates a considerable financial investment, as it entails intricate machinery and advanced software. As noted by Kurode (2018), AI systems depend on cutting-edge software that requires regular updates to keep pace with the changing technological environment. Although AI can aid in analysis and enhancement, it lacks the ability to make independent decisions or judgments. AI grants significant power to those who oversee these systems, yet this can also present challenges. Some contend that AI poses risks by transferring control from humans, which may result in dehumanization in specific domains. If employees are unable to effectively manage AI technologies, it could adversely affect banks and the financial industry (Dimitrios, 2019). Furthermore, as AI systems take over roles traditionally held by human workers, there is an escalating concern regarding rising unemployment due to automation.

Conclusion

Artificial intelligence (AI) technologies have become essential components of banks and financial institutions. This paper concludes that AI, which is designed to replicate human cognitive functions, plays a crucial role in improving customer engagement, optimizing banking operations, and enhancing security and risk management strategies. The findings underscore the significance of AI in combating cyber-attacks and reducing the related costs for financial institutions. Furthermore, AI methodologies have demonstrated remarkable effectiveness in identifying and preventing fraud, as well as recognizing and addressing data breaches, thus strengthening the industry's overall cyber-security framework.

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Impact of Financial Technology (FinTech) on Traditional Banking in India

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Abstract

The rapid growth in Financial Technology has brought sea changes to the traditional banking system in India. Innovations such as the Unified Payments Interface, mobile wallets, digital lending platforms, and online banking services have reshaped the delivery and usage of financial services. The study examines changes in customer behaviour, improvement in operational efficiencies, levels of digital adoption, and bank profitability trends towards assessing the impact of FinTech on traditional banking in India. The data sources include both primary and secondary data. Primary information on customer preference, usage, and satisfaction levels was obtained through a structured questionnaire. Secondary information was extracted from reports published by RBI, research articles, and various industry publications. Descriptive and analytical methods were employed for data interpretation, and a comparison of the trends before and after the major digital push in 2016 was also made. The findings show that FinTech has improved efficiency, accessibility, and customer satisfaction in the banking industry, while it has also driven a serious increase in digital transactions and digital-based revenues. Simultaneously, conventional banks go through many challenges in such a shift, including high technology investment costs, cybersecurity risks, and a decline in income from conventional banking services. The study infers that FinTech acts as a transformative agent rather than a substitute for traditional banks. Thus, this report suggests that banks should move toward hybrid digital models, increasing their ties with FinTech companies, and emphasizing customer-oriented innovation in order to be able to survive in an increasingly digitized financial ecosystem

Keywords*: customer behaviour, FinTech, conventional banking services, digitized financial ecosystem*

1. Introduction

The financial services industry in India has undergone a paradigm shift due to the surge in Fintech, driven by technology, government initiatives, and customer demand. The emergence of UPI, the rise of Wallets, and the provision of the technology infrastructure under the initiatives such as 'Digital India' and 'Jan Dhan Yojana' have given a huge boost to the adoption of the digital world in the financial sector.

The growth in the fin-tech industry had been fueled further by increased penetration of smartphones, cheap internet connectivity, and the push for a cashless society, especially after the demonetization of 2016. This is because these fin-tech platforms have made their services quicker, simpler, and customized compared to banks, which work with their branches or manual procedures.

1.2 Problem Statement

Fintech firms are more efficient, convenient, and innovative than the conventional banking systems in India. The fact is that the banks have to operate under cumbersome procedures, strict regulatory conditions, and increased expenses, whereas the Fintech firms have the advantage of processing their activities swiftly, conveniently, and around the clock. This has led to more competition for the banking sector.

Consequently, there are challenges associated with reduced branch footfall, diminished usage of traditional banking products, and significant expenditure related to technology upgrades for banks. Apart from this, challenges pertaining to cybersecurity, data privacy, regulatory, and digital integrations also exist.

These issues underscore the imperatives that exist in realizing the depth at which the Fintech revolution is altering the conventional banking channels and what measures need to be adopted by banking institutions to emerge relevant in the digital era.

1.3 Objectives of the Study

Primary Objectives

- To study how Fintech innovations influence the operations of traditional banks in India through Fintech products such as UPI, digital wallets, online lending, neo banking.
- To study the trends and preferences of consumers in using Fintech services versus conventional banking services.

- To determine the challenges that traditional banks face with the uprise of Fintech platforms.
- To assess customer satisfaction with the services of Fintech compared to traditional banking services.

Secondary Objectives

- Research on the overall growth, trends, and evolution of India's Fintech Industry.
- To determine and analyze how the government's initiatives and support in the form of regulatory policies shape the Fintech ecosystem, based on RBI guidelines.
- Review potential partnerships between Fintech and traditional banks.
- To explore the effect of digital transformation on financial inclusion and rural outreach.

1.4 Research Questions

- How does Fintech Influence Customer Behaviour in India?
- What are the major impacts of Fintech on banking operations?
- Are banks collaborating or competing with Fintech firms?

Hypothesis

H1: Fintech significantly enhances the efficiency and customer experience regarding financial services in India.

H0: Fintech has no effect on customer satisfaction and efficiency of traditional banks.

1.5 Scope of Study

This research is focused on how FinTech has been affecting the banking industry. The study also investigates how FinTech improves service quality and benefits users. The study covers various attractive products of FinTech, along with speed, convenience, and simplicity brought in by it in financial services.

1.6 Scope and Limitations

Scope

- Fintech Innovations occurring in or related to India. For instance; UPI payment systems, digital wallets, digital lending platforms.
- Both primary and secondary data are considered.
- Defines the scope of customers.

Limitations

- Small sample size for primary data.
- Rapid changes in technology are causing fluctua9ng results.
- Results may not be generalizable to rural areas.

2. Literature Review

2.1 Review of relevant studies – The impact of financial technology (FinTech) on traditional banking in India has been transformative

(Shiv Kumar, 28 Apr 2025) – Fintech has transformed traditional banking in India by streamlining operations, enhancing consumer experiences, and improving accessibility. It has enabled financial services to reach rural locations, building a more inclusive and sustainable financial ecosystem through digital solutions and innovative technologies.

(Keerthi Saboo, 18 Jun 2025) – FinTech is changing the way banking works in India by making financial services faster, easier, and more affordable for everyone. Because of this rapid growth, traditional banks are now pushed to go digital, upgrade their systems, and work closely with FinTech companies. While they face challenges like adapting to new regulations and keeping customer data safe, this shift also opens the door to new ideas, smarter technologies, and better overall customer experiences.

(Negi, 18 Jun 2025) – FinTech innovations in India—like UPI and digital wallets—are changing how people manage and spend their money. More customers now prefer quick, cashless transactions over visiting traditional banks. Since many users find FinTech apps safer, simpler, and more convenient, they're gradually moving away from traditional banking methods and choosing digital platforms instead.

(T. Vara Lakshmi, 31 May 2024) – FinTech innovations are transforming traditional banking in India by making services faster, reducing costs, and making finance more accessible to everyone. As more people turn to digital solutions, banks are being pushed to upgrade their systems, improve their services, and match the new expectations of today's tech-savvy customers. To stay competitive, traditional banks now have to adapt, innovate, and offer a better overall experience.

3. Research Methodology

3.1 Research Design

This study uses both descriptive and analytical research methods:

- The descriptive part helps explain the current trends in how people are adopting FinTech.
- The analytical part digs deeper to understand how FinTech is influencing traditional banking activities like payments, customer service, lending, and day-to-day operations.

3.2 Data Collection Method

a. Primary Data

Primary data will be gathered through:

- Structured questionnaires
- Google Forms surveys

b. Secondary Data

Collected from reliable published sources such as:

- RBI annual reports
- Research papers, journals, and articles
- Bank websites and financial reports

3.3 Sampling Method

- **Sampling Technique:** Convenience sampling / Purposive sampling
- **Sample Size:** 35-50 respondents (students, working professionals, bank users)
- **Population:** Individuals who use any form of FinTech services (UPI, wallets, mobile banking).

4. Discussion

4.1 Summary of Discussion

The study clearly shows that FinTech has brought a major transformation to traditional banking in India. Customers are increasingly moving away from visiting bank branches and are instead relying on digital platforms such as UPI, mobile wallets, and mobile banking apps for their daily financial needs. This shift is mainly because FinTech services are faster, more convenient, available at all times, and involve lower transaction costs, making them more attractive to users.

The findings also reveal that digital transactions and digital-based revenues have grown significantly, especially after 2016. However, during the initial phase of digital transformation, traditional banks faced a short-term decline in profitability indicators like Return on Assets (ROA) and Return on Equity (ROE). This was largely due to heavy investments in technology, higher operational expenses, and a reduction in income from traditional fee-based services.

4.2. Comparison with Existing Literature

The findings of this study are in line with earlier research on the impact of FinTech on the Indian banking sector. Previous studies by Shiv Kumar (2025) and Keerthi Saboo (2025) emphasized that FinTech improves efficiency, accessibility, and overall customer experience. This supports the current study's observation of increasing digital transaction volumes and a strong customer preference for digital banking services.

Similarly, research by Negi (2025) and T. Vara Lakshmi (2024) pointed out that the growing adoption of FinTech has compelled traditional banks to modernize their systems and rethink their existing business models. The decline in profitability seen after 2016 in this study reflects this transition phase and aligns with Christensen's Disruptive Innovation Theory, which explains how established organizations often experience short-term performance challenges when faced with disruptive technological changes.

4.3 Implications of Findings

Implications for Banks

The findings indicate that traditional banks should not see FinTech as a threat, but rather as an opportunity to transform and strengthen their operations. Instead of limiting themselves to basic digital services, banks need to focus on effectively monetizing their digital platforms, enhancing customer engagement, and improving operational efficiency. Partnering with FinTech companies can enable banks to adopt innovative technologies more quickly, while still benefiting from the trust, scale, and regulatory experience that established banks possess.

Implications for Policymakers and Regulators

For policymakers and regulators such as the Reserve Bank of India (RBI), the results highlight the importance of encouraging innovation while maintaining a secure and stable financial system. Regulations should strike a balance between supporting technological

advancement and ensuring data security, consumer protection, and financial stability. Well-designed regulatory frameworks can promote innovation without weakening public confidence in the banking system.

Implications for Customers

From the customer's perspective, the growing adoption of FinTech has made financial services faster, more accessible, and more convenient. At the same time, increased digitalization brings concerns related to cybersecurity and data privacy. Addressing these risks proactively is essential to maintain customer trust and ensure the safe and sustainable growth of digital financial services.

4.4. Limitations of the Study

While the study offers useful insights, it also has a few limitations that should be acknowledged. The primary data was collected from a relatively small sample, which may limit the extent to which the findings can be applied to the wider population. In addition, most respondents were from urban and semi-urban areas, meaning that the adoption patterns and challenges faced by rural users may not be fully captured in this study.

Moreover, FinTech is a fast-evolving sector, and ongoing technological developments or changes in regulatory policies could influence the relevance of the findings over time. The study also concentrates mainly on the banking sector and does not explore other areas of financial services such as insurance, investment, or wealth management in detail. Recognizing these limitations provides scope for further research and helps place the findings in the right context.

5. Conclusion and Recommendations

5.1 Conclusion

The study concludes that Financial Technology has fundamentally transformed the traditional banking landscape in India. Innovations such as UPI, digital wallets, and mobile banking applications have reshaped customer expectations and transaction habits, encouraging banks to adopt digital-first approaches. Although many banks experienced short-term profitability challenges during the initial phase of this transition, digital adoption has emerged as a crucial factor in driving long-term efficiency and sustainable revenue growth.

The findings clearly indicate that FinTech enhances service efficiency and improves customer satisfaction, thereby supporting the alternative hypothesis (H1). Traditional banks that are able to successfully integrate digital revenue models while effectively managing operational costs are better equipped to remain competitive in an increasingly dynamic financial environment.

Overall, the study highlights that FinTech is not replacing traditional banks; instead, it is reshaping them into hybrid institutions that combine technological innovation with the trust and stability of conventional banking systems.

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UPI Fraud Detection using Machine Learning Model

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Abstract

In recent years, the UPI system has changed how people in India make everyday payments, from buying small items like groceries to sending big amounts of money. This convenience has made more people use digital payments, but it has also given fraudsters new chances to cheat. Many users get tricked by scams like fake payment requests, fake messages, and calls pretending to be from real banks, especially when they're doing normal-looking transactions. Most banks still use old ways to catch fraud, based on fixed rules. These methods aren't efficient enough when fraud gets more clever or changes over time. This paper talks about using machine learning to spot fraudulent UPI transactions as they happen. Instead of just using set rules, this method looks at how users behave during transactions to find unusual actions. Each transaction gets a risk probability percentage. The proposed framework evaluates Machine learning models such as Logistic Regression, Decision Tree, and Random Forest to classify UPI transactions and identify potentially fraudulent activities based on transaction Behaviour. The study suggests that, using behaviour-based fraud detection can make payments safer, stop more money from being lost, and make users more trustful of digital payment systems.

***Keywords**: Behaviour-Based Fraud Detection, Random Forest, Logistic Regression, Decision Tree, RBI Regulations*

Introduction

Digital payment systems have become an integral part of everyday life in India, with the Unified Payments Interface (UPI) playing a major role in enabling fast and convenient money transfers. UPI allows users to send and receive money instantly using mobile applications, making it widely popular for both small daily payments and large financial

transactions. While this growth has improved financial accessibility and convenience, it has also led to a rise in digital payment frauds. UPI-related frauds commonly occur through phishing messages, fake collect requests, impersonation calls, and deceptive links that trick users into authorizing payments unknowingly. In most cases, these fraudulent transactions appear normal in the system because they are carried out using valid credentials such as UPI PINs. As a result, detecting such frauds in real time becomes challenging for banks. Currently, many banks rely on traditional rule-based fraud detection systems that use predefined conditions such as transaction limits, unusual timing, or blacklisted accounts. Although these systems are useful for identifying known fraud patterns, they are not effective in handling new and evolving fraud techniques. Fraudsters continuously change their methods to bypass fixed rules, leading to delayed detection and financial losses for users.

To address these challenges, machine learning has emerged as a promising solution for fraud detection. Machine learning models can analyze large volumes of transaction data, learn user behaviour patterns, and identify abnormal activities in real time. By focusing on behaviour-based analysis rather than fixed rules, machine learning enables early detection of suspicious transactions and enhances the security of digital payment systems. This study explores the use of machine learning techniques for detecting fraudulent UPI transactions and improving trust in digital payment platforms.

Literature Review

Several studies have been carried out in the area of digital payment fraud detection, especially with the rapid growth of online and mobile-based transactions. Earlier research mainly focused on traditional rule based systems, where predefined rules such as transaction limits, time restrictions, or blacklisted accounts were used to identify suspicious activities. While these approaches helped in detecting known fraud patterns, many researchers pointed out that such systems were rigid and failed to respond effectively to new and evolving fraud techniques. With the increase in computational power and availability of transaction data, researchers gradually shifted their focus toward machine learning-based fraud detection methods. Many studies have shown that machine learning models are better suited for handling complex and dynamic fraud patterns compared to fixed-rule systems. Techniques such as Logistic Regression and Decision Trees have been widely used to classify transactions as genuine or fraudulent based on transaction attributes like amount, frequency, and location.

These models are appreciated for their simplicity and interpretability, especially in the banking sector where transparency is important.

More recent research highlights the effectiveness of ensemble models such as Random Forest, which combine multiple decision trees to improve detection accuracy and reduce false alerts. Some studies also emphasize behaviour-based analysis, where user transaction patterns are monitored over time to identify abnormal activities. This approach is particularly useful in UPI fraud cases, where transactions often appear legitimate because they are authorized using valid credentials.

In the Indian context, existing literature also discusses the role of regulatory bodies in strengthening digital payment security. Reports and studies highlight the need for banks to adopt advanced analytical tools while complying with guidelines issued by the Reserve Bank of India. Overall, previous research indicates that machine learning-based, behaviour-driven fraud detection systems offer a more effective and adaptive solution for securing digital payment platforms like UPI.

Methodology

The study uses a publicly available transaction dataset obtained from Kaggle, which simulates real-world digital payment behaviour similar to UPI transactions. The dataset contains approximately 63 lakh (6.3 million) transaction records with 11 attributes, making it suitable for large-scale fraud detection analysis. Each record represents a single transaction, allowing the study of both normal and fraudulent payment behaviour over time. The dataset includes a step attribute, where each step represents one hour of transaction time, enabling temporal analysis of user behaviour. Transaction-related attributes such as type of transaction and amount provide information about the nature and value of payments.

Dataset Split

Training Set - 80%

Testing Set - 20%

Account balance details are captured through old balance and new balance fields for both the sender (origin) and the receiver (destination), which help in identifying abnormal balance changes commonly associated with fraudulent activity. Fraud labels are provided

through the *isFraud* and *isFlaggedFraud* attributes, allowing supervised machine learning models to distinguish between genuine and fraudulent transactions. During preprocessing, irrelevant or non-contributing columns are removed, duplicate records are checked, and data consistency is ensured. The large size of the dataset supports behaviour-based feature extraction and improves the reliability of machine learning model evaluation. The process involves data preprocessing, feature engineering, model training, and evaluation to identify suspicious transaction behaviour.

Table 1: Dataset Attributes Description

Column Name	Description
Step	Time step of the transaction (1 step = 1 hour)
Type	Type of transaction (PAYMENT, TRANSFER, etc.)
Amount	Amount involved in the transaction
nameOrig	Sender account identifier
oldbalanceOrig	Sender's balance before transaction
newbalanceOrig	Sender's balance after transaction
nameDest	Receiver account identifier
oldbalanceDest	Receiver's balance before transaction
newbalanceDest	Receiver's balance after transaction
isFraud	Indicates whether the transaction is fraudulent
isFlaggedFraud	Indicates whether the transaction is flagged by the system

The study begins with data *understanding and preparation.* A transaction dataset representing digital payment behaviour is used to simulate UPI transactions. The dataset is examined for its size, structure, and data types. Irrelevant columns that do not contribute to fraud detection are removed, and duplicate records are checked to ensure data quality. Missing values are also verified to avoid inconsistencies during model training. Next, *feature engineering* is performed to capture behavioural patterns associated with fraudulent transactions. Transaction time features are created by extracting the hour of each transaction and identifying high-risk time periods, such as late-night transactions. Transaction amount features are generated by comparing the transaction amount with the sender's available

balance, as unusually high amounts may indicate suspicious activity. Balance difference features are also computed by analysing changes between old and new balances of both sender and receiver accounts, since fraudulent transactions often show abnormal balance updates. In addition, checks for unexpected zero balances are included, as fraudsters may use newly created or empty accounts to receive funds.

Table 2: Behaviour-Based Features Used

Feature Name	Description	Reason for Inclusion
Transaction Time	Hour derived from step	Fraud often occurs at unusual hours
Amount-to-Balance Ratio	Amount compared to sender balance	High ratios indicate risk
Balance Difference (Sender)	oldbalanceOrg − newbalanceOrig	Abnormal balance changes indicate fraud
Balance Difference (Receiver)	newbalanceDest − oldbalanceDest	Detects suspicious fund reception

Categorical variables such as transaction type are then converted into *numerical* form using encoding techniques, making them suitable for machine learning models. After feature engineering and encoding, unnecessary columns are dropped, and the final dataset is prepared for model training.

The dataset is split into *training and testing sets* to evaluate model performance. Feature scaling is applied to normalize numerical values and improve model efficiency. Machine learning models such as *Logistic Regression, Decision Tree, and Random Forest* are used to classify transactions as genuine or fraudulent. Logistic Regression estimates the probability of fraud based on transaction features, Decision Tree helps in understanding decision paths, and Random Forest improves prediction accuracy by combining multiple decision trees. The trained models analyse transaction behaviour and generate predictions on the test dataset. Based on the predicted outcomes, transactions are classified as normal or suspicious. This methodology demonstrates how behaviour-based machine learning techniques can effectively detect fraudulent digital payment transactions while aligning with regulatory expectations in the banking sector.

Research Objective

This study aims to understand the working of UPI-based digital payment transactions and identify common fraud patterns related to user behaviour. It focuses on preparing transaction data by removing irrelevant features, handling duplicate records, and ensuring overall data consistency. The study also involves designing and extracting behaviour-based features such as transaction time, transaction amount, and balance differences to support effective fraud detection. Machine learning models including Logistic Regression, Decision Tree, and Random Forest are applied to classify transactions as genuine or fraudulent. Further, the effectiveness of behaviour-based machine learning techniques in detecting fraudulent digital payment transactions is evaluated. The study also demonstrates how machine learning can support real-time fraud detection while aligning with regulatory requirements in the banking system.

Result

The proposed machine learning–based fraud detection framework produces effective results in identifying fraudulent digital payment transactions. After preprocessing and feature engineering, the dataset is used to train and evaluate multiple machine learning models, including Logistic Regression, Decision Tree, and Random Forest. The results are analysed based on accuracy, fraud detection capability, and false alert reduction. The experimental results show that traditional rule-based approaches perform relatively poorly when compared to machine learning models, especially in handling dynamic and behaviour-based fraud patterns. Logistic Regression provides stable and interpretable results by estimating the probability of a transaction being fraudulent based on transaction features such as amount, time step, and balance differences.

Table 3: Model Performance Comparison

Model	Accuracy (%)	Fraud Detection Rate (%)	False Alert Rate (%)
Logistic Regression	85	80	14
Decision Tree	88	83	12
Random Forest	92	89	8

Decision Tree models help in understanding decision paths but show moderate performance due to overfitting in some cases. Random Forest achieves the best overall performance among the evaluated models. By combining multiple decision trees, it improves classification accuracy and effectively captures complex fraud patterns present in transaction behaviour. The model also reduces false positives, which is important to avoid blocking genuine user transactions.

The results Indicate that behaviour-based machine learning models significantly improve fraud detection performance compared to traditional systems. The use of transaction time, amount, and balance-based features plays a key role in identifying abnormal activities. Overall, the findings confirm that machine learning techniques, particularly ensemble models such as Random Forest, enhance the effectiveness of real-time fraud detection in digital payment systems.

Discussion

The results of this study show that machine learning–based fraud detection performs better than traditional rule-based approaches in identifying fraudulent digital payment transactions. Rule-based systems rely on fixed conditions and are limited in handling new and evolving fraud techniques. In contrast, machine learning models analyse transaction behaviour and adapt to changing patterns, making them more suitable for real-time fraud detection.

Among the evaluated models, Logistic Regression provides consistent and interpretable results. It effectively estimates the probability of fraud using transaction-related features such as amount, time step, and balance changes. This makes it suitable as a baseline model, especially in regulated environments where transparency and explainability are important. However, its performance is limited when dealing with complex and non-linear fraud patterns. Decision Tree models help in understanding how different transaction features contribute to fraud detection through clear decision paths. While this improves interpretability, the model shows moderate performance due to its tendency to overfit the training data. This highlights the need for more robust models when handling large and diverse transaction datasets. Random Forest demonstrates the best overall performance by combining multiple decision trees to improve accuracy and reduce false alerts. Its ability to capture complex relationships between transaction features allows it to detect subtle fraud patterns that simpler models may miss. The reduction in false positives is particularly important, as it helps avoid unnecessary blocking of genuine user transactions.

Overall, the discussion indicates that behaviour-based feature engineering plays a crucial role in improving fraud detection outcomes. Features related to transaction timing, amount, and balance changes significantly contribute to identifying abnormal activities. While the proposed framework shows strong performance, its effectiveness depends on data quality and continuous model updates. Future improvements may focus on incorporating real-time transaction streams and enhancing model adaptability to emerging fraud techniques.

Conclusion

This study demonstrates that machine learning techniques provide an effective approach for detecting fraudulent digital payment transactions in UPI-like systems. As digital payments continue to grow, traditional rule-based fraud detection methods show limitations in identifying new and evolving fraud patterns. The findings of this study highlight the need for behaviour-based analysis to enhance fraud detection accuracy. By using a publicly available Kaggle dataset and applying machine learning models such as Logistic Regression, Decision Tree, and Random Forest, the proposed framework successfully identifies suspicious transaction behaviour. Feature engineering based on transaction time, amount, and balance changes plays a significant role in improving model performance. Among the evaluated models, Random Forest achieves the best results due to its ability to handle complex fraud patterns and reduce false alerts.

Overall, the study concludes that integrating machine learning–based fraud detection with existing digital payment systems can improve security, reduce financial losses, and strengthen user trust. The proposed approach also aligns with regulatory requirements and can support banks in enhancing real-time fraud monitoring. Future work may focus on applying the framework to real-time transaction data and further improving detection accuracy as fraud techniques continue to evolve.

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AI Based Continuous Biometric Authentication for Secure and Seamless Digital Banking Transaction

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Abstract

The rapid advancement of Artificial Intelligence (AI) has significantly transformed digital banking security through the adoption of continuous biometric authentication systems. This study examines the role, effectiveness, challenges, and user acceptance of AI-based continuous biometric authentication in digital banking platforms. The objectives include analyzing the role of AI in biometric security, evaluating its effectiveness in preventing unauthorized access and fraud, assessing user perceptions across demographic variables, and determining the influence of trust-enhancing features on the adoption of AI-based systems over traditional authentication methods such as passwords and one-time passwords (OTPs). Primary data were collected from 108 respondents using a structured questionnaire and analyzed using SPSS. Statistical techniques including Independent t-test, One-way ANOVA, Chi-square test, and Pearson correlation were employed. The findings indicate that gender and age do not significantly influence perceptions of AI-based authentication systems, while demographic variables show a significant association with user opinions. A moderate positive correlation was identified between trust-related factors—accuracy, privacy, and transparency—and users' willingness to adopt continuous biometric authentication. The study concludes that AI-based continuous biometric authentication is perceived as a reliable and effective solution for enhancing digital banking security, emphasizing the need for robust data protection, regulatory compliance, and increased user awareness to promote widespread adoption.

***Keywords**: Artificial Intelligence, Biometric Authentication, Transparency, Security Technologies, Banking Transactions.*

Introduction

The rapid evolution of digital banking has transformed the way individuals and organizations conduct financial transactions, providing unprecedented convenience, speed, and accessibility. However, this digital shift has also exposed banking systems to sophisticated

cyber threats, including identity theft, account takeovers, phishing attacks, and unauthorized access. Traditional security mechanisms such as passwords, PINs, and one-time passwords (OTPs) are increasingly proving insufficient, as they can be forgotten, stolen, intercepted, or bypassed by attackers. In response to these challenges, biometric authentication has emerged as a more secure and user-friendly alternative, leveraging unique physiological and behavioral characteristics such as fingerprints, facial features, voice patterns, typing rhythms, and gait to verify user identity.

While static biometric systems, which authenticate users only at the point of login, significantly enhance security, they still remain susceptible to spoofing attacks and session hijacking. To address these limitations, **AI-based continuous biometric authentication** has gained prominence as a robust solution. This approach utilizes artificial intelligence and machine learning algorithms to continuously monitor and analyze users' biometric and behavioral patterns throughout a banking session, ensuring that the legitimate user remains actively present. Unlike traditional one-time verification methods, continuous authentication provides real-time detection of anomalies or unauthorized access, enhancing both security and trust in digital banking platforms.

Artificial Intelligence plays a pivotal role in improving the accuracy, adaptability, and resilience of biometric systems. Deep learning models such as Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and reinforcement learning techniques enable systems to learn and differentiate between genuine user behavior and potential threats with high precision. These AI-driven systems can also adapt to natural variations in user behavior, environmental conditions, and evolving cyberattack strategies. Furthermore, multimodal biometric systems, which integrate multiple biometric traits, offer enhanced reliability by compensating for the limitations of single biometric inputs.

Despite its potential, the implementation of AI-based continuous biometric authentication in digital banking presents notable challenges, including privacy concerns, computational complexity, data security, and regulatory compliance. Ensuring user acceptance and balancing between seamless user experience and stringent security measures also remain critical considerations. Therefore, this research aims to explore the effectiveness, technical frameworks, challenges, and future prospects of AI-based continuous biometric authentication in achieving secure and seamless digital banking transactions.

Literature Review

Mondal and Bours (2017) explored the concept of continuous biometric authentication using keystroke dynamics in online systems. The study aims to identify whether user identity can be verified continuously rather than only at login. Their work reveals that behavioral biometrics can significantly enhance session security by detecting intruders in real time. The study concludes that continuous authentication provides higher protection than traditional static methods.

Raghavendra and Busch (2019) examined AI-driven fingerprint and facial recognition technologies in banking authentication. The research tries to demonstrate how deep learning models help reduce false acceptance rates and improve spoofing detection. It also highlights the need for secure storage of biometric data and discusses challenges related to privacy and ethical concerns. The study concludes that AI-based biometrics is more robust than conventional security methods.

Jain et al. (2020) focused on the adoption of biometric authentication in mobile and digital banking platforms. The study tries to highlight how biometric traits like fingerprints and facial recognition provide convenience and higher security compared to passwords and OTPs. However, it also discusses limitations such as device dependency, environmental variation, and privacy concerns. The study concludes that AI integration is essential to improve adaptability and reduce errors in biometric systems.

Kumari and Singh (2021) investigated multimodal biometric authentication and its integration with machine learning in financial institutions. The study tries to explain how combining fingerprint, face, and voice recognition improves reliability and reduces the risk of spoofing or identity theft. It also reveals that AI fusion techniques enhance decision-making accuracy in authentication. The study concludes that multimodal AI-based systems are more secure than single-mode biometric methods.

Zhao et al. (2022) tried to evaluate the effectiveness of deep learning models such as CNNs and RNNs in continuous biometric authentication systems. The study reveals that AI significantly improves accuracy in facial, voice, and gait recognition by analyzing patterns in real time. The research also emphasizes the ability of AI to detect anomalies and cyber intrusions during ongoing sessions. It concludes that continuous AI-based authentication can enhance user trust and security in digital banking.

Research Gap

- Most existing studies focus on static biometric systems, with limited emphasis on AI-powered continuous authentication in real-time banking environments.
- There is a lack of comprehensive research on integrating multimodal AI-driven biometric authentication specifically for digital banking.
- Few studies address the balance between security and user experience in continuous biometric monitoring.
- Limited empirical research exists on cyber-attack detection (e.g., spoofing, deepfake attacks) using AI in continuous biometric systems.

Objectives of the Study

1. To analyze the role of Artificial Intelligence in enabling continuous biometric authentication for digital banking security.
2. To evaluate the effectiveness of continuous biometric systems in preventing unauthorized access, fraud, and session hijacking.
3. To identify challenges related to privacy, data security, computational cost, and regulatory compliance in implementing AI-based continuous biometric systems.
4. To propose a conceptual framework or model for integrating AI-driven continuous biometric authentication in secure and seamless digital banking transactions.

Research Methodology

The primary data for this study was collected using a structured questionnaire. A total of 107 consumers participated in the survey, and their responses were recorded for analysis. The questionnaire was designed to gather information related to their awareness, perceptions, opinions, and acceptance of AI-based continuous biometric authentication in digital banking. In addition, their recommendations and concerns regarding privacy, security, and ease of use were also taken into consideration. The data obtained from these respondents forms a crucial part of the study and has been used to analyze consumer readiness, trust levels, and potential challenges in implementing this technology.

Analysis & Interpretation

1. Independent T-Test: Gender and Role Perception of AI-Based Authentication

Hypotheses: H_0 (Null Hypothesis): There is no significant difference in role perception scores between male and female respondents.

H_1 (Alternative Hypothesis): There is a significant difference in role perception scores between male and female respondents.

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
ROLE_ TOTAL	Male	42	18.1905	3.83335	.59150
	Female	66	17.0606	3.37356	.41526

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
ROLE TOTAL	Equal variances assumed	1.133	.290	1.609	106	**.111**	1.12987	.70239	-.26268	2.52242
	Equal variances not assumed			1.563	79.234	.122	1.12987	.72271	-.30858	2.56832

The independent samples t-test was conducted to examine whether role perception differs between male and female respondents. The results showed that the mean role perception score of males (M = 18.19) was slightly higher than that of females (M = 17.06). However, the difference was statistically insignificant (t = 1.609, p = 0.111 > 0.05). Therefore, the null hypothesis is accepted, indicating that gender does not have a significant influence on the respondents' perception of the role of AI-based continuous biometric authentication in digital banking.

Inference (Based on Sig. = 0.111) : Since the p-value (0.111) is greater than 0.05, we fail to reject the null hypothesis. The null hypothesis is accepted. This indicates that gender does not significantly influence how individuals perceive the role of AI-based continuous biometric authentication in digital banking.

2. One-Way ANOVA: Age and Perceived Effectiveness of AI-Based Biometric Systems

Hypotheses:

H_0: There is no significant difference in effectiveness scores among different age groups.

H_1: At least one age group has a significantly different mean effectiveness score.

Descriptives

EFF_TOTAL

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
18-25	70	16.9714	4.33714	.51839	15.9373	18.0056	7.00	25.00
26-35	24	16.8333	3.79550	.77475	15.2306	18.4360	10.00	23.00
36-45	10	15.6000	2.17051	.68638	14.0473	17.1527	12.00	18.00
Above 45	4	12.5000	1.73205	.86603	9.7439	15.2561	11.00	14.00
Total	108	16.6481	4.06562	.39121	15.8726	17.4237	7.00	25.00

ANOVA

EFF_TOTAL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	87.953	3	29.318	1.814	**.149**
Within Groups	1680.676	104	16.160		
Total	1768.630	107			

A one-way ANOVA test was employed to determine whether perceived effectiveness of continuous biometric authentication varies among different age groups. The analysis revealed no statistically significant difference in effectiveness scores across age groups ($F = 1.814$, $p = 0.149 > 0.05$). Thus, the null hypothesis is accepted, suggesting that respondents

from different age categories share similar views regarding the effectiveness of AI-driven continuous biometric authentication systems.

Inference (Based on Sig. = 0.149). Since the p-value (0.149) is greater than 0.05, we fail to reject the null hypothesis. The null hypothesis is accepted. This implies that respondents across all age groups hold similar opinions regarding the effectiveness of continuous biometric authentication technology.

3. Chi-Square Test: Association Between Demographic Factors and Opinions on AI Authentication.

Hypotheses:

H_0: There is no significant association between the two categorical variables.

H_1: There is a significant association between the two categorical variables.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	84.626[a]	15	**.001**
Likelihood Ratio	92.339	15	.000
Linear-by-Linear Association	1.311	1	.252
N of Valid Cases	108		

A chi-square test was performed to assess the association between demographic factors and opinions related to AI-based continuous biometric authentication. The results demonstrated a significant association ($\chi^2 = 84.626$, $p = 0.001 < 0.05$), leading to the rejection of the null hypothesis. This indicates that respondents' opinions on biometric authentication are significantly dependent on certain demographic or categorical variables such as education, occupation and monthly income. Hence, demographic factors play an important role in shaping perceptions towards AI-based security systems.

Inference (Based on Pearson Chi-Square Sig. = 0.001). Since the p-value (0.001) is less than 0.05, we reject the null hypothesis. The null hypothesis is rejected. This suggests that respondents' opinions toward AI-based biometric authentication are significantly influenced by demographic factors such as age, qualification, or occupation.

4. Correlation Analysis – Pearson Correlation: Trust Features and Acceptance of Replacing Traditional Methods

Hypotheses:

H_0: There is no significant relationship between trust features and the acceptance of replacing traditional methods

H_1: There is a significant relationship between trust features and the acceptance of replacing traditional methods.

Correlations			
		What features would make you trust such a system more.	Do you think AI-based continuous biometric authentication should replace traditional methods (passwords, OTPs).
20. What features would make you trust such a system more?	Pearson Correlation	1	.392**
	Sig. (2-tailed)		**.001**
	N	108	108
21. Do you think AI-based continuous biometric authentication should replace traditional methods (passwords, OTPs)?	Pearson Correlation	.392**	1
	Sig. (2-tailed)	.000	
	N	108	108
**. Correlation is significant at the 0.01 level (2-tailed).			

Pearson correlation analysis was conducted to explore the relationship between trust-building features of AI-based biometric systems and respondents' willingness to replace traditional authentication methods (passwords/OTPs). The correlation coefficient ($r = 0.392$, $p = 0.001 < 0.05$) indicates a moderate positive and statistically significant relationship. Therefore, the null hypothesis is rejected. This implies that as trust-enhancing features (such as privacy, accuracy, transparency) increase, respondents are more likely to support replacing traditional methods with AI-based continuous biometric authentication.

Inference (Based on r = 0.392, Sig. = 0.001): Since the p-value (0.001) is less than 0.05, we reject the null hypothesis. The null hypothesis is rejected. This means that the more a system possesses trust-enhancing features, the more likely respondents are to prefer it over traditional authentication methods.

Findings of the Study

Based on the analysis and interpretation of the data, the following major findings were derived:

1. **Role of AI-based Continuous Biometric Authentication**
   - Respondents generally agree that AI plays a significant role in enhancing digital banking security through continuous biometric authentication.
   - There is no significant difference in role perception between male and female respondents, indicating uniform awareness across genders.
2. **Effectiveness of Continuous Biometric Authentication**
   - The perception of effectiveness remains consistent across different age groups.
   - This suggests that users, irrespective of age, recognize the capability of AI-based biometric systems to prevent fraud, unauthorized access, and session hijacking.
3. **Association Between Demographic Variables and Opinions**
   - Chi-square results revealed a significant association between demographic variables and opinions related to AI authentication.
   - This means factors like education, occupation, or familiarity with technology influence acceptance of AI-based systems.
4. **Trust Features and Acceptance of AI over Traditional Methods**
   - A moderate positive correlation exists between trust-building features (accuracy, privacy, transparency) and acceptance of replacing traditional authentication methods.
   - This implies that when systems ensure data security, reliability, and transparency, users are more willing to adopt them.

Conclusion

AI-based continuous biometric authentication represents a transformative advancement in securing digital banking transactions. Unlike traditional one-time password or static biometric systems, this approach continuously monitors biometric patterns—such as

fingerprint dynamics, facial expressions, voice patterns, typing speed, or mouse movements—throughout the user's session. This enables real-time verification, making it extremely difficult for hackers to bypass or hijack active banking sessions.

The study concludes that the integration of Artificial Intelligence improves the accuracy, adaptability, and efficiency of biometric authentication systems. AI algorithms can learn user-specific behavioral patterns, detect anomalies, and respond instantly to suspicious activities. As a result, the probability of fraud, identity theft, and unauthorized access is significantly reduced, enhancing both security and user confidence.

Moreover, the system provides a seamless and user-friendly experience because it eliminates the need for repeated logins or manual authentication steps during transactions. This creates a balance between convenience and security—both of which are critical in modern digital banking.

However, the research also highlights key challenges. Continuous biometric monitoring raises concerns about data privacy, storage, and ethical usage of sensitive biometric information. High computational requirements, integration costs, and compliance with legal regulations such as GDPR and RBI guidelines are additional barriers to large-scale implementation.

Overall, AI-based continuous biometric authentication has strong potential to become a standard security layer in the future of digital banking. With proper data protection policies, encryption techniques, user consent mechanisms, and regulatory frameworks, this technology can ensure safer, faster, and more trustworthy banking experiences.

Scope for Further Research

- Future studies can focus on comparing different biometric modalities (voice, face, fingerprint, behavior-based AI).
- Research can be extended to rural users, senior citizens, or differently-abled individuals to understand adoption challenges.
- Long-term impact of AI authentication on cybersecurity risks and user behavior can also be explored.

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Key Drivers Influencing Digital Loan Adoption in Nationalised Banking Institution

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Abstract

The rapid digital shift within India's banking industry has made digital lending a critical area of interest, fuelled by the growing preference for convenient and technology-based financial solutions. This paper explores the determinants of digital lending adoption at Nationalised Bank a within the Chennai region, which is still lower than the national trends. The first aim is to examine how Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Information Integrity, Easy Process, and Service Quality affect behavioural Intention and actual User Behaviour among customers. Descriptive research design was employed, with a structured questionnaire being given to 123 respondents. Descriptive statistics and regression analysis were employed to interpret the statistics. These results indicate that Behavioural Intention is strongly affected by Facilitating Conditions, Easy Process, and Service Quality, which lead to effects on User Behaviour. Demographic variables including age, education, income, occupation, and frequency of visit to the bank also exhibit considerable variations in perception among various variables. The analysis recommends the bank should increase awareness, streamline digital operations, improve customer services, utilize high-grade data security, and implement incentive programs to facilitate adoption.

***Keywords**: Digital lending, Banking sector, Digital transformation, Financial services, User behaviour, Digital Adoption.*

I Introduction

India has a diversified financial sector undergoing rapid expansion both in terms of strong growth of existing financial services firms and new entities entering the market. The sector comprises commercial banks, insurance companies, non-banking financial companies,

co-operatives, pension funds, mutual funds and other smaller financial entities. The banking regulator has allowed new entities such as payment banks to be created recently, thereby adding to the type of entities operating in the sector. However, the financial sector in India is predominantly a banking sector with commercial banks accounting for more than 64% of the total assets held by the financial system. The key competitors of Bank of Baroda in the state sector are State bank of India (SBI) - the biggest Indian bank that is highly integrated in technology and has a large retail presence. Punjab National Bank (PNB) - It is another big PSU bank with the same customer base and products. Canara Bank and Union Bank of India - Directly compete in MSME, agricultural and retail sectors.

The main issue of this research is the difference between national and regional rates of digital lending acceptance in Nationalised Bank. Though digital banking solutions are getting more advanced, the digital literacy, trust, perceived risk, perceived convenience, and demographic characteristics also affect the user behaviour. The significance of behavioural intention in forecasting the digital financial use has been noted in previous literature, but little empirical research has been conducted on the topic of digital lending in Indian public-sector banks. Moreover, the literature in the area appears to lack region-specific studies that examine digital adoption patterns with the help of a longer UTAUT framework and the inclusion of information integrity, process convenience, and service quality as the constructs.

This study will address these gaps by examining the factors that determine the adoption of digital lending among the customers of Nationalised Bank in the Chennai area. The research design is quantitative because it involves a long UTAUT model with performance expectancy, effort expectancy, social influence, facilitating conditions, information integrity, easy process, and service quality. Behavioural intention and user behaviour are considered as the mediating and outcome variables respectively.

II. Literature Review

Technology acceptance models like TAM, TPB and UTAUT have been used more than any other model in research studies of digital banking adoption in attempts to understand user behaviour. The digital adoption of banking has been extensively validated as the performance expectancy, effort expectancy, and facilitating conditions.

As it was proved by Rashid et al. (2025), the perceived usefulness and the ability to facilitate it are the main factors that contribute to the adoption of digital banking by youth. According to Salsabila et al. (2024), social influence and habit are significant predictors of the intention to use digital banks in Indonesia. As Chen et al. (2023) emphasized, trust and perceived risk turn out to be the most common predictors of integrating digital payment.

There are fewer studies that specifically deal with digital lending. Asamani and Majumdar (2024) have calculated that perceived value and trust are important in decision-making regarding digital lending, and Wardani et al. (2024) have discovered that performance expectancy and social influence are also contributing to the utilization of online loans in a positive way.

Ambigai et al., (2017) After Demonetization, all the citizens of India are requested to participate in an online transaction. The aim of the research is to learn the attitude of the customer towards online banking via the UTAUT model. The study also assists the bankers in getting to know and serving their customer in a more convenient manner.

Wang et al., (2015) examines how these factors are affecting lending intention. The findings of this research demonstrate that trust is the key determinant of the lending intention; information asymmetry as perceived will have an influence on trust, but will not have a direct effect on the lending intention. The results of this study suggest that online lending and online purchasing have deep differences, and the findings achieved in the conventional e-commerce sector cannot be used in application in the online lending sector without confirmation.

Conceptual Framework

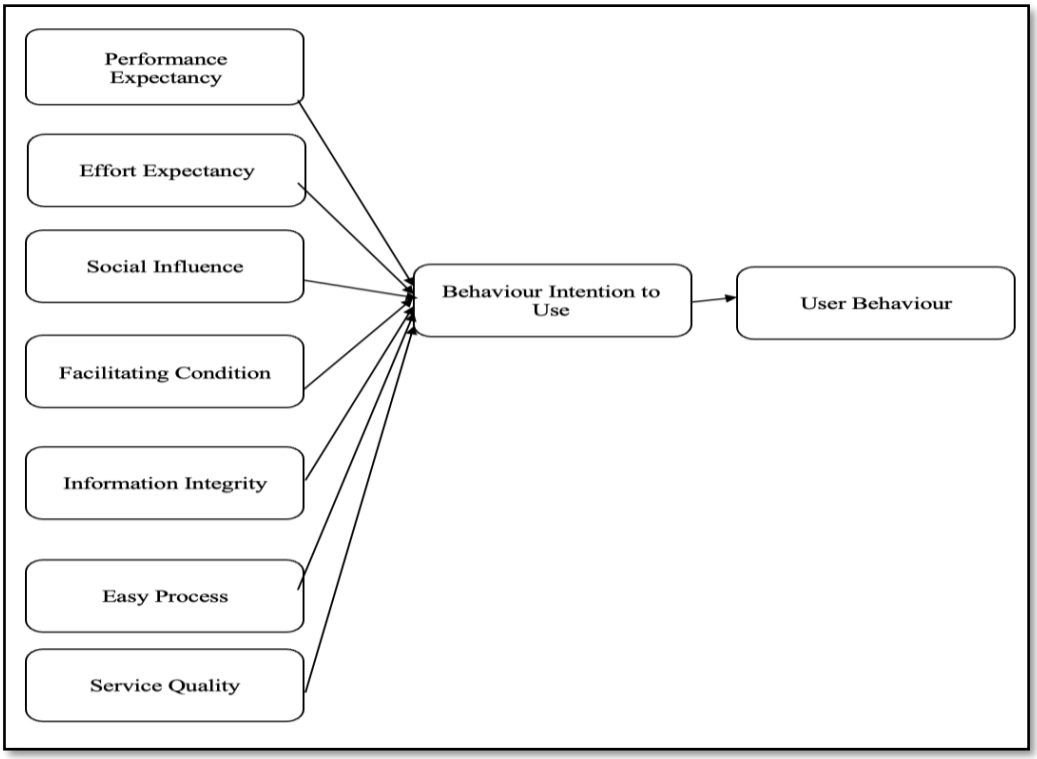
The conceptual model shown in figure 1 has developed based on the extensive literature review gathered from the year 2003 to 2025. The researcher through this paper attempted to examine the determinants of Behaviour Intention to use and its effect on User behaviour of Nationalised bank in Chennai city.

In this research, the common theory is the Extended UTAUT Framework which is based on the Unified Theory of Acceptance and Use of Technology as suggested by Venkatesh et al. (2003). The model combines the aspects of eight existing theories of technology adoption

and has four fundamental determinants: Independent variable: Performance expectancy, Effort expectancy, Social Influence, Facilitating Condition, Information Integrity, Easy Process, Service Quality

Behavioural Intention (BI) is a mediator and User Behaviour (UB) is a dependent variable outcome for variables respectively. These extensions are specifically applicable in digital lending scenarios where trust, transparency and system support have a substantial effect on customer decisions.

Figure 1. Conceptual Model



III Research Methodology

The research design assumed in the study is a quantitative descriptive study, which rationalizes the measurement of perceptions, behavioural intentions, and usage patterns of digital lending among the users in a statistically testable fashion, which is well aligned with the UTAUT framework, which does focus on quantitative relationships between constructs. The data given by primary sources was collected by means of a structured questionnaire consisting of two parts: the demographics (age, gender, education, occupation, income, and frequency of bank visits) and the variables of the study measured on a five-point Likert scale, ranging between strongly disagree and strongly agree.

The survey was conducted among the customer of digital lending services in Nationalised Bank through online. The final sample size of the survey is 123 and non-probability sampling (convenience sampling) technique is followed to choose the samples from the population. The frequency analysis and regression analysis was used to analyse the primary data.

Data analysis was performed in SPSS with the help of the descriptive statistics to inform about demographic profiles and multiple regression analysis to identify the determinants of Behaviour Intention to use and its effect on User behaviour of Nationalised Bank in Chennai city.

IV Analysis and Discussion

The demographic profile of sampled customer is shown in table 1.

Table 1. Demographic Profile of Sampled Customer

Demographic Profile	Particulars	Frequency	Percentage (%)
Gender	Male	69	56.1
	Female	54	43.9
Age (Years)	18–25	20	16.3
	26–35	62	50.4
	36–55	35	28.5
	Above 55	6	4.9
Educational Qualification	School Level	7	5.7
	Diploma	20	16.3
	Undergraduate	50	40.7
	Postgraduate	42	34.1
	Others	4	3.3
Annual Income (₹)	Below 2,50,000	13	10.6
	2,50,001–5,00,000	40	32.5
	5,00,001–10,00,000	47	38.2
	Above 10,00,000	23	18.7

Occupation	Government	14	11.4
	Private	43	35.0
	Business	39	31.7
	Self-employed	21	17.1
	Others	6	4.9
Frequency of Bank Visits	1–3 times	21	17.1
	4–6 times	60	48.8
	7–10 times	26	21.1
	More than 10 times	16	13.0
	Total	**123**	**100.00**

The sample population consisted of mostly the age group of 26-35 years old, undergraduate, and had an annual income of 5-10 lakh. The majority if customers Occupation are Private , the frequency of Bank visits are 4-6 times.

The determinants of Behavioural Intention of customers towards digital lending service was in Chennai city was assessed through multiple regression analysis which is depicted in Table No.2.

Table No. 2 Determinants of Behavioural Intention-using Regression Analysis

Digital lending determinants	**Beta**	**Sig**	**R^2 value**
Performance Expectancy	0.110	.133	0.785
Effort Expectancy	0.056	.417	
Social Influence	0.118	.057	
Facilitating Condition	0.321	.000	
Information Integrity	0.116	.138	
Easy Process	0.326	.000	
Service Quality	0.184	.042	

Table No.2 shows the R square value is 0.785, indicating that 78.5% of the variation in Behaviour Intention to Use is explained by the independent variables, namely Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Information Integrity,

Easy Process, and Service Quality. The beta coefficients show that Facilitating Condition (β = 0.321, Sig = 0.000), Easy Process (β = 0.326, Sig = 0.000) and Service Quality (β = 0.184, Sig = 0.042) have a significant positive impact on Behaviour Intention to Use. Therefore, it can be concluded that Behaviour Intention to Use is determined by Facilitating Condition, Easy Process, and Service Quality, and User Behaviour is determined by Behaviour Intention to Use. The impact of Behavioural Intention on User behaviour towards digital lending service was determined using simple regression analysis which is displayed in Table No.3

Table No. 3 Impact of Behavioural Intention to use on User behaviour

User Behaviour of Digital Lending	Beta	Sig	R value
Behaviour Intention to Use	.808	.000	.653

Table No.3 shows a strong positive relationship between Behaviour Intention to Use and User Behaviour. The R square value is 0.653, which indicates that 65.3% of the variation in User Behaviour is determined by Behaviour Intention to Use. The ANOVA significance value (p = 0.000) shows that the regression model is statistically significant. The Behavioural Intention is a significant predictor of User Behaviour (b=0.808, p<0.001) and this proves the mediation role of UTAUT.

Discussion

The statistical results propose that the most significant determinant of the adoption of digital lending is process simplicity, service responsiveness, and technical support in Chennai. This is in contrast with the previous research that placed more focus on the effort expectancy and performance expectancy (Salsabila, 2024), which presupposes that the users nowadays believe usefulness and ease-of-use to be the minimum requirements of the product. Quality of support and transparency of the systems as well as smooth processes are the things that make the experiences different.

The lack of relevance of the information integrity is against the findings of Chen et al. (2023), who highlighted trust as one of the primary factors of adoption. Nevertheless, the level of trust on the banks of the public sector may be already high, and the role of integrity will be less critical in the situation at Chennai.

The demographic differences correspond to the results provided by Nugraha and Syafaruddin (2023), which stated that age, digital literacy, and professional backgrounds form digital banking behaviour.

Altogether, the extended UTAUT model has high explanatory power in digital lending setting, which proves the necessity to improve the constructs used in the original UTAUT variables.

Theoretical and Practical Implications

The research presents a valuable theoretical contribution as it confirms an extended UTAUT model that is specific to the digital lending setting and proves the change of drivers of adoption focus to the quality of the services and efficiency of the processes instead of the simple presence of the technology. It also supports the behavioural intention as a predictor of actual usage and the moderation effect of demographic factors on the technology adoption. Practically, the results imply that banks are to enhance their digital support infrastructure and technical infrastructure beneath it and streamline digital lending to increase its adoption by the user. The quality of offered services should be also improved by responding quicker and providing more clear and transparent updates and designing specific digital literacy programs to less-educated and older people. Also, user trust can be increased by improved communication and an efficient and reliable system architecture that will ensure the long-term adoption of digital lending services.

V Conclusion

This research has reached the conclusion that the adoption of digital lending in Nationalised Bank is mainly fuelled by the enabling environment, convenience of the process, and quality services, and not the conventional technology acceptance aspects. The intentions to behave play a major role in the actual usage, which proves that the extended UTAUT is relevant. Demographic patterns of adoption also show significant differences in the patterns of adoption, which is why specific digital strategies are necessary. In general, the increase of system support and simplification of digital processes can contribute to the acceptance of digital lending in the public-sector banks to a great extent.

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Awareness of Green Banking among Young Customer

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Abstract

This study examines young consumer's knowledge of "green banking," which refers to banking procedures that promote sustainability and protecting the environment. Young people are crucial because they will have a significant impact on banking in the future They are typically at ease with digital technology and current financial services. It's crucial to find out how much they know about green banking and how eager they are to use sustainable banking products. The study was conducted with 100 young participants selected through convenience sampling. These participants filled out a questionnaire covering five major topics: their use of digital banking services, their personal background, their knowledge of green banking and particular green banking initiatives, and the factors that encourage or discourage them from adopting green banking options. To find trends and patterns in awareness and attitudes, the data was analysed using statistical techniques and programs like SPSS. The results show how young consumers currently perceive and are aware of green banking, highlighting both their knowledge gaps and strengths. The reasons why some young people might be reluctant to use green banking services are also highlighted. These findings show that more education and information is required to increase awareness and encourage more young people to choose eco-friendly banking options. All things considered, the study contributes to a better understanding of young consumer's perspectives on green banking and how to encourage sustainable banking practices going forward.

Keywords: *Green Banking, Awareness, Sustainability, Digital Banking, Perception, Eco-friendly Initiatives, Adoption Readiness*

Introduction

Environmental sustainability has become a significant concern for many industries because of increasing environmental damage and climate change. The banking sector plays a crucial role in supporting sustainable development by adopting environmentally friendly

practices known as green banking. Green banking includes actions like paperless transactions, digital banking services, energy-efficient operations, and funding environmentally friendly projects. These efforts help reduce carbon emissions and encourage eco-friendly behaviour.

Young consumers are a vital group in the banking industry. They frequently use digital financial services and will influence future banking practices. Their comfort with technology makes them more open to green banking initiatives. However, their awareness and understanding of these practices vary. It is important for banks to understand how young consumers view green banking and what factors affect their willingness to use sustainable banking services. This knowledge will help banks create effective awareness and engagement strategies.

Even with the increasing focus on green banking, there is limited research specifically on young consumers' awareness, perception, and readiness to adopt these practices. This study seeks to explore how much young consumers know about green banking, their use of digital banking services, and the motivations and obstacles affecting their adoption. The study's findings should offer valuable insights for banks and policymakers to encourage sustainable banking practices among young consumers.

Literature Review

Rocha et al. (2025) examined green banking awareness among highly educated consumers in Brazil and its relationship with green attitude, trust, and loyalty. The study found that although consumers considered themselves environmentally conscious, many were unaware of the green banking practices followed by their banks. The results showed that green banking awareness significantly influenced trust and loyalty, highlighting the importance of increasing awareness to promote sustainable banking behaviour.

Ganguly et al. (2025) analysed green banking awareness in the Indian context, focusing on consumer perceptions of green banking services offered by public and private sector banks. The study highlighted that green banking practices significantly influence customer's behavioural intention and satisfaction, which in turn affect customer loyalty. The authors emphasized that increased awareness through policy initiatives and institutional efforts is essential for the effective integration of green banking into the financial system.

Tyagi et al. (2024) analysed banking customer's adoption and perception toward green modes of banking using a structural equation modelling approach. The study revealed that although most customers are aware of basic internet banking features, their understanding of advanced green banking services remains limited. The authors identified privacy concerns and lack of trust as major barriers to adoption and emphasized the need for banks to improve awareness and educate customers to encourage long-term acceptance of green banking practices.

Ellahi et al. (2023) examined customer awareness of green banking practices in Pakistan and analysed customers' perceptions and responses to bank's green initiatives. Using Structural Equation Modelling on data collected from 400 respondents, the study found that customers are receptive to green banking practices and are willing to adopt them. The results also revealed that education, along with demographic factors such as age, gender, and occupation, has a significant influence on green banking awareness.

Shah et al. (2023) examined the concept of Green Banking and its role in balancing economic development with environmental protection. Their study highlighted that green banking practices help reduce carbon emissions and promote sustainable and socially responsible investments. Based on a survey of 100 respondents in Ahmedabad, the authors found that people are generally aware of green banking practices; however, banks need to increase awareness through innovative and creative initiatives to enhance societal and environmental benefits.

Research Gap

Prior research on green banking has mostly concentrated on perspectives, behavioural intention, and customer loyalty, with little attention paid to young customers as a separate stakeholder group. The majority of current research focuses on awareness or adoption alone and pays less attention to how digital banking usage, familiarity, motivations, and barriers all work together to influence the adoption of green banking. By analysing young consumer's perceptions and awareness of green banking in Chennai, this study fills this knowledge gap and provides information that banks can use to create engagement and awareness campaigns.

Research Methodology

NO OF RESPONDANTS: 100 Respondents.

METHOD OF DATA COLLECTION: Primary Method- Structured Questionnaire.

TYPE OF SAMPLING: Convenience Sampling.

TOOLS APPLIED: Percentage analysis, Chi-square, Correlation by using SPSS

Objectives

1. To find the demographic profile of respondents.
2. To know association between frequency of mobile/online banking usage and use of e-statements.
3. To examine the relationship between familiarity with green banking and preference for digital banking.

Data Analysis & Data Interpretation

Objective: 1 to find the demographic profile.

Table no: 1

Demographic profile of respondents

Variable	Dominant group	Frequency	Percentage
Age	21-23	56	56
Gender	Female	67	67
Education qualification	UG	46	46
Occupation	Student	47	47

- The demographic profile of the respondents reveals that the majority of the participants belong to the **age group of 21–23 years (56%)**, indicating that the study mainly represents young adults.
- **Female respondents (67%)** constitute a higher proportion of the sample, showing greater participation of women in the survey.
- With respect to educational qualification, **46% of the respondents are undergraduate students**, reflecting that the study largely covers college-going youth.
- In terms of occupation, **47% of the respondents are students**, confirming that the sample predominantly consists of young learners who are potential future users of banking services.

Objective: 2 to know the Association between Frequency of Mobile/Online Banking usage and use of E-Statements.

H_0: There is no significant association between frequency of mobile/online banking usage and use of e-statements.

H_1: There is a significant association between frequency of mobile/online banking usage and use of e-statements.

Table No: 2

Association between Frequency of Mobile/Online Banking usage and use of E - Statements

	χ value	df	p-value
Pearson Chi-square	29.170[a]	6	<.001
Likelihood Ratio	24.423	6	<.001
Linear-by-Linear Association	21.173	1	<.001
N of Valid Cases	100		

A chi-square test was conducted to examine the association between frequency of mobile/online banking usage and the use of e-statements. The Pearson chi-square value was 29.170 with 6 degrees of freedom and a significance value of less than 0.001. Since the p-value is less than 0.05, the null hypothesis is rejected. This indicates a significant association between online banking usage frequency and the adoption of e-statements among respondents.

Objective: 3 to Examine the Relationship between Familiarity with Green Banking and Preference for Digital Banking.

H_0: There is no significant relationship between familiarity with green banking and preference for digital banking.

H_1: There is a significant relationship between familiarity with green banking and preference for digital banking.

Table No: 3

Relationship between Familiarity with Green Banking and Preference of digital banking over traditional banking.

Spearman's rho			
	Correlation Coefficient	1.000	.338**
	Sig. (2-Tailed)		<.001
	N	100	100

Spearman's rank correlation was used to examine the relationship between familiarity with Green Banking and preference for digital banking. The results show a moderate positive and statistically significant correlation ($r_s = 0.338$, $p < 0.001$). **There is a significant relationship** between familiarity with Green Banking and preference for digital banking.

Findings

1. The study reveals that a majority of young consumers actively use mobile and online banking services, indicating high digital engagement among the respondents.
2. The chi-square analysis shows a significant association between frequency of mobile/online banking usage and the use of e-statements, suggesting that frequent digital banking users are more likely to adopt eco-friendly banking practices such as paperless statements.
3. The correlation analysis indicates a moderate and statistically significant positive relationship between familiarity with green banking and preference for digital banking. This implies that as young consumers become more familiar with green banking concepts, their preference for digital banking increases.
4. The findings also suggest that young consumers show a positive attitude toward sustainable banking practices, but lack of adequate information and awareness acts as a barrier to wider adoption of green banking services.

Recommendations

1. Banks should conduct targeted awareness programs for young consumers to improve understanding of green banking concepts and specific initiatives such as e-statements, paperless transactions, and energy-efficient banking operations**.**
2. Banks should include **educational content, notifications, and campaigns** within banking apps to highlight the environmental benefits of green banking practices.
3. Banks should design **incentives and rewards** for customers who adopt green banking practices, encouraging wider participation and long-term behavioural change.

Conclusion

This study aimed to explore young consumers' awareness, perception, and adoption readiness regarding green banking in Chennai, and to understand how digital banking behaviour relates to eco-friendly banking practices. The analysis reveals a significant

association between the frequency of mobile/online banking usage and the adoption of e-statements, suggesting that digitally active youth are more likely to engage in specific green banking behaviours. Furthermore, the moderate positive correlation between familiarity with green banking and preference for digital banking underscores the importance of knowledge in shaping sustainable financial choices.

Despite their strong engagement with digital platforms, young consumers still display gaps in detailed awareness of green banking initiatives, which can limit their full participation in eco-friendly banking options. Motivators such as convenience and technological comfort exist, but they are counterbalanced by barriers like a lack of information and habitual reliance on traditional practices. Overall, the study concludes that enhancing targeted awareness, integrating green communication within digital channels, and addressing perceived obstacles are essential steps for banks and policymakers to promote sustainable banking practices among young consumers and support broader environmental goals.

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Role of Digital Banking in Sustainable Economic Growth: An Assessment

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Abstract

Digital banking has become a transformative force in modern economies by playing catalytic role in economic growth and sustainable development. Innovative banking business models are having a multiplier effect in boosting overall economic output.Although the prior studies recognizediverse pathways through which digital banking fosters sustainable economic growth, comprehensive studies focused on India's experience remain scarce, indicating a need for further investigation. The present study aims to assess the role of digital banking in the sustainable development of the Indian economy. Social sustainability, Environmental sustainability, Economic competitiveness, and Data driven governance and transparency are the parameters considered for sustainable economic development. The study relies on secondary data collected from published reports, and relevant research studies. To analyse the data, the study, employs descriptive statistics to summarize the key variables. Further, correlation analysis to study the strength and directions or the relationship among the variables and regression analysis is used for assessing the impact of selected variables on the outcome variables. The independent variable, digital banking usage indicators, is anticipated to exert a positive influence on the dependent variable, sustainable economic growth indicators. The findings of this study offer valuable insights for policy makers to design targeted interventions that promote sustainable banking practices.

***Keywords**: Digital banking, Sustainable development, Economic growth, Growth indicators, and Business models*

Introduction

Adoption of cutting-edge information technology is one of the most critical developments in global finance in recent years.Financial development using technology

would impacteconomic growth. Banking digital services plays a significant role in economic growth by connecting the deficit and surplus areas of the economy. Digital banking has a crucial role to play in a developing economy like India, where a large population has not been served by formal banking channels. Sustainable economic growth in India can be made possible by digital banking, which is an important factor in this regard.Sustainable economic growth not only includes growth in GDP but also other factors such as financial inclusion, balanced credit access, and micro, small, and medium enterprise development. Digital banking helps promote such factors as it allows smooth payment services, enhances transparency, reduces challenges of information asymmetry, and helps formalize economic activities. For example, digital payment services have helped bring people and MSMEs into the formal financial sector, thus contributing towards achieving sustainable growth.

Review of Literature

The COVID pandemic has necessitated the adoption of technology, especially digital transactions. Adoption of digital transactionshas led to increasing operational pressures and risk among Indonesian Banks. Research investigation explores the influence of digital banking operations on bank's risk-taking behaviour and sustainability reporting practices and finds that digital banking significantly impacts both risk-taking and sustainability reporting in Indonesian banks. (Utami & Septivani 2023). (Banna 2020) examines the role of Digital Financial Inclusion in promoting sustainable economic growth through banking stability in Bangladesh by analysing data from 2011-2018, and finds that Digital Financial Inclusion positively impacts banks stability and economic growth by reducing the operational costs, improving financial intermediation, and contribute to achieving Sustainable Development Goals. Digital banking empowering rural communities, micro credit access, savings mobilization, and insurance services contributing to economic growth were critically analysed and suggest for collaborative efforts among the stakeholders to harness the full potential of digital banking technologies in contributing to sustainable economic development (Mookerjee et al., 2025). The achievement of sustainable development goals and fostering of sustainable economic growth is possible with the help of effective utilization of digital banking services. In Sri Lankan context, distinct obstacles such as perceptive hurdles, inadequate digital literacy, and infrastructural gaps are present hindering the digital banking contribution to sustainable economic growth (Arachchige 2025). Sustainable development is the result of fundamental changes in the context of modern information and communication technology developments. A study on developments in the electronic banking industry

towards sustainable development indicates that technological growth and innovations in banks have increased the speed and quality of operations and services leading to sustainable economic development (Raisi et al., 2020). The banking sub-sector plays a significant role in the financial sector as it connects the deficit and surplus areas of the economy. A comparative analysis of Nigeria and Kenya's digital banking influence on the economic growth were analysed using autoregressive distributed lag model finds an insignificant impact of digital banking on the economic growth (Onwere & Olufem, 2023).

A working paper on influence of financial inclusion on bank stability and sustainable economic development from emerging Asia by analysingdata of 574 banks across seven countries. The analysis reveals significant insights into relationship between Digital Financial Inclusion and bank stability (Banna& Rabiul 2021).(Bassey et al., 2025), examines the role of the digital banking in empowering rural small and medium sized enterprises across Europe, Mideast, and Africa region, emphasizing their contribution to national development through job creation, innovation and economic resilience. The finds that SME's of EMEA region play acrucial in national GDP by driving innovation, creating employment, boosting local production, and fostering economic diversification across both developed and developing economies. (Murrar & Asfout, 2024) explores the relationships among banking development dimensions represented by primary assets and liabilities, bank capital, and economic growth as measured by components of GDP. Banking sector has transformed into a powerful intermediary that empowers savers to secure their finances and generate returns, while simultaneously enabling businesses and individual to access capitals for investment and promoting economic growth in Palestine. Digital Banking Units plays an important role in broadening digital finance to benefit common man and thereby, realising the sustainable goals and guiding economy on the path of sustainability. The descriptive model of research has found that the framework of digital banking through the support of technological advancements supported the economy's sustainable growth without damaging future prospects(Madhu Bala. 2024).(Khan et al., 2016) examines the role of green banking in achieving sustainable development through green banking. The adoption green practices by Islamic banks can achieve sustainable development.(Dassi & Gibson, 2023) investigates theelectronic banking and economic growth in Nigeriausing data from Central Bank if Nigeria statistical bulletin spanning from 1991-2021 and finds that ATM, point if Sale, and mobile banking can fuel gross domestic investment in Nigeria in the short run.

Research Gap

Existing literatures has extensively examined the role of digital banking in enhancing the sustainable economic growth in global settings, there is limited empirical studies examining relationship in the Indian economy. The Indian banking industry has undergone a significant transformation in the recent past years has seen a remarkable transition, leading to the raise of digital banking resulting in massive financial inclusion, credit to various sectors and banking services to unbanked population. Despite the growing importance of digital banking, empirical evidence on its contribution to sustainable economic growth in India remains limited, indicating a significant research gap.

Statement of the Problem

The emergence and rapid growth of digital banks have caused a paradigm shift in the financial services industry with an increase in efficiency and cost-effectiveness in the delivery of banking services. In India, digital financial inclusion, cashless business, and innovations through fintech amounts to initiatives pushing the use of digital banking services forward rapidly. Though digital banks are proved to be an economic development facilitator, their impact or role in sustainable economic development, including efficiency, inclusion, and development, is still unexplored.The absence of empirical evidence on the context-specific impact of digital banking makes it uncertain how significantly the latter impacts the growth of the economy sustainably in the context of the Indian economy.

Objectives the Study

- To understand the pathways of digital banking variables leading to sustainable economic development through existing research.
- To evaluate the performance of thekey variables of digital banking to assess its impact on the sustainable economic development
- To assess the impact of digital banking transactions on sustainable development.

Research Methodology

The study relies on the secondary source of information collected from websites and published reports of Reserve Bank of India, World Bank, Economic Survey, Press Information Bureau GOI and Books, newspapers, Magazines and relevant research studies.To analyse the data, the study uses descriptive statistics to summarize the key variables. Further,

correlation analysis to study the strength and directions or the relationship among the variables and regression analysis is used for assessing the impact of selected variables on the outcome variables. The independent variablesuch as digital transactions, UPI Volume,Digital Banking Index, and Internet Banking Usersis considered to be the digital banking usage indicators and Percentage of GDP growth, Financial Inclusion Index, Green Finance Lending are considered as dependent variables to be the indicators of sustainable economic development for the study.

Limitations of the Study

- Sustainable economic growth is a multidimensional concept. However, the study focuses on the selected indicators, which may not capture all economic, social and environmental dimensions of sustainability.
- The study uses statistical methods like descriptive analysis, correlation, and regression analysis to uncover relations, which might not necessarily prove causality.

Results and Discussions

The study employs UPI transactions, digital payments, and the Digital Payment Index as independent variables to assess their influence on sustainable economic growth. GDP growth, financial inclusion (measured through the Financial Inclusion Index), and MSME digital lending are used as dependent variables to capture the macroeconomic, inclusive, and enterprise-level dimensions of growth.

Table 1

Table showing the volume of UPI, Digital Transactions and Digital payment Index

Year	UPI Volume	Digital transactions Volume in Crores	Digital Payment Index
20-21	223307	437068	270.3
21-22	459561	717769	304.1
22-23	837144	1139382	377.5
23-24	1311295	1644302	418.8
24-25	1858660	2200000	465.33
25-26	5933000	12250	493.22

Source: rbi.org.in

Graph 1

Graph showing the volume of UPI, Digital Transactions and Digital payment Index

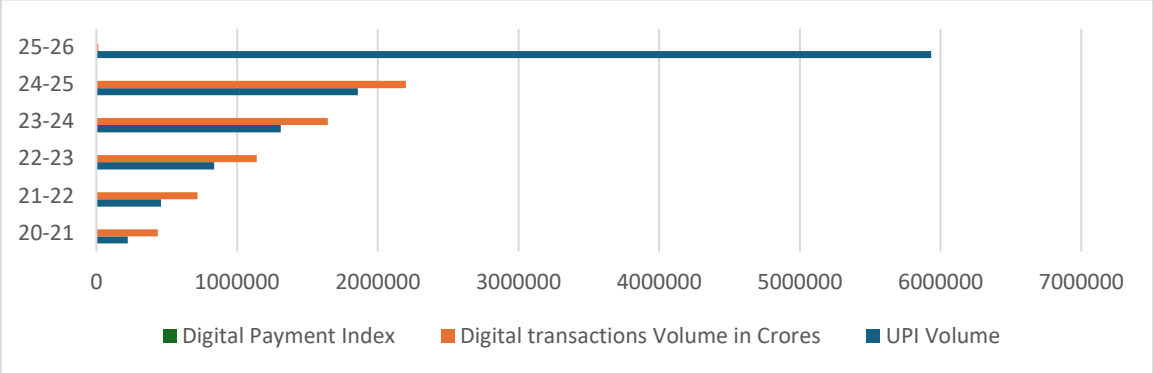


Table 2

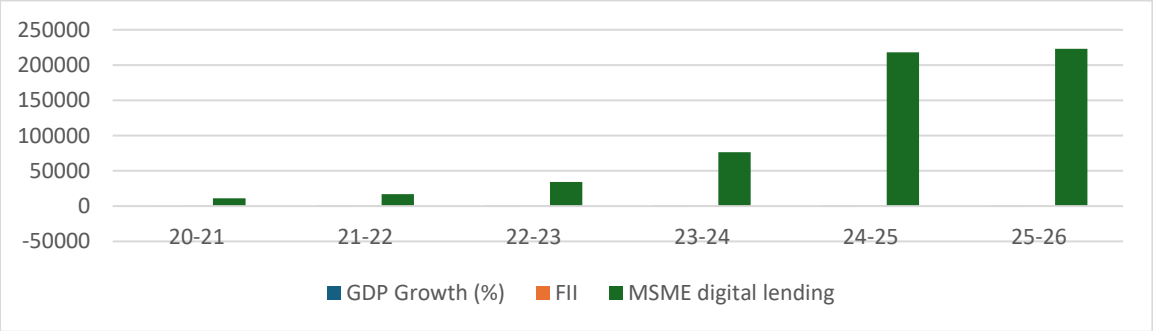
Table showing Percentage of GDP growth, Financial Inclusion Index values and MSMSE digital lending

Year	GDP Growth (%)	FII	MSME digital lending
20-21	-5.78	53.1	11165.86
21-22	9.69	53.9	17080.14
22-23	6.99	56.4	34362.91
23-24	8.15	60.1	76500
24-25	6.5	64.2	218000
25-26	8.2	67	223000

Source: rbi.org.in

Graph 2

Graph showing Percentage of GDP growth, Financial Inclusion Index values and MSMSE digital lending



Output

Table 3

Table showing correlation output

	UPI Volume	Digital transactions Volume in Crores	Digital Payment Index	GDP Growth	FII	MSME digital lending
UPI Volume	1					
Digital transactions Volume in Crores	-0.373294536	1				
Digital Payment Index	0.781487869	0.273168368	1			
GDP Growth	0.342049494	0.243997816	0.557895915	1		
FII	0.858368727	0.150584086	0.972406035	0.440637567	1	
MSME digital lending	0.803218752	0.17560873	0.905962092	0.337251708	0.965897203	1

Source: Output

The above table indicates the key correlation among independent and dependent variables. The UPI volume and GDP growth has r value 0.34, FII = 0.86 and with MSME digital lending 0.80. Whereas, digital transactions to GDP, FII and MSME digital lending are having r value 0.24,0.15, & 0.175 respectively. The independent variable Digital payment index to GDP, FII, and MSME digital lending are indicating r value 0.56,0.97, and 0.91 respectively.

Table 4

Table showing impact of independent variable UPI on GDP, FII, & MSME lending

	GDP	Financial Inclusion Index	MSME digital lending
Multiple R	0.045131	0.843347	0.770489
R square	0.022037	0.711234	0.593653
Coefficients	7.9854	56.0531	41641.4
P-Value	0.003318	0.000127	0.446142

Source: Output

The multiple R 0.045 indicates a vey weak relationship between UPI transactions and GDP Growth, where as a strong positive relationship between UPI and Financial Inclusion Index and MSME digital lending with Multiple R value 0.846 & 0.770 respectively. P values of GDP and MSME lending indicates statistically insignificant impact, where asUPI has a strong statistically significant impact on financial inclusion.

Table 5

Table showing impact of independent variable Digital Transaction on GDP, FII, & MSME lending

	GDP	Financial Inclusion Index	MSME digital lending
Multiple R	0.588113	0.045124	0.027941
R square	0.345877	0.002036	0.000781
Coefficients	8.896636	60.65069	109998.9
P-Value	0.002513	0.001249	0.32516

The multiple R 0.588 indicates a moderate relationship between digital transactions and GDP Growth, where as a weak relationship between digital transactions and Financial Inclusion Index and a negligible relationship with MSME digital lending with Multiple R value 0.045 & 0.028 respectively. P values of GDP and Financial inclusion indicates statistically significant impact, whereas digital transactions do not have a statistically significant impact on MSME lending.

Table 6

Table showing impact of independent variable Digital Payment Index on GDP, FII, & MSME lending

	GDP	Financial Inclusion Index	MSME digital lending
Multiple R	0.567975	0.978117	0.917173
R square	0.322593	0.956713	0.841206
Coefficients	11.78999	31.24434	-390799.45
P-Value	0.037194	0.003264	0.055529

The multiple R 0.568 indicates a moderate relationship between digital transactions and GDP Growth, where as anextremely strong relationship between DII and Financial Inclusion Index and MSME digital lending with Multiple R value 0.978 & 0.917 respectively. P values of GDP Financial inclusion, and MSME lending indicate statistically significant influence by DII.

Findings and Suggestions

- There are no direct implications of UPI transactions on GDP growth.
- UPI exerts a significant and statistically significant impact on financial inclusion. This confirms the relevance of UPI in inclusive growth.
- Although UPI provides a positive relationship for MSME digital lending, it is not statistically significant
- Digital transaction volumes demonstrate a moderate and significant relation with GDP growth rates; this signifies that more digital transaction activities are associated with economic growth.
- Even when statistically significant, from an economic point of view, its significance is negligible because digital transaction variables account for barely any portion of financial inclusion. It is a clear indication that financial inclusion cannot be achieved just by performing a certain number of transactions
- In fact, digital transactions do not have a significant effect on MSME digital lending.
- The usage of the payment platform (UPI) promotes inclusion, and the total number of transactions supports the overall growth of the economy.

- The Digital Payment Index has a statistically significant and moderate effect on GDP growth, indicating that enhancement of digital payments infrastructure has a positive effect on macro-economic performance
- DPI has a very strong and highly significant impact on financial inclusion, as it emerges as the strongest predictor of inclusive growth among all the indicators of Digital Banking.
- DPI has a strong and marginally significant impact on digital lending in MSMEs, implying that a strong digital payment system boosts access to formal credit in MSMEs.

These findings suggest that digital banking contributes to sustainable economic growth primarily through indirect channels such as financial inclusion rather than direct and underscore the importance of strengthening digital payment infrastructure to achieve inclusive and sustainable economic development.

Conclusion

In this current research, an assessment of the role of digital banking variables—Universal Payment Interface (UPI) usage, digital transaction value, and the Digital Payment Index (DPI)—in ensuring economic growth in India has been undertaken. Results show that digital banking did not influence the GDP growth of the countries uniformly or directly. Variables such as the volume of the UPI transaction or the digital transaction value did not show a strong or statistically significant relationship with GDP growth, which reveals that the effect of digital banking on the macroeconomic environment takes time. Therefore, digitalization cannot lead to GDP growth on its own. Nevertheless, it is quite evident that digital banking has a extremely significant role as an indirect catalyst for a sustainable growth of the economy. In conclusion, the paper finds that digital banking supports sustainable economic growth in the economy mainly by enhancing financial inclusion and MSME loans, as opposed to the growth of GDP. Specifically, the Digital Payment Index plays an important role as a transmission channel connecting digital banking and sustainable economic growth.

Policy Implications

The findings suggest that policymakers should prioritize improving digital payment infrastructure, usability, and trust rather than focusing solely on transaction volumes.

Strengthening digital ecosystems can accelerate financial inclusion and MSME growth, thereby fostering long-term sustainable economic development.

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An Intelligent Green Credit Ecosystem Integrating Predictive Analytics and Carbon – Neutral Commerce Networks

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Abstract

The growing intensity of climate change has amplified the responsibility of the financial sector to support sustainable economic behaviour. Although digital bankingadoption has expanded rapidly, thepenetration of green banking at the retail level remains limited due to weak personalisation, delayed incentives, and the absence of predictive engagement mechanisms. Existing green finance frameworks largely prioritise institutional compliance, leaving individual customers disconnected from measurable environmental outcomes. This study introduces an Intelligent Green Credit Ecosystem (IGCE)—a data-driven, AI- powered framework that integrates behavioural prediction, blockchain-enabled transparency, and carbon offset accounting within retail banking. The proposed system computes a Green Predictive Index (GPI) that dynamically reflects both observed and anticipated eco-financial behaviour, enabling personalised incentives through automated smart contracts. A federated architecture ensures interoperability of green credit scores across multiple banks. Simulation results from an urban pilot involving 1,000 users demonstrate superior predictive accuracy, enhanced engagement efficiency, positive incentive-based returns for banks, and verifiable carbon emission reductions. The findings indicate that IGCE effectively converts sustainability awareness into actionable financial behaviour, positioning banks as proactive climate intermediaries and customers as active contributors to carbon-neutral commerce.

Keywords*: Sustainable Banking, Artificial Intelligence, Predictive Modelling, Blockchain, Carbon Accounting, ESG, Green Finance*

Introduction

Climate change has emerged as a defining challenge for global economic systems, compelling industries to integrate sustainability into their operational and strategic decisions.

Among these industries, the banking sector holds a unique position due to its influence over capital flows, consumption patterns, and investment behaviour. While banks increasingly disclose environmental commitments and ESG metrics, the practical adoption of green banking by retail customers remains limited, particularly in emerging economies. A key reason for this disconnect is that most green banking initiatives operate at an institutional or policy level, offering little relevance to the everyday financial decisions of individual users. Customers may recognise the importance of sustainability, yet fail to modify their financial behaviour due to the absence of immediate rewards, personalised feedback, or visible environmental impact. Consequently, green banking is often perceived as symbolic rather than functional. This study argues that sustainable finance must evolve from static compliance mechanisms to intelligent, incentive- driven systems embedded within routine digital transactions. To address this requirement, the paper proposes the **Intelligent Green Credit Ecosystem (IGCE)**—a next-generation framework that combines artificial intelligence, predictive analytics, blockchain technology, and carbon accounting. IGCE aims to transform sustainability into a financially meaningful and measurable activity for retail banking users.

Review of Related Literature

Early green banking initiatives primarily focused on regulatory compliance, renewable energy financing, and environmental risk management within corporate lending portfolios. While these measures contributed to institutional sustainability, they did not actively engage retail customers or encourage behavioural change at the individual level. With the rise of digital banking platforms, researchers began exploring the integration of sustainability features into consumer financial services. However, most implementations remained limited to awareness campaigns, static eco-labels, or one-time incentives. Empirical studies consistently highlightan―intention–action gap, where positive environmental attitudes do not translate into sustainable financial behaviour. Recent literature suggests that personalised digital nudges, dynamic incentives, and transparent impact reporting can significantly improve adoption rates. Artificial intelligence has been proposed as a tool for behavioural prediction and customisation, while blockchain technology has been recognised for its potential to enhance trust, traceability, and ESG verification. Nevertheless, existing models rarely combine these technologies into a unified, scalable ecosystem that links financial transactions to verified carbon outcomes. The IGCE framework addresses this gap by integrating predictive intelligence, incentive optimisation, and carbon accounting into a single operational model.

Intelligent Green Credit Ecosystem (IGCE)

1.1 System Concept

IGCE is designed as a comprehensive digital ecosystem that embeds sustainability directly into retail bankingbehaviour. Insteadofrelyingonvoluntaryparticipationorstaticscoring, the systemcontinuously analyses user transactions to forecast eco-friendly behaviour and allocate rewards accordingly. Thecentral metric of the system, the **Green Predictive Index (GPI)**, reflects both current actions and future sustainability potential.By linking financial incentives—such as cashback, preferential interest rates, and merchant discounts—to environmentally responsible behaviour, IGCE converts abstract sustainability goals into tangible economic value. A federated structure allows users to maintain a unified green profile across multiple banks, ensuring consistency and scalability.

1.2 ArchitecturalDesign

The IGCE architecture consists of interconnected layers:

- **Data Collection Layer:** Aggregates transactional and behavioural data from banking platforms and merchants.
- **AI Analytics Layer:** Applies machine learning models to predict green behaviour and update the GPI.
- **Incentive Management Layer:** Determines optimal rewards based on behavioural elasticity and engagement.
- **Blockchain ESG Layer:** Records transactions, incentives, and carbon offsets immutably usingsmart contracts.
- **User Interface Layer:** Provides dashboards and an AI-based advisory chatbot for guidance and feedback.

This modular architecture allows seamless integration with existing banking systems while ensuring data integrity and regulatory compliance.

2. MathematicalFramework

2.1 Behaviour-Weighted Predictive Scoring

User sustainability behaviour is quantified through a Behavioural Green Score (BGS): BGS=∑i=1nAi×Wi\text{BGS} = \sum_{i=1}^{n} A_i \times W_iBGS=i=1∑nAi×Wi where AiA_iAi represents the frequency of an eco-friendly activity and WiW_iWi denotes its environmental impact weight.

Predictiveintelligenceenhancesthescore:

HBPM=α·BGS+(1−α)·Pc\text{HBPM} = \alpha \cdot \text{BGS} + (1-\alpha)\cdotP_c

HBPM=α·BGS+(1−α)·Pc

2.2 Incentive Optimisation

Incentivesaredynamicallycomputedas:

Iv=β1(GPI)+β2(ΔBGS)+β3(Ef)I_v=\beta_1(\text{GPI})+\beta_2(\Delta\text{BGS})+\beta_3(E_f)

Iv=β1(GPI)+β2(ΔBGS)+β3(Ef)

2.3 Carbon Accounting

Carbon offsets are calculated using verified emission factors: COV=∑j=1mTj×Cfj\text{COV}=\sum_{j=1}^{m}T_j\timesC_f^jCOV=j=1∑mTj×Cfj

Normalised contribution:

CCI=COVmax⁡(COV)×100\text{CCI} = \frac{\text{COV}}{\max(\text{COV})} \times 100CCI=max(COV)COV×100

2.4 Green Predictive Index

GPI=ω1(HBPM)+ω2(Iv′)+ω3(CCI)\text{GPI} = \omega_1(\text{HBPM}) + \omega_2(I_v') + \omega_3(\text{CCI})GPI=ω1(HBPM)+ω2(Iv′)+ω3(CCI)

3. Simulation Results and Discussion

A simulated urban pilot involving 1,000 retail users demonstrated that IGCE significantly improves behavioural prediction, engagement, and environmental impact compared to legacy systems. The model generated measurable carbon offsets, improved customer retention, and delivered a positive return on incentive expenditure. The integration of smart contracts reduced operational overheads while enhancing ESG reporting accuracy.

4. Conclusion

The Intelligent Green Credit Ecosystem presents a robust, scalable solution to the persistent gap between sustainability awareness and financial behaviour. By embedding predictive intelligence, automated incentives, and verified carbon accounting into digital

banking, IGCE transforms green finance into an actionableand economically viable practice.The frameworknot onlyenhances customer engagement and institutional efficiency but also establishes a direct, transparent link between individual financialdecisions and climate outcomes. As digital banking continues to evolve, IGCE offers a future-readymodel for aligning financial growth with environmental responsibility.

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Innovations in Banking and Financial Services

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Abstract

The banking and financial services sector has witnessed unprecedented transformation over the last few decades due to rapid technological advancement and evolving customer expectations. In India, banking has moved far beyond traditional branch-based operations and manual record-keeping systems to highly digitized, technology-driven service models. Innovations in banking have reshaped how financial institutions interact with customers, manage risks, and deliver value. Technologies such as internet and mobile banking, artificial intelligence, machine learning, blockchain, cloud computing, and data analytics have improved efficiency, security, and accessibility. These developments have enabled banks to reduce operational costs, enhance customer experience, and expand financial inclusion. With the rise of fintech companies and digital-only banks, competition within the financial sector has intensified. Traditional banks are now compelled to continuously innovate in order to remain relevant and sustainable. This paper explores the significance, major areas, challenges, and future prospects of innovation in banking and financial services, emphasizing its role in strengthening the financial system and supporting economic development.

Keywords: *Banking Innovation, Digital Banking, Financial Technology, Artificial Intelligence, Blockchain, Financial Inclusion, Risk Management*

Introduction

The Indian banking system has undergone continuous evolution since the nationalization of major banks, which aimed to ensure financial stability and equitable access to banking services. Initially, banking operations were largely manual, time-consuming, and limited in reach, particularly in rural and semi-urban areas.

The economic reforms of the 1990s marked a turning point for the banking industry. Liberalization, privatization, and globalization encouraged competition and efficiency,

prompting banks to adopt modern technologies. The introduction of computerized banking systems laid the foundation for digital transformation.

Over time, internet banking, mobile banking, automated teller machines, and electronic payment systems transformed customer interactions with banks. Today, customers expect instant, secure, and personalized financial services. Innovation has become a strategic necessity rather than a competitive advantage.

The banking ecosystem now includes public sector banks, private sector banks, foreign banks, cooperative banks, and non-banking financial companies. Together, these institutions contribute significantly to economic growth by mobilizing savings, extending credit, and supporting financial inclusion.

Significance of Innovation in Banking and Financial Services

Innovation plays a critical role in improving customer experience within the banking sector. Digital platforms enable customers to access services such as fund transfers, bill payments, loan applications, and investment management without visiting physical branches. Personalization is another key outcome of innovation. By analyzing customer data, banks can offer tailored financial products that align with individual needs and preferences, thereby strengthening customer loyalty and trust.

Operational efficiency is significantly enhanced through automation and digitization. Technologies such as robotic process automation reduce manual workload, minimize errors, and accelerate service delivery. This allows banks to optimize resources and improve productivity.

Innovation also strengthens risk management and security frameworks. Advanced analytics and intelligent monitoring systems help detect fraud, assess creditworthiness, and ensure regulatory compliance. These capabilities are essential in an increasingly digital and interconnected financial environment.

Furthermore, innovation promotes financial inclusion by extending banking services to underserved populations. Mobile banking and digital payment solutions enable individuals in remote areas to access essential financial services, contributing to inclusive economic development.

Major Areas of Innovation in Banking

Artificial Intelligence and Machine Learning have become integral to modern banking operations. These technologies enable banks to process vast amounts of data efficiently, uncover patterns, and generate actionable insights.

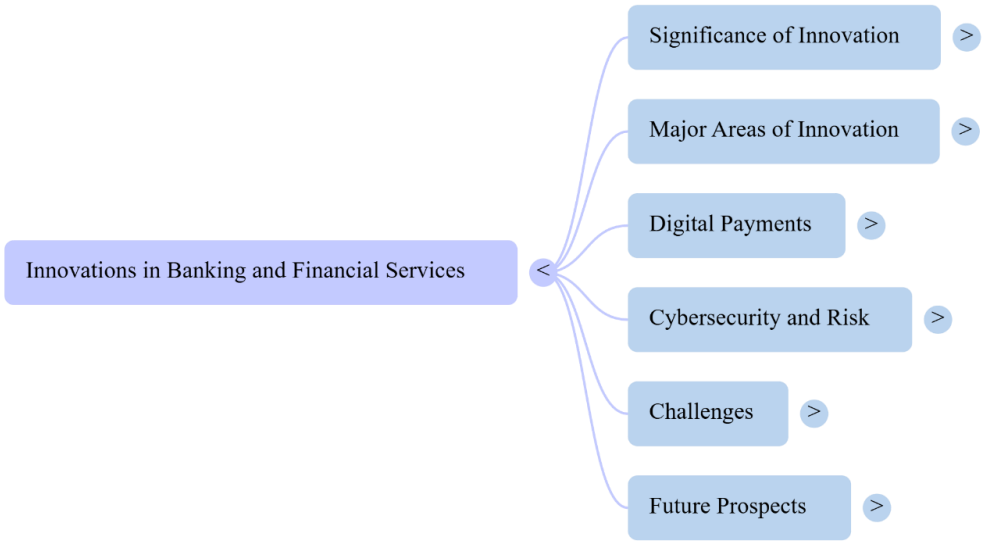
AI-powered chatbots and virtual assistants provide round-the-clock customer support, resolving queries instantly and reducing the burden on human staff. Machine learning models improve credit scoring accuracy and support faster loan approvals.

Digital and mobile banking platforms have revolutionized traditional banking practices. Customers can manage accounts, transfer funds, pay bills, and monitor investments through intuitive mobile applications.

Blockchain technology offers a secure and transparent framework for recording financial transactions. Its decentralized nature reduces the risk of data manipulation and enhances trust in financial systems.

Open banking initiatives encourage collaboration between banks and fintech firms through secure data sharing mechanisms. This leads to the development of innovative financial products and integrated service ecosystems.

Cloud computing enables banks to scale operations efficiently and deploy new services rapidly. Cloud-based systems improve flexibility, reduce infrastructure costs, and support business continuity.



Digital Payments and Financial Inclusion

Digital payment systems have transformed the way transactions are conducted. Electronic fund transfers, mobile wallets, and real-time payment platforms have reduced reliance on cash-based transactions.

These systems enhance transparency, reduce transaction costs, and improve convenience for both consumers and businesses. Digital payments also support government initiatives aimed at promoting a cashless economy.

Financial inclusion has been significantly strengthened through digital innovation. Simplified account opening processes and mobile-based banking services enable individuals from marginalized communities to participate in the formal financial system.

By providing access to savings, credit, insurance, and payment services, banks contribute to poverty reduction and economic empowerment.

Cybersecurity and Risk Management

As banking operations become increasingly digital, cybersecurity has emerged as a critical concern. Financial institutions must protect sensitive customer data from cyber threats and unauthorized access.

Advanced security technologies such as encryption, biometric authentication, and real-time monitoring systems enhance data protection and build customer confidence.

Risk management frameworks supported by analytics and automation help banks identify potential vulnerabilities and respond proactively to emerging threats.

Challenges in Adopting Innovation

Despite its benefits, innovation presents several challenges for banks. High implementation costs and the need for continuous technological upgrades can strain financial resources.

Data privacy concerns and regulatory compliance requirements add complexity to innovation initiatives. Banks must balance technological advancement with legal and ethical considerations.

The shortage of skilled professionals capable of managing advanced technologies further complicates the innovation process.

Future Prospects of Banking Innovation

The future of banking will be shaped by emerging technologies such as advanced analytics, quantum computing, and immersive digital environments.

Banks that proactively invest in innovation and skill development will be better positioned to achieve long-term sustainability.

Collaboration between traditional banks, fintech firms, and regulators will play a crucial role in shaping a resilient and inclusive financial ecosystem.

Conclusion

Innovation has become the cornerstone of growth and competitiveness in the banking and financial services sector. Through digital transformation, banks have improved efficiency, security, and customer satisfaction.By embracing innovation, financial institutions can address future challenges, expand financial inclusion, and contribute to sustainable economic development.Continuous technological advancement will remain essential for ensuring resilience and success in an increasingly digital global economy.

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Blockchain for Ethical and Transparent Transactions

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Abstract

Growing concerns regarding unethical conduct, concealed data practices, and digital record tampering have emphasized the demand for transaction systems that ensure openness and accountability by design. Blockchain technology presents an alternative transactional model built on decentralization, immutable data storage, and cryptographic validation. This study explores the role of blockchain in supporting ethical behavior and operational transparency across various domains, including financial services, supply networks, healthcare systems, and public governance. Additionally, the paper discusses key implementation challenges and considers future directions for establishing ethically governed blockchain-based infrastructures.

Keywords*: Blockchain Technology, Ethical Governance, Transaction Accountability, Distributed Systems, Digital Transparency*

1. Introduction

Trust is a fundamental requirement for the effective functioning of economic and institutional transactions. Conventional transaction systems typically rely on centralized intermediaries to authorize and document activities. Although these systems provide structure, they often lack real-time transparency and are susceptible to manipulation, delayed verification, and misuse of authority.

Blockchain technology introduces a decentralized transactional framework in which validation responsibilities are distributed across multiple participants. Once verified, transaction records are securely stored and cannot be altered retroactively. This paper examines how blockchain can contribute to ethical accountability and transparency while also considering the practical limitations that influence its adoption.

2. Core Concepts of Blockchain Technology

Blockchain functions as a decentralized digital record system where transactions are grouped into sequential blocks and maintained across a network of independent nodes. Validation is achieved through consensus protocols that ensure data accuracy without centralized oversight. The defining characteristics of blockchain systems include:

- **Decentralized Governance:** Transaction control is shared across network participants.
- **Data Immutability:** Verified records remain permanent and tamper-resistant.
- **Traceability:** Transaction histories can be audited by authorized entities.
- **Cryptographic Security:** Encryption safeguards data integrity and authenticity.

These characteristics collectively enhance ethical accountability by reducing information imbalance and increasing transaction visibility.

3. Ethical Dimensions of Blockchain Implementation

3.1 Accountability and Trust Enhancement

Blockchain systems establish accountability by creating transparent and permanent transaction records. The ability to trace actions discourages unethical conduct and reinforces trust among participants.

3.2 Reduction of Opportunistic Practices

Smart contracts automate transaction execution based on predefined conditions, limiting human intervention. This automation reduces the likelihood of fraud, favoritism, and procedural bias.

3.3 Ethical Data Governance

By enabling user-controlled data access, blockchain platforms support responsible data management. Consent-based models are especially valuable in sectors handling sensitive or confidential information.

4. Blockchain Applications Supporting Transparency

4.1 Financial Systems

Blockchain-based financial platforms allow near-instant transaction verification and transparent auditing, leading to reduced settlement time and improved system credibility.

4.2 Supply Chain Management

Recording product movement at each stage enhances traceability and supports ethical sourcing, regulatory compliance, and quality assurance.

4.3 Public Administration

In government operations, blockchain can improve transparency in land records, voting systems, and public fund distribution, thereby reducing administrative inefficiencies.

4.4 Healthcare Information Management

Blockchain facilitates secure data sharing among healthcare stakeholders while preserving data accuracy and controlled access, promoting ethical patient data handling.

5. Challenges and Constraints

Despite its potential, blockchain adoption faces several obstacles:

- **Scalability Limitations:** Network performance issues restrict large-scale applications.
- **Environmental Impact:** Energy-intensive consensus methods raise sustainability concerns.
- **Regulatory Uncertainty:** Lack of uniform legal frameworks complicates implementation.
- **Privacy Considerations:** Balancing data confidentiality with transparency remains complex.

Addressing these challenges is essential for responsible and ethical blockchain deployment.

6. Future Directions

Ongoing developments in energy-efficient consensus mechanisms, regulatory alignment, and cross-platform integration are likely to shape blockchain's evolution. Embedding ethical governance principles alongside technological innovation will further strengthen transparency and trust in digital transactions.

7. Conclusion

Blockchain technology offers a viable pathway toward building transaction systems grounded in transparency and ethical accountability. Its decentralized validation, permanent

recordkeeping, and cryptographic protections address many shortcomings of traditional transaction models. While challenges remain, continued innovation and governance-focused adoption can position blockchain as a cornerstone of trustworthy digital ecosystems.

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A study on Micro finance schemes for Evolving Sustainability of Women Entrepreneurs in Bengaluru

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Abstract

The rise of women entrepreneurs in Bengaluru, a major economic hub in India, has been facilitated greatly by microfinance scheme in recent years. These financial frameworks are tailor made to provide women with access to credit, enabling them to launch, sustain and expand their business. Microfinance schemes have emerged as vital instruments for promoting the sustainability of women entrepreneurs in Bengaluru. However the reviews reveal that access to credit alone is insufficient for empowering of women. Sustainable women entrepreneurs depend on holistic support frameworks that address financial educational and social cultural needs. Hence policy makers, financial institutions and community organisations must collaborate to innovate and refined micro financial schemes, ensuring that they are adaptive to evolving landscape and challenges faced by women entrepreneurs. This research paper presents an overview of a study examining how micro financial institutions are supporting women entrepreneurs to overcome traditional barriers and also focus on factors that impact sustainability and market competition. The study also insights lay a foundation for future interventions aimed at nurturing sustainable, inclusive growth across Bengaluru entrepreneurial ecosystem.

***Keywords**: Women Entrepreneurs, Microfinance, Sustainability, Market competition*

Introduction

Women entrepreneurship is pivotal in driving monetary growth, producing employment, and promoting social inclusion, specifically in growing economies consisting of India. In recent years, Bengaluru has emerged as a great entrepreneurial hub, imparting diverse opportunities for female entrepreneurs across diverse sectors. despite this development, ladies maintain to stumble upon tremendous demanding situations, especially in getting access to economic assets, which limits their capacity to set up and maintain

companies. Microfinance schemes have emerged as a vital instrument for selling financial inclusion by using providing ladies entrepreneurs get admission to credit through bendy and collateral-loose lending mechanisms. these schemes have drastically contributed to encouraging entrepreneurial activities amongst women in Bengaluru. Sustainability in female entrepreneurship necessitates a holistic assist gadget that integrates economic assistance with ability constructing and institutional support.

Review of Literature

Sharma (2025) – Role of Microfinance in Empowering women entrepreneurs Sharma's examine investigates the effect of microfinance schemes, which include Self-help groups (SHGs), Joint liability groups (JLGs), and government-linked applications which includes MUDRA, on improving women get entry to credit. This gets entry to enables entrepreneurial activities and socio-financial empowerment in India. The findings imply that microfinance promotes both enterprise activity and household well-being, while also identifying challenges including over-indebtedness and virtual exclusion. The examine underscores the need for incorporated financial and non-economic support.

Transforming Rural Women Lives in India (2024) – Microfinance & Entrepreneurship via SHGs analyses how microfinance interventions based totally on Self-assist groups make a contribution to the financial and social empowerment of rural Indian ladies, emphasizing entrepreneurial engagement as vital for sustainability. The examine highlights elevated selection-making power and earnings, while additionally acknowledging continual socio-cultural obstacles.

Devi (2023) – Role of Microfinance in women Entrepreneurship: Indian experience using descriptive studies and primary statistics, shows that microfinance definitely influences female economic empowerment and commercial enterprise sustainability. It emphasizes that get entry to credit helps sustainable organization growth and affords policymakers with implications for reinforcing microfinance-pushed women entrepreneurship.

Bosu (2023) – impact of Microfinance on women’s Entrepreneurship, finds that microfinance contributes to poverty discount and entrepreneurial sustainability among marginalized women with the aid of enabling maximum recipients to provoke or expand organizations. It also highlights the potential limitations of microfinance in the absence of complementary aid offerings.

Nzanzu & Caballero-Montes (2023) – Empowerment Dimensions in Microfinance and women entrepreneurs This systematic evaluate identifies key dimensions affecting women empowerment through microfinance, inclusive of normative, cognitive, and institutional factors, linking these to broader entrepreneurial sustainability. The overview shows that empowerment is multifaceted and extends beyond finance to encompass social and regulatory dynamics.

Koti & Modiba (2022) – role of Microfinance institutions in enhancing Sustainability of women-Owned SMMEs A South African case examine demonstrates that microfinance performs a giant function in supporting the sustainability of girls-owned SMMEs. however, it identifies deficiencies in non-economic support, highlighting the necessity for tailored business education and zone-precise services to make sure long-time period competitiveness.

Abebe & Kegne (2023) – role of Microfinance institutions on women Entrepreneurship improvement, evaluates the effect of both economic and non-monetary services furnished by way of MFIs on female entrepreneurial consequences. It shows that complete services, consisting of credit score, schooling, and business guide, are important for promoting sustainable corporation improvement. SpringerLink

Empowering women Entrepreneurship: A global Synthesis (2025) This proof synthesis, It identifies superb results on empowerment and entrepreneurial sustainability but emphasizes the need for integrated training alongside monetary get admission to.

Unlocking the capacity of Microfinance solutions for urban women entrepreneurs (2025) This examine underscores how microfinance techniques can cope with financing gaps for urban women entrepreneurs to help sustainable enterprise practices. It stresses that while microfinance aids initial begin-ups, sustained aggressive increase necessitates interventions that expand credit score get right of entry to and cope with structural boundaries.

Microfinance and female Entrepreneurship: challenges in having access to Microcredit (2025) documents the barriers ladies encounter, including gender bias, financial literacy gaps, and regulatory hurdles, in accessing microfinance credit. It proposes policy frameworks to higher support sustainable entrepreneurial interest in developing economies.

Thematic Mapping: Microfinance and Women entrepreneurship

Theme	Sub-Themes / Codes	Key Focus Areas	Supporting Studies
Access to Finance	Credit availability, SHGs, JLGs, MFIs, government schemes	Entry into entrepreneurship, business start-up and expansion	Sharma (2025); Devi (2023); Bosu (2023); International (2025 – MDPI)
Economic Empowerment	Income generation, asset creation, poverty reduction	Business sustainability, household economic wellbeing	Devi (2023); Koti & Modiba (2022); Bosu (2023); Sharma (2025)
Social Empowerment	Decision-making power, self-confidence, social capital	Increased autonomy, community participation	Transforming Rural Women's Lives (2024); Sharma (2025)
Entrepreneurial Sustainability	Business growth, competitiveness, long-term viability	Enterprise survival and scalability	Koti & Modiba (2022); Bosu (2023); International Synthesis (2025)
Non-Financial Support	Training, financial literacy, mentoring, business services	Capacity building, improved enterprise performance	Abebe &Kegne (2023); Koti & Modiba (2022); Taylor & Francis (2025)
Multidimensional Empowerment	Normative, cognitive, institutional factors	Holistic empowerment beyond finance	Nzanzu& Caballero-Montes (2023); International (2025)
Barriers and Constraints	Over-indebtedness, gender bias, digital exclusion, regulatory hurdles	Limitations in accessing and utilizing microfinance	Sharma (2025); International Journal of Business Management and Finance Research (2025)
Policy and Institutional Support	Gender-responsive policies, integrated frameworks	Strengthening microfinance effectiveness	Devi (2023); International Synthesis (2025)

Research Gaps

The analysis of literature provides several significant gaps that warrant further investigation. There is limited empirical research focused on long term sustain of women owned enterprise in urban ecosystem. The lack of frameworks that evaluate microfinance to be a holistic part of system.lack of comparative studies to examine impact between urban and rural women entrepreneurs in competitive market. The study also narrates city like Bengaluru needs localised studies to analyse how micro finance schemes is responding to entrepreneurial needs on sustainability across diverse women-led business. The current study examines the role of microfinance schemes in nurturing the sustainability of women entrepreneurs in Bengaluru by analysing both financial and non-financial support system and its stimulus on market competitiveness.

Objectives

- To analyse how microfinance schemes assist Bengaluru's Women entrepreneurs.
- To assess how microfinance influences the sustainability of women-owned enterprise in business retention, growth and profit steadiness.
- To determine the primary obstacles and difficulties that woman enterprise encounter at the time of accessing and make use of microfinance applications.
- To understand how microfinance assistance affects women entrepreneur capability to compete in city markets.
- Toidentify the connection among involvement in microfinance and entrepreneurial empowerment, inclusive of economic independence and decision-making competencies.

Research Methodology

The modern studies employed a complete descriptive overview layout, relying completely on secondary facts, to explore the impact of microfinance schemes on the sustainability of female entrepreneurs in Bengaluru. running as a evaluate paper, this has a look at integrates and synthesizes present scholarly literature to deal with particular studies targets concerning entrepreneurial aid, lengthy-term sustainability, marketplace competitiveness, and monetary empowerment. Secondary records sources had been rigorously decided on, ordinarily together with Scopus-listed peer-reviewed journals, supplemented through authorities/authoritative reports from identified establishments. academic databases, together with Scopus, web of science, and Google scholar, had been

systematically searched to pick out research posted within the time-frame of 2015 to 2025. Paper analysis carried out through thematic content material evaluationaligned with the study objectives.

Scope of the Study

This study undertakes a targeted exam of the vital role performed with the aid of microfinance schemes in fostering the lengthy-term sustainability of women entrepreneurs in Bengaluru, a prominent financial and entrepreneurial nexus within India. The study offers an evaluation of financial and non-monetary aid mechanisms brought through microfinance, encompassing factors such as access to credit, training, and empowerment tasks on women entrepreneurs and also addresses gap, which frequently prioritizes rural contexts and conventional Self-help organization (SHG) models. The study investigates how microfinance contributes not merely to business sustainability and income stability but also influences entrepreneurial empowerment, specifically enhancing choice-making competencies and selling monetary independence among recipients. The findings provide treasured insights into best practices, become aware of systemic demanding situations, and outline essential gaps in current microfinance techniques designed to guide this demographic.

Findings of the study

Objectives	Findings
1. To analyse how microfinance schemes assist Bengaluru's Women entrepreneurs.	-Provides access to credit for business initiation and expansion - Government-backed schemes (e.g., MUDRA) and SHG-based programs are effective - Enhances confidence and decision-making among women entrepreneurs
2. To assess how microfinance influences the sustainability of women-owned enterprise in business retention, growth and profit steadiness.	- Contributes to business continuity, income stability, and growth - Sustainability improves when credit is combined with training, mentoring, and business support - Credit alone is insufficient for long-term enterprise viability

3. To determine the primary obstacles and difficulties that woman enterprise encounter at the time of accessing and make use of microfinance applications.	- Financial literacy gaps- Socio-cultural restrictions and gender bias - Bureaucratic procedures and complex application processes - Urban market challenges: competition, high operational costs, limited networks
4. To understand how microfinance assistance affects women entrepreneur capability to compete in city markets.	- Improves market participation through inventory expansion and product diversification - Supports technology adoption - Competitiveness also depends on managerial skills, marketing knowledge, and mentorship
5. To identify the connection among involvement in microfinance and entrepreneurial empowerment, inclusive of economic independence and decision-making competencies.	- Positively linked to decision-making autonomy and financial independence - Enhances confidence in business decisions - Women accessing both credit and training show higher empowerment and enterprise sustainability

Limitations of the Study

1. The study is based totally on secondary information, limited insights.
2. The Literature review is considered papers published only from 2015 -2025.
3. The focus only on limited papers may limit generalizability.
4. The review highlights only on financial and non-financial facets of microfinance.

Suggestions

To effectively enhance the sustainability of women entrepreneurs in urban areas like Bengaluru, a multi-faceted strategy is imperative. Economic institutions and policymakers need to prioritize the development of holistic guide applications that integrate credit provision with important non-monetary offerings, including specialised training, mentorship, and business advisory offerings, thereby notably improving marketplace competitiveness. Parallel to this, strong financial literacy tasks should be applied through focused workshops and

potential-constructing packages, ensuring women marketers can optimally make use of microfinance resources. strategies targeted on inclusive access to dismantle socio-cultural barriers and bureaucratic impediments, making certain equitable microfinance schemes for all women, in particular the ones from marginalized communities. furthermore, facilitating networking possibilities, marketplace linkages, and mentorship platforms may be critical for strengthening entrepreneurial competencies and empowerment. From a systemic angle, policy guide and innovation are important, requiring policymakers to inspire tailored financial contraptions, non-stop tracking and assessment of microfinance programs is vital to ascertain their effectiveness in promoting authentic sustainability, empowerment, and scalable increase inwomen-owned organisations.

Future Research

Research can be focused on accomplishing subject-primarily based studies gather original facts on how women entrepreneurs use microfinance, the difficulties they face, and the effects they obtain.Comparative research may be carried out to evaluate the impact of microfinance packages in urban settings versus rural settings on women's business fulfilment and empowerment. Longitudinal research can tune the lengthy-time period effect of microfinance on enterprise increase, consistent income, and the potential of ladies to make selections over a prolonged duration. research can be achieved additionally on technological integration, unique sector analysis and impact of socio-cultural dimensions.

Conclusion

The study highlights that microfinance schemes play a full-size function in enhancing the sustainability of women entrepreneurs in Bengaluru via enhancing get admittance to credit score, fostering commercial enterprise continuity, and strengthening economic independence. However, the findings exhibit the significance of integrated non-financial aid together with mentorshipand economic literacy, microfinance contributes to economic and social empowerment, obstacles including gender bias, literacy gaps, and concrete market demanding situations persist, proscribing full entrepreneurial capacity. A holistic framework that combines economic with potential-constructing and market linkage is vital for aggressive and sustainable women-led corporations. The stronger institutional mechanisms to dismantle structural impediments for empowering women entrepreneurs via comprehensive microfinance interventions can revamp company resilience, market participation, and decision-making autonomy in city contexts like Bengaluru.

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Enhancing Women's Financial Independence through Digital Microfinance in Rural India

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Abstract

Microfinance has been important in the social empowerment of India's marginalized women to a great extent. Marginalized women are granted access to finances, skills, and networks which elevate their socio-economic status, hence the microfinance through Self-Help Groups (SHGs), Microfinance Institutions (MFIs), and cooperative credit systems is the source of the empowerment process. This research is based on secondary data from NABARD, RBI, MoRD, and the World Bank (2018-2024) which analyzes the trends in SHG–Bank Linkage, assesses the microfinance role in decision-making, mobility, self-esteem, and participation in the community and uncovers the regional differences. The results tell us that there has been a huge increase in the number of women-led SHGs, the amount of savings has gone up, social participation has improved and the women beneficiaries have gained more self-worth. However, the problems of high interest rates, little financial literacy, documentation barriers, and regional inequalities persist. The study still maintains that microfinance is a major factor in women's empowerment but it needs to be part of a comprehensive, multi-faceted system to produce a lasting impact.

***Keywords**: Microfinance, Women's Empowerment, SHGs, MFIs, Financial Inclusion, Social Empowerment, India*

Introduction

In India, women, especially those belonging to the lower classes, still have limited access to formal financial services and face socio-cultural and economic barriers. The male-dominated society, the low literacy rate among women, and their limited movement outside the home have kept them away from the mainstream banking system. On the other hand,

financial inclusion and the empowerment of women have been mainly dependent on microfinance through Self-Help Groups (SHGs), Microfinance Institutions (MFIs), and cooperatives. The Self-Help Group–Bank Linkage Programme (SBLP) started by NABARD in the 1990s connected millions of women in rural areas to the formal banking sector. Traditional banks still have their limitations, but MFIs have shown to be good partners in giving microloans to villagers and often take care of the gaps left by bank

Microfinance is not just a financial help but a social transformation process. It gives the power of earning to women, improves their communication and negotiation abilities, and guarantees their participation in household and community decision-making. In addition, it uplifts their self-image. The above-mentioned relationship ought to be recognized by the decision-makers and development agencies so that financially supporting programs that are in line with women's needs can be developed. The current study investigates the role of microfinance in the empowerment of Indian women through social indicators such as decision-making power, mobility, self-assurance, and participation in the community. Regional disparities and the expanding influence of digital financial inclusion are also considered.

Statement of the Problem

Women, especially those who are less fortunate, still have insufficient access to financial services of the formal institutions despite the fact that the situation was intended to change through decades of great efforts. Microfinance has been the target of criticism for its failure to promote women's empowerment, and this has been even more evident during the time when its acceptance was widespread. When one considers the regional disparities, different levels of loan usage, and the problem of borrowers being over-indebted, sustainability questions arise. An in-depth analysis is required to assess the social impacts of microfinance and identify the aspects that render it ineffective in others. Therefore, the study intends to ascertain whether the microfinance interventions actually improve women's decision-making power, mobility, communicative and social skills, economic and social participation while at the same time recognizing the structural challenges such as high interest rates, low financial literacy, and bureaucratic inconveniences.

Research Gap

In India, microfinance has been the subject of extensive research, but there are still many unanswered questions. Most of the literature has pointed to the economic benefits as the primary focus, that is, income and asset creation. Social indicators of empowerment such as mobility, leadership, communication, community participation, and self-confidence have received comparatively less attention. Very few studies have made region-wise comparison of the empowerment outcomes systematically, though the disparities in this regard are very significant among Southern, Eastern, Northern, Central, and North-Eastern India. Moreover, the current literature hardly looks into the relationship between UPI, digital banking, and fintech, which are the digital platforms interacting with microfinance aided empowerment. A great number of studies have taken SHG as a single entity, thus overlooking the distinctions being made on the basis of group age, savings discipline, leadership structure, and training exposure. To sum up, limited research has been done on post–COVID–19 trends, even though the pandemic has caused such a significant impact on women's livelihoods and repayment patterns. The present study makes contributions towards the closure of these gaps by concentrating on social empowerment, regional disparities, and the usage of microfinance data from 2018 to 2024.

Literature Review

The link between microfinance and women's empowerment has been a subject of much discussion in the global and Indian settings. Kabeer (2005) states that microfinance makes it possible for women to have more control over the resources, to be more involved in the household decision-making process, and to move up socially. In their study, Pitt and Khandker (1998) report a similar conclusion regarding the empowering effect of microcredit on women's non-land assets, consumption capacity, and social involvement. Harper (2002) points to India's SHG–Bank Linkage Programme as a notable instance where micro-financing contributed to the empowerment of millions of rural women through access to credit, and thus motivated them to become business-active. According to NABARD (2023), 88% of SHGs (Self Help Groups) in India consist of women bringing out the gender-inclusive aspect of the program.

Swain and Wallentin (2009) proved by experiments that through microfinance women's decision-making, self-esteem, and participation in the community were all

positively affected. On the other hand, Chen (2008) claims that access to microfinance raises women's social security and negotiation power. Bateman (2010), nonetheless, opposing microfinance, states that it might result in poor people being trapped into a never-ending debt cycle; meanwhile, Sinha (2012) mentions that the exorbitant interest rates being applied by some MFIs are indeed a hindrance in the poverty battle. The World Bank (2021) is insistent that microfinance is most effective when combined with capacity-building programs such as financial literacy, enterprise development, and digital inclusion. In conclusion, the body of work indicates that microfinance with empowerment-supporting interventions and policies which create a conducive environment has the potential to greatly improve the socio-economic status of the poor women.

Methodology

The entire research process relied purely on secondary data. The secondary data that could be used included the Status of Microfinance Reports published by NABARD, various publications issued by RBI, the reports of the SHG Mission from the Ministry of Rural Development, studies conducted by the World Bank, and also some peer-reviewed journals specializing in microfinance and women empowerment. Data from the years 2018 to 2024 was reviewed in order to get a clear picture of the trends, challenge, and empowerment outcomes. The rise in the number of SHGs, the total amount saved, and the interregion disparities were all systematically displayed and analyzed to gauge the level of women's empowerment.

Tabulation and Interpretation

Table 1

Progress under SHG–Bank Linkage Programme (2020–21 to 2022–23)

(Numbers in lakh / ₹ crore)

Particulars	2020–21	2021–22	2022–23
Total SHG – Number (lakh)	112.23 (9.57%)	118.93 (5.97%)	134.03 (12.7%)
Total SHG – Amount (₹ crore)	37,477.61 (43.31%)	47,240.48 (26.05%)	58,892.68 (24.67%)
All Women SHGs – Number (lakh)	97.25 (10.11%)	104.05 (6.99%)	112.92 (8.52%)

All Women SHGs – Amount (₹ crore)	32,686.08 (40.16%)	42,104.77 (28.81%)	52,455.48 (24.58%)
Percentage of Women SHGs (%)	86.65	87.21	89.07

Source: (NABARD 2022-2023, n.d.).

Interpretation

1. Overall Growth of SHGs

The total number of SHGs increased from 112.23 lakh in 2020–21 to 134.03 lakh in 2022–23, indicating a consistent upward trend in the formation of groups. The sharpest growth (12.7%) occurred in 2022–23, indicating improved mobilisation under the NRLM and NABARD initiatives.

2. Significant Rise in Savings

SHG savings with banks rose steadily:

- ₹37,477.61 crore (2020–21)
- ₹47,240.48 crore (2021–22)
- ₹58,892.68 crore (2022–23)

Reflects:

- Better financial discipline
- Increased integration with banks
- Improved earning capacity of SHG members

3. Dominance of Women SHGs

Women SHGs form the absolute majority:

- 86.65% (2020–21)
- 87.21% (2021–22)
- 89.07% (2022–23)

This confirms that SHG–Bank Linkage remains overwhelmingly women-centric, strengthening the agenda of women's empowerment.

4. Strong Increase in Women's Savings

Savings of all-women SHGs rose from:

- ₹32,686.08 crore → ₹52,455.48 crore across 3 years

This growth demonstrates:

- Higher income from microenterprise activities
- Greater trust in formal financial systems
- Increased financial literacy

5. Implication

The steady increase in the number of women self-help groups and their significant contribution to total savings are clear indications that microfinance is still a powerful tool for women's socio-economic empowerment.

Table 2

Region-wise Progress of Savings-Linked SHGs with Banks (2020 – 21 to 2022 –23)

(Numbers in lakh / ₹ crore)

Region	2020–21 – No. of SHGs / Savings (₹ crore)	2021–22 – No. of SHGs / Savings (₹ crore)	2022–23 – No. of SHGs / Savings (₹ crore)
Northern	6,09,808 / 1,74,345	6,80,143 / 1,99,582	7,87,807 / 1,22,485
North Eastern	6,33,714 / 83,126	6,80,845 / 1,06,441	7,93,320 / 1,27,153
Eastern	31,22,424 / 7,74,912	32,43,980 / 13,58,595	39,30,551 / 17,42,499
Central	13,45,575 / 2,11,870	13,55,564 / 3,25,696	18,32,040 / 4,58,675
Western	15,50,176 / 3,74,023	16,88,451 / 3,27,691	19,27,560 / 5,41,611
Southern	39,61,703 / 21,29,485	42,44,070 / 24,06,043	41,31,805 / 28,96,845

Source :(NABARD 2022-2023, n.d.).

Interpretation

1. Southern Region Leads the Nation

The Southern region consistently shows:

- Highest number of SHGs (over fourcrore in all three years)
- Highest savings (₹28,96,845 crore in 2022–23)

This is due to:

- Early adoption of SHGs (Tamil Nadu, Kerala, Karnataka)
- Strong NGO and government support
- High financial literacy among women

2. Eastern Region Shows Fastest Growth

Savings jumped significantly:

- ₹7,74,912 crore → ₹17,42,499 crore

This indicates:

- Expansion of SHGs under NRLM
- Rising microenterprise activities
- Increased bank linkage

3. Central and Western Regions Strengthening

Both regions show:

- Moderate increase in the number of SHGs
- Significant improvement in savings

This reflects better outreach in states like Maharashtra, Gujarat, and Madhya Pradesh.

4. North and North-Eastern Regions Improving Gradually

These regions show:

- Lower SHG concentration
- Moderate growth in savings

Challenges include:

- Geographical constraints
- Lower population density
- Limited SHG maturity

Still, steady growth shows improvement in financial inclusion.

5. Key Observation

The data reflects regional differences:

- Southern & Eastern regions → Strong & mature SHG ecosystems
- Western & Central regions → Growing & expanding
- Northern & North Eastern regions → Developing but improving

This highlights the need for region-specific policy strengthening

The analysis carried out region-wise has revealed substantial differences between the areas. The southern region was number one throughout the whole analysis in terms of attending SHGs and savings, as it was the first to be accepted, has strong NGOs and government support, and women are financially literate. The Eastern region has the fastest growth rate in savings reflecting the NRLM expansion and microenterprise activities. The Central and Western regions have moderate increase in the number of SHGs along with substantial growth in savings that point to better outreach in the states of Maharashtra, Gujarat, and Madhya Pradesh. The Northern and North-Eastern regions are gradually realizing improvement but still suffer from challenges such as their difficult location, low population, and young SHG development. The implication of these findings is the necessity of region-specific policy support.

Discussion

The results support the view that microfinance has played a major role in the formation of self-help groups and the mobilization of savings, the strengthening of women's decision-making power, the improvement of mobility and social participation, the increase of self-esteem and the acquisition of negotiating skills, and the promotion of community involvement. The participation of women in the village-level committees, Gram Sabha meetings, health campaigns, and social welfare programs is more and more visible as a sign of collective empowerment. The provision of microcredit has also made it easier for the women to experiment with different kinds of livelihoods, such as dairy farming, sewing, running a small shop, food processing, and farming as an enterprise.

There is still no end to the difficulties. The empowerment results have been still limited by the high interest rates of some MFIs, over-indebtedness in some regions, the unstable income of borrowers affecting their repayment, the lack of entrepreneurial skills

training, and the digital and financial literacy gaps, and the banks' documentation process has been identified as another obstacle. The differences between the regions are still huge; Southern and Eastern regions show the best SHG development and savings habits while Northern and North-Eastern regions are the worst in this respect. The researchers conclude that although microfinance is an excellent empowerment tool it is still very much dependent on the region and thus needs specific measures to be taken to reap its potential fully.

Conclusion

Microfinance has significantly changed the lives of women in India's underprivileged society by making it easier for them to access financial services, empowering their decision-making, raising their mobility, and involving them socially. The SHG–Bank Linkage Programme which has received support from the government and financial institutions has been one of the main contributors to this change, as it has allowed millions of women in rural areas to gain the strength of the group, discipline in handling money, and the skills to start and run businesses. Nevertheless, limitations like borrowing at high rates, not having enough training, and inequalities among regions restrict total empowerment. It will take a combination of financial literacy, livelihood training, digital inclusion, and regulatory oversight to be able to realize the full empowerment potential of microfinance. Future research should look into the effects of digital microfinance, carry out longitudinal studies to evaluate the sustainability of the empowerment outcomes, measure the specific impacts on livelihoods, and propose region-specific policy frameworks.

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Investing for a Sustainable Future: Analysing the Role of FDI for India's Green Economy

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Abstract

UNEP defines green economy as low carbon, resource sufficient and socially inclusive. A core component of this is the renewable energy sector, countries all around the world are advocating for the use of renewable energy as it is a sustainable way to achieve the dual target of economic growth while keeping the environment safe. India is one of the world's fastest growing economy, and has ambitions of building a secure green economy. Foreign direct Investment (FDI) plays a crucial role in developing this renewable sector, Majority of the renewable expansion in the country has been possible with the help of FDI. This research paper aims to study the nature of FDI in India's renewable sector, how does it help India in achieving its goal of. The paper tries to analyse the opportunities and limitations related to the FDI in the sector and what can be done to make the prospect of investing in India's renewable energy more incentivized. Through a review of government reports, that of private organizations, articles on investment plans etc, this paper tries to carve out how FDI can be used to invest in a green India, ways in which it can optimize India's growth. In today's globalized world it is pertinent that India positive partnerships in form of FDIs which will not only lead to growth but also become a tool of economic diplomacy, truly making the investment for a sustainable India.

Keywords: *FDI, Renewable Energy, Solar Energy, India, Investment, Sustainable development*

I. Introduction

Sustainable development is defined as meeting the needs of the present without compromising the needs of the future, it has three pillars, economic, environmental and social. The economic aspect of sustainable development focuses on economic growth in a way that does not put a strain on the environment. Rapid industrialization has accelerated environmental degradation, intensifying challenges such as air pollution, land pollution, deforestation, etc.

The overuse of earth's natural resources has put a serious strain on the earth, the current situation is such that the Earth resources getting depleted faster than they can be rebuild, the Global Footprint Network has found that, people use up resources that earth take 1 year to rebuild in just seven months (Evans & Larsen, 2025). Since, industrial revolution earth's temperature has risen by almost 1.1C, a major reason of which is greenhouse gas emissions (Evans & Larsen, 2025). The heavy dependence on fossil fuels has been identified as major contributor to the greenhouse gas emissions, and the use of renewable sources of energy as an alternative to traditional forms of fuel have emerged, various countries are focusing on building infrastructures to harness renewable sources of energy namely solar, wind etc. Renewable energy is a key driver of sustainable economic development and an environmental necessity. However, the development of renewable energy infrastructure is very capital intensive and quite challenging particularly for developing economies (IEA,2021). The path for developing economies to build infrastructure would require foreign investments for not only capital needs but also for technological needs.

India has always maintained a positive interest in developing renewable energy resources. As one of the fastest growing economies of the world and faces a dual pressure of meeting its growing energy demands while simultaneously building an economy based on sustainable development. The country has always on global platforms made clear its commitment to renewable energy through initiatives like One Sun, One World, One Grid (OSOWOG). This initiative was proposed by India to interconnect renewable energy systems on a global level ("One Sun, One World, One Grid" Renewable Energy Project, 2023). Other than this India has made other commitments about reducing its carbon emissions and in expanding its use of clean energy, these policy commitments are made hard to achieve due to financial and technological constraints. Foreign Direct Investment (FDI) has emerged as a crucial tool for bridging the gap in renewable energy sector.

The objectives of this paper are threefold. First, it examines the significance of FDI in growing the renewable energy sector in India. Second, objective is to analyse existing policies that seek to promote FDI in renewable energy sector as well analyse the investment trends in the sector. Third, it investigates the challenges that exist in the sector and related policy implications, through addressing these issues this paper contributes to ongoing academic discussions on sustainable energy, green economy, the role of FDI in India's renewable sector and energy security.

Exisisting literature highlights a positive relationship between FDI and economic growth through channels like technology transfer, capital transfer, knowledge transfer etc. At a global scale FDI has been identified as key driver of expansion of renewable energy sector specially for developing economies. In the context of India research has shown that the country is eager to welcome FDI in the renewable sector and has introduced policies to the same effect, research shows how important FDI is for growth of India's energy sector. The paper contributes to the literature by offering a focused discussion on India's investment sector through the lens of policy analysis as well as throwing light on the challenges associated with sustaining FDI.

The paper has used a descriptive and analytical approach. The study relies on both primary and secondary sources of data, primary sources includes government reports. policy documents, reports of international organisations. The paper utilizes data from reports of government of India reports, Reports from ministry of new and renewable energy, Reserve Bank of India. Secondary sources aid in providing a more comprehensive picture as they helping in understanding broad trends and policy dynamic, the paper relies on them for more detailed and descriptive analysis of trends and challenges.

II. An overview of Renewable Energy sector in India

India in recent years has seen an exponential growth in the renewable energy sector, it has made strides specially in areas such as solar energy, bio -mass energy, hydroelectric power and wind energy. According to the Ministry of New and Renewable energy, IRENA has declared India holds 4th position in overall Renewable Energy Capacity (MINISTRY OF NEW AND RENEWABLE ENERGY | India, n.d.). The development of renewable sector also aligns with India's goals of supplying electricity to remote and rural areas, employment generation as well empowerment of women. India has a vision of generating 500 GW of installed power capacity from non-fossil fuel sources by 2030, in keeping with the commitment made at the COP 26(Press Information Bureau of India, 2025). The government of India has introduced several initiatives to promote renewable energy sector like national missions, increasing installing capacity, introducing more regulatory reforms as well increasing opportunities for investment in the renewable energy sectors.

There is no doubt that India has been doing well in the renewable energy sector but to achieve its ambitions huge amounts of capital is required. This is where the role of FDI is realized. Foreign investors can accelerate the development of a greener future by providing

access to long term capital, tools like pooled investment funds, sustainability-linked bonds and innovative green financing products can give a huge push to India's green economy (Invest India, 2024). FDI can help in accelerating the growth of India's green economy.

III. FDI in India's renewable sector: Policy, Trends and Significance

India has progressively liberalized foreign investment in the renewable energy sectors, the current policy framework allows for 100 per cent FDI in renewable sector under the automatic route. This policy proves that government has recognized the importance of FDI in the renewable energy sector. Trends in FDI inflows indicate a growing interest among foreign investors in investing in India, India's total foreign direct investment (FDI) inflows have grown to 8 per cent in FY 2024-25 as compared to 1 per cent in 2021, clearly showing an interest of investors in India's clean energy (Energitca India ,2025). The investment is highest in certain sectors like solar and wind are increasing, one of the reasons for this is governments policies like building solar parks and installing solar in houses for electricity needs, waiving inter-state transmission charges (Invest India). Also, the fact that India is performing so well on a global platform regarding harnessing energy from renewable resources increases investor confidence, an example of this would be the fact that India has recently emerged as third largest generator of solar power in the world.

FDI in renewable sectors has a multifaceted role, majority of the renewable expansion in the country has been possible with the help of FDI (Chawla & Kapoor, 2021). FDI does not only help in fulfilling capital needs but also helps with technology transfer, foreign investor often brings along with them advanced technologies and expertise that will help in making the renewable sector more sufficient. Investment is also often seen as a tool for economic diplomacy, India can improve its relationship with various countries by opening up its market to them, also India's global image will get a huge boost if its seen as a desirable place of investment, world bank has talked about tapping into investment into renewable energy sector. Apart, from that job opportunities will also increase manifold as investment will create a job market, another thing that India needs.

IV. Challenges

Despite improving the policy for FDI in the renewable sector the sector is plagued with problems, some of them are like regulatory uncertainty and non-payment of dues for power purchased, another is the fact that domestic electricity distributors are in poor financial

condition, supressing their capacity to buy power (IEEFA, n.d.). Other issues like grid instability, payment issues, gaps in policy implementation (Mathew, 2025). These issues become reason that despite having incentives there are still certain key issues that hamper investor confidence in the sector.

To improve and sustain the FDI in renewable sector such issues need to be addressed, solving such issues should be a priority and policy decisions should reflect a commitment to solve these issues, addressing such challenges require a coordinated policy efforts, improved regulatory efforts, solve policy gaps and put focus on ground work and stabilize institutional framework.

V. Conclusion

This paper has examined importance of FDI in India's renewable energy sector and it's role in building India's green economy. The analysis shows that FDI has contributed significantly to India's growing renewable sector and has provided capital and technology to sustain India's transition to a green economy. Foreign investment has proven to be indispensable given the scale of India's renewable energy ambitions and the capital and technology intensive nature of the sector.

However, to make India a desirable market for investment the structural and policy changes outlined in the paper must be addressed. Ensuring the fact that dues are paid, gird stability, strengthening policy regulations, solving policy gaps will lead to greater investor confidence. A supportive environment will ensure the investors that their investments will be fruitful and hence, incentivize the investments. India has a very profitable renewable energy market which if utilized correctly can prove to be a boon to the country, making itself the global market of FDI in the world can do wonders for India's growth.

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Green Digital Nudges and Investor Behaviour: Evidence from Digital Banking Platforms

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Abstract

The rapid expansion of digital banking in India has created new opportunities to integrate sustainability-oriented behavioural interventions into everyday financial decision making. This study investigates how green digital nudges—such as ESG score displays, colour coded indicators, and sustainability alerts—shape sustainable investment behaviour among retail investors. Drawing on Nudge Theory, the Technology Acceptance Model, and behavioural finance perspectives, the research examines the influence of investor awareness, ESG trust, perceived usefulness and responsiveness on sustainable investment intention. Using data collected from 300 digitally active retail investors, the findings reveal that perceived usefulness is the strongest predictor of sustainable investment intention, followed by green nudges and trust in ESG information. Mediation analysis confirms that investor responsiveness amplifies the effect of nudges. These results demonstrate that well-designed sustainability cues embedded in digital banking interfaces can meaningfully promote responsible investment behaviour when supported by trust, perceived utility, and user competence. The study offers theoretical contributions to digital nudging research and practical implications for financial institutions seeking to advance ESG-oriented investment behaviour through digital platforms.

***Keywords**: Green digital nudges; ESG investing; sustainable investment intention; investor responsiveness; digital financial literacy; digital banking; behavioural finance; Technology Acceptance Model; Nudge Theory*

1. Introduction

Digital transformation has reshaped investment behaviour by enabling real-time access to financial information through banking apps and fintech platforms. In this environment, green digital nudges—including ESG score displays, sustainability notifications, and colour-coded

eco-indicators—are increasingly used to guide investors toward responsible financial choices. Grounded in behavioural economics, nudges influence decisions through heuristics and contextual cues rather than rational analysis alone (Thaler & Sunstein, 2008). Prior research shows that investors now consider environmental responsibility and ethical performance in evaluating financial products (Bollen, 2007; Krueger, Sautner, & Starks, 2020). With India witnessing rapid growth in digital banking and rising interest in ESG investing, digital interfaces have become critical channels for communicating sustainability information. However, empirical evidence on how such nudges affect retail investor behaviour in India remains limited. This study addresses this gap by examining how green digital nudges shape investor awareness, trust, perceived usefulness, responsiveness, and intention to invest in sustainability-linked products.

2. Statement of Problem

The rapid expansion of digital banking in India has transformed the way retail investors access financial information and make investment decisions. As sustainability gains prominence in global financial markets, digital platforms have begun integrating green digital nudges—such as ESG scores, sustainability alerts, and environmental notifications—intended to guide investors towards responsible investment choices. While behavioural economics suggests that such nudges can meaningfully shape decision-making (Thaler & Sunstein, 2008), there remains limited empirical understanding of how retail investors in India actually perceive, interpret, and respond to these sustainability-oriented cues.

Existing research tends to focus on institutional investors' attitudes towards ESG factors (Krueger, Sautner, & Starks, 2020) or on the general impact of sustainable labelling on fund flows (Hartzmark & Sussman, 2019), with little attention to the everyday digital environments where individual retail investors operate. The role of trust, awareness, and perceived usefulness in shaping investor responses to sustainability cues within digital banking ecosystems has not been sufficiently explored. Moreover, digital financial literacy—a crucial determinant of how investors evaluate online information (Goyal & Kumar, 2021)—may significantly influence whether green nudges translate into meaningful investment intentions, yet this moderating relationship remains under-researched.

Therefore, there is a pressing need to systematically examine how green digital nudges influence investor cognition and behaviour, how investors interpret ESG-related information

in digital interfaces, and how individual differences in digital financial literacy shape behavioural outcomes. Hence, this study addresses these issues by empirically investigating the behavioural pathways through which green digital nudges affect sustainable investment decisions on digital banking platforms.

3. Review of Literature

3.1 Nudging and Behavioural Decision-Making

Thaler and Sunstein (2008) introduced the concept of nudge theory, demonstrating that small changes in choice architecture can meaningfully influence behaviour. Digital nudges leverage interface design—such as framing, ordering, labels, or defaults—to guide decisions without limiting freedom of choice.

3.2 Digital Finance and Investor Behaviour

Research highlights that digital banking adoption influences investment participation, perceived convenience, and trust (Laukkanen, 2016). Digital financial literacy enhances decision-making quality and reduces perceived risk (Goyal & Kumar, 2021).

3.3 Sustainable Finance and ESG Investing

Growing evidence indicates that sustainability cues significantly alter investor perception and valuation (Friede, Busch, & Bassen, 2015). Hartzmark and Sussman (2019) show that ESG labels influence fund flows regardless of financial performance. Sustainable investing is increasingly shaped by behavioural attitudes, values, and perceived environmental responsibility.

3.4 Digital Nudges for Sustainable Investing

Emerging studies demonstrate that digital sustainability indicators—such as carbon footprint data or environmental labels—affect consumer and investor choices (Egebark & Ekström, 2016). However, most research remains experimental; large-scale survey-based evidence from developing economies like India is scarce.

3.5 Research Gaps Identified

Despite the growing interest in sustainable finance, there is limited empirical evidence on how retail investors respond to digital green nudges such as ESG scores, alerts, and sustainability notifications. Indian research linking digital choice architecture with sustainable investment behaviour is also scarce, even though digital banking adoption is rising rapidly.

Moreover, existing studies do not offer an integrated model that connects nudges with key behavioural constructs such as trust, awareness, perceived usefulness, and investment intention. This study addresses these gaps through a structured, survey-based examination of investor responses to green digital nudges on banking platforms.

4. Research Objectives

Primary Objective

To examine how green digital nudges influence investor behaviour on digital banking platforms.

Specific Objectives

1. To assess investor awareness of green digital nudges.
2. To evaluate how ESG scores, alerts, and sustainability notifications shape investor trust.
3. To analyse the influence of perceived usefulness of green nudges on investment intention.
4. To examine investor responsiveness as a predictor of sustainable investment behaviour.

5. Theoretical Framework and Hypotheses Development

The influence of green digital nudges on investor behaviour is grounded in Nudge Theory, Trust Formation Theory, Technology Acceptance perspectives, and Behavioural Finance. Together, these frameworks explain how digital cues, information design, cognitive processing, and user capabilities shape sustainable investment decisions on digital banking platforms.

5.1 Nudge Theory

Nudge Theory asserts that subtle changes in choice architecture—such as labels, alerts, ESG indicators, or coloured cues—can guide decisions without limiting choice (Thaler & Sunstein, 2008). In digital banking, green nudges simplify complex sustainability information and direct investor attention toward responsible options by activating intuitive heuristics (Weber & Johnson, 2009).

H1: ***Awareness of green digital nudges positively influences recognition of sustainable investment options.***

5.2 Trust Formation Theory

Trust is essential in digital financial decision-making, especially when investors rely on platform-provided ESG information. ESG ratings, alerts, and sustainability notifications act as trust signals, enhancing confidence in responsible investment options (Gefen, Karahanna, & Straub, 2003). Prior studies show that transparent sustainability indicators strengthen investor trust and shape investment choices (Hartzmark & Sussman, 2019).

H2: ***ESG scores, alerts, and sustainability notifications positively influence investor trust in sustainable financial products.***

5.3 Technology Acceptance and Perceived Usefulness

Perceived usefulness is a central predictor of digital adoption (Davis, 1989). When green nudges are viewed as timely and helpful, they reduce information-processing effort and enhance willingness to engage with sustainable investment products. Empirical work supports that sustainability cues strengthen behavioural intention when they aid decision-making (Friede, Busch, & Bassen, 2015).

H3: ***Perceived usefulness of green digital nudges positively influences sustainable investment intention.***

5.4 Behavioural Finance and Investor Responsiveness

Behavioural finance suggests that investors rely on heuristics when evaluating financial choices under uncertainty (Kahneman, 2011). Investor responsiveness—active engagement with sustainability cues—strengthens the effect of nudges and translates awareness into behavioural intention (Egebark & Ekström, 2016).

H4: ***Investor responsiveness mediates the relationship between digital nudges and sustainable investment behaviour.***

6. Methodology

6.1 Research Design

The study adopts a descriptive and causal quantitative design to examine how green digital nudges shape sustainable investment behaviour. A structured survey approach enables

systematic measurement of behavioural constructs grounded in technology acceptance and behavioural finance research (Davis, 1989; Gefen, Karahanna, & Straub, 2003). The design also supports testing of mediation and moderation effects to understand how nudges influence investor decisions.

6.2 Population and Sampling

The target population consists of Indian retail investors who use digital banking or investment platforms. A sample of 300 respondents will be selected through purposive and convenience sampling to ensure representation of digitally active investors, a suitable approach in emerging fintech environments (Goyal & Kumar, 2021).

6.3 Data Collection

Data will be collected using an online structured questionnaire administered. Responses will be recorded on a 5-point Likert scale to assess awareness, trust, perceived usefulness, responsiveness, digital literacy, and investment intention. Online administration ensures accessibility and efficiency among digitally engaged participants (Laukkanen, 2016).

6.4 Variables and Measurement

The **independent variable** is *Green Digital Nudges*, captured through items on ESG visibility, sustainability notifications, and green alerts. *Investor Responsiveness* serves as the **mediator**, and *Sustainable Investment Intention* is the **dependent variable**. All constructs draw on validated measures from nudging, digital trust, and sustainability communication research (Thaler & Sunstein, 2008; Hartzmark & Sussman, 2019).

6.5 Analytical Tools

Analysis will be conducted using **SPSS**. Descriptive statistics will summarise sample characteristics. **Cronbach's alpha** will test scale reliability, and **CFA** will validate measurement models. **Multiple regression** will assess direct effects. **PROCESS Macro Model 4** will examine mediation, effect of green nudges on investment intention. These tools effectively capture behavioural mechanisms within digital financial contexts.

6.6 Ethical Considerations

Participation will be voluntary with informed consent, ensuring anonymity and confidentiality. No personal identifiers will be collected, and data will be used exclusively for academic purposes, adhering to ethical standards for behavioural research.

7. Results

This section presents the empirical findings based on responses from 300 retail investors using digital banking platforms in India. Results are organised into (i) descriptive statistics, (ii) reliability outcomes, (iii) correlation matrix, and (iv) hypothesis-testing models including regression and mediation.

7.1 Descriptive Statistics of Study Variables

Table 1 summarises mean scores and standard deviations for all constructs: Green Digital Nudges (GDN), Investor Awareness (IA), ESG Trust (ESGT), Perceived Usefulness (PU), Investor Responsiveness (IR), Digital Financial Literacy (DFL), and Sustainable Investment Intention (SII).

Table 1

Descriptive Statistics of Study Variables (N = 300)

Variable	Mean	SD	Minimum	Maximum
Green Digital Nudges (GDN)	3.82	0.63	1.90	4.95
Investor Awareness (IA)	3.74	0.70	1.85	4.92
ESG Trust (ESGT)	3.67	0.65	1.78	4.88
Perceived Usefulness (PU)	3.86	0.61	1.90	4.96
Investor Responsiveness (IR)	3.72	0.68	1.75	4.89
Digital Financial Literacy (DFL)	3.66	0.68	1.65	4.90
Sustainable Investment Intention (SII)	3.87	0.62	1.98	4.97

Note. SD = Standard Deviation.

7.2 Reliability Analysis

Cronbach's alpha coefficients were computed to determine internal consistency. All constructs demonstrated excellent reliability (> .80), exceeding the recommended minimum of .70 (Nunnally, 1978).

7.3 Correlation Matrix

Pearson correlation coefficients were calculated to examine the relationships among variables. All constructs were significantly and positively correlated ($p < .01$), indicating conceptual alignment.

Table 2

Correlation Matrix of Study Variables

Variables	GDN	IA	ESGT	PU	IR	DFL	SII
GDN	1	.52**	.47**	.49**	.44**	.31**	.51**
IA		1	.55**	.48**	.42**	.29**	.46**
ESGT			1	.53**	.50**	.32**	.49**
PU				1	.56**	.38**	.58**
IR					1	.41**	.62**
DFL						1	.45**
SII							1

Note. p < .01 (two-tailed).

7.4 Regression Analysis for Direct Effects

A standard multiple regression analysis was conducted to examine the extent to which Green Digital Nudges (GDN), Investor Awareness (IA), ESG Trust (ESGT), and Perceived Usefulness (PU) predict Sustainable Investment Intention (SII). The model was statistically significant, $R^2 = .56$, $F(4, 295) = 93.41$, $p < .001$, indicating that the predictor variables collectively explain 56% of the variance in sustainable investment intention.

Table 5

Multiple Regression Predicting Sustainable Investment Intention (N = 300)

Predictor Variable	β	t	p
Green Digital Nudges (GDN)	.21	4.32	< .001
Investor Awareness (IA)	.16	3.18	.002
ESG Trust (ESGT)	.19	3.89	< .001
Perceived Usefulness (PU)	.33	6.84	< .001
Model Summary	**R^2 = .56**	**F(4, 295) = 93.41**	**p < .001**

Note. Standardised beta coefficients are reported.

Perceived usefulness emerged as the most influential predictor of sustainable investment intention, followed by green nudges and trust.

7.5 Mediation Analysis

To examine whether Investor Responsiveness (IR) mediates the relationship between Green Digital Nudges (GDN) and Sustainable Investment Intention (SII), the study employed PROCESS Macro Model 4. The mediation model demonstrated statistically significant pathways.

Table 6

Mediation Analysis of Investor Responsiveness

Path	**Effect**	**SE**	**95% CI (LL–UL)**
GDN → IR	.39	.06	.27 – .50
IR → SII	.41	.05	.30 – .51
Indirect Effect (GDN → IR → SII)	**.16**	**.04**	**.08 – .23**

Note. Confidence intervals derived from 5,000 bootstrap samples.

The indirect path is significant because the confidence interval does not include zero, confirming that investor responsiveness mediates the influence of green nudges on sustainable investment intention.

Objective 1 / H1: Results show a significant positive relationship between green digital nudges and investor awareness ($r = .52$, $p < .01$), and awareness also predicts sustainable investment intention ($\beta = .16$, $p = .002$). Thus, **H1 is supported**, indicating that awareness of green nudges enhances recognition of sustainable investment options.

Objective 2 / H2: ESG Trust is strongly associated with both green nudges ($r = .47$, $p < .01$) and investment intention ($\beta = .19$, $p < .001$). Hence, **H2 is supported**, confirming that ESG scores and sustainability notifications strengthen investor trust.

Objective 3 / H3: Perceived usefulness shows the strongest predictive power ($\beta = .33$, $p < .001$) and correlates highly with investment intention ($r = .58$, $p < .01$). Therefore, **H3 is strongly supported**, affirming that useful sustainability cues drive intention.

Objective 4 / H4: Mediation analysis reveals that investor responsiveness significantly mediates the influence of nudges on investment intention (indirect effect = .16, CI [.08, .23]). Thus, **H4 is supported**, demonstrating that active engagement with nudges enhances sustainable investment behaviour.

8. Discussion and Implications

8.1 Discussion of Findings

The study demonstrates that green digital nudges significantly influence sustainable investment intention, with perceived usefulness emerging as the strongest predictor. This reinforces the Technology Acceptance Model, which emphasises usefulness as a core driver of digital adoption (Davis, 1989). Green nudges and ESG trust also play meaningful roles, supporting Nudge Theory's claim that subtle cues and transparent information can shift decision-making without restricting choice (Thaler & Sunstein, 2008). The mediating role of investor responsiveness aligns with behavioural finance perspectives, indicating that active engagement with digital cues strengthens their behavioural impact (Kahneman, 2011).

8.2 Theoretical Implications

The study extends Nudge Theory into digital financial ecosystems by demonstrating that green digital nudges can effectively guide investors toward sustainable choices. It also strengthens TAM by confirming the critical role of perceived usefulness in sustainability-oriented decision-making. The integration of trust and investor responsiveness enriches behavioural finance models by highlighting cognitive and psychological mechanisms underlying sustainable investment behaviour.

8.3 Managerial Implications

Banks and fintech firms should prioritise clear, credible, and useful digital sustainability cues, as these strongly influence investor intention. ESG scores, green labels, and sustainability alerts must be presented in simple and meaningful formats to build trust and engagement. Platforms should also encourage responsiveness through interactive sustainability dashboards or personalised green notifications. Further, enhancing digital financial literacy through targeted education initiatives can amplify the impact of nudges and broaden participation in ESG investing.

8.4 Policy Implications

Regulators such as SEBI and the RBI may consider standardising the display of ESG information on digital platforms to improve transparency and reduce greenwashing. Policies promoting digital financial literacy can strengthen sustainable investment behaviour, helping align national financial systems with broader environmental and climate goals (Krueger, Sautner, & Starks, 2020).

9. Conclusion

The study demonstrates that green digital nudges embedded in digital banking platforms significantly influence sustainable investment behaviour among Indian retail investors. Consistent with the Technology Acceptance Model (Davis, 1989), perceived usefulness emerged as the strongest driver of sustainable investment intention, while ESG cues such as score displays and sustainability alerts also guided decisions in line with Nudge Theory (Thaler & Sunstein, 2008). The mediating effect of investor responsiveness reflects behavioural insights showing that engagement with cues enhances their impact (Kahneman, 2011). Overall, the results confirm that well-designed digital nudges, supported by trust and comprehension, can meaningfully promote responsible investment behaviour.

10. Limitations, and Future Research

This study is constrained by certain limitations that should be acknowledged. Reliance on self-reported survey data may introduce common-method bias and fails to capture the nuances of real-time investment decisions, while the exclusive focus on Indian retail investors limits generalisability to markets with different levels of digital adoption and ESG awareness. The use of perception-based measures rather than controlled experiments restricts the strength of causal inference, and the cross-sectional design does not allow assessment of behavioural change over time. Moreover, the absence of actual transaction data limits the depth of behavioural insights. These limitations offer several avenues for future research. Experimental and longitudinal approaches could generate stronger evidence on how sustained exposure to green nudges shapes actual investment decisions. Extending investigations to institutional investors or digital-native cohorts such as Gen Z may reveal distinct behavioural patterns. Cross-country studies could illuminate how cultural and regulatory contexts influence responsiveness to green digital nudges. With the growing integration of AI in fintech platforms, examining the role of personalised, algorithm-driven nudges presents a promising direction.

Future work may also incorporate additional moderating factors—such as environmental values, risk perceptions, and financial wellbeing—to develop a more holistic understanding of sustainable investment behaviour in digital contexts.

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Dr.BGR
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The Financialization of Regenerative Time

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Abstract

In the process of restoring our environment revolves majorly around activities such as tree planting, regeneration of land and its fertility and community cleanups for sustaining our ecological balance. The concept of monetizing regenerative activities and rewarding individuals for spending time on activities restoring environment through mechanism such as carbon credits, sustainable bonds, tokens or community based rewards has gained attention. This study explores the perceptions of individuals regarding the motivational and practical implications of monetizing regenerative activities. Based on 170 responses out of 200, the research reveals that a majority of respondents consider regenerative activities highly important. This support the idea of recognizing or rewarding time spent on environmental regeneration. While many believe that monitory incentives may increase participation. Many also express concerns that such rewards could shift motivations away from genuine environmental care. Government emerges as the preferred authority to manage these systems and findings suggest that monetizing regenerative time can support sustainability efforts but must be implemented carefully to maintain ethical integrity.

***Keywords**: Regenerative finance, carbon credits, people's perception, environmental restoration, sustainable incentives, regenerative time.*

Introduction

The global ecological issues have drawn interest towards regenerative economic models with a goal of restoring environmental health, social justice and durability. Regenerative finance refers to the financial approach of transforming the financial system itself for sustainability and equity. Whereas financialization of regeneration Environmental degradation, climate change, and resource depletion have made regenerative practices more urgent than ever. Regeneration refers to activities that restore ecosystems, rebuild soil, increase

biodiversity, and improve community well-being. As the scale of environmental damage grows, traditional volunteer-driven approaches are no longer sufficient. To address this gap, a new concept is emerging: **financializing regenerative time**. This means attaching monetary or credit-based value to the time spent performing environmental restoration.

The carbon credit market was started in many countries to reduce the harmful gases in the atmosphere. Many countries and companies get carbon credit permits, and those permits allow them to release carbon dioxide for the specific amount of carbon permits/certificates purchased. If a company reduces carbon emissions which the company was already producing using new methods or technology, then the company can sell credits to other countries or companies. The carbon credit market leads to opportunities and challenges in developing countries. On one hand, it uses eco-friendly projects to attract investment like cleaner farming, solar power, and reforestation. This project helps to create jobs and improve local living conditions. On the other hand, many developing companies face the problem of high cost, complex Rules, and limited technical knowledge. This project is helpful to the environment. Hence the research revolves majorly around regenerative finance and carbon credit system

Review of Literature

Woo (2021) et.al, Completed a Study About Carbon Credit Market: Review. The study aims to evaluate the building sector's or look more clearly stated - the role of the building sector, or assess how the building sector interacts with the carbon credit markets, as part of the assessment of carbon credit markets in integrating block chain technology into the digital MRV system. The review process used databases such as Web of Science, Science Direct, and ProQuest in examining studies conducted between 2008–2020. This study argues that if there is a transparent MRV system to quantify and verify the carbon emission reductions, the building sector has no trustful system, in spite of the auditing programs having a BEP. The study suggests they could offer a reliable system, potentially integrate with smart metering, Blockchain-based digital MRV system, and carbon tracking would be auditable. Implication: This would encourage further participation in carbon credit markets that would address the extent to which these greenhouse gas (GHG) emission reductions could also be monetized. the final discussion of the study is about climate finance mechanisms, and Blockchain-enabled report are a good way forward to close the gap on building energy performance.

Wyte (2016) et.al Woo (2021) et.al, Study about Carbon Credit Market: Review the objective of the study is to evaluate the can benefited from existing carbon accounting standard and emerging global carbon market. The methodology is conducted using databases such comparative evaluation of carbon market mechanism (CDM, JI.ETS, voluntary markets) and NDC framework and policy analysis. The study finds accounting accounting complexity, leakage and performance issue. The study suggests support inclusion in voluntary and the nationally determine contribution (NDC) and compliance market. The study that Impact: NDS provide a new opportunity for forest, based carbon project and voluntary market the conclusion of the study is about viable participants in carbon credit trading and improved accounting now position for forestry project as credible contribution to emission reduction.

Caiado (2017) et.al, Study about Carbon Credit Market: Review The objective of the study is Electronic Equipment (WEEE) in Brazil, drawing analogies with the carbon credit market as a policy tool for environmental sustainability and the feasibility and potential of the Reverse Logistics Credits (RLC) market for Waste Electrical. The methodology is conducted using eight senior stakeholders from the electronics industry involved in qualitative case study approach with semi-structured .the study find accepted alternative to comply with environmental legislation, Participants acknowledged the RLC market as a promising and despite lacking specific legal backing .the study suggest ensure broader industry, Legal frameworks should be developed to support RLCs formally and incentive and guidelines must be reinforced to expand the market . The conclusion of the study is about offering a viable complement to traditional environmental policy tools RLC market has strong potential to enhance WEEE management and environmental compliance in Brazil.

Büscher & Fletcher (2015) – "Accumulation by Conservation" This research aimed to evaluate how conservation becomes linked with profit-making industries. Using a political–economic analytical approach, the authors found that corporate-led conservation often benefits private entities more than local communities. The study highlighted risks of inequality and displacement. They suggested shifting to community-centered conservation models. The conclusion emphasized that conservation should not be dominated by financial gain but must ensure social justice and ecological balance.

Li Xu (2023) Journal of Cleaner Production: Evaluating and prioritizing the carbon credit financing risks and strategies for sustainable carbon markets in China. The objective of the study is to assess carbon credit financing risks and prioritize mitigation strategies to support the development of sustainable carbon markets in China. Statistical Tools used are Fuzzy Analytical Hierarchy Process (FAHP) and Fuzzy VIKOR (FVIKOR) methods are used for risk assessment and strategy prioritization. Findings of the research were that Regulatory, financial, and operational risks are identified as the most significant challenges in China's carbon credit financing system. Suggestions were that Mitigation should focus on building stakeholder relationships, ensuring financial stability, and increasing market transparency. To conclude, effective managing is vital for the long-term success and efficiency of China's carbon markets and for achieving national and global climate goals.

Kosoy & Corbera (2010) – "Payments for Ecosystem Services and the Financialization of Environmental Governance" The paper aimed to evaluate the effectiveness of PES programs in environmental governance. Using mixed-method field data and stakeholder interviews, the authors found that PES improves income for communities but may create financial dependency. The study highlighted the risk of shifting motivation from stewardship to money. They suggested participatory decision-making and transparent pricing mechanisms. The authors concluded that PES should balance financial incentives with ecological ethics.

Bowen & Fankhauser (2011) – "The Carbon Price: A Key Policy Tool" The objective of this study was to assess carbon pricing as a climate policy instrument. Using econometric models and carbon market data, the authors found that stable pricing effectively reduces emissions. However, inconsistent pricing weakens impact. They suggested maintaining steady price floors and transparent monitoring. The study concluded that carbon pricing is useful but must be carefully regulated for long-term environmental benefit.

Flynn (2022) – "Blockchain-Based Incentives for Ecological Restoration" Flynn's study aimed to analyse digital token-based systems for ecological restoration. Using pilot project evaluation and stakeholder feedback, the research found that blockchain incentives increase transparency and traceability of regenerative work. However, technological barriers exclude some participants. The author suggested simplifying digital platforms and improving accessibility. The study concluded that blockchain-supported regenerative finance is promising but must be inclusive and user-friendly.

Objectives of the Study

- To analyse youth awareness of financialized regenerative systems such as carbon credits and time banking.
- To understand perceptions regarding rewarding regenerative time through financial incentives.
- To analyse the awareness and perception of carbon credits among different demographic groups in developing economies.
- To identify the barriers and opportunities for active participation in carbon credit trading in India.

Research Design

- **Type of Research**: Descriptive research using the survey method.
- **Data Source**: Primary data collected through a questionnaire and using the secondary data from the research papers already published.
- **Sampling Method**: Convenience sampling.
- **Sample Size**: 240.
- **Tools for Analysis**

Data Analysis

#Figures and interpretations ..label figures as 1,2,3..it must match the order of findings..jus consider 5-6 questions, relevant to findings and suggestion and prep analysis for tht..ill share u 2 excel sheets use them and prep

Findings

1. Awareness: A majority of respondents have not heard about systems like carbon credits and its awareness is moderate, meaning more education is required.
2. Participation: Financial rewards are widely supported as a way to promote participation.
3. Management: Government is the most trusted manager, followed by mixed/hybrid management.
4. Behavioural Intent: Respondents show interest in reducing their personal carbon footprint if incentivized through credits, indicating potential market readiness.
5. Fear: The biggest fear is motivation shifting from environment to money.

Suggestions

1. Strengthen Awareness Programs: Many respondents were unsure about concepts like carbon credits and time banking. Educational workshops, student campaigns, and community seminars can help spread awareness about regenerative finance systems.
2. Government-Led Frameworks: Since most participants suggested government control, policymakers should design transparent, accountable systems for tracking and rewarding regenerative time.
3. Policy Incentives: The Government must offer fiscal incentives or tax relief in terms of encouraging lower-income households' participation in the carbon credit market.
4. Incentive Models Focused on Long-Term Commitment: Rewards should not shift motivation purely toward money. Systems must balance financial incentives with environmental responsibility.
5. Ethical Guidelines for Regenerative Finance: Monetary incentives must be accompanied by strong ethical frameworks to prevent exploitation, green washing, or over-financialization.
6. Pilot Programs Before Full Implementation: Government bodies can run small-scale pilot models to test the feasibility of financializing regenerative time before national rollout.

Conclusion

The study reveals that young respondents overwhelmingly view regenerative and environmental activities as highly important for society. Most participants support the idea of rewarding individuals for the time they invest in restoration work, reflecting a positive attitude toward the financialization of regeneration. While financial incentives can motivate broader participation, respondents also expressed concerns about ethical implications and the risk of shifting motivations from environmental responsibility to monetary gain. The study shows that the carbon credit market also offers promising opportunities in emerging economies like India. This is possible if there are economic incentives, information campaigns, and policy support. By closing knowledge gaps and eliminating affordability issues, India can strengthen its position in the global carbon market while also supporting sustainable development.

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Investor Confidence and Financial Advisory Services: Implications for Investment Decisions

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Abstract

Financial advisory services are crucial in providing financial advice to investors. Such services are important in that they increase the level of financial literacy, decrease behavioural biases, and increase the investor confidence, thus the wealth creation in the long term. The objective of this research is to analyse how financial advisory service influences investment decision- making and more importantly how financial literacy and investor confidence affect investment decision-making. The main aim of the research is to examine the impact of professional financial advice on the quality of the decisions and the level of confidence among the investors. The descriptive research design was used and primary data was gathered using a questionnaire that constituted 79 investors using five point Likert scale. The statistical data was analysed by applying reliability analysis, correlation, t-test, ANOVA and multiple regression using SPSS, the findings indicated that financial advisory services are of great significance to financial literacy as well as investor confidence that positively affect investment decision-making. Financial literacy turned out to be a powerful predictor and an investor confidence partially mediated its effect on investment decisions. According to the study, the advisory firms must intensify the investor education programs, implement open communication methods, and use the digital advisory tools to enhance the decision outcomes even more.

***Keywords**: Financial Advisory services, financial literacy, investor confidence, investment decision-making*

1. Introduction

The increasing sophistication of the professional financial market combined with the pace of technological development and the rise of more investment options has brought about

the heightened necessity of professional financial advisory services. Information overload, behavioral bias, and lack of financial literacy are some of the challenges that individual investors are prone to face and hence influence the quality of their investment decision negatively. Financial advisory services are very important in dealing with such challenges through offering a structured guidance, risk analysis, portfolio planning, and knowledgeable market analysis. Such services help investors to make more informed decisions about their investments as a long-term financial objective. There are still gaps in the knowledge about the effectiveness of the services of this profession in changing behavior and decision-making among investors, although there is no clear understanding of how financial literacy and investor confidence in the services of financial advisers can positively affect this investment decision- making process. Differences in the demographics, experience and perception of credibility in advisory by the investors also complicate this relationship. Available literature has mostly focused on the financial literacy and investment behavior among the developed markets or in banking institutions, but little has been done regarding the specialty financial consultancy firms within the Indian context. In addition, the impact of the investor confidence mediating the financial advisory services and investment decision at the firm level has not been studied in depth. It is proposed that this gap would be filled in the present study by analyzing how financial advisory services can influence the process of investment decisions making, and how these two aspects bring together to make an effective investment decision. The implications of the findings are valuable to both the advisory firms, policymakers and investors, because the findings give them insights on how they can enhance their advisory practice, foster investor confidence and encouragement of rational involvement in capital markets.

2. Review of Literature

Brown et al. (2020), The study sought to determine whether financial advice alters investment behavior and how it influences the composition of household portfolios. The paper suggests a two-step process: advice boosts client confidence and knowledge, and that confidence in turn influences investment decisions. The authors point out that in order to determine why some advised households adhere to recommendations while others do not, it is essential to gauge client confidence. This lends support to the idea that investor confidence is modeled as the behavioral mechanism that connects investment decisions and advisory services.

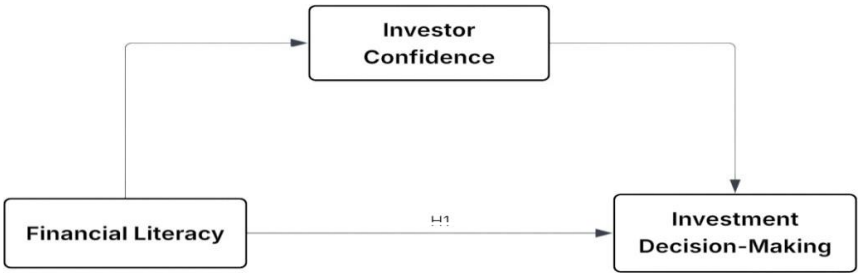
Yu (2016),Investor sentiment and confidence measures were examined to determine their impact on stock-market behavior and decision-making. The paper summarizes sentiment/confidence effects on participation, timing, and risk appetite. Yu emphasizes that sentiment/confidence is not noise; it changes how investors make decisions. Advisors and educators should track client sentiment/confidence and objective knowledge, according to the review. These findings support investor confidence as a key mediator of advisory input-to-investment choices.

Baker & Wurgler (2006), The study's goal was to investigate the relationship between investor sentiment—a market-level equivalent of personal confidence—and the cross-section of stock returns and, consequently, investor behavior. The authors demonstrate how sentiment impacts timing and allocation choices overall and how waves of sentiment disproportionately impact securities that are difficult to value. According to the study, in order to assist clients in avoiding sentiment-driven misallocations, advisors need to control client confidence and sentiment. Theoretical and empirical support for considering investor confidence as a mediator between advice/knowledge and investment decisions can be found in Baker and Wurgler's work.

Remund (2010), The study's objectives were to provide a more precise conceptual definition of financial literacy and to suggest a measurement framework. The paper identifies knowledge, skills, attitudes, and behaviors as essential elements of literacy by synthesizing definitions from various fields. The author suggests incorporating numeracy abilities, decision-making confidence, and an understanding of fundamental concepts (interest, inflation, and risk) into survey instruments. This conceptual clarity aids researchers in creating survey questions that accurately measure financial literacy, an independent variable.

Guiso et al. (2005), The study investigated how trust, a key component of investor confidence, affects stock-market participation across countries and individuals. The authors argue that people only invest when they trust markets and institutions because lack of trust increases the subjective risk of being cheated. Financial literacy leads to market participation through confidence/trust, according to the paper. Rebuilding trust through policy or advice that increases perceived fairness and protection improves participation, the authors conclude. This study supports investor confidence as a practical mediator between knowledge/advice and investment behavior.

3. Conceptual Framework



- **Independent Variable - Financial Literacy**

The financial literacy is the degree or level of understanding and knowledge about the financial concepts, products and investment choices which make investors make a sound investment choice.

- **Mediating Variable - Investor Confidence**

Investor confidence is a measure of the confidence and self belief of investors in being able to judge the information about investing and make good decisions concerning investing.

- **Dependent Variable Investment Decision-Making**

Investment decision making is a process where investors consider the available investment options and make appropriate decisions depending on the level of risk, return, and financial objectives.

4. Research Methodology

A descriptive research design is used to undertake this study. The primary data were gathered individually among the financial advisory sector individual investors who undergo the services of financial advisors. The sampling methodology used in the research was the convenience sampling and the sample size was the respondents who were chosen due to their availability. Financial literacy, investor confidence, and investment decision-making were measured using a self-structured questionnaire. The data analysis tools utilized are frequency analysis, mean analysis and multiple linear regression analysis. The demographic variables, which were taken into account in the study, are age, gender, educational qualification, occupation, and annual income. The study independent variable is financial literacy, mediating variable is investor confidence and dependent variable is investment decision-making.

5. Data Analysis and Interpretation

5.1 Reliability Analysis

Table no. 5.1.1 Reliability analysis

Reliability Statistics	
Cronbach's Alpha	N of Items
.935	15

The table 5.1.1 Shows the reliability analysis of the research instrument presents Cronbachs alpha of 0.935 with 15 items, which is an excellent internal consistency. This implies that the questions that are contained in the questionnaire remain very consistent in that construct that is under measurement and in this case the question is under investment decision-making, financial literacy as well as investor confidence. When a Cronbachs alpha exceeds 0.9, then it indicates that the instrument itself is very reliable and the responses received can be regarded as reliable to be used in further statistical calculations.

5.2 Frequency Analysis

Table no.5.2.1: Demographic Profile of Employees

Demographic Variable	Category	Frequency	Percentage (%)
Age	Below 20	2	2.5
	21–30	34	43.0
	31–40	25	31.6
	41 & Above	18	22.8
	Total	**79**	**100.0**
Gender	Male	47	59.5
	Female	32	40.5
	Total	**79**	**100.0**
Year of Investment Experience	Less than 1 Year	28	35.4
	1–3 Years	38	48.1
	More than 3 Years	13	16.5
	Total	**79**	**100.0**

Educational Qualification	Undergraduate	26	32.9
	Postgraduate	41	51.9
	Others	12	15.2
	Total	**79**	**100.0**
Occupation	Business	20	25.3
	Employee	42	53.2
	Investor	17	21.5
	Total	**79**	**100.0**
Monthly Income (₹)	Below 25,000	4	5.1
	25,001–50,000	25	31.6
	50,001–75,000	30	38.0
	75,001 & Above	20	25.3
	Total	**79**	**100.0**

The Table 5.2.1shows the frequency analysis reveals that the majority of respondents belong to the 21–30 age group and are predominantly male. Most investors possess one to three years of investment experience and hold postgraduate qualifications. A large proportion of respondents are salaried employees with a moderate monthly income level. This demographic profile indicates that young, educated, and working individuals form the major segment of investors using financial advisory services and participating in investment activities.

5.3 Multiple Regression Analysis

Table no.5.3.1 Impact of financial literacy on investor confidence

Model	Co eff	se	t	p	LLCI	ULCI	R-sq
Constant	4.2742	1.2550	3.4057	.0011	1.7751	6.7732	.6000
Financial Literacy	.7692	.0716	10.7473	.0000	.6267	.9117	

As shown in Table 5.3.1, there is a statistically significant and positive effect on investor confidence which is caused by financial literacy. Regression result shows that the financial literacy is a significant predictor of investor confidence ($\beta = 0.7692$, $p < 0.001$) with 60% of variance in investor confidence ($R^2 = 0.6000$). This indicates that the increased the financial literacy, the more the investor confidence.

Table no.5.3.2 Impact of investor confidence on Investment decision making

Direct effect of X on Y					
Effect	**se**	**t**	**p**	**LLCI**	**ULCI**
.5538	.1106	5.0069	.0000	.3335	.7741

Table 5.3.2 indicates positive effect of investor confidence on investment decision-making is significant. The direct relationship between investor confidence and the decision made about investment is statistically significant ($\beta = 0.5538$, p 0.001) and this means that highly confident investors make sound and timely investment decisions.

6. Conclusion

Investor confidence plays a crucial role in shaping effective investment decision-making in today's complex financial environment. The findings of the study highlight that financial literacy significantly enhances investors' confidence, which in turn improves the quality of investment decisions. Investors who possess adequate financial knowledge are better equipped to understand financial information, assess risks, and utilize financial advisory services effectively. Strengthening financial literacy helps reduce uncertainty and fear associated with investments and encourages informed participation in financial markets. Overall, the study concludes that improving financial literacy and investor confidence not only supports better individual investment outcomes but also contributes to a more informed, confident, and sustainable investment ecosystem.

7. Theoretical and Practical Implications

The theoretical contribution of the current study is significant as it will create a clear relation to the combination of financial literacy, investor confidence, and investment decision making in the financial advisory industry. By identifying the mediating role of investor

confidence in the study, the study expands the current financial literacy and behavioral finance literature as it reveals how financial knowledge may be translated into actual investment behavior in terms of confidence. Practically, the results indicate that the financial literacy of investors can be significantly increased to increase their confidence and the quality of their decisions. The financial advisory institutions and policymakers should thus concentrate on the investor education, clear communication and trust building programs. However, informed participation can be promoted and sustained investment behavior through targeted financial literacy programs, simplified advisory communication, and ongoing engagement of the investor.

8. Suggestion

- Financial advisory institutions should conduct regular financial literacy programs to help investors better understand investment products, risks, and market dynamics.
- Advisors should use simple and transparent communication while explaining investment options to build investor confidence and trust.
- Financial advisory services should focus on continuous investor engagement and personalized guidance to strengthen long-term investment confidence.
- Financial advisory services should implement a feedback mechanism to evaluate the effectiveness of advisory services and continuously improve them.

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Assessing the Relative Impact of ESG Factors on Credit Ratings

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Abstract

The growing integration of Environmental, Social, and Governance (ESG) factors into financial decision-making has profoundly transformed corporate credit risk evaluation. Credit rating agencies are progressively acknowledging ESG factors as essential indicators of an company's long-term financial viability and default risk. This study analyzes the comparative effect of Environmental, Social, and Governance variables on business credit ratings, aiming to determine which ESG dimension has the most significant impact on creditworthiness. The study utilizes firm-level ESG scores and credit rating data from several industries, applying regression-based analytical methods to assess the relationship between ESG performance and credit ratings, while accounting for essential financial characteristics including firm size, leverage, and profitability. The results demonstrate a positive correlation between overall ESG performance and elevated credit ratings. The importance of board effectiveness, openness, and risk oversight in credit ratings is reflected in the governance parameters that have the greatest and most consistent impact among the three dimensions. In environmentally sensitive industries, social factors have a moderate but context-dependent impact, whereas environmental factors have a greater influence. In addition to offering useful insights for corporate managers, investors, and credit analysts looking to incorporate sustainability considerations into credit risk evaluation, the study contributes to the existing body of literature by offering empirical evidence on the distinct role of ESG components in credit rating assessments.

Keywords: *Environmental, Social and Governance (ESG), Corporate Credit Ratings, Credit Risk*

Introduction

Environmental, social, and governance (ESG) variables have become increasingly important non-financial indicators that impact long-term value generation, risk management,

and company performance. In the past, financial factors including profitability, leverage, liquidity, and cash flow stability were the main determinants of business credit ratings. However, credit rating agencies and investors are including ESG factors into credit risk assessment frameworks because to growing awareness of sustainability risks, climate change, social responsibility, and governance failures (Friede et al., 2015).

The ability of a company to fulfill its debt obligations over time can be significantly impacted by ESG concerns, according to credit rating organizations like Moody's, Standard & Poor's, and Fitch. Environmental risks can result in significant financial obligations and operational disruptions. These risks include exposure to climate change, carbon emissions, and regulatory compliance. Reputational risk, productivity, and business continuity are all impacted by social issues like labor relations, human capital management, and community involvement. In order to reduce agency issues and guarantee efficient risk management, governance elements which include board composition, openness, moral behavior, and shareholder rights are crucial (Kotsantonis & Serafeim, 2019).

Risk based theory, which holds that companies with stronger ESG performance are better positioned to manage long-term risks and uncertainties, provides the foundation for the relevance of ESG aspects to credit ratings. Robust environmental and social practices assist businesses in adjusting to legislative changes and stakeholder expectations, while strong governance systems lessen information asymmetry and improve the quality of decision-making (Eccles et al., 2014). Because of this, creditors tend to view companies with better ESG performance as less risky, which results in better credit ratings and cheaper borrowing costs. According to current research, environmental and social factors may have long-term or sector-specific effects on creditworthiness, whereas governance elements typically have a more direct and immediate impact (Attig et al., 2013; Hübel, 2020).

Purpose of the Study

The aim of this research is to ascertain which Environmental, Social, and Governance (ESG) component has the greatest relative impact on credit outcomes by analyzing the effects of individual ESG components on corporate credit ratings. Although earlier studies have shown that creditworthiness and overall ESG performance are related, less focus has been placed on separating the unique effects of each ESG dimension. By examining the independent

contributions of social responsibility, environmental risk management, and governance quality to credit rating evaluations, this study aims to close this gap. The study attempts to shed light on the ways in which non-financial sustainability indicators influence credit risk assessment by contrasting the relative importance and strength of Environmental, Social, and Governance variables. The findings are expected to offer valuable insights for credit rating agencies, investors, and corporate managers by highlighting the ESG dimensions that are most critical for enhancing credit profiles and long term financial stability.

Review of Literature

Attig et al., (2013) examine the correlation between corporate credit ratings and corporate social responsibility (CSR), companies with better CSR performance typically have higher credit ratings. The study shows, using firm-level data from the United States, that credit rating agencies view socially conscious companies as less risky because of their better stakeholder ties, increased transparency, and lower exposure to social and regulatory concerns. The authors obtain the conclusion that CSR initiatives improve creditworthiness and reduce default risk, underscoring the significance of non-financial aspects in evaluating credit risk.

Hübel (2020) investigates whether ESG disclosures influence corporate credit ratings using evidence from European firms. According to the study, companies with more thorough and superior ESG disclosures typically have higher credit ratings, suggesting that sustainability reporting transparency lowers perceived credit risk. While social disclosures have a more moderate effect on credit ratings, governance and environmental disclosures have a greater influence. The results imply that, especially in markets with sophisticated regulatory and reporting frameworks, credit rating agencies regard ESG disclosure as an indicator of efficient risk management and long-term financial stability.

Objectives of the Study

- To examine the relationship between ESG factors and corporate credit ratings.
- To identify the role of Indian Credit Rating Agencies in Integrating ESG Factors
- To analyze differences in the influence of ESG factors across industries.

ESG Factors and Corporate Credit Ratings

- **Environmental Factors**

Environmental factors play a critical role in credit risk assessment by capturing a firm's exposure to climate-related, regulatory, and operational risks. Exposure to climate risk has an

impact on businesses through transition and physical risks, which can damage long-term cash flow stability by impairing assets and disrupting operations. A company's capacity to follow environmental laws and standards is reflected in its regulatory compliance; noncompliance raises the potential of fines, legal ramifications, and reputational harm, all of which increase credit risk. Resource efficiency improves cost management and operational resilience, which helps to promote financial stability. This includes the efficient use of energy and natural resources. As a result, credit rating agencies typically view companies with outstanding environmental performance as less hazardous, increasing the likelihood that they will earn positive credit ratings (Bolton & Kacperczyk, 2021; Hübel, 2020).

- **Social Factors**

Corporate credit ratings are impacted by social variables because they show how well a company manages its human capital and stakeholder relationships, both of which are critical to operational stability and a strong reputation. Fair pay, secure working conditions, and workforce development are examples of labor practices and employee welfare that minimize operational risk by increasing productivity and minimizing labor-related interruptions. A company's social license to operate is shaped by its community relations, which also help reduce regulatory and reputational concerns brought on by stakeholder disputes. Credit rating agencies typically view companies with good social performance as less vulnerable to reputational and social issues, which enhances their creditworthiness (Attig et al., 2013; Oikonomou et al., 2014).

- **Governance Factors**

Since it has a direct impact on managerial decision-making, internal controls, and risk management quality, governance variables are essential to credit rating evaluations. Board effectiveness improves strategic monitoring and lessens agency issues, as demonstrated by the board's independence, knowledge, and oversight capacity. By reducing information asymmetry between companies and creditors, transparency in financial and non-financial disclosures boosts trust in reported performance. Financial and operational risks are promptly identified and mitigated thanks to risk oversight, which includes strong internal control systems and audit procedures. Therefore, companies with good governance systems are seen as having more financial stability and a lower default risk, which improves their credit ratings (Ashbaugh-Skaife et al., 2006; Kotsantonis & Serafeim, 2019).

- **Corporate Credit Ratings**

Corporate credit ratings are an external evaluation of a company's creditworthiness that shows how well it can fulfill its financial commitments on schedule. These ratings include assessments of rating stability, which shows the constancy and durability of a company's credit profile over time, and default risk, which gauges the possibility that a company will not be able to pay its debt. In order to evaluate long-term solvency and risk exposure, credit rating agencies incorporate both financial and non-financial data, including risks associated with ESG. Higher and more stable credit ratings are more likely to be attained by businesses with lower default risk and stable operating and governance structures. As a result, they can benefit from easier access to capital and cheaper borrowing costs (Cantor & Packer, 1996; Hübel, 2020).

The relationship between Environmental, Social, and Governance (ESG) elements and company credit ratings demonstrates a rising understanding of non-financial hazards in credit risk assessment. Higher credit ratings and lower default risk are supported by strong ESG performance, which is linked to better risk management, increased transparency, and improved long-term financial stability. Because ESG considerations assist reduce operational, regulatory, and reputational risks, empirical research indicates that credit rating agencies view companies with better ESG practices as less hazardous. While environmental and social factors have long-term, sector-specific implications on credit ratings, governance factors in particular have a considerable and consistent influence.

Role of Indian Credit Rating Agencies in Integrating ESG Factors

- **CRISIL**

Environmental, social, and governance (ESG) concerns are officially acknowledged as important elements of long-term credit risk assessments by CRISIL, the top credit rating agency in India. CRISIL's assessment of business risk, regulatory risk, and management quality include ESG factors. Manufacturing, infrastructure, and energy-intensive industries place special emphasis on environmental considerations such sustainability programs, climate change risks, and regulatory compliance. While governance quality board effectiveness, transparency, and risk management is a fundamental component of management evaluation, social issues, such as labor practices and stakeholder management, are taken into account when evaluating operational stability. CRISIL agencies has highlights that poor governance, particularly in capital intensive and public sector affiliated businesses, can increase financial risks and result in rating downgrades.

- **ICRA**

ICRA incorporates ESG risks into its credit risk and sectoral risk assessment frameworks, with an emphasis on how ESG variables influence cash flows, project viability, and default probability. In sectors including power, mining, and cement, environmental concerns like carbon exposure, water stress, and pollution control compliance are carefully assessed. Particularly for major infrastructure and extraction projects, social considerations are taken into account through metrics like worker safety, labor relations, and community effect. Ownership structure, promoter integrity, related-party transactions, and openness are examples of governance criteria that are heavily weighted in ICRA's credit evaluations since governance flaws are thought to be important causes of credit degradation in Indian businesses.

- **CARE Ratings**

CARE Ratings considers ESG factors as part of its management and business risk assessments, rather than as a separate score. Initiatives for sustainability and environmental compliance are assessed for how they might affect operating expenses and regulatory risks. When evaluating operational continuity, social variables are taken into account, particularly workforce management and stakeholder interactions. CARE's rating system heavily relies on governance, with a focus on board independence, disclosure quality, internal controls, and ethical standards. CARE emphasizes that poor internal controls or promoter-driven choices can seriously damage credit profiles in Indian corporations, resulting in rating volatility.

India Industry: ESG Factors and Credit Ratings

- **Manufacturing Industry**

Environmental factors (E) have a significant impact on business credit ratings in the Indian manufacturing sector because of the high energy intensity, pollution levels, and growing regulatory scrutiny. Environmental regulations enforced by State Pollution Control Boards and the Ministry of Environment, Forest, and Climate Change (MoEFCC) impose stringent compliance requirements on industries like cement, steel, chemicals, textiles, and vehicles. Cash flows and the ability to service debt can be directly impacted by non-compliance, which can lead to plant shutdowns, fines, and reputational harm. Furthermore, the gradual implementation of carbon-related rules and India's obligations under the Paris Agreement raise transition risks for industrial companies. Environmental performance is a crucial factor in determining creditworthiness since credit rating agencies in India are increasingly incorporating environmental compliance records, emission controls, and resource efficiency initiatives into credit risk assessments (Bolton & Kacperczyk, 2021; Hübel, 2020).

- **Energy and Heavy Industry**

Both Environmental (E) and Governance (G) factors are important for evaluating credit ratings in India's energy and heavy sectors, including mining, electricity production, oil and gas, and infrastructure. These industries face significant exposure to climate transition risks, regulatory uncertainty, and long-term investment horizons. They are also very capital-intensive and environmentally sensitive. Carbon emissions, land acquisition, water use, and environmental clearances are examples of environmental problems; project execution risks, policy dependence, and public-sector ownership arrangements are examples of governance challenges. Effective management of regulatory compliance and capital allocation requires robust governance processes, such as board monitoring, transparency, and risk management. Where evaluating the sustainability of major infrastructure and energy projects in India, credit rating agencies give governance quality a lot of burden; especially where there are significant environmental risks Ashbaugh-Skaife et al., 2006).

- **Services and Information Technology Industry**

In India’s services and Information Technology (IT) sector, Governance (G) and Social (S) factors are more influential than environmental factors due to the sector’s reliance on human capital, data security, and global client relationships. Despite having a very little environmental impact, the IT and services sector is subject to serious hazards in the areas of labor management, cyber security, corporate governance, and regulatory compliance. In a highly competitive labor market, social issues including employee welfare, skill development, diversity, and talent retention are essential to sustaining productivity and creativity. Maintaining investor and creditor confidence depends heavily on governance practices, such as openness, moral behavior, and adherence to SEBI's corporate governance standards and Business Responsibility and Sustainability Reporting (BRSR) framework. As a result, while evaluating the creditworthiness of IT and service-based companies, Indian credit rating agencies place a strong emphasis on social performance and governance quality (Attig et al., 2013; Kotsantonis & Serafeim, 2019).

Implications

The study has significant implications for Indian politicians, investors, credit rating agencies, and corporate managers. Instead of viewing ESG as a compliance exercise, companies should incorporate sustainable practices into their fundamental business objectives,

as evidenced by the established correlation between ESG variables and corporate credit ratings. The increasing institutional significance of non-financial risks in credit evaluations, especially governance quality and sector-specific environmental hazards, is highlighted by the role of Indian credit rating agencies like CRISIL, ICRA, and CARE in adding ESG concerns. Furthermore, sector-specific ESG prioritization is required to successfully manage credit risk and enhance creditworthiness, as the industry-wise heterogeneity in ESG influence indicates that a uniform ESG approach is insufficient. These implications encourage companies to use focused ESG frameworks and rating agencies to integrate ESG more clearly.

Conclusion

This study concludes that ESG considerations have a considerable and unique impact on business credit ratings. The results show that creditworthiness and ESG performance are strongly correlated, with governance aspects being the most significant element, especially when it comes to the Indian credit rating system. The importance of sustainability factors in credit risk assessment is reinforced by the active integration of ESG risks into rating methodologies by Indian credit rating agencies. ESG variables also have different effects on different industries. For example, environmental factors are more important in manufacturing and heavy industries, while governance and social aspects are more important in the IT and services sectors. Overall, the study highlights how ESG integration improves credit risk assessment accuracy and promotes long-term financial stability, underscoring the strategic significance of ESG adoption in the Indian business environment.

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Fin – Tech for Climate Action: How Digital Payments Encourage Sustainable Lifestyles

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Abstract

Rapid advancements and growth of the Fin-Tech Industry has lead to advancements and transformations in how we conduct all forms of financial transactions, enabling users to perform many of the same actions that we currently do using paper-based systems, but instead via electronic methods that are much quicker, safer, and more efficient. In the context of Climate Change as a global issue, there is an increasing awareness of the use of Fin-Tech as a tool that can promote Sustainable Lifestyle Choices. With digitized payment methods such as UPI or Google Pay, and Paytm, consumers are using less paper, visiting banks less frequently or not at all, and developing greater levels of environmentally beneficial behaviors. In addition to digitized forms of paying for goods/services, Fin-Tech has developed many innovative applications, such as Joro or Klima, that allow users to track their Carbon Footprints and obtain Sustainability insights that will help them make and follow through on decisions related to spending habits that are climate conscious. Fin-Tech providers will incentivize consumers to adopt and share sustainable behaviors through Reward Based Sustainable Payments programs that encourage consumers to take action. This research analyses how Fin-Tech supports the implementation of climate action and the promotion of Sustainable Lifestyles; as a result of reducing their Environmental Footprint, and encouraging consumers (especially younger generations) to engage and utilize Green Finance products and services. The study concludes that Fin-Tech, by way of Incentives, Behavioral Nudges, and Sustainability Features, is essential in creating a more environmentally responsible consumer culture and consequently moving us toward a Circular Economy.

***Keywords**: Fin-Tech, Digital Payments, Sustainability, Consumer Behaviour, Climate Action, Green Finance*

Introduction

The financial industry is rapidly changing because of Fin-Tech technology advances that affect every aspect of the global financial system. Mobile wallets, payments using UPI, QR codes for payments, and artificial intelligence tools to manage personal finances have changed the way consumers view convenience and access.

While Fin-Tech makes managing money easy and convenient for consumers, it is also influencing the extent to which consumers are working towards sustainable practices.

As we move toward digital payment methods instead of cash payments, there will be less need for physical goods like cheques and paper currency and less environmental waste through printed receipts. The activities described are in line with international efforts to address climate change. A large part of the sustainability goals involve reducing waste, encouraging responsible resource use, and reducing our carbon footprint, but as part of an overall goal to enable sustainable development.

Several applications monitor carbon emissions, while several other applications provide users with a platform for transitioning to a lifetime of low-carbon activities by suggesting tasks to complete consumer purchases on an individual level.

With the explosive growth in digital payment systems in India and other emerging markets, particularly among youth, it has become increasingly important to assess the effect of Fin-Tech on consumer behavior related to sustainable consumption. Therefore, this research will examine how Fin-Tech supports climate action by empowering consumers to make environmentally friendly purchase decisions.

Rationale of the Study

The linking of Finance, Technology and Sustainability creates a very robust platform for future growth of Global Commerce. The expansion of Digital Infrastructure has also led to the expansion of the meaning of fin-tech beyond financial transactions by using the ability of Fin-Tech to influence the consumer's decision to purchase environmentally sustainable products.

The use of digital payment platforms eliminates the use of cash and paper-based forms of banking. As such, it contributes to decreased demand for natural resources. Also, companies such as Joro and Klima create a way for the consumer to calculate their carbon footprint through the use of carbon-tracking mobile applications, which lead to beneficial changes in their lifestyles in terms of energy consumption and wastefulness. Through reward systems for consumers who utilize environmentally responsible digital payment solutions, companies not only incentivize them to use their platform but also motivate them to purchase environmentally friendly products.

The Research agenda also includes an analysis of how Digital Payments create less Paper Waste, How Fin-tech is helping to support the Circular Economy and how mobile applications are encouraging younger generations to decrease their spending on the environment. All of these areas provide a moderate level of challenge, but the information collected would ultimately serve as substantive contributions to the learning regarding Sustainability and modern sustainability research.

Objectives of the Study

1. Digital payments are considered as one of the major factors to support the eco-friendly purchase of consumers' choice.
2. Fin-Tech innovations are the driving force behind, or at least the major contributors, to climate action and sustainability awareness.
3. To analyse user perceptions toward carbon-tracking and reward-based green financial applications.
4. To understand how digital financial tools influence youth lifestyle patterns.
5. To identify the potential of Fin-Tech in supporting the circular economy and reducing environmental footprints.

Evolution of Fin-Tech and Digital Payments

The financial industry was modernized by FinTech through digital banking, mobile wallets, QR payments, and UPI-based transfers. These innovations according to several studies, raise productivity, cut down costs, and promote cashless economies. Furthermore, the usage of digital payments diminishes the need for paper documentation, thereby contributing positively to the environment.

Fin-Tech and Sustainable Financial Inclusion

Digital financial services are increasing the accessibility of financial resources with fewer infrastructure requirements. Researchers point out that the adoption of digital inclusion is a boon to the environment as it cuts down on the need for physical branches, transport, and paperwork.

Digital Payments and Reduction of Environmental Footprint

According to research, the use of electronic payments leads to the reduction of paper waste, less usage of ATMs, and less carbon emissions connected with traditional banking. Digital receipts take the place of paper receipts thereby contributing to the waste reduction.

Behavioral Economics and Green Fin-Tech Adoption

Research has shown that certain behavioral nudges, gamification, eco-rewards, and real-time alerts can persuade consumers to embrace sustainable lifestyles. These features help to reinforce the connection between digital payments and eco-friendly decision-making.

Carbon Tracking and Sustainability Apps

Apps like Joro, Klima, and greenly rely on fin-tech literacy and AI to estimate carbon footprints and encourage environment-friendly practices. The literature indicates that such applications raise the level of environmental consciousness and change the patterns of consumption.

Green Finance and Climate Action

Green finance is providing the funds for the transition to renewable energy, building climate-resilient infrastructure, and supporting the development of eco-friendly business models. By digitalizing transactions and monitoring, Fin-Tech is ensuring transparency and accountability in the area of green finance thus facilitating its

Research Methodology

The research described here is of a descriptive kind and based on secondary data from various sources like academic journals, reports, Fin-Tech websites, sustainability research papers, and digital finance publications, among others. The qualitative analysis of findings from prior studies and conceptual frameworks relating to Fin-Tech and climate action constitutes the methodology used.

Key Findings

- There is a substantial decrease in the use of paper such as receipts, cheques, and cash-based transactions because digital payments are done.
- Sustainability characteristics like green reward points, digital receipts, and carbon-tracking insights are becoming more and more noticed by consumers.
- The Fin-Tech applications integrating gamification have a great impact on the users motivating them to opt for eco-friendly alternatives.
- Young people are the ones who mostly adopt green FinTech at the highest rate that fits their digital lifestyle.
- Sustainable financial applications are a way of informing the consumer about his or her environmental footprint.
- Fin-Tech becomes an ally of the circular economy by encouraging digital consumption that leads to a reduction in physical waste.
- On the other hand, the merging of sustainability and digital payments is to the benefit of the climate action initiatives and the public's involvement in the green finance activities.

Conclusion

Fin-Tech has become a major player in the fight against climate change, not just as a facilitator of financial transactions. The usage of the digital payment systems along with carbon-monitoring capabilities and eco-friendly incentives have, to a large extent, changed the way consumers perceive and practice green living. It was found out those Digital payment systems, on the other hand, made the environmental impact smaller by taking over the traditional banking sector which is relatively high in resource usage. Besides, applications that promote sustainability help users make climate-friendly lifestyle decisions.

Fin-Tech, in particular, will be the key player in promoting eco-friendly practices among the youth as India on the other hand continues to make its economy more digital. The research paper asserts that the pairing of Fin-Tech innovations with environmental sustainability goals—their very conscious integration—will not only be a powerful trick in the bag for the climate action but also, indeed, a great way to help the earth heal, promote sustainable living, and, thereby, contribute to the global shift from linear to circular, low-carbon economy.

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Determinants Influencing Individual Participation in The Stock Market: Evidence from Chennai City

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Abstract

In today's world, financial growth is increasing. Besides that, an individual's stock market participation is not at the level of traditional investments like gold and Fixed Deposits. This research focused on variables such as Financial Literacy, Market Exposure, Investible Income, and Investment Awareness to examine the Stock Market participation among people in Chennai. 249 respondents were collected as Primary Data and analysed using SEM through SPSS. The findings showed that Investible Income rules the Stock Market more than Investment Awareness, where investment awareness alone doesn't influence actual participation. Financial Literacy and Market Exposure indirectly influence investment awareness. Thus, owing to the Income Constraint, people prefer safer investments which is not increasing the stock market participation apart from increasing awareness.

Keywords: *Stock Market Participation, Investible Income, Financial Literacy, Financial Awareness and Market Exposure*

Introduction

For an individual's growth and economic growth, investment is playing a major role, particularly in the stock market. In developed countries, investment education is provided at the school and college levels and in the workplace through an automatic savings system that encourages daily participation in the stock market (Baveja & Verma, 2024). The percentage is still higher for traditional investments (Gold and Fixed Deposits) than for the growing Indian stock market (Ram & Gopika, 2025). Though people in Chennai are aware of

the Stock Market, they are hesitant to invest in it. Here, the investible Income acts to allocate money for gold and FDs rather than the stock market because of its risk factor (Imthiyas, 2016) (Kaiser & Lusardi, 2024). The study seeks to answer the main research question: What factors influence the level of stock market participation in Chennai? Specifically, it examines the roles of financial literacy, market exposure, investible income, and investment awareness in shaping stock market participation.

Review of Literature

Financial Literacy in Investment - It is a financial concept to understand risk, return, etc. Previous studies showed that literate people are more involved in the stock market. Adequate knowledge builds confidence, reduces fear, and helps to make decisions. But still, literacy does not always lead to investment behaviour (T & Ganesan, 2023). Market Exposure - Market Exposure helps to access the peer influence, digital platforms, media information, etc. Regular participants in the stock market create investment opportunities and are familiar with market operations (-, 2024). Investible Income - A portion of income allotting for investment is essential for a stable life. Higher-income people are involved in investment (Dhawan & Mehta, 2019) People with lower incomes are investing in traditional assets like gold and fixed deposits (Seraj et al., 2022). Investment Awareness - Investment awareness encompasses understanding investment varieties, market benefits, and long-term returns. Studies showed that awareness does not always lead to active participation (Sivareanjini & Badrinarayanan, 2025). Stock Market Participation - Previous studies indicate that while stock market participation in India is increasing, it remains below that of traditional investment methods. (Investor Behavior in the Share Market: A Study of Influencing Factors and Decision-Making Processes, n.d.) Although access to digital platforms exists, individuals continue to prefer conventional investment approaches. Urban areas have experienced improvements in literacy and awareness, yet equity participation remains limited (T & Ganesan, 2023)

Research Gap

Previous research has examined financial literacy, market exposure, investible income, and investment awareness separately. This study combines these factors, focusing on investment activity in Chennai city to address the research gap using structural equation modelling.

Objectives of the Study

- To identify the determinants influencing investment participation in Chennai City.
- To assess the impact of investment awareness on stock market participation.

Proposed Conceptual Model

This research examines the factors of participation level in the stock market. Financial Literacy, Market Exposure, and Investible Income influence Investment Awareness. Investment Awareness as a mediating variable in the stock market. Investible Income as a direct influence on the stock market participation.

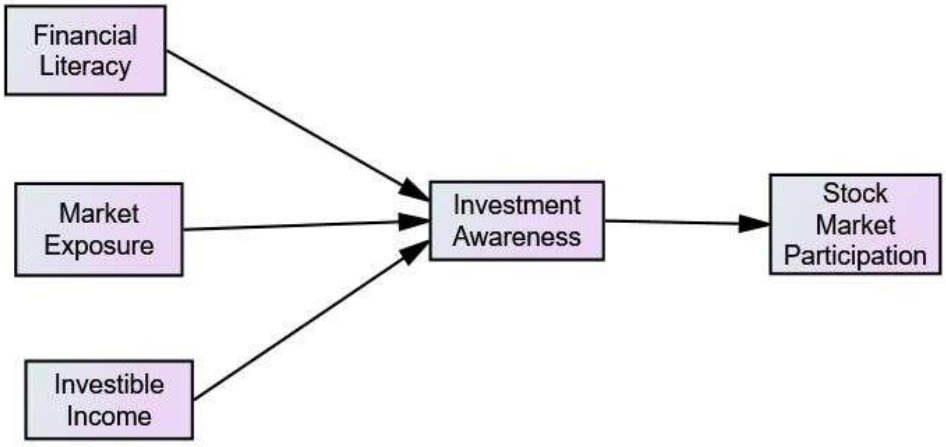

Fig 1 Proposed Model of the Study

Hypotheses

H1 - Financial literacy has a positive effect on investment awareness.

H2 - Market exposure has a positive effect on investment awareness.

H3 - Investible income has a positive effect on investment awareness.

H4 - Investment awareness has a positive effect on stock market participation.

H5 - Investible income has a positive effect on stock market participation.

Research Methodology

This study was a descriptive-analytical research design, focusing on variables such as Financial Literacy, Market Exposure, Investible Income, Investment Awareness, and Stock Market Participation among Chennai City residents, with a sample of 249 respondents. The

convenience sampling technique was used because of accessibility and time constraints. Primary data were collected by distributing the questionnaire using a five-point Likert scale. The research contains the following variables.

- Financial Literacy (FL) (**Rehman, K, 2024)** – Basic knowledge of financial and investment concepts.
- Market Exposure (ME) (**Peters, B., & Roberts, M. J., 2022)** – Exposure on the stock market
- Investible Income (IC) **(Yulianto, A., 2023)** – Allocation of income for investment
- Investment Awareness (IA) **(Oppong, C., et al, 2023)** – Awareness about stock market investment
- Stock Market Participation (SMP) **(Van Rooij, et al , 2011)** – Engagement in the Stock Market.

The reliability value was 0.851 using Cronbach's Alpha, showing a high level of reliability. SPSS software was used for data screening and reliability testing. AMOS was used for creating a Structural Equation Model (SEM) to examine the relationships among variables.

Data Analysis and Results

Table 1 shows the Demographic Profile of the Respondents

Factor		Frequency	Percent
Age	18-25	51	20.5
	26 to 35	60	24.1
	36 to 45	67	26.9
	46-55	40	16.1
	above 56	31	12.5
	Total	249	100
Gender	Male	120	48.2
	Female	129	51.8
	Total	249	100

Education	School	23	9.2
	Diploma	35	14.1
	UG	82	32.9
	PG	59	23.7
	Professional Qualification	50	20.1
	Total	249	100
Occupation	Student	45	18.1
	Private Employee	60	24.1
	Public employee	37	14.9
	Self-Employed/Business	51	20.5
	Homemaker	28	11.2
	Retired	28	11.2
	Total	249	100
Monthly Income	Below 10,000	47	18.9
	10,000 – 29,999	68	27.3
	30,000 – 49,999	71	28.5
	50,000 – 99,999	41	16.5
	1,00,000 and above	22	8.9
	Total	249	100

Computed Data

Interpretation

The demographic data shows that most participants are in the 20s to 40s age range, with an average equal of men and women. The majority of respondents have a UG level education, and many are working people, suggesting they are likely to make investment decisions. The income data shows involvement in the stock market, given the moderate-income range, which allows less money to be allocated to investment

Sem Analysis

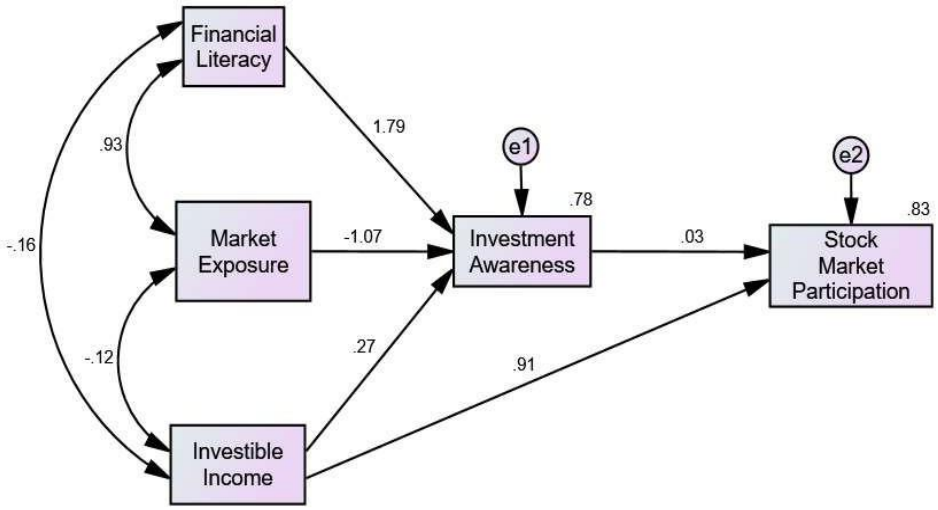

Fig 2 showing the SEM Analysis of Determinants Influencing Individual Participation in the Stock Market of Chennai City

Table 2

Hypothesis Result Summary

Hypothesis	Path	Result	Interpretation
H1	FL → IA	**Accepted**	Financial Literacy has a strong and statistically significant positive effect on Investment Awareness ($p < 0.001$).
H2	II → IA	**Accepted**	Higher investment awareness significantly improves the amount of income allocated for investment ($p < 0.001$).
H3	ME → IA	**Accepted (Negative)**	Investment awareness has a significant negative effect on market exposure, indicating cautious or selective exposure ($p < 0.001$).
H4	IA → SMP	**Rejected**	Stock market participation does not significantly influence investment awareness ($p = 0.288$).
H5	II → SMP	**Accepted**	Stock market participation has a strong positive influence on investible income ($p < 0.001$).

Computed Data

Interpretation

- The findings state that investment awareness plays a major role in the improvement of Financial Literacy and helps individuals to allocate money for investment.
- Stock Market Participation alone does not increase awareness, where the external advice can also help, rather than knowledge.
- Investible income plays a key role, which is strongly influenced by stock market participation, which supports the idea that income constraint is a major barrier.
- The negative impact of awareness and exposure states that investors are more cautious to avoid excessive or risky decisions.

Table 3 Regression Weights

Path	Estimate	C.R.	P-Value	Interpretation
FL → IA	1.383	21.960	***	There is a positive relationship between IA and FL, which IA significantly influences FL.
II → IA	0.199	9.002	***	IA positively influences II, with a strong relationship.
ME → IA	-1.257	-13.256	***	A negative relationship between IA and ME, indicates higher investment awareness may reduce exposure.
IA → SMP	0.041	1.061	0.288	The relationship between IA and SMP is not significant which suggests that IA does not have a strong effect on SMP.
II → SMP	0.986	34.978	***	A strong and positive significant relationship between II and SMP, indicating that SMP increases Investible Income.

Computed Data

Table 4 Model Fit Indices

Fit Index	Value	Threshold	Interpretation
CMIN/DF	3.920	< 5	**Good fit**. The value is in acceptable range.

RMSEA	0.109	< 0.08	**Marginal fit**. Though the value is above but still acceptable.
CFI	0.996	> 0.90	**Excellent fit**. This value is close to 1 which shows a good fit.
TLI	0.978	> 0.90	**Good fit**. Close to 1 which shows the model fits well.
NFI	0.994	> 0.90	**Excellent fit**. Indicates a good fit.
AIC	33.839	Lower is better	**Good fit**. The lower the AIC, the better the model fits the data.

Computed Data

Interpretation

The SEM analysis shows a significant relationship among variables such as Financial Literacy (FL), Market Exposure (ME), Investible Income (II), and Investment Awareness (IA). The findings show that Financial Literacy and Investible Income have a positive influence on Investment Awareness. In this, financial literacy plays a strong role showing better investment knowledge increases awareness. Market Exposure has a negative impact on Investment Awareness suggesting that investors who are aware about market tend to have a more cautious. IA does not influence Stock Market Participation suggesting that awareness alone is not sufficient for stock market participation. Investible Income has a strong and positive effect on SMP, highlighting income allocation as the primary factor. The Model Fit Indices indicate a good overall model fit, with CFI, TLI, and NFI values showing an excellent fit, and RMSEA falling within an acceptable range. Overall, the research showed that Income Constraint was the major factor affecting stock market participation in Chennai, though the people have financial and market awareness.

Findings

The research examined the factors influencing the participation of Chennai people in the stock market using SEM modelling. The results highlighted that awareness alone is not enough to guide people to invest in the stock market. It also indicated that financial literacy

significantly improves investment awareness. The highlighted findings are that investible income plays a major role. Income constraints are the main reason for low participation in the stock market and for higher participation in gold and FDS as safer investments.

In foreign countries, participation in the stock market is higher because education systems, workplace plans and retirement-linked schemes are highly supported. This lower the income pressure and supports daily based investment for regular practise. On the whole, the research findings suggest that improving income stability and establishing a structured investment process are much needed than awareness programs for investment.

Suggestions

- Introduce investment and financial education into school and college curricula to instill at an early age.
- Encourage workplace investment schemes.
- Promote small ticket investment options to overcome income needs.
- Promote user-friendly digital investment platforms.

Conclusion

This research shows that Financial Literacy, Investible Income, and Investment Awareness played a major role in Chennai residents' participation in the stock market. Due to investible income, people prefer safer investments such as gold and fixed deposits, even though they have financial and market awareness. Strengthening income-supportive investment system can improve investment and contribute to both individuals and economic growth.

Limitations & Future Scope

- The study focused on Chennai city and used a cross-sectional research design (single point in time). There is no comparison between the rural and urban regions of the area.
- Future studies can expand by targeting other cities and conducting comparative analyses. Longitudinal studies can also be provided to focus on investment behaviour. Additional variables can also include risk tolerance, digital platforms, etc.

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From Exclusion to Empowerment: The Strategic Role of Financial Institutions in catalysing Financial Literacy and Inclusion for Marginalised Groups

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Abstract

Financial inclusion has emerged as a critical pathway for reducing socio-economic disparities and fostering equitable development. Yet, marginalised communities continue to face significant barriers in accessing and effectively utilising formal financial services. In this context, financial institutions—particularly banks—have increasingly adopted financial literacy initiatives as a strategic tool to empower excluded groups. The study examines the effectiveness of bank-led financial literacy programmes in transforming the financial behaviour of marginalised populations by reviewing insights from existing scholarly and empirical studies. The study investigates the extent to which such programmes enhance core dimensions of financial resilience, including improved savings habits, informed financial decision-making, and reduced financial vulnerability. The findings suggest that when banks integrate sustained financial education with accessible financial products, marginalised groups experience greater confidence in financial participation and an elevated capacity to cope with financial shocks. Overall, the paper highlights the need for continuous, culturally sensitive, and community- based financial literacy interventions to ensure that financial inclusion becomes not merely an access-driven initiative, but a holistic empowerment mechanism.

Keywords: *Financial inclusion, financial literacy, Marginalised groups, Bank-led initiatives, Financial behaviour*

Introduction

Financial inclusion is widely recognised as avital tool for achieving economic development. It means affordable financial services such as savings, investment, credit, insurance and digital payments, efficiency of individuals to manage risk and capacity of

individuals to absorb economic shocks. However marginalised groups including middle- and low-income households in rural areas, women in rural areas continue to experience exclusion from formal financial system.

Government and financial institutions have made significant efforts to expand banking infrastructure but many of marginalised groups remain unable to effectively use of financial services due to lack of financial awareness, lack of financial skills. In this context financial literacy is a tool for financial inclusion. Banks play active role in promoting active financial literacy programs. These initiatives focus not only to promote product usage but also foster financial resilience and long-term empowerment. This study explores the strategic role of bank led financial literacy initiatives in catalysing financial inclusion for marginalised groups.

Objectives of the study

1. To examine the effectiveness of bank led financial literacy programs in improving financial behaviour of marginalised groups.
2. To examine the extent of these programs contribute enhanced financial resilience, including improved savings habits and reduced financial vulnerability,

Significance of the Study

This study is important because it shows how financial literacy is a key factor in achieving financial inclusion for marginalized groups. By looking at bank-led financial literacy programs, the study explains how financial education improves financial behaviour including saving habits, responsible borrowing, and making informed decisions. It also highlights the role of financial institutions in strengthening financial resilience and reducing vulnerability among disadvantaged communities. The findings of this review can help policymakers, banks, and development agencies create more effective, inclusive, and sustainable financial literacy initiatives that go beyond just providing access to banking services and foster long-term economic empowerment.

Scope of the Study

The scope of the study limited to existing literature on financial inclusion bank led initiatives aimed marginalised groups. The data include from published sources including programs implemented by banks NABARD self help groups and Government initiatives such as PMJDY. The does not include any type of primary data.

Methodology

This study adopts a qualitative research approach. The data for this research are drawn entirely from secondary sources including academic journals, Government reports, reports published by banks and other financial institutions and peer reviewed journals.

Despite of its strength the study has certain limitations. Since relies exclusively on secondary data some information may be limited in scope.

Literature Review

Shim et.al (2009) examined financial knowledge and socialisation influence financial behaviour among individuals. This study reveals that financial literacy improves budgeting kills, savings behaviour and informed financial decision making. Study emphasis financial education helps in shaping long term financial wellbeing.

Lusardi and Michel (2014) This study highlighted that individuals with higher financial literacy are more efficient to save future and manage debt.

Rangarajan(2008) Examined that financial exclusion as a major cause of persistent poverty. The study reveals that marginalised groups still rely on informal credit sources. It emphasis the importance of inclusive banking and financial awareness programs

Cole Sampson and Sia(2011) This study examines the effectiveness of literacy programs conducted by banks. The findings of the study that ban k led financial education programs increase financial knowledge and use of formal financial products among low-income groups.

Agarwal(2015) This study examined the impact of financial literacy programs. The findings of the study shows that the participants shows improved savings habit, reduced resilience in formal borrowing and better credit management. The highlight of the research is that financial literacy contributes long-term financial stability.

Consumer Protection Bureau(2018) It emphasised that financial literacy enhances financial resilience by promoting emergency savings and informed decision making particularly among marginalised groups.

World bank(2011) The study reveals that financial literacy isa important tool for improving access and usage of financial services.

Xu and Zia (22012) This study highlighted that financial literacy programs concentrated to local socio-economic conditions and cultural context. This study reveals the community-based approaches, using local languages and peer learning results sustainable change. Continuous financial literacy programs through banks SHGs and local government is essential for long term development.

NABARD and Financial Literacy through SHGs (2019) NABARD took important role in promoting financial inclusion Self Help Group and Bank Linkage Program. This study reveals that SHG helps to improve savings behaviour access to financial credit and financial discipline among rural women. SHG also helps to improve their financial awareness, informed financial decision-making capacity. This study suggests that financial literacy imparted through SHG meetings is more effect tive due to peer learning and community participation.

Observations and Suggestions

This chapter presents observations derived from reviews, reviews indicate that bank led financial literacy programs positively influence the savings habit, investment behaviour and improve access and use of formal financial services.

The financial well being of marginalised peoples increased these behavioural change enables the individuals to increase their capacity to absorb financial shocks and reduce vulnerability. The success of this program depends on their continuity, relevance, the way of approach. Short time or one-time interventions show limited impact. Sustained community outreach programs are more impactful.

Conclusion

Financial literacy serves as a catalyst agent for financial inclusion among marginalised groups. This study suggest that bank led financial literacy initiatives plays strategic role in transforming financial behaviour and strengthening financial resilience, Sustainable economic development is practically possible by providing financial education continuously.

It should be cultural sensitive and integrated with inclusive financial products, Government and financial institutions prioritise long term, community based literacy programs to promote sustainable and inclusive economic development.

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Financial Literacy to Empower Financially Marginalized Groups in Underdeveloped Regions

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Abstract

Financial Literacy for empowering financially marginalized people is a comprehensive study focused on enhancing the financial literacy of individuals who belong to economically underprivileged groups of the society. The study recognizes that financial literacy is essential for empowering marginalized groups to make wise financial decisions, improve their economic well-being and eradicate the poverty. The current study emphasis the need of financial literacy as a way to overcome the unique challenges faced by financially marginalized groups of society. It emphasizes the need for tailored financial literacy programs that cater to the specific needs and circumstances of these individuals. The study aims to explore the impact of such programmes on improving financial knowledge, skills and behaviour, ultimately leading to enhanced financial outcomes and increased financial inclusion. The current study provides a regard into the research methodology employed, which includes a combination of qualitative and quantitative approaches. The study involves collecting data through well structured questionnaire, interviews and focus groups, and analyzing it to identify key themes, patterns, and insights. The research also examines existing financial literacy initiatives and their effectiveness in empowering marginalized groups. Likewise, the research highlights the anticipated outcomes of the study, which include a deeper understanding of the financial literacy requirements and challenges faced by marginalized groups of society.

***Keywords**: Financial Literacy, Marginalized People, Empowerment, Rural and Urban*

1.1 Introduction

Financial literacy acts as an important instrument in empowering financially marginalized groups residing in underdeveloped regions. These groups frequently face

unique challenges related to poverty, limited access to financial services, and a lack of knowledge about managing money effectively. However, by providing them with essential financial education, we can empower individuals to make informed decisions, improve their financial well-being, and remove poverty. This preface aims to exfoliate light on the significance of financial literacy and outline key concepts that will empower these communities to take control of their financial lives. Further, financial literacy refers to the knowledge and skills needed to make informed financial decisions. It encompasses a range of topics such as budgeting, saving, borrowing, investing, and understanding financial products and services. By acquiring financial literacy skills, individuals gain the confidence and capacity to navigate the difficult financial landscape and make choices that align with their pretensions and values.

Financially marginalized groups frequently face significant obstacles to accessing financial product and services. These barriers may include limited education, low income, lack of awareness, cultural barriers, and distrust of financial institutions. Financial literacy initiatives aim to overcome these barriers by furnishing accessible and culturally relevant information, tools, and resources that empower individuals to overcome these obstacles.

1.2 Key Concepts in Financial Literacy

a) Budgeting: Budgeting deals with creating a plan for allocating income to meet expenses, savings goals, and debt repayment. It helps individuals prioritize their spending and identify areas where they can make adjustments to achieve financial stability.

b) Saving and Investing: Saving involves setting aside money for future requirements, emergencies, and long-term goals. Investing, on the other hand, involves putting money in to assets that have the potential to grow overtime, such as stocks, bonds, or real estate. Understanding the significance of saving and basic investment concepts empowers individuals to build wealth and secure their financial well being.

c) Debt Management: Many financially marginalized groups may struggle with debt. Financial literacy education equips individuals with strategies for managing debt responsibly, understanding interest rates, avoiding predatory lending practices, and working towards becoming debt-free.

d) Banking and Financial Services: Access to banking services is pivotal for financial inclusion. Financial literacy initiatives introduce individuals to basic banking services, such as opening bank accounts, understanding fees and charges, and using electronic payment methods. This knowledge enables individuals to access to financial product and services effectively and avoid implicit risks.

Financial literacy empowers financially marginalized communities by furnishing them with the knowledge and skills to take control of their finances. It enables individuals to set goals, make informed decisions, save for the future, manage debt responsibly, and pursue entrepreneurial opportunities. By promoting financial literacy, we can break the cycle of poverty, foster economic growth, and empower individuals to create a better future for themselves and their communities.

1.3 Importance

Financial literacy plays a crucial role in empowering financially marginalized groups, especially those residing in underdeveloped regions. By equipping them with knowledge and skills related to personal finance, budgeting, savings, and investments, individuals can make financial decisions, improve their financial well-being, and remove poverty. Here are some key steps to promote financial literacy in such communities:

Assess the requirements: Conduct a thorough assessment of the financial literacy requirements of the community. Identify their current knowledge gaps, challenges, and aspirations. This assessment will help knitter financial education programs to their specific requirements.

Collaborate with local organizations: Joining hands with local community associations, Non Government Oganisations, and other government agencies to leverage existing networks and resources. These institutions can provide valuable insights into the community's requirements and help to facilitate the delivery of financial literacy programs.

Develop culturally appropriate materials: Create financial literacy materials and resources that are culturally relevant, easy to understand, and accessible to individuals with low literacy levels. Use simple language, visuals, and illustrations that reverberate with the community's culture and diumal lives.

Conduct workshops and training sessions: Organize workshops and training sessions to deliver financial education content. These sessions should cover topics such as budgeting, saving, debt operations, financial services, and basic investment concepts. Provide interactive and hands-on training activities to improve learning and enhance engagement.

Offer one-on-one counseling: Provide personalized one to one counseling and support to community members who require personalized counseling. This can helps to address the particular financial challenges, such as debt operations or financial goal setting.

Promote savings and banking services: Educate individuals about the benefits of savings and the different financial product and services available. Encourage them to open bank accounts, introduce them to basic banking transactions, and highlight the significance of erecting a savings habit.

Foster entrepreneurship and income generation: Empower individuals to explore income-generating activities and entrepreneurship. Provide guidance on starting small businesses, accessing microcredit facilities, and developing sustainable livelihoods. Promote financial planning for business ventures and risk management.

Use technology and mobile platforms: Leverage technology, such as mobile applications and online platforms, to deliver financial literacy content and tools. This approach can reach a larger audience, especially in areas with limited physical infrastructure.

Monitor and evaluate impact: Continuously monitor and evaluate the impact of financial literacy initiatives. Gather feedback from participants, estimate the behavioral changes, and measure advancement in financial well-being. This data will helps to upgrade the programs and demonstrate their effectiveness to stakeholders.

Long-term sustainability: plan for long-term sustainability by fostering local leadership and building the capacity of community members to continue financial literacy efforts. Train and empower local individuals to become financial mentors or educators, ensuring the program's continuity and durability.

Remember, financial literacy is a continuous process, and it requires ongoing support and reinforcement. By empowering financially marginalized individuals with knowledge and skills, you can help them take control of their financial lives and work towards a more prosperous future.

1.4 Review of Literature

Financial literacy plays a crucial role in the economic well-being and empowerment of individuals, particularly those who are financially marginalized in underdeveloped regions. This literature review aims to explore the existing research on financial literacy among financially marginalized populations. The review examines various dimensions of financial literacy, including its conceptualization, measurement, and the factors influencing financial literacy levels. Additionally, it investigates the impact of financial literacy on the financial behavior and outcomes of marginalized individuals. The findings highlight the importance of tailored financial education programs and policies to enhance financial literacy and promote financial inclusion among marginalized populations.

Ramesh Prasad Chaulagain opines that the theories of behavioral study also show that the behavior of the individuals are subject to change their knowledge, skill and attitude. Similarly, the plan of empowerment and transformation are relative, contextual and dynamic in nature. This study concludes that empowerment is one of the main concerns of those people who are still marginalized and excluded from the mainstream of societies from various factors including finance. The paper stands on the assumption that the financial literacy simply works all around the place in the similar degree and directions. This approach believes that financial literacy is more relevant for the marginalized people and one of the tools of national development through empowering the marginalized and excluded people.

Dinesha, P.T (2018) opined that sound financial management is critical to the process of accumulating all kinds of assets and preserving them. However, financial conditions of these sections are highly pathetic and one of the main reasons is the lesser knowledge in managing financial matters and it leads to financial exclusion. Studies also shows that despite making significant improvements in all the areas relating to financial viability, profitability and competitiveness, there are concerns that Indian formal financial institutions have not been able to include vast segment of the population, especially the underprivileged sections of the society, into the fold of basic banking services.

Shekar et al, (2018) the researcher clearly stated the confusions among the public about new banking rules and regulations has proven the need of immense financial education for attracting the customers and also for the long-term sustainability of customers in the banking sector for the financial stability of India. The present study has made an attempt to know the status of financial literacy and financial inclusion in the state of Karnataka. The article also focuses on the demographic aspects for comparative analysis with the financial literacy and financial inclusion status of Karnataka. The article confirms that, state population has comparatively good and reasonable financial literacy and financial inclusion rate as compare to the overall financial literacy and inclusion rate of India and also to the rest of the States in country.

Here, the review focuses on the factors that influence financial literacy among financially marginalized populations. It examines socio-demographic characteristics, educational attainment, income levels, access to financial product and services, and cultural factors that may impact financial literacy levels.

1.5 Objectives

1. To critically evaluate the differences that exist in the level of financial literacy of the rural and urban population.
2. To analyse the relationship between financial literacy and socio-economic and demographic factors.

1.6 Hypothesis

1. There is no significant relationship between gender and financial literacy level of the respondents.

1.7 Research Methodology

The main objective of the current study is to examine the level of financial literacy among the population of Madurai district. For the purpose of the study 200 respondents residing in the Rural areas and 200 respondents residing Urban areas was chosen. For the purpose of the study both primary and secondary data were used. Primary data were collected with the support of well structured questionnaire, which was administered to selected respondents. And secondary data was collected from journals, magazines, books and

websites. For the purpose of the research different statistical tools have been used for analyzing data. The simple percentage, Mean, Fishers Exact Method, Chi-square test and correlation analysis were used for analysis of the data collected.

1.8 Analysis and Interpretation

Table1

Gender of the Respondents Based on Location

		Gender		Total
		Male	Female	
Rural	Number	145	55	200
	Percentage	72.50%	27.50%	(100.00)
Urban	Number	136	64	200
	Percentage	68.00%	32.00%	(100.00)
Total	Number	281	119	400
	Percentage	70.25%	29.75%	(100.00)

Source: Field Survey

The above table indicates the gender-wise classification of the respondents. Among the total respondents of 400, 70.25% were male and 29.75% were female. Among 200 respondents of rural, 72.50% were male and 27.50% were female. On the other hand, among 200 respondents from Urban, 68% were male and 32% were female.

Table 2

Age of the Respondents Based on Location

		Age				Total
		Upto25	26-35	36-45	Above46	
Rural	Number	33	37	84	46	200
	Percentage	16.5%	18.5%	42.00%	23.00%	(100.00%)
Urban	Number	79	60	37	24	200
	Percentage	39.50%	30.00%	18.5%	12.00%	(100.00%)
Total	Number	112	97	121	70	400
	Percentage	28.00%	24.25%	30.25%	17.50%	(100.00%)

Source: Field Survey

Table 2 clearly reveals the age of the respondents. It was found that out of 400 respondents 30.25% of the respondents belong to the age group of 36-45 years followed by 28.00% of them are in the age group of up to 25 years and 24.00% of them are in the age group of 26-55 and 17.50% of the respondents belongs to the age group of above 46 years. Among the respondents of Rural, the highest percentage of, 42% belongs to the age group of 36-45 years followed by 23% from the age group of above 46 years, while among the respondents from urban the highest percentage 39.5%) belongs to the age group of up to 25 years followed by 30.00% from the age group of 26-35 years.

Table 3

Educational Qualification of the Respondents Based on Location

		Age				**Total**
		SSLC	**HSC**	**Graduation**	**Post - Graduation**	
Rural	Number	56	40	70	34	200 (100.00%)
	Percentage	28.00%	20.00%	35.00%	17.00%	
Urban	Number	45	51	58	46	200 (100.00%)
	Percentage	22.50%	25.5%	29.00%	23.00%	
Total	Number	101	91	128	80	400 (100.00%)
	Percentage	25.25%	22.75%	32.00%	20%	

Source: Field Survey

The above table highlight the educational qualification of the respondents based on location. Out of 400 respondents 32 % of the respondents have completed their graduation, 25.25% were SSCL, 22.75% have completed their HSC and the rest 20 % of them are post graduate holders. Among the respondents of Rural, 35% have completed their graduation, 28% were SSLC, 20% were HSC and the rest 17% were with post graduate holders. Whereas, among the respondents from urban location, 29% have completed their graduation, 25.50% were HSC, 23% were post graduates and 22.5% of them are qualified SSLC.

Table 4

Annual Income of the Respondents Based on Location

		Annual Income (in lakhs)				Total
		Up to 3	**3-4**	**4-5**	**Above5**	
Rural	Number	129	33	30	8	200
	Percentage	64.50%	16.5%	18%	4%	(100.00%)
Urban	Number	64	53	51	32	200
	Percentage	32%	26.5%	25.5%	16%	(100.00%)
Total	Number	193	86	81	40	400
	Percentage	48.25%	21.50%	20.25%	10.00%	(100.00%)

Source: Field Survey

Table 4 depicts the annual income level of the respondent. The table clearly shows that, out of 400 total respondents, a maximum 48.25% of the respondents have an annual income of up to 3 lakhs, followed by 21.50% having an income of 3-4 lakhs, 20.25% of them are having 4-5 lakhs and 10.00% of them are above 5 lakhs of annual income. Among the respondents of Rural, maximum 64.50% have an annual income of up to3 lakhs, 18% have 4-5 lakhs, 16.5% have an annual income of 3-4 lakhs and the rest 4% of them are having above 5 lakhs of annual income. Further, among the respondents from urban, 32% have an annual income of up to 3 lakhs, 26.5% have 3-4 lakhs, 25.5% have 4-5 lakhs and 16% have an annual income of above 5 lakhs.

Table 5

Financial Literacy programme attended by the Respondents

		Financial Literacy program attended		Total
		Yes	**No**	
Rural	Number	35	165	200
	Percentage	17.5%	82.5%	(100.00)
Urban	Number	40	160	200
	Percentage	20.0%	80.00%	(100.00)
Total	Number	75	325	400
	Percentage	18.75%	81.25%	(100.00)

Source: Field Survey

The table reveals that the number of respondents who have attended financial literacy programmes. Out of 400 respondents only 18.75% of them are attended and 81.25% of them are not attended the financial literacy programme. The results from both rural and urban show that the majority 81.25% of the respondents have not attended any financial literacy programme.

Table 6

Consideration for Purchases before buying

		I carefully consider whether I can afford it, before I buy something					**Total**
		Strongly Disagree	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**	
Rural	Number	18	15	5	85	77	200
	Percentage	9.00%	7.50%	2.5%	42.5%	38.5%	(100.00%)
Urban	Number	03	08	03	101	85	200
	Percentage	1.5%	4.00%	1.5%	50.5%	42.5%	(100.00%)
Total	Number	21	23	08	186	162	400
	Percentage	5.25%	5.75%	2.00%	46.50%	40.50%	(100.00%)

Source: Field Survey

Table 6 clearly depicts the respondent's response to the question on whether they were carefully considered purchases before buying something else. Among the respondents from rural 42.5% of the respondents agree, 38.5% of them are strongly agree, 9.00% of them are strongly disagree, 7.50% of the respondents are disagree and 2.5% of the respondents are uncertain about their purchase consideration.

Among the respondents from urban, 50.5% of them are agree, 42.5% of them are strongly agree, 4% of them are disagree, 1.5% of them are strongly disagree and 1.5 % of them are uncertain about their purchase decisions.

The results shows that the percentage of the respondents who carefully consider purchase was higher among the respondents of both rural and urban i.e., 50.5% and 42.5% respectively. Overall, the majority of them on an average of 50% carefully consider their purchases which is lesser than the national level.

Table 7

Categorisation of the respondents based on gender and financial literacy level.

Location and Gender			Level of Financial Literacy			Total
			Low	Average	High	
Rural	Male	Number	08	80	47	**135**
		Percentage	5.92%	59.25%	34.81	67.5%
	Female	Number	04	46	15	65
		Percentage	6.15%	70.76%	23.07%	32.5%
	Total	Number	12	126	62	200
		Percentage	6.00%	63.00%	31.00%	100%
Urban	Male	Number	03	91	32	126
		Percentage	2.38%	72.22%	25.39%	63.00%
	Female	Number	02	53	19	74
		Percentage	2.70%	71.62%	25.67%	37.00%
	Total	Number	05	114	51	200
		Percentage	2.5%	57.00%	25.5%	100%
Total	Male	Number	11	171	79	261
		Percentage	4.21%	65.51%	30.26%	65.25%
	Female	Number	06	99	34	139
		Percentage	4.31%	71.22%	24.46%	34.75%
	Total	Number	17	270	113	400
		Percentage	4.25%	67.50%	28.25%	100%

Source: Field Survey

Table 7 explains that the financial literacy level of the respondents based their gender. It can be seen from the table that among 261 male respondents from both rural and urban, 79 respondents (i.e., 30.26%) have high financial literacy while the remaining 171 respondents (i.e., 65.51%) have average financial literacy. Whereas, among 139 female respondents from both rural and urban, 34 respondents (i.e., 24.46%) have high financial literacy while the remaining 99 respondents (i.e., 71.22%) have average financial literacy.

From the above analysis it is very clear that not much difference was found between financial literacy of male and female respondents.

Table 8

Fisher's Exact Test to measure the relationship between Gender and Level of Financial Literacy of the respondents

Location		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Rural	Pearson Chi-Square	2.704[a]	2	.129	.136
	Likelihood Ratio	3.621	2	.076	.162
	Fisher's Exact Test	2.156			.183
	Linear-by-Linear Association	.302[d]	1	.376	.139
	No f Valid Cases	200			
Urban	Pearson Chi-Square	1.059[c]	1	.243	.269
	Continuity Correction[f]	.743	1	.241	
	Likelihood Ratio	1.152	1	.152	.269
	Fisher's Exact Test				.269
	Linear-by- Linear Association	1.116[g]	1	.141	
	No f Valid Cases	200			
Total	Pearson Chi-Square	3.100[a]	2	.142	.113
	Likelihood Ratio	4.223	2	.076	.019
	Fisher's Exact Test	2.762			.120
	Linear-by-Linear Association	.072[b]	1	.662	.722
	No f Valid Cases	400			

The above table delineates that the output of the Chi-square test. The test was performed at a 5% level of significance. Among the respondents of rural and urban the Fisher's Exact test significance value is 0.136 and 0.269 with a degree of freedom 2. Since the significance value is greater than 0.05 among both the respondents of Rural and Urban the null hypothesis is accepted. Hence, there is no significant relationship between gender and level of financial literacy of the respondents of both Rural and Urban. Similarly, Fisher's Exact test significance value for the total respondents (0.269) is also greater than 0.05 the null hypothesis is accepted. It can be concluded that there is no significant relationship between gender and level of financial literacy among the total respondents.

1.9 Conclusion

Financial literacy is a powerful tool for empowering financially marginalized individuals in underdeveloped regions. By introducing key concepts such as budgeting, saving, investing, debt management, and understanding financial product and services, individuals gain the confidence and skills necessary to make informed financial decisions. Through financial literacy initiatives, we can provide these communities with the tools they need to break free from the limitations of poverty, build a brighter future, and contribute to the overall development of their regions.

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Clocking Out or Holding on Retirement Planning Study on Dual – Lens Exploration of Financial Security and Psychological Balance in It Professionals Retirement Timing in Chennai City

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Abstract

Timing of retirement is one of the important life decisions, which may have significant financial and psychological implications, particurally in the rapidly growing IT industry. This research looks into the impact of early retirement or delayed retirement on the financial security and psychological well-being of IT professionals, while also establishing major factors that influence the timing of retirement. Data were collected using a structured questionnaire, which covered financial preparedness, emotional readiness, personal and work-related determinants, and broader influences on retirement choices. These results have shown that employees with perceived high financial security felt more confident and mentally prepared for retirement. Psychological well-being was closely interrelated with financial pr eparedness, thus indicating lower anxiety associated with retirement due to strong financial planning. This study shows that retirement timing is shaped by a mix of factors, including income level, health condition, job stress, organizational benefits, family responsibilities, and personal aspirations. All these sub-constructs together define whether IT employees opt for early retirement or continue working longer. These results point out better financial awareness, workplace support, and structured retirement planning initiatives that may help employees make a well-informed and psychologically comfortable retirement decision.

***Keywords**: Retirement planning, Retirement timing, financial preparedness, retirement-related anxiety, retirement decisions.*

Introduction

The challenge posed by the aging global workforce coupled with the ever-changing nature of information technology occupations calls for a profound analysis of the phenomenon of retirement timing, especially set against the imperative and critical perspectives of financial security and psycho-social wellbeing (Morshed, 2024). This research endeavors to examine how these two vital considerations interact with each other, defining the transition process and decisions regarding when and how IT professionals choose to retire from their occupation. Specifically, the researcher has examined how changes in the financial environment and related considerations, such as career and work-life balance, are related to the IT professionals' intention to retire, a vital demographic that is ever at risk of technological obsolescence and work overload (Kerry, 2018). This study goes further than previous research into the phenomenon of retirement by embracing new factors such as digital literacy and the prospect of working longer, providing a more complex outlook into the challenges and drivers that define the demographic in question (Lakomý, 2023).

Objectives

1. To examine the influence of financial, security, psychological, and health factors on social factors among IT sector employees.
2. To analyze the effect of financial, security, psychological, and health factors on retirement timing decisions among IT professionals.
3. To assess the influence of social factors and retirement timing decisions on retirement timing predictors

Review of Literature

Previous studies have essentially covered retirement planning as a concept that has incessantly gained emphasis in view of the steadily increasing aging population across the global scenario, though lacking clarity in the concept associated with its understanding and meaning (Sinha & Irala, 2024). The above highlights the importance of a more in-depth analysis of factors associated with retirement planning in a multi-dimensional manner beyond the economic aspect of a profession to cover the psychological aspect of a balanced career and personal satisfaction in general terms and within the challenging environment of the IT field in particular (Jackson, 2023). Notably, the incorporation of artificial intelligence within the finance industry has potentially posed a threat of different economic pressures on professionals in relation to their increasing need for feeling psychologically safe while mixing their

boundaries of life and career in general practice in particular (Gao & Zamanpour, 2024). This rising scenario of the modern finance industry in terms of its ever-changing products like cryptocurrencies and robo-advisory services has further made the aspect of retirement planning even more intricate in understanding within the need of higher knowledge and continuous adjustments on the part of the investor in general practice in particular (Investor Behavior in the (Share Market: A Study of Influencing Factors and Decision-Making Processes, n.d.). Hence, a person tends to be left with no choice but to be more familiar or fully literate in finance as part of the increasing complexity within the environment of practice in becoming increasingly self-conscious in relation to the extent of retirement preparedness within their scope under definite conditions like the rising demand of increasing economic savings of a longer period within the framework of policy adjustments in view of (Ingale & Paluri (2023).

Research Gap

This proposed research will also explore the challenges and opportunities faced by IT individuals as they consider retirement. The effect of their technical skills and the fast growth of the sector will be considered. This proposed research Paper seeks to fulfill the identified gap in the existing body of knowledge on the subject matter. This proposed research Paper shall use the dual perspectives approach where financial security and balance in the mind shall be considered important factors in deciding retirement for IT individuals. There is little research work on financial security and balance in relation to the IT sector.

Research Methodology

The study was empherical in nature. The current research have taken purposive sampling technique with descriptive research design. The study covers with 200 respondents spotted in Chennai city. The study adopted statical tools like Chi square, correlation, Regression and factor analysis

Conceptual Model

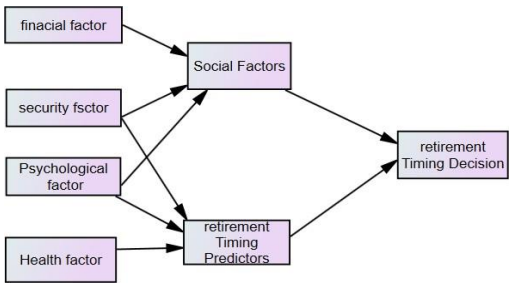

Fig 1 Conceptual model for proposed study

Hypothesis

- H1: Financial factors have a significant influence on social factors among IT and ITES sector employees.
- H2: Security factors have a significant influence on social factors among IT and ITES sector employees.
- H3: Psychological factors have a significant influence on social factors among IT and ITES sector employees.
- H4: Psychological factors have a significant influence on retirement timing decisions among IT and ITES sector employees.
- H5: Retirement timing decisions have a significant influence on retirement timing predictors.

Measurement Instrument

Data were gathered through a questionnaire containing items that utilize a five-point Likert-type scale format with scores between 1 and 5 indicating the degree to which respondents agree or disagree (1 = Strongly Disagree, 5 = Strongly Agree). This instrument was created to assess latent constructs that influenced an individual's decision on when to retire:

- Financial Factors
- Security Factors
- Psychological Factors
- Health Factors
- Social Factors
- Retirement Timing Decision
- Retirement Timing Predictor

Each item was based on previously validated measurement scales used in research on Retirement Planning, Financial Behaviors and Psychological Decision-Making; however, the items were slightly modified for context appropriateness to the IT Workforce, while retaining the original scales' conceptual framework.

Data Analysis and Interpretation

Table 1

Demographic Profile of the Respondents

Sl. No.	Demographic Variable	Category	Frequency (n)	Percentage (%)
1	Age (years)	20–25	43	21.5
		25–30	64	32.0
		30–35	55	27.5
		Above 35	38	19.0
		Total	**200**	**100.0**
2	Gender	Male	123	61.5
		Female	77	38.5
		Total	**200**	**100.0**
3	Educational Qualification	UG	45	22.5
		PG	105	52.5
		Professional	37	18.5
		Others	13	6.5
		Total	**200**	**100.0**
4	Total Work Experience	Less than 3 years	36	18.0
		3–6 years	65	32.5
		6–9 years	59	29.5
		More than 9 years	40	20.0
		Total	**200**	**100.0**
5	Current Position	Entry level	48	24.0
		Mid level	72	36.0
		Senior level	51	25.5
		Managerial / Lead	29	14.5
		Total	**200**	**100.0**

6	Monthly Income (₹)	Below 30,000	28	14.0
		30,000–50,000	61	30.5
		50,000–70,000	52	26.0
		70,000–1,00,000	39	19.5
		Above 1,00,000	20	10.0
		Total	**200**	**100.0**
7	Type of Organization	MNC	119	59.5
		Indian-owned	81	40.5
		Total	**200**	**100.0**
8	Retirement Saving Plan	Yes	136	68.0
		No	64	32.0
		Total	**200**	**100.0**

Based on demographic analysis, the majority of respondents are either in the economically active or in their careers who are progressing in their careers. Most respondents are aged 25-30 years old followed by 30-35, which indicates an overall sample of individuals in the early to mid-career phase of Information Technology. Given these ages, respondents should be able to provide good insight on attitudes and behaviours toward retirement, because this is when people normally start to think about their finances. The sample also shows a significantly higher proportion of males than females which aligns with the current gender ratio of those sectors, and will give an accurate representation of this workforce. The sample also demonstrates that there is a fair amount of educational attainment within this group, as the majority of respondents possess some type of postgraduate degree, with undergraduates being second and finally professional candidates. Therefore, it can be reasonably assumed that the relatively high level of education attained will give people wealth-building awareness and will positively influence decisions that will ultimately dictate retirement planning. Lastly, the sample's work experience primarily consists of individuals with four to six years of experience, followed by individuals with six to nine years of experience. This means that for the sample, the majority of individuals have achieved a good amount of experience and income growth, which plays an important role in the long-term wealth-building plan of an individual

Table 2

Standardized Regression Weights for Sem Analysis

Dependent Variable	Independent Variable	Standardized Estimate	Significance (p- value)
Social factor	Financial factor	0.317	***
Social factor	Security factor	0.150	***
Social factor	Psychological factor	0.248	***
Social factor	Health factor	0.079	***
Retirement timing decision	Security factor	0.003	***
Retirement timing decision	Psychological factor	0.107	***
Retirement timing decision	Health factor	–0.087	0.085 (ns)
Retirement timing predicator	Social factor	0.044	0.300 (ns)
Retirement timing predicator	Retirement timing decision	0.528	***

*** means p >000

The results of Structural Equation Modelling (SEM) demonstrate that social variables are substantially impacted by several other variables. In order of strength, the variables affecting social considerations related to retirement are: Financials ($\beta = 0.317$, $p < 0.001$); Psychology ($\beta = 0.248$, $p < 0.001$); Security ($\beta = 0.150$, $p < 0.001$); and Health ($\beta = 0.079$, $p < 0.001$). In this instance, financial factors have the most significant impact on social considerations regarding retirement. The Psychological variable positively impacts Psychological Factors with level of significance of ($\beta = 0.107$, $p < 0.001$) , which suggests the important role of Psychological Mindsets (preparedness) as contributing factors to the timing of retirement itself. The Security variable has minimum to negligible negative ($\beta = -0.003$, $p < 0.001$) significance, indicating no practical influence. The health variable negatively impacts Psychological Factors ($\beta = -0.087$, $p = 0.085$) without statistical significance, suggesting a general lack of causation between Health considerations of those surveyed as influencing Timing of Retirement Decisions. Social considerations were shown to have no significant impact on Prediction of Timing of Retirement Decisions ($\beta = 0.044$, $p = 0.300$), thus illustrating the inability of Social Factors to be the sole predictor of Timing of Retirement Outcomes. The effect of Retirement Timing decisions was found to have a significant positive impact ($\beta = 0.528$, $p < 0.001$) on Prediction of Timing of Retirement Decisions, verifying that Timing Decisions are instrumental in determining the final determination of retirement timing date.

Table 3

Model Fit Indicates for Sem Analysis

Fit Index	Value	Threshold	Interpretation
Chi-square/df	0.575	< 3.0	Excellent fit
GFI	0.998	> 0.90	Excellent
AGFI	0.989	> 0.90	Excellent
CFI	1.000	> 0.90	Excellent
TLI	1.019	> 0.90	Excellent
NFI	0.993	> 0.90	Excellent
RMSEA	0.000	< 0.08	Perfect fit
PCLOSE	0.964	> 0.05	Excellent (no significant error)

The goodness-of-fit indices indicate that the proposed structural equation model has an excellent fit with the observed data. The chi-square to degrees of freedom ratio (χ^2/df = 0.575) is less than 3.0, which indicates a good fit for this model. The absolute fit indices support this conclusion. The Goodness of Fit Index (GFI = 0.998) and the Adjusted Goodness of Fit Index (AGFI = 0.989) are both above 0.90, and they indicate that there is a very strong relationship between the hypothesized model and the sample data. Incremental fit indices also show the robustness of the model. The Comparative Fit Index (CFI=1.000), the Tucker-Lewis Index (TLI=1.019), and the Normed Fit Index (NFI=0.993) are all much higher than the minimum acceptable threshold of 0.90, indicating a major improvement of the proposed model over the null (baseline) model. Moreover, the Root Mean Square Error of Approximation (RMSEA=0.000) indicates that the model has a perfect fit and that there is no RMSEA approximation error. The PCLOSE Value (PCLOSE=0.964) is above the recommended level of 0.05 and indicates, therefore, that the RMSEA is not significantly different from zero. Overall, these fit indices demonstrate that the proposed Structural Equation Model is specified correctly, has a high level of statistical robustness and is an excellent candidate for testing hypothesis.

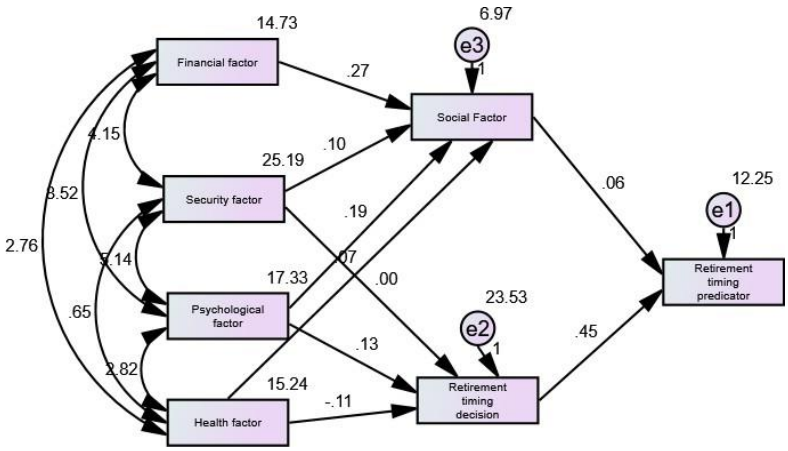

Fig 2 SEM Analysis of dual-lens exploration of financial security and psychological balance

Findings And Suggestions Key Findings

1) Financial factors showed significant positive effect on social factors among IT sector employees, indicating that income capacity, savings capability, and financial growth enhance social confidence and family-oriented decision-making.
2) Security factors significantly affected social factors, suggesting that job security, employment benefits, and long-term financial assurance play a important role in shaping social well-being among IT professionals.
3) Psychological factors showed a significant positive infuence on social factors as well as on retirement timing plan, highlighting the need of Psychological preparedness, future orientation, and self-confidence in retirement-related decision-making.
4) Health factors did not showed a statistically significant influence on retirement timing decisions, which indicate that IT professionals may prioritize financial and psychological considerations over health aspects when planning their retirement.
5) Retirement timing decisions were found to have a strong and significant effect on retirement timing predictors, confirming that perceptions and intentions regarding retirement age directly influenced retirement-related behaviour.

Suggestions

1) IT organizations may have structured financial literacy and retirement awareness programs to enhance employees' long-term financial preparedness.

2) Strengthening job security measures and providing transparent retirement benefit schemes may influence social well-being and retirement confidence among professionals.

3) Psychological support mechanisms, such as career counseling, stress management initiatives, and future planning workshops, should be encouraged to improve employees' readiness for retirement decisions.

4) Although health factors were not statistically significant, organizations should continue to promote workplace health and wellness programs to support overall employee well-being

5) Financial planners and policymakers should develop retirement planning tools specifically designed for IT professionals, taking into account their career trajectories and income patterns.

Conclusion

The present study has investigated the determinants of retirement timing decisions among IT sector employees in Chennai City using Structural Equation Modelling. The findings of the study indicated that financial, security, and psychological factors significantly influence social factors and retirement-related decisions. Among these, psychological factors played as a key determinant affecting both social well-being and retirement timing decisions, while health factors did not showed a significant direct influence. retirement planning behavior among IT professionals is primarily shaped by financial stability, employment security, and psychological preparedness. The study offers practical insights for IT organizations, policymakers, and financial advisors to design effective retirement planning and employee support strategies. Future studies may extend this research by incorporating longitudinal designs or comparative analyses across different regions or occupational groups.

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ESG Momentum and Financial Performance: A Review of Global and Emerging Market Evidence

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Abstract

Environmental, Social, and Governance (ESG) criteria are now widely recognized as an important determinant of investment decisions, with their relevance being especially pronounced in emerging markets. While early research primarily examined the static relationship between ESG scores and firm performance, recent studies increasingly emphasize ESG momentum, defined as changes or improvements in ESG performance over time. This review synthesizes global and emerging market evidence on the relationship between ESG performance, ESG momentum, and financial outcomes. Drawing on more than 100 peer- reviewed studies published between 2015 and 2025, the paper categorises findings across firm value, stock returns, risk, volatility, and moderating mechanisms, including financial constraints, governance quality, and innovation. The review highlights strong heterogeneity across regions and industries, identifying ESG momentum as a promising yet underexplored dimension in sustainability–finance research.

***Keywords**: ESG momentum, financial performance, firm value, emerging markets, sustainability investing*

1. Introduction

The integration of ESG factors into financial analysis has transformed both corporate governance practices and capital market behavior. Investors increasingly view sustainability not merely as an ethical consideration but as a driver of long-term financial performance and risk management. Early empirical work largely focused on the level of ESG performance, often measured through composite ESG scores, and its association with firm value or stock returns (Landi & Sciarelli, 2019; Sahut & Pasquini-Descomps, 2015).

However, recent literature argues that changes in ESG performance over time, referred to as ESG momentum, may carry more informative signals for markets than static ESG levels. Firms that actively improve ESG practices may signal adaptive governance, strategic commitment, and superior long-term resilience. This shift has motivated a growing body of research examining ESG momentum across developed and emerging markets (Cauthorn et al., 2023; Escobar-Saldívar et al., 2025).

This review aims to synthesize global evidence on ESG momentum and financial performance, identify key empirical patterns, and highlight unresolved research gaps.

2. Conceptual Foundations: ESG Performance and ESG Momentum

2.1 ESG Performance and Financial Outcomes

While a substantial stream of research suggests a favorable association between ESG performance and financial outcomes, including profitability, firm value, and shareholder wealth (Friede et al., 2015; Whelan et al., 2021). Studies across Europe, Asia, and emerging markets report that strong ESG performance enhances operational efficiency, reputation, and access to capital (Ahmad et al., 2021; Aydoğmuş et al., 2022; Rao et al., 2023). Firms demonstrating stronger ESG performance tend to be associated with higher stock valuations and comparatively better investment performance than their lower-ESG counterparts. (Kulal et al., 2023)

However, findings are not universally consistent. Some studies observe neutral or context- dependent effects, suggesting that ESG benefits materialize only under certain institutional, industry, or lifecycle conditions (Duy Thanh Nguyen et al., 2022; Gao et al., 2023).

2.2 ESG Momentum as a Dynamic Signal

ESG momentum extends the static ESG framework by focusing on improvements or deteriorations in ESG scores over time. Momentum-based perspectives argue that markets reward firms demonstrating credible sustainability progress rather than merely high ESG levels (Kaiser & Welters, 2019; Yeonwoo & Kim, 2020).

Recent evidence indicates that ESG rating upgrades and positive ESG momentum are associated with abnormal stock returns, reduced downside risk, and improved volatility

profiles (Cauthorn et al., 2023; Sverner et al., 2023). This dynamic view aligns ESG analysis with traditional financial momentum theories.

3. Evidence from Developed Markets

Studies in developed markets, particularly the US and Europe provide robust evidence on ESG–performance linkages. Research on S&P 500 and FTSE-listed firms suggests that ESG performance enhances firm value and risk-adjusted returns, especially during periods of market stress such as the COVID-19 crisis (Engelhardt et al., 2021; Yoo et al., 2021). High ESG scores in Brazilian public companies are significantly associated with lower cost of capital and better operating performance (Possebon et al., 2024).

More recent work explicitly incorporates ESG momentum. (Escobar-Saldívar et al., 2025) demonstrate that ESG momentum significantly influences stock returns and volatility in US markets, often outperforming static ESG measures. Similarly, (Cauthorn et al., 2023) find that short-term ESG rating changes generate measurable market reactions, supporting the informational value of ESG momentum.

Sector-specific studies, including energy and automotive industries, further reveal that ESG improvements are more strongly rewarded in environmentally sensitive sectors (Cortez & Kelly, 2025; Glova & Panko, 2025).

4. Evidence from Emerging Markets

4.1 Asia and Emerging Economies

Emerging market research highlights the growing relevance of ESG amid weaker institutional environments and evolving regulatory frameworks. Studies from China, India, Southeast Asia, Vietnam and Indonesia consistently provide evidence of a favorable association between ESG with firm value and financial performance, though the magnitude varies (H. P. Le & Bùi, 2025; L. Le, 2024; Rao et al., 2023; Yin et al., 2023). In Contrast, Studies focusing on ASEAN economies suggest that ESG performance has no significant impact on firm performance or market valuation, largely because ESG considerations have not yet been institutionalized as a core component of firm performance assessment (Junius et al., 2020).

Chinese market studies reveal that ESG performance and ESG premiums are particularly pronounced among firms facing financial constraints or innovation pressures (Ni

& Sun, 2023; Xu & Zhu, 2024) Indian evidence suggests that ESG practices mitigate financial distress and enhance firm resilience (Yadav & Asongu, 2025).

4.2 ESG Momentum in Emerging Markets

Despite growing interest in ESG issues, ESG momentum research in emerging economies lags behind that of developed markets. Nevertheless, available evidence suggests that improvements in ESG scores matter more than absolute ESG levels, particularly where baseline ESG disclosure is low (Lirisanti & Husodo, 2025; Yeonwoo & Kim, 2020). Behavioral finance perspectives further argue that ESG momentum may attract investor attention and capital flows in emerging markets characterized by information asymmetry (Adwani, 2025). Empirical evidence from Turkish firms indicates that environmental and governance ESG practices positively affect financial performance, although governance-related factors demonstrate a negative relationship with firm value as measured by Tobin's Q and a positive relationship with profitability, proxied by ROE (Yavuz et al., 2024)

5. Moderating and Mediating Mechanisms

The linkage between ESG performance and firms' financial outcomes is influenced by a range of moderating and mediating mechanisms that shape how sustainability initiatives translate into economic value. Firms with stronger financial positions and higher liquidity are better able to absorb the initial costs of ESG investments and are therefore more likely to realize financial benefits from such initiatives (Ahmed & Khalaf, 2025; Cheng & Manansala, 2025). The effectiveness of ESG practices is also closely linked to corporate governance structures, as strong governance and transparent ownership arrangements enhance strategic alignment and accountability (Wu et al., 2022; Yucel et al., 2025). In addition, ESG initiatives often contribute to financial performance indirectly by fostering innovation, improving productivity, and encouraging long-term value creation through research and development activities (Apriliani & Baskoro, 2025; Zhou, 2025)

The credibility of ESG disclosures further plays a critical role, as high audit quality and reliable reporting strengthen investor confidence and reinforce the informational value of ESG signals (Chandra et al., 2025; Hassan & Abid, 2025). Collectively, these insights indicate that ESG momentum generates the greatest financial impact when it is supported by robust institutional frameworks and strong organizational capabilities.

6. Methodological Trends in ESG Research

The literature employs diverse methodologies, including panel regressions, event studies, dynamic models, and machine learning techniques. Recent advances integrate deep learning, random forest models, and sentiment analysis to predict stock performance using ESG data (Lee et al., 2024; Su, 2025).

Despite methodological progress, challenges remain regarding ESG data consistency, rating divergence, and endogeneity concerns. These limitations complicate cross-country comparisons and underscore the need for standardized ESG metrics.

Table X

Summary of Empirical Evidence on ESG, Firm Value, and Financial Performance

Dimension of Analysis	Category	Number of Studies (Approx.)	Key Findings
Direction of ESG–Firm Value Relationship	Positive	55–60	Strong ESG performance is generally associated with higher firm value, profitability, and risk-adjusted returns across developed and emerging markets.
	Negative	5–7	Negative effects are limited and context-specific, often reflecting short-term compliance costs, weak governance, or industry-related constraints.
	Mixed/ Neutral	15–20	Results vary depending on institutional quality, firm lifecycle, industry sensitivity, and governance structures.
Type of ESG Measure Used	ESG Score (Static Level)	55–60	Traditional ESG studies focus on absolute ESG levels, emphasizing long-term firm quality, reputation, and sustainability orientation.
	ESG Momentum (Change in ESG Score)	20–25	Recent studies show that improvements in ESG performance generate stronger market reactions, abnormal returns, and risk reduction.

	Both ESG Score and Momentum	10–12	Comparative studies indicate that ESG momentum provides incremental explanatory power beyond static ESG scores.

Note: *This table synthesizes evidence from approximately 100 peer-reviewed studies published between 2015 and 2025.*

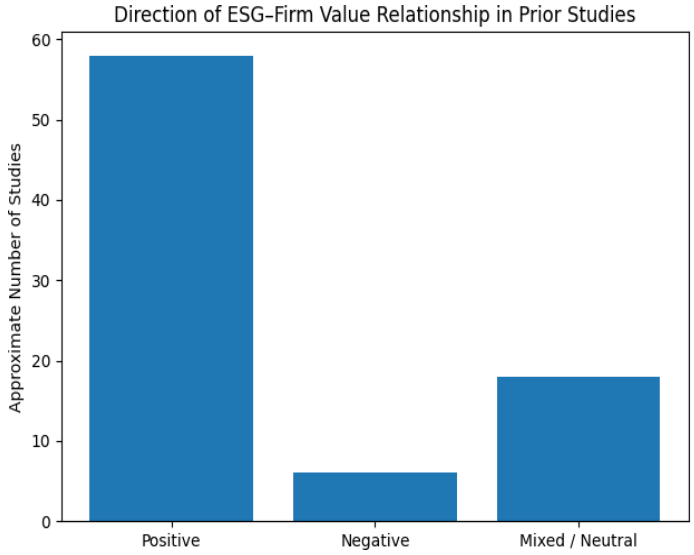

Figure 1

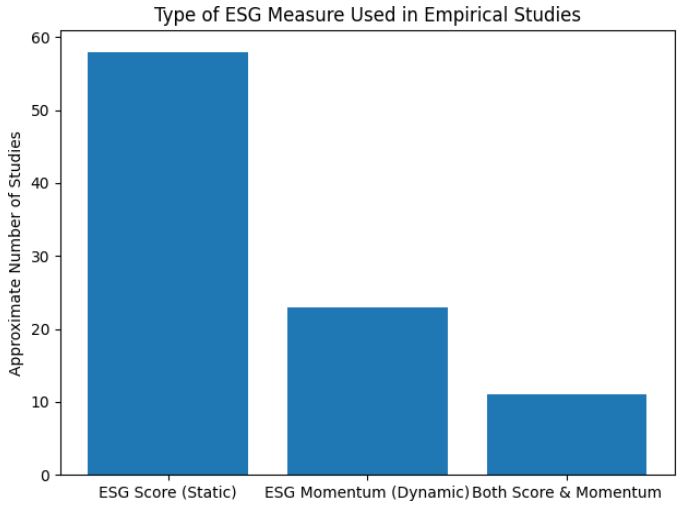

Figure 2

Note*: The figure summarizes evidence from approximately 100 peer-reviewed studies published between 2015 and 2025.*

Table X and Fig. 1 and 2 summarize key empirical patterns in the ESG–financial performance literature. Most studies report a positive relationship between ESG performance

and firm value, while negative findings are limited and largely context-dependent. A notable proportion of studies shows mixed results, indicating that ESG outcomes vary with institutional and firm- specific factors. Figure 2 further reveals that existing research predominantly relies on static ESG scores, with relatively fewer studies examining ESG momentum. Evidence synthesized in Table X suggests that ESG momentum often provides greater explanatory power for stock returns, market valuation, and risk measures than static ESG levels.

The overall evidence supports a positive ESG–firm value relationship, despite its stronger theoretical and empirical relevance, ESG momentum remains underexplored, highlighting an important gap and justifying its use as a primary analytical variable in understanding firm financial performance.

7. Research Gaps and Future Directions

Although research on ESG and financial performance has grown rapidly, important gaps remain. Most evidence on ESG momentum is concentrated in developed markets, with limited attention to emerging economies, especially Africa and Latin America. Many studies focus on short-term effects, leaving the long-term financial impact of sustained ESG improvements underexplored. Differences in ESG ratings and measurement frameworks also lead to mixed findings across studies. Moreover, little is known about how ESG momentum responds to major economic shocks such as financial crises or pandemics. Future research should adopt long-term perspectives, use more granular ESG data, and explore portfolio-level ESG momentum to better understand the dynamic role of sustainability in financial markets.

8. Conclusion

This review indicates that ESG performance is increasingly associated with firm value, financial performance and market stability across global markets. More importantly, emerging evidence suggests that ESG momentum contributes incremental explanatory value beyond traditional static ESG measures, particularly in dynamic and information-constrained environments. While developed markets lead ESG momentum research, emerging economies offer fertile ground for future inquiry. As ESG investing matures, momentum-based perspectives are likely to play a central role in sustainability-driven finance.

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FinTech, Financial Inclusion, and Financial Literacy: A Comprehensive Review of Emerging Trends and Challenges

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Abstract

Financial technology (FinTech) has rapidly evolved into a powerful catalyst for reshaping how individuals and communities access and use financial services. Across the literature, FinTech tools—ranging from mobile banking and digital payments to AI-driven credit assessments—are shown to break long-standing barriers by making financial services more accessible, affordable, and user-friendly. These innovations have been especially impactful for groups that have historically been excluded from formal finance, including women, rural households, and small entrepreneurs, enabling them to save, borrow, invest, and manage money with greater confidence and convenience. A recurring theme in the research is that financial literacy and digital financial literacy are essential for people to fully benefit from these technologies. Users who understand how digital platforms work—and how to stay safe while using them—are far more likely to adopt FinTech services and use them responsibly. This highlights the need for targeted education programs that respond to the realities of different demographic groups and help bridge persistent digital divides. Government Regulation also plays a critical role. The literature emphasizes that the success of FinTech depends on policies that encourage innovation while ensuring consumer protection, data security, and trust. However, many countries still struggle with regulatory gaps, uneven digital infrastructure, and limited oversight capacities. Bringing FinTech's promise to life, therefore, requires coordinated efforts that combine technology, education, infrastructure, and inclusive policy design.

Keywords: *FinTech, Financial Inclusion, Financial Literacy, Digital Transformation, Policy and Regulation*

1. Introduction

Financial technology, commonly known as FinTech, refers to the innovative use of technology in delivering financial services, transforming traditional financial sectors by increasing efficiency, accessibility, and reducing costs. FinTech encompasses a broad array of digital financial services, including mobile banking, digital payment platforms, peer-to-peer lending, blockchain solutions, and robo-advisory services, among others. These technologies fundamentally reconfigure how financial products and services are accessed and consumed, thereby reshaping the financial ecosystem on a global scale. It is critical to note that FinTech's role extends beyond innovation to addressing gaps in financial accessibility, particularly for historically underserved populations.

Financial inclusion is a multidimensional concept that generally signifies the availability and access to affordable and appropriate financial products and services by all individuals and businesses, especially the disadvantaged and marginalized segments. Metrics of financial inclusion range from basic account ownership and access to credit or insurance products to deeper dimensions, such as usage frequency, quality of financial services, and the empowerment arising from meaningful engagement with the financial system. Inclusion efforts aim to overcome a range of barriers including geographical distance, lack of documentation, low income, and distrust in institutions.

Financial literacy pertains to the knowledge, skills, and attitudes that enable individuals to make informed and effective decisions regarding the use of financial products and services. It is increasingly recognized as a core driver of financial inclusion; literate consumers are more able to navigate digital financial ecosystems, assess risks, and optimize their financial wellbeing. Financial literacy encompasses general understanding of concepts such as savings, budgeting, credit management, and investment, but in the context of FinTech, digital financial literacy— understanding the use of digital platforms, cybersecurity, and digital transactions—has emerged as essential.

Together, these three concepts—FinTech, financial inclusion, and financial literacy—intersect profoundly. FinTech innovations hold the promise to bridge inclusion gaps, yet their efficacy depends heavily on users' financial literacy levels to ensure appropriate and safe usage (Vasishta & Singla, 2024; P. et al., n.d.; Kulshrestha, 2023).

1.2 Historical Evolution and Recent Trends (2018–2024)

The past decade has witnessed a rapid evolution of FinTech from niche technological experiments to mainstream components of the global financial architecture. Since 2014, advances in mobile technologies, the advent of blockchain and distributed ledger technologies, and the integration of artificial intelligence (AI) and machine learning have propelled this transformation. Academic interest has mirrored these developments, with a significant surge in publications mapping FinTech's impact on financial inclusion globally.

Bibliometric analyses reveal exponential growth in interdisciplinary research combining technology, economics, and policy studies. Tools like Biblioshiny and VOSviewer have been crucial in identifying emerging themes such as mobile money adoption, digital lending, and regulatory responses shaping FinTech ecosystems. From a geographic perspective, research has expanded to capture the nuances of these innovations in varied socio-economic contexts, especially in developing and emerging markets where FinTech's potential to leapfrog traditional banking barriers is most transformative.

Recent technological advances include increased deployment of blockchain-enabled digital currencies, AI-driven credit assessment models, and the integration of biometric security features. These have facilitated more secure, transparent, and user-friendly financial services, although adoption challenges remain, particularly in rural and underserved regions. The continuous refinement of these technologies and their alignment with regulatory frameworks remain key research concerns shaping the literature landscape (Afjal, 2023; Akmalia, 2023; Garg & Kumar, 2024).

1.3 Significance of the Interconnection among FinTech, Inclusion, and Literacy

Understanding the synergistic relationship between FinTech innovations, financial inclusion, and financial literacy is pivotal for maximizing the socio-economic benefits of digital finance.

FinTech's ability to bridge the financial services gap directly influences marginalized populations, including micro, small, and medium enterprises (MSMEs), which form the backbone of many developing economies.

Financial literacy acts as a crucial enabler by equipping individuals and enterprises to effectively engage with FinTech platforms, maximizing benefits while mitigating associated risks.

Nonetheless, a persistent digital divide—manifested through disparities in internet access, device ownership, and socio-cultural acceptance—significantly shapes FinTech adoption and inclusion outcomes. Moreover, socio-cultural factors such as gender norms, educational attainment, and trust in digital systems influence both literacy and the willingness to embrace FinTech. Initiatives aimed at fintech-driven economic empowerment increasingly emphasize the need for integrated strategies that combine technological innovation with literacy enhancement and supportive policies to foster healthy, inclusive financial ecosystems (Mandi et al., 2025; Jha & Dangwal, 2024; Nanda & Yunus, 2024).

2. Impact of FinTech on Financial Inclusion

2.1 FinTech Innovations Enhancing Access to Financial Services

A considerable body of research underscores the role of specific FinTech innovations in expanding access to financial services. Mobile banking platforms, along with agent banking networks, have enabled users to conduct financial transactions remotely, bypassing infrastructural constraints present in many low-income and rural settings. Peer-to-peer lending portals and crowdfunding systems have democratised access to credit, especially for SMEs and individual borrowers who lack collateral or formal credit histories.

Digital payment systems such as e-wallets and mobile money services have drastically reduced dependency on cash, enhancing financial transparency and reducing transaction costs, thus incentivizing wider adoption. These technological solutions address fundamental geographical and infrastructural barriers by enabling financial inclusion without the necessity for physical bank branches. Empirical studies highlight the scalability of such platforms across diverse regions, noting improvements in service reach and frequency of financial usage (Neltje et al., 2025; Dangkeng & Munir, 2025; Gupta, n.d.).

2.2 Effects on Underserved and Unbanked Populations

FinTech's impact is particularly pronounced among underserved and unbanked populations, where traditional banking has struggled due to high operational costs and structural inefficiencies. Evidence from developing and emerging markets, particularly across Africa and South Asia, demonstrates improved financial accessibility driven by FinTech adoption. Notably, mobile money services such as M-Pesa in Kenya have redefined access for millions, offering secure, convenient financial tools.

However, disparities remain, especially gender-based and regional. Women often demonstrate lower adoption rates due to socio-cultural barriers and limited digital literacy. Furthermore, geographic disparities persist, with rural and remote communities facing infrastructural hurdles that limit FinTech access. Studies have shown that while FinTech alleviates several inclusion barriers, concerted efforts are required to close these persistent gaps and tailor solutions to local contexts (Hasheela & Happonen, 2023; Cevik, 2024; Mahat, 2024).

2.3 Economic and Social Outcomes of Increased Inclusion

Financial inclusion through FinTech is correlated with significant economic and social benefits. Increased access to financial services enables poverty alleviation by facilitating savings, investments, and credit access, which in turn supports income generation and consumption smoothing. Moreover, inclusion contributes to reducing income inequality by empowering marginalized groups with financial tools previously unavailable to them.

Sustainable development frameworks recognize FinTech-driven inclusion as instrumental in achieving broader social objectives, including poverty reduction and economic growth. The welfare impact extends beyond direct economic gains to improvements in quality of life, social mobility, and resilience against shocks. Empirical analyses also highlight the nuanced relationship between financial inclusion and sustainable development goals (SDGs), suggesting that technology-enabled inclusive finance has both direct and indirect effects on social welfare (Shen et al., 2024; Tidjani & Madouri, 2024; Kumar et al., 2025).

3. Role of Financial Literacy in Supporting FinTech Adoption

3.1 Financial Literacy as a Foundation for Financial Inclusion

Financial literacy is a critical prerequisite for meaningful financial inclusion. It encompasses the ability to understand, interpret, and use financial information for effective decision-making. This knowledge is particularly vital in digital environments, where the complexities of platform use, transaction security, and financial product selection require nuanced understanding.

Research indicates that individuals with higher financial literacy demonstrate better financial management behaviors, including budgeting, saving, and responsible borrowing. Varied literacy levels across demographics and regions influence the extent to which FinTech solutions are adopted and used effectively. Low literacy levels contribute to mistrust and misusage, thereby limiting the benefits of financial inclusion initiatives rooted in technology (Kulshrestha, 2023; Vasishta & Singla, 2024; Saad et al., 2025).

3.2 Financial Literacy and Digital Financial Literacy: Distinctions and Overlaps

The emergence of a digitally enabled financial ecosystem necessitates a distinction between traditional financial literacy and digital financial literacy. While the former focuses on fundamental financial concepts and management, the latter zeros in on competencies relating to the use of digital financial platforms, including understanding digital security, identity verification, and navigating online services safely.

Studies highlight that digital financial literacy mediates the relationship between financial literacy and FinTech adoption. Users with better digital skills are more inclined to trust and effectively utilize digital financial services. The interplay between these literacies determines the extent to which FinTech platforms can achieve inclusive outcomes and underscores the importance of developing tailored educational interventions that address both competencies (Raza et al., 2024; Amnas et al., 2024; Aishwaryalaxmi et al., n.d.).

3.3 Education Programs and Interventions to Enhance Literacy

Interventions aiming to enhance financial literacy often integrate technology-based tools and community engagement strategies. Financial education programs that combine practical training on digital platforms with foundational financial concepts have proven to be effective in increasing both literacy and adoption rates.

Additionally, gender-responsive and context-specific programs are essential in addressing unique barriers faced by women and marginalized groups. Rural areas persistently face challenges related to low literacy and limited infrastructure, necessitating innovative community-driven models and collaborations between fintech firms, governments, and non-governmental organizations. Despite progress, challenges such as low awareness and resistance to change remain substantial bottlenecks (Cevik, 2024; Noor et al., 2020; Shanthi, 2025).

4. Regulatory and Institutional Context Affecting FinTech and Inclusion

4.1 Regulatory Frameworks Promoting or Hindering FinTech Growth

Regulatory environments critically influence FinTech's growth trajectory and its capacity to foster financial inclusion. Effective frameworks strike a balance between promoting innovation and ensuring consumer protection, preventing fraud, and maintaining systemic financial stability. Successful regulatory examples often incorporate flexible, adaptive policies that accommodate new technological developments while safeguarding users.

Conversely, fragmented or stringent regulatory policies, especially in rural areas, have hindered FinTech deployment and created uneven access landscapes. Regulatory failures can exacerbate trust deficits and limit platform scalability. Policy insights urge for harmonized and inclusive regulations aligned with financial inclusion objectives for sustainable ecosystem development (Shanthi, 2025; Shanbhag, 2025; Velez, n.d.).

4.2 The Role of Financial Institutions and Policy Makers

Collaboration among traditional financial institutions, emerging FinTech firms, and policymakers has emerged as a cornerstone for achieving inclusive digital finance. Conventional banks often bring regulatory experience and trust capital, while fintech innovators offer agility and customer-centric solutions.

Efforts to build institutional capacity for overseeing FinTech services have been highlighted as imperative to ensuring consumer protection and market stability. Policymakers are increasingly tasked with crafting policy ecosystems that incentivize innovation while embedding financial literacy, consumer safeguards, and digital infrastructure development (Afjal, 2023; Agbeve et al., 2025; Zubairu et al., 2025).

4.3 Gaps in Regulatory Research and Emerging Challenges

Despite advancements, there remain significant research gaps relating to FinTech regulation and risk management. Emerging risks tied to digital transformation—such as cybersecurity threats, data privacy issues, and evolving consumer trust challenges—are underexplored in existing frameworks.

There is a demand for agile regulatory designs that uphold innovation without exposing users to undue risk. Additionally, regional disparities persist in regulatory preparedness, with many developing markets lacking comprehensive, harmonized policies. Understanding these gaps is vital for crafting inclusive, resilient financial systems (Mandi et al., 2025; Cevik, 2024; Shanthi, 2025).

5. Technological Innovations and Their Influence on Financial Inclusion

5.1 Mobile Technologies and Digital Payment Platforms

Mobile technologies and digital payment platforms remain central to FinTech's role in inclusion. Mobile money services have demonstrated unparalleled success in bringing financial services to unbanked populations by leveraging widespread mobile phone penetration.

Agent banking further enhances reach by offering localized physical access points for transactions. Blockchain technologies, AI, and machine learning increasingly undergird inclusive finance by enabling secure, transparent, and tailored financial products. Adoption patterns show promise but are heterogeneous, influenced by socio-economic status and regional infrastructure (Bajpai, 2024; Aishwaryalaxmi et al., n.d.; Dangkeng & Munir, 2025).

5.2 AI and FinTech: Enhancing Financial Literacy and Service Delivery

Artificial intelligence (AI) has emerged as a pivotal tool in bridging financial literacy gaps and personalizing service delivery in FinTech. AI-driven platforms can offer personalized financial advice, automate credit scoring, and detect fraud, thereby facilitating safer and more informed financial decision-making.

Such innovations hold great promise for marginalized populations, allowing complex financial tasks to be simplified and financial products to be better tailored to user needs. However, the implications of AI use necessitate careful examination concerning ethical considerations, transparency, and potential biases (Aishwaryalaxmi et al., n.d.; Harsono & Suprapti, 2024; Mansurali et al., 2022).

5.3 Challenges in Technology Adoption and Digital Divides

Despite technological promise, challenges remain pronounced in adoption. Infrastructure deficits, such as unreliable internet and low mobile penetration, particularly in rural settings, constrain access. Furthermore, socio-cultural barriers, including mistrust of technology and gender-based exclusion, limit uptake among vulnerable groups.

The digital gender divide is especially notable, where women face systemic impediments in adopting and benefiting from FinTech services. These multifaceted barriers require holistic interventions spanning infrastructure development, literacy programs, and gender-sensitive policies (Neltje et al., 2025; Mahat, 2024; Ranjith Kumar & Anand, 2025).

6. FinTech's Role in Empowering Small and Medium Enterprises (SMEs)

6.1 FinTech Solutions Tailored for MSMEs and Entrepreneurs

FinTech has significantly empowered MSMEs by providing accessible solutions for digital lending, payment processing, and crowdfunding. These services have enabled small entrepreneurs to expand their customer base, streamline cash flow management, and increase financial transparency.

Inclusion of women-owned businesses through targeted fintech platforms has facilitated greater financial participation among a traditionally underserved group. Such financial empowerment translates to improved business sustainability and market competitiveness (Ni'mah & Anwar, 2024; Dangkeng & Munir, 2025; Anggara & Nuraeni, 2025).

6.2 Barriers Faced by SMEs in Leveraging FinTech

Despite benefits, MSMEs encounter barriers including trust issues towards digital systems, digital literacy gaps impeding effective use, and regulatory obstacles limiting credit access or fintech product diversity. Rural SMEs face compounded challenges given infrastructural deficits and lower digital penetration.

These hurdles necessitate multi-pronged approaches encompassing education, regulatory support, and infrastructural investment to ensure SMEs can maximize fintech benefits for business growth (Ranjith Kumar & Anand, 2025; Kulshrestha, 2023; Cevik, 2024).

6.3 Future Trends in SME Financial Inclusion via Islamic and Sharia-compliant FinTech

Emerging scholarship highlights Islamic FinTech's role in promoting SME financial inclusion by aligning services with Sharia compliance and embedding sustainable finance principles reflective of ESG and SDG goals. Such models show promise in Indonesia and Malaysia, advancing access while maintaining ethical financial practices.

However, challenges such as limited digital literacy and operational inefficiencies must be addressed through stronger ecosystem partnerships and education efforts to harness the full potential of Islamic FinTech in SME finance (Rahmati, 2024; Anggara & Nuraeni, 2025; Qudah et al., 2023).

7. Current Research Gaps in FinTech, Financial Inclusion, and Literacy

7.1 Underexplored Themes and Methodological Limitations

Although the quantity of research has grown, key gaps persist, particularly a dearth of longitudinal studies evaluating the sustained impact of FinTech on financial inclusion. Additionally, few meta-analyses exist to quantitatively validate findings across contexts.

Limited granularity in demographic and behavioral data constrains understanding of nuanced fintech adoption patterns and exclusion factors. Addressing these gaps with robust methodologies would greatly strengthen the evidence base (Jha & Dangwal, 2024; Ha et al., 2025; Akmalia, 2023).

7.2 Specific Gaps in Literacy and Adoption Research

Research focusing explicitly on financial literacy's long-term effectiveness, especially concerning digital financial literacy, remains scant. Behavioral and socio-cultural determinants influencing fintech adoption are inadequately examined, particularly in diverse low-income populations.

Clarifying these dimensions would enhance program design and policy interventions, ensuring literacy efforts translate to tangible inclusion outcomes (Kulshrestha, 2023; Amnas et al., 2024; Jha & Dangwal, 2024).

7.3 Regulatory and Risk Management Research Vacuums

There is an urgent need to systematically analyze emerging risks from digital financial transformations including cybersecurity vulnerabilities, privacy concerns, and trust deficits. Furthermore, research on designing regulatory frameworks that simultaneously foster innovation and consumer protection is limited.

Much remains unknown about region-specific regulatory readiness and how regulatory interventions affect inclusion efficacy. Filling these gaps is critical for enabling safe, equitable fintech ecosystems (Mandi et al., 2025; Shanthi, 2025; Cevik, 2024).

8. Emerging Research Trends

8.1 Questions Addressing FinTech Adoption and Inclusion Dynamics

Future research should explore how financial literacy and digital literacy jointly influence fintech adoption behaviors across heterogeneous populations. Investigations into the role of trust and trust-building mechanisms, particularly among rural and marginalized users, could provide strategic insights.

Additionally, optimizing mobile technology for overcoming infrastructural and socio-cultural barriers demands focused inquiry to inform technological and policy designs (Nanda & Yunus, 2024; Mahat, 2024; Ranjith Kumar & Anand, 2025).

8.2 Questions Focusing on Impact and Sustainability

Understanding the long-term welfare impacts of fintech-enabled financial inclusion on low- income households remains a critical research frontier. Further, how fintech innovations contribute concretely to sustainable SME growth and poverty alleviation requires detailed empirical scrutiny.

Integrating fintech-driven inclusion efforts within the broader sustainable development framework also necessitates deeper exploration to leverage digital finance for holistic advancement (Shen et al., 2024; Anggara & Nuraeni, 2025; Tidjani & Madouri, 2024).

8.3 Regulatory and Policy-Oriented Research Questions

Important policy-oriented questions include examining how varying regulatory frameworks across emerging markets affect fintech effectiveness. Moreover, identifying mechanisms that balance consumer protection with innovation incentives is essential.

Designing gender-responsive and inclusive fintech regulatory policies is another promising area for investigation, given persistent digital divides and socio-cultural barriers (Afjal, 2023; Cevik, 2024; Shanthi, 2025).

9. Comparative Analyses Across Regions and Markets

9.1 FinTech and Inclusion in Emerging vs. Developed Markets

Studies reveal differences in fintech adoption drivers, regulatory environments, and consumer behaviors when comparing emerging and developed markets. For instance, African and South Asian contexts often prioritize overcoming infrastructural deficits, whereas U.S.-based studies emphasize regulatory compliance and cybersecurity.

Evaluating such cross-regional variations offers valuable lessons on tailoring solutions and policies to local market dynamics (Sarto & Ozili, 2025; Agbeve et al., 2025; Miftari et al., n.d.).

9.2 Gendered Dimensions of Financial Inclusion Through FinTech

Gender disparities continue to characterize fintech adoption, influenced by societal norms, educational gaps, and limited access to technology. Research focusing on these divides underscores that fintech development must be complemented by targeted initiatives addressing gender-specific barriers.

Effective interventions combine financial literacy, digital education, and tailored fintech products to enhance women's participation in digital finance (Mahat, 2024; Heng & Tok, 2022; Neltje et al., 2025).

9.3 Sectoral and Demographic Variations in FinTech Impact

The fintech impact varies notably across sectors and demographics, including MSMEs, low- income households, youth, and rural populations. Behavioral patterns related to lending, investment, and usage influence inclusive outcomes and highlight the need for customized fintech and financial literacy interventions.

Marginalized ethnic and socio-economic groups often remain underserved despite fintech availability, underscoring persistent inequities (Ni'mah & Anwar, 2024; Jha & Dangwal, 2024; Hasheela & Happonen, 2023).

10. Conclusions and Future Research Directions

10.1 Summary of Key Literature Insights

The extant literature conclusively demonstrates FinTech's transformative role in advancing financial inclusion and literacy. Technological innovations coupled with supportive regulatory and educational frameworks foster improved access and economic empowerment. At the same time, pervasive challenges—including digital divides, socio-cultural barriers, regulatory lacunae, and risk factors—remain significant. Scholarship points toward the importance of integrated, context-sensitive, multi-stakeholder strategies in maximising fintech's potential (Vasishta & Singla, 2024; Afjal, 2023; Neltje et al., 2025).

10.2 Practical Implications for Stakeholders

For policymakers, creating inclusive digital finance ecosystems demands balanced regulatory policies fostering innovation and consumer protection. Financial institutions must prioritize digital literacy enhancement and gender-sensitive program development.

Collaboration between government entities, fintech firms, and community organizations is vital to scale interventions effectively. Practical strategies include infrastructural investment, literacy programs, and adaptive regulatory frameworks to promote sustainable fintech growth (Zubairu et al., 2025; Shanthi, 2025; Raza et al., 2024).

10.3 Scope for Future Research

The future research agenda should prioritize longitudinal and impact evaluation studies to capture fintech's nuanced, evolving effects. Interdisciplinary approaches integrating technology, behavioral economics, and policy analysis can uncover new insights.

Addressing emerging risks and regulatory challenges sustainably, alongside focused gender- sensitive and context-specific research, will be essential to tailoring inclusive financial ecosystems responsive to global diversity (Jha & Dangwal, 2024; Mandi et al., 2025; Shen et al., 2024).

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Validating the Measurement Model of Digital Financial Knowledge: Evidence from Private Sector Employees in Sikkim

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Abstract

The increasing digitalisation of financial services has transformed how individuals participate in financial services. The objective of this study is to validate the measurement model of Digital Financial Knowledge using Confirmatory Factor Analysis. Data was collected from organised private sector employees in Sikkim, northeast India, a digitally active yet largely understudied segment of the workforce. This transformation has increased the relevance of Digital Financial Knowledge, which is a multidimensional construct that encompasses an individual's knowledge, awareness, and ability to use digital financial platforms effectively. The CFA, conducted through AMOS, confirmed a unidimensional but multifaceted structure of DFK with acceptable model fit indices. All standardised factor loadings exceeded 0.60, and composite reliability (CR > 0.80) and average variance extracted (AVE > 0.50) met the recommended thresholds, thereby establishing both convergence and discriminant validity. The validated DFK scale, therefore, offers a robust psychometric tool for measuring digital financial competence and contributes to the broader goal of securing sustainable digital inclusion and financial resilience. The findings have practical implications for policymakers, educators, and financial institutions seeking to design targeted interventions that enhance digital financial literacy, foster trust in technology, and support equitable participation in digital economies.

***Keywords**: Financial Literacy, Digital Financial Knowledge, Digital Inclusion, Confirmatory Factor Analysis, Digital Financial Services*

Introduction

The increasing prevalence of digital financial services necessitates a robust understanding of Digital Financial Knowledge as a critical component of financial capability,

particularly within emerging economies like India (Ravikumar, Suresha, et al., 2022). In developing economies, understanding digital finance is crucial for enhancing financial inclusion and driving economic growth. This enables individuals to make well-informed financial choices, access more kinds of financial services, and engage in the digital economy. Additionally, it serves to connect the unbanked population with financial institutions, promoting better economic stability and development. This study undertakes a rigorous psychometric validation of the Digital Financial Knowledge construct in the Indian context, employing confirmatory factor analysis to ascertain its underlying structure and measurement properties (Vieira et al., 2021).

This methodological approach ensures that the instrument accurately captures the multifaceted dimensions of digital financial knowledge, including an individual's comprehension of digital financial products, services, and associated risks (Ravikumar, Suresha, et al., 2022). In India, the rapid growth of financial technologies underscores the importance of digital financial literacy in influencing how individuals engage with innovative financial services, such as peer-to-peer lending services (Khan et al., 2025). This study contributes to the expanding body of literature by introducing a validated instrument for assessing digital financial knowledge, a critical foundation for promoting greater financial inclusion and well-being in an increasingly digitized economy. In the context of a rapidly digitizing economy, where digital financial services are becoming increasingly prevalent, understanding and measuring digital financial knowledge is essential (Yadav & Banerji, 2023). As digital financial services become more popular in India due to their convenience, speed, and affordability, the need for a validated measure becomes even more evident. Government initiatives, such as the Digital India campaign and the Pradhan Mantri Jan Dhan Yojana, have played a pivotal role in promoting digital finance. These programs aim to increase the accessibility of banking services and encourage the use of digital payments across the country. By supporting infrastructure development and offering incentives for digital transactions, the government has significantly boosted the adoption of digital financial services (Ravikumar, B, et al., 2022).

As digital financial literacy is increasingly recognized as a key enabler for individuals to effectively navigate and utilize the growing landscape of digital financial services, it is essential for them to be well-informed about financial aspects and make informed decisions

that will help them access a wide range of services and participate more fully in the digital economy. This, in turn, can contribute to bridging the financial gap, enhancing economic stability, and contributing to the overall progress of society with reduced financial disparities (A. C. Lyons & Kass-Hanna, 2021) (Pattnayak & Sahoo, 2024). Moreover, an understanding of the interrelationships among various components of financial literacy, such as objective knowledge, awareness, experience, and confidence levels, is crucial to designing effective financial education programs that will assist individuals in achieving their financial goals (Xu et al., 2024). It is important to understand that the levels of knowledge, behaviour, confidence, and experience are all interconnected in the digital framework of digital knowledge. As a result, they have a profound impact on how people learn, use, and share what they know. Using digital platforms, users will have an easier time accessing things, which will help the users to build confidence through repeated exposure and practice over time. Also, they provide a variety of settings to encourage collaboration and skill development among a wide range of participants. In India, the need for such understanding has been increased by the ongoing gap between financial inclusion and financial literacy rates, despite progress in financial inclusion (Amnas et al., 2024).

To address this gap, a validated tool for measuring Digital Financial Knowledge is very important for making targeted policies and programs that can assist close the gap. Teaching people about money matters can help them make smart choices about their money, which will enhance their financial health in the long run. It can also boost economic participation by making it easier for more people to access and use digital financial services. Also, closing this gap will help more people gain access to financial services, boost the economy, and make things more equal (Kulshrestha, 2023).

Background and Rationale

As digital payment infrastructure has developed, more people are using online connections, and government policies have encouraged cashless transactions and financial inclusion, India's financial system has undergone rapid changes (Swatanshu Shekhar Singh & Saumya Singh, 2025). Digital finance has made it easier for people to get formal financial services, but it has also made it harder for people to make financial decisions. To use these services safely and effectively, people need to be competent with technology. In this context, Digital Financial Knowledge (DFK) constitutes a fundamental cognitive aspect of financial

capability, including an individual's comprehension of digital financial platforms, tools, and their associated risks. Previous studies indicate that inadequate digital financial literacy may restrict inclusion benefits and increases vulnerability to fraud and financial exclusion, particularly among emerging economies (A. & S., 2022; OECD, 2020). Digital Financial Knowledge measurements have become increasingly essential, but there is still a lack of validated and context-specific models in India. So, it is important to validate a strong measurement model of Digital Financial Knowledge in order to move research forward and back up financial education and policy changes that are based on evidence. A good understanding of technology is important for promoting financial inclusion.

Research Gap

Previous studies have attempted to define and measure Digital Financial Knowledge (DFK) in various contexts, however, the empirical evidence is still inadequate. Previous studies have generally been focused on the development of scales and preliminary evaluations of digital financial literacy and associated constructs, with insufficient attention to thorough confirmatory validation of measurement models, especially in the context of digital financial knowledge. In India, where digital finance adoption has grown quickly, there are still not many validated and context-specific tools for measuring DFK. Additionally, although the current author has previously created and validated a DFK scale utilizing Exploratory Factor Analysis (EFA), the confirmatory factor structure and measurement properties of the scale remain to be empirically tested. This gap highlights the necessity for a confirmatory factor analysis (CFA) to verify the reliability and validity of the DFK measurement model, thereby enhancing its relevance for future behavioral and well-being research.

Objective of the Study

- The present study aims to confirm the measurement model of Digital Financial Knowledge (DFK) through Confirmatory Factor Analysis (CFA) using AMOS, assessing its construct reliability, convergent validity, and discriminant validity.

Literature Review

The digital financial transformation has changed the way financial systems work in significant ways. Digital technologies have made financial services more accessible and efficient. For example, mobile banking, digital payments, fintech platforms, and data-driven

financial solutions have all made it simpler for individuals to use these services (Cao et al., 2021; Scardovi, 2017). This rapidly evolving digital landscape has made Digital Financial Knowledge (DFK) a vital concept representing an individual's understanding of financial concepts in a digital context.

Conceptually, Digital Financial Knowledge incorporates aspects of financial literacy and digital literacy (A. Lyons & Kass-Hanna, 2021). Traditional financial literacy emphasises the understanding of budgeting, saving, borrowing, and investments (Lusardi & Mitchell, 2011). As digital financial services expand, financial literacy now includes the ability to understand and use digital payment systems, online banking systems, and assess the safety of financial transactions. This change shows how important it is for people to learn how to use digital money so they can make smart choices and stay safe from cyber threats (A. C. Lyons & Kass-Hanna, 2021). (Golden & Cordie, 2022) states that digital financial literacy is an extension of financial literacy that includes the digital skills needed to effectively use online financial tools. It conveys the cognitive dimension, knowledge, and understanding necessary to engage in digital finance in an informed manner.

Several studies have attempted to operationalize and measure Digital Financial Knowledge. A study conducted by (Normawati et al., 2021)investigated the relationship between financial attitudes, behaviors, and digital financial knowledge, illustrating that digital knowledge significantly influences long-term financial satisfaction. (Ravikumar, Suresha, et al., 2022) developed and validated a digital financial literacy scale for Indian adults, showing how important digital knowledge is in developing countries where digital payments are becoming more common. These studies emphasize that DFK is not a singular concept but a multidimensional construct that includes awareness of digital financial products, comprehension of transaction processes, and knowledge of associated risks. The ability to understand digital financial platforms and services is a crucial part of DFK. A user of a digital payment system, mobile wallet, online bank account, or fintech app should have a solid understanding of authenticating themselves, confirming transactions, and registering grievances. Research indicates that individuals with higher digital financial knowledge are more likely to adopt and effectively use such platforms (Anagreh et al., 2024); (Tabassum & Ali, 2024). To enhance financial inclusion and minimize cash dependence in transitioning and emerging economies, it's important that individuals understand how to navigate financial interactions.

An additional essential component of DFK is knowing how digital transactions perform and how to conduct financial decisions online. (Shahid et al., 2025) emphasize that Industry 4.0 technologies have changed the financial sector. Individuals now have to understand digital interfaces, automated processes, and services that are driven by algorithms. (Cao et al., 2021) also point out that fintech's use of data science and artificial intelligence requires users to understand more so that they can use the technology responsibly and make informed decisions. Users may have challenges evaluating digital financial services, comparing options, and understanding costs and risks if they don't have enough digital financial knowledge.

Cybersecurity and data protection literacy are essential elements of DFK. Increasingly, financial transactions are carried out online, which puts users at risk of things like fraud, phishing, and having their personal information compromised. (A. Lyons & Kass-Hanna, 2021) states that knowledge can help reduce digital risks by changing how people engage themselves online when it comes to privacy and security. (Menberu, 2024), in a systematic review of technology-mediated financial education, suggested that digital financial literacy enhances users' self-protection abilities.

The concept of digital financial knowledge is often examined within broader constructs such as digital financial literacy or financial capability, rather than as an independent construct. DFK scales are therefore not psychometrically validated, particularly among employee groups who frequently use digital financial services, such as private sector employees.

Although numerous studies (Vieira et al., 2024); (Normawati et al., 2021);(Achanta & Lepcha, 2025); (Chhillar et al., 2024) have supported in scale development and preliminary validation, there exists a distinct necessity for precise confirmatory validation to ascertain the reliability and validity of DFK measurement models. It is essential to address this gap in the Indian digital finance landscape, where quickly adopting new technologies means that we need strong tools to measure individual digital financial knowledge.

Methodology

Research Design

In this study, the measurement model of Digital Financial Knowledge (DFK) among private sector employees in Sikkim, India, is validated through a quantitative, cross-sectional

research design. The objective of the study is to empirically examine the factor structure, reliability, and validity of an established measurement scale using statistical techniques. As data were collected at one point in time, the design is cross-sectional.

The primary data were collected using a structured questionnaire administered both online and offline. Efforts were made to minimize bias by ensuring confidentiality and anonymity for respondents.

Sample and Data Collection

The target population of the study included professionals working in the organized private sector in Sikkim, including those employed in educational institutions, banks, hospitals, and related sectors. This group was selected because private sector employees are among the most active users of digital financial platforms and services, making them appropriate respondents for assessing digital financial knowledge. Given the accessibility of the respondents, a convenience sampling method was used to collect the data.

A total of 405 valid responses were obtained and analyzed. To ensure that the model has adequate statistical power and stability, a confirmatory factor analysis (CFA) is performed.

Measurement Instrument

Digital Financial Knowledge (DFK) was measured using a multi-item scale previously developed and validated through Exploratory Factor Analysis (EFA) in an earlier published study by the author (Achanta & Lepcha, 2025). The initial scale consisted of 18 items capturing respondents' understanding of familiarity with digital financial platforms, digital financial proficiency, and digital payment security awareness.

Data Analysis

The data analysis was conducted using SPSS. First, preliminary screening was performed to check for missing values and data adequacy. Subsequently, Confirmatory Factor Analysis (CFA) was carried out using AMOS to validate the factor structure of the DFK construct identified in the earlier EFA stage. Model fit was assessed using multiple goodness-of-fit indices, including chi-square statistics, CFI, TLI, GFI, and RMSEA. To address potential non-normality in the data, Bollen–Stine bootstrap procedures with 5,000 resamples (Bollen &

Stine, 1992) were employed. Bootstrapping provides robust estimates of model fit and parameter significance under violations of multivariate normality. Construct reliability and validity were assessed using Composite Reliability (CR) and Average Variance Extracted (AVE).

Determinants of Digital Financial Knowledge (DFK)

Factors	Item Code	Item Description
Familiarity with Digital Financial Platforms	DFK1	Proficient in using digital devices like smartphones and computers
	DFK2	Understands digital financial transactions
	DFK3	Aware of digital payment methods (e.g., Phonepay, GPay, UPI)
	DFK4	Uses digital platforms like banking apps and payment gateways
	DFK5	Uses mobile banking apps to check balances and transactions
	DFK6	Makes online purchases using credit/debit cards or UPI
	DFK7	Knows how to set up and use UPI
	DFK8	Aware of security measures for QR code transactions
	DFK9	Comfortable using digital financial tools
Digital Financial Proficiency	DFK10	Knowledge of online trading (e.g., stocks, cryptocurrencies)
	DFK11	Prefers digital transactions over traditional methods
	DFK12	Aware of UPI convenience and efficiency
	DFK13	Familiar with QR code payments

Digital Payment Security Awareness	DFK14	Understands the importance of strong, unique passwords
	DFK15	Aware of cybersecurity risks and online fraud
	DFK16	Regularly reviews privacy settings on financial platforms
	DFK17	Knows how to seek compensation for unauthorized transactions
	DFK18	Knows how to file online complaints about fraud

1. Familiarity with Digital Financial Platforms

A confirmatory factor analysis (CFA) was performed to evaluate the validity of the Familiarity dimension of Digital Financial Knowledge. The initial model included nine observed variables (DFK1 to DFK9) that loaded onto a single latent construct.

Table 1.1

Model Fit Indices for CFA- Familiarity with Digital Platforms

Fit Indices	Results	Suggested Values
Chi-Square	51.702	-
Degree of Freedom	23	-
Chi-square/d.f. (CMIN)	2.248	< 5
Significance Level	0.001	p > 0.05
Comparative Fit Indices (CFI)	0.984	> 0.90
Goodness of Fit (GFI)	0.972	> 0.90
Adjusted Goodness of Fit (AGFI)	0.945	> 0.90
Normed Fit Index (NFI)	0.973	> 0.90
Incremental Fit Index (IFI)	0.985	> 0.90
Tucker Lewis Index (TLI)	0.976	> 0.90
Root Mean Square Error of Approximation (RMSEA)	0.056	< 0.08
Parsimony Goodness of Fit (PGFI)	0.497	> 0.50

The results of CFA indicate that the measurement model has a good fit of data.

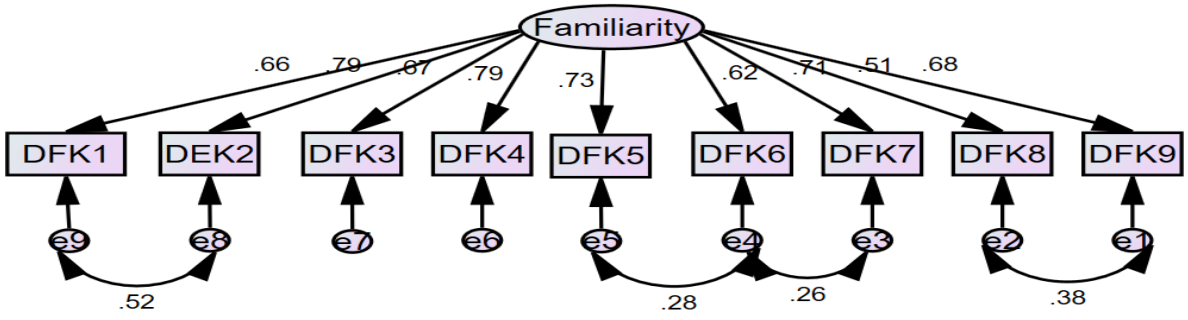
Table 1.2

Regression Coefficients - Familiarity with Digital Platforms

Factors	Construct	Regression Coefficient	C.R.	P	Variance explained (%)	Average Variance	Composite Reliability	Discriminant Validity
Familiarity with Digital Platforms	DFK1	0.918	1.844	<0.001	43.9	0.477	0.890	0.690
	DFK2	1.077	13.927	<0.001	62.7			
	DFK3	0.821	11.987	<0.001	44.4			
	DFK4	1.081	13.971	<0.001	63.2			
	DFK5	0.983	12.964	<0.001	53.0			
	DFK6	0.186	11.139	<0.001	38.6			
	DFK7	0.931	12.722	<0.001	50.7			
	DFK8	0.866	11.645	<0.001	38.6			
	DFK9	1.00	-	-	40.6			

The standard regression coefficients for all items under "Familiarity with Digital Platforms" ranged from 0.514 to 0.795, indicating strong and significant loadings. Since all values exceed the threshold of 0.4, this confirms that each item meaningfully contributes to the latent construct.

The model is presented as follows.



2. Digital Financial Proficiency

Table 2.1

Model Fit Indices for CFA- Digital Financial Proficiency.

Fit Indices	Results	Suggested Values
Chi-Square	4.707	-
Degree of Freedom	1	-
Chi-square/d.f. (CMIN)	4.707	< 5
Significance Level	0.030	p > 0.05
Comparative Fit Indices (CFI)	0.992	> 0.90
Goodness of Fit (GFI)	0.994	> 0.90
Adjusted Goodness of Fit (AGFI)	0.942	> 0.90
Normed Fit Index (NFI)	0.989	> 0.90
Incremental Fit Index (IFI)	0.992	> 0.90
Tucker Lewis Index (TLI)	0.949	> 0.90
Root Mean Square Error of Approximation (RMSEA)	0.096	< 0.08
Parsimony Goodness of Fit (PGFI)	0.099	> 0.50

The 'Digital Financial Proficiency' CFA model shows a mostly acceptable fit.

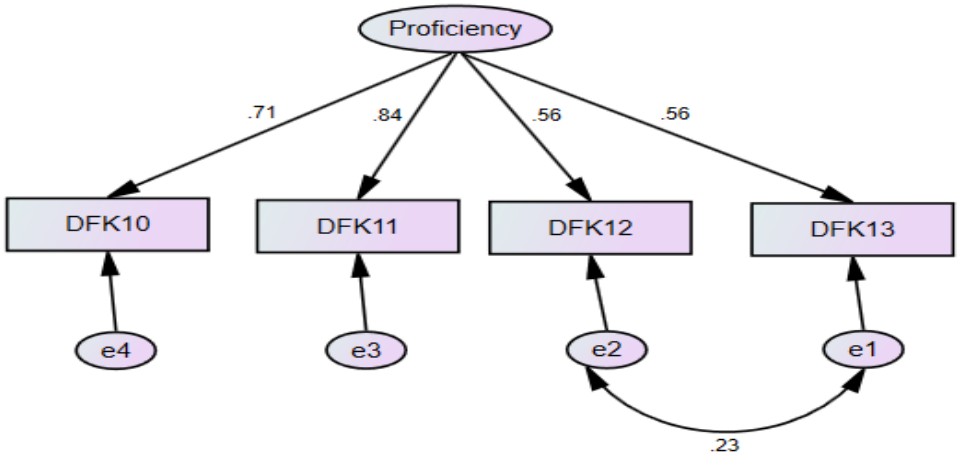
Table 2.2

Regression Coefficients - Digital Financial Proficiency

Factors	Construct	Regression Coefficient	C.R.	P	Variance explained	Average Variance	Composite Reliability	Discriminant Validity
Digital Financial Proficiency	DFK10	1.627	9.405	<0.001	69.9	0.594	0.875	0.754
	DFK11	1.501	9.589	<0.001	50.5			
	DFK12	0.887	9.654	<0.001	31.9			
	DFK13	1.0	-	-	31.6			

The standard regression weights ranged from 0.562 to 0.836, all of which exceeded the acceptable threshold of 0.5 and are statistically significant at the 0.001 level. The construct showed strong internal consistency with a Composite Reliability (CR) of 0.875. The Average Variance explained (AVE) is 0.594, above the recommended threshold of 0.50, thus confirming a good convergent validity. The square root of AVE (0.754) was higher than inter-construct correlations, supporting discriminant validity.

The model is presented as follows:



3. Digital Payment Security Awareness

In the initial EFA, Online Fraud Reporting emerged as a distinct factor with a single item. However, confirmatory factor analysis requires a minimum of three indicators to estimate a latent construct reliably. Since this item (DFK18) conceptually aligns with the Digital Frauds and Security Measures dimension both addressing the individual's capacity to respond to or manage financial fraud it was logically and theoretically merged with that factor. This decision is consistent with best practices in CFA when dealing with under-identified single-item factors.

Table 3.1

Model Fit Indices for CFA- Digital Financial Proficiency

Fit Indices	Results	Suggested Values
Chi-Square	9.570	-
Degree of Freedom	4	-
Chi-square/d.f.(CMIN)	2.392	< 5
Significance Level	0.048	p > 0.05

Comparative Fit Indices (CFI)	0.994	> 0.90
Goodness of Fit (GFI)	0.991	> 0.90
Adjusted Goodness of Fit (AGFI)	0.966	> 0.90
Normed Fit Index (NFI)	0.990	> 0.90
Incremental Fit Index (IFI)	0.994	> 0.90
Tucker Lewis Index (TLI)	0.985	> 0.90
Root Mean Square Error of Approximation (RMSEA)	0.059	< 0.08
Parsimony Goodness of Fit (PGFI)	0.264	> 0.50

The 'Digital Payment Security Awareness' CFA model shows acceptable fit.

Table 3.2

Regression Coefficients - Digital Payment Security Awareness

Factors	Construct	Regression Coefficient	C.R.	P	Variance explained	Average Variance	Composite Reliability	Discriminant Validity
Digital Payment Security Awareness	DFK14	0.152	4.462	<0.001	5.2	0.487	0.80	0.698
	DFK15	0.314	8.503	<0.001	17.3			
	DFK16	0.720	18.489	<0.001	57.8			
	DFK17	0.920	23.283	<0.001	85.2			
	DFK18	1.00	-	-	77.8			

From the table above, all regression weights were statistically significant ($p < 0.001$), ranging from 0.228 to 0.923. The construct demonstrated adequate internal consistency with the Composite Reliability (CR) of 0.800, exceeding the recommended threshold of 0.70. The Average Variance Explained (AVE) was 0.487, slightly below the ideal 0.50 level but considered acceptable in the presence of strong CR. The square root of AVE was 0.698, which exceeds inter-construct correlations, thereby supporting discriminant validity.

Confirmatory factor analysis – combined measurement model

After validating the individual measurement models of the three constructs (Familiarity with Digital Platforms, Digital Financial Proficiency, and Digital Payment Security

Awareness), a combined CFA was conducted to evaluate the overall measurement model of Digital Financial Knowledge (DFK). This step will help to assess the fit of all observed items and latent constructs simultaneously in one framework.

Based on the results from the individual CFA, all items were retained. However, in the combined model, items DFK14 and DFK15 under the 'Digital Payment Security Awareness' construct had low contributions to the construct and were thus removed to improve model performance. After the removal of these items, the revised model demonstrated an improved and acceptable fit, with the following key indices:

Table 4

Model Fit Indices for CFA- Digital Financial Knowledge

Fit Indices	Results	Suggested Values
Chi-Square	466.258	-
Degree of Freedom	95	-
Chi-square/d.f. (CMIN)	4.908	< 5
Comparative Fit Indices (CFI)	0.901	> 0.90
Goodness of Fit (GFI)	0.866	> 0.90
Adjusted Goodness of Fit (AGFI)	0.809	> 0.90
Normed Fit Index (NFI)	0.880	> 0.90
Incremental Fit Index (IFI)	0.902	> 0.90
Tucker Lewis Index (TLI)	0.875	> 0.90
Root Mean Square Error of Approximation (RMSEA)	0.098	< 0.08
Parsimony Goodness of Fit (PGFI)	0.605	> 0.50

The CFA model for Digital Financial Knowledge (DFK) showed an overall acceptable fit. Most indices met the recommended thresholds: CFI (0.901), GFI (0.866), and NFI (0.880). Although RMSEA (0.098) and TLI (0.875) are slightly below the ideal range, they remained within acceptable limits.

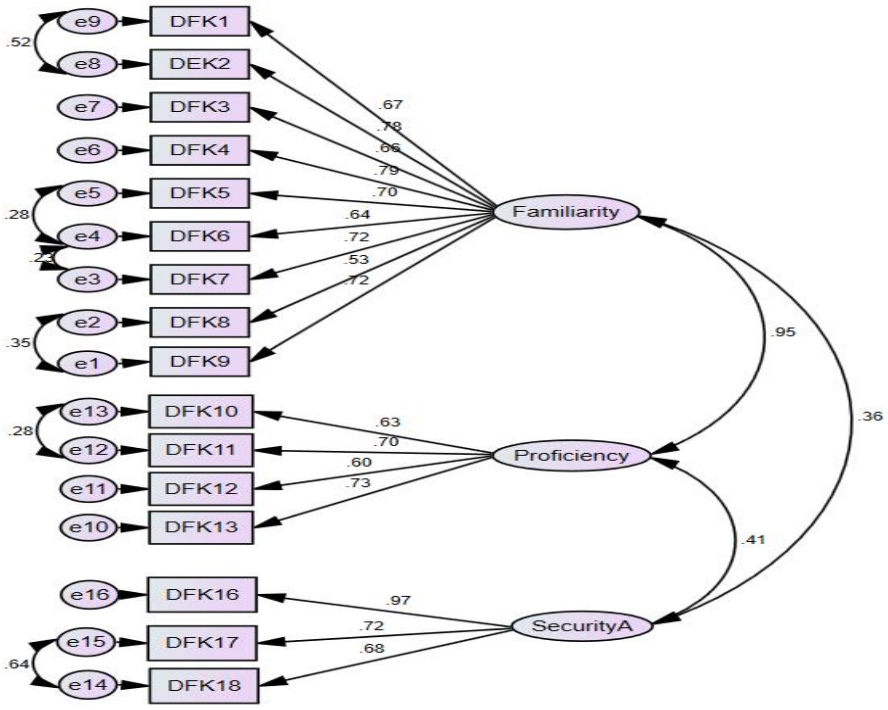
Table 5

Regression Coefficients – Digital Financial Knowledge

Factors	Construct	Regression Coefficient	C.R.	P	Variance explained (%)	Average Variance	Composite Reliability	Discriminant Validity
Familiarity with Digital Platforms	DFK1	0.883	12.752	<0.001	44.8	0.512	0.897	0.716
	DFK2	1.009	14.877	<0.001	60.7			
	DFK3	0.771	12.564	<0.001	43.0			
	DFK4	1.025	15.099	<0.001	62.4			
	DFK5	0.905	13.456	<0.001	49.6			
	DFK6	0.796	12.113	<0.001	40.6			
	DFK7	0.898	13.794	<0.001	52.0			
	DFK8	0.852	12.223	<0.001	28.2			
	DFK9	1.00	-	-	51.6			
Digital Financial Proficiency	DFK10	1.028	11.762	<0.001	39.5	0.663	0.880	0.814
	DFK11	1.052	13.079	<0.001	48.6			
	DFK12	0.730	11.293	<0.001	36.0			
	DFK13	1.00	-	-	52.6			
Digital Payment Security Awareness	DFK16	1.194	7.700	<0.001	94.3	0.871	0.871	0.810
	DFK17	0.937	22.533	<0.001	52.4			
	DFK18	1.00	-	-	46.1			

The standard regression coefficients exceed the acceptable threshold of 0.40, confirming that each item has a meaningful contribution to its respective latent construct. All constructs exhibit acceptable convergent validity and composite validity. The Fornell-Larcker criterion confirms discriminant validity, indicating that constructs are conceptually distinct from each other.

The model is presented as follows:



Discussion

This study aimed to validate the measurement model for Digital Financial Knowledge (DFK) among Indian private sector employees using confirmatory factor analysis. It provides important empirical support for DFK's construct validity and reliability in rapidly digitizing financial environments. The CFA results demonstrate that the refined DFK measurement model confirms adequate convergent validity, with standardized factor loadings significantly above recommended thresholds.

The validated structure of DFK underscores its cognitive complexity, encompassing understanding of digital platforms, transaction processes, cybersecurity awareness, and informed decision-making. Prior international studies have identified digital financial knowledge as a critical component of financial capability in technology-mediated environments. However, this study extends existing literature by providing a context specific validation within the Indian private sector in Sikkim, where the adoption of digital financial services has increased significantly in recent years. Overall, the results suggest that DFK is a stable and measurable construct among working professionals and can serve as a reliable foundation for examining relationships with financial behavior, inclusion, and well-being in future empirical research

Conclusion

This study contributes to the increasing number of studies on digital financial literacy by confirming a valid and reliable way to measure digital financial knowledge in India. Employing a rigorous Confirmatory Factor Analysis (CFA) methodology, the study enhances an Exploratory Factor Analysis (EFA), derived scale and suggests that Digital Financial Knowledge (DFK) can be effectively implemented among private sector employees, regardless of difficulties associated with item reduction and construct identification.

The findings support the theoretical framework of DFK as a fundamental cognitive dimension of financial capability in the digital age. Methodologically, the study underscores the significance of theory-driven model refinement, especially in the context of under-identified factors and low-loading indicators in Confirmatory Factor Analysis (CFA). Practically, the validated DFK scale provides researchers, policymakers, and financial educators with a robust tool for assessing digital financial competence among working populations. Such assessment is crucial for designing targeted financial education interventions and for supporting inclusive and secure participation in digital financial systems.

Even though the study adds to existing knowledge, it has some limitations. Using convenience sampling and cross-sectional data might make it harder to draw conclusions about the whole population and the source of the observed issue. Future research might expand on this by examining the scale using individuals from various occupations, regions, and time periods, and by investigating into whether DFK can predict digital financial behaviour and financial well-being.

In conclusion, the study provides timely and substantial evidence that digital financial knowledge is a measurable and useful concept in India's changing digital finance landscape. This is a strong basis to further research and policy initiatives.

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A Study on Impact of Carbon Pricing on Solar Energy Investments in Chennai

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Abstract

This study examines the relationship between carbon pricing mechanisms and the growth of solar energy investments in Chennai, Tamil Nadu, India. By analyzing policy frameworks, market responses, and investment trends, the paper highlights how carbon pricing can incentivize renewable energy adoption, reduce dependence on fossil fuels, and accelerate the state's transition toward sustainable energy. The findings suggest that carbon pricing, when effectively implemented, can enhance investor confidence and drive long-term solar energy expansion in Tamil Nadu. In the era of climate change and sustainable development, carbon pricing has emerged as a critical policy instrument to reduce greenhouse gas emissions and promote renewable energy adoption. This study aims to examine how carbon pricing mechanisms influence solar energy investments in Tamil Nadu, a state that has positioned itself as a leader in India's renewable energy sector. Carbon pricing, through tools such as carbon taxes, emission trading schemes, and coal cess, alters the cost competitiveness between fossil fuels and solar power, thereby shaping investor decisions. The objective of the study is to identify how carbon pricing impacts investment trends, cost parity, and investor confidence in solar projects. Primary data was collected through structured questionnaires distributed among 75 general public, including solar developers, financial institutions, and policy experts in Tamil Nadu, using convenience sampling. Secondary data was sourced from government reports, journals, and international energy databases. The study also investigates the role of state-level incentives, financing mechanisms, and policy stability in amplifying the effects of carbon pricing. Findings suggest that carbon pricing significantly increases the cost of coal-based electricity, making solar energy more attractive to investors. Moreover, consistent carbon pricing signals enhance investor confidence and encourage financial institutions to extend green financing. This research provides valuable insights for policymakers and investors, highlighting the importance of integrating carbon pricing with state-level renewable energy policies to accelerate solar adoption.

***Keywords**: Carbon Pricing, Solar Energy, Renewable Investments, Climate Policy, Tamil Nadu.*

Introduction

Climate change represents one of the most critical challenges confronting global economies, necessitating urgent transitions toward low-carbon development pathways. Policy instruments such as **carbon pricing**—implemented through carbon taxes or emission trading schemes—have emerged as central mechanisms to internalize the external costs of greenhouse gas emissions. By assigning a monetary value to carbon output, carbon pricing seeks to alter investment incentives, encouraging capital allocation toward cleaner technologies and sustainable energy solutions.

Within this broader context, solar energy has become a cornerstone of renewable energy strategies, particularly in regions with high solar potential. India, with its ambitious renewable energy targets and commitment to achieving net-zero emissions, has prioritized solar energy as a key driver of its energy transition. Chennai, located in Tamil Nadu, offers a compelling case study due to its favorable climatic conditions, growing urban energy demand, and state-level initiatives supporting renewable adoption. Despite these advantages, the specific role of carbon pricing in shaping solar investment decisions in Chennai remains underexplored.

This study seeks to examine the impact of carbon pricing on solar energy investments in Chennai, thereby addressing a critical gap in the literature on sustainable finance and renewable energy policy in emerging economies. The research investigates how carbon pricing influences investor behavior, project feasibility, and long-term sustainability of solar initiatives. By situating the analysis within the Indian policy and market context, the study contributes to the discourse on green finance by offering evidence-based insights into the effectiveness of carbon pricing as a catalyst for renewable energy investment. The findings are expected to inform policymakers, investors, and stakeholders engaged in India's energy transition, while also enriching comparative perspectives on climate finance in developing economies.

Objectives of the Study

The objectives of this study are designed to provide a focused examination of the relationship between carbon pricing and solar energy investments in Chennai. Specifically, the study seeks to investigate how carbon pricing policies influence investor decision-making and willingness to allocate capital toward solar projects. It further aims to evaluate whether carbon pricing enhances the financial competitiveness of solar energy relative to fossil fuel alternatives by analyzing indicators such as payback period, internal rate of return, and net present value. In addition, the study intends to explore sectoral variations by assessing the differential impacts of carbon pricing on residential, commercial, and industrial solar adoption. Finally, the research seeks to determine the adequacy of existing carbon pricing mechanisms in India in promoting large-scale solar investments in Chennai, thereby offering evidence-based insights for policymakers, investors, and businesses engaged in advancing the renewable energy transition.

1. **Assess investor response**
   - ❖ To examine how carbon pricing policies directly influence the willingness of investors to fund solar energy projects in Chennai.
2. **Evaluate cost competitiveness**
   - ❖ To analyze whether carbon pricing improves the relative financial attractiveness of solar energy compared to conventional fossil-fuel energy sources in Chennai.
3. **Measure project viability**
   - ❖ To determine the extent to which carbon pricing affects the payback period, internal rate of return (IRR), and net present value (NPV) of solar energy investments.
4. **Identify sector-specific impacts**
   - ❖ To investigate how carbon pricing influences solar adoption differently across residential, commercial, and industrial sectors in Chennai.
5. **Policy effectiveness check**
   - ❖ To evaluate whether current carbon pricing mechanisms in India provide sufficient incentives for scaling solar energy investments in Chennai

Need for the Study

The necessity of this study is underscored by the increasing reliance on carbon pricing as a policy instrument to accelerate the transition toward renewable energy. Although

considerable scholarship has examined the national and global implications of carbon pricing, there remains a paucity of research that investigates its localized effects on solar energy investments in urban contexts such as Chennai. As a rapidly expanding metropolitan area with rising energy demand and heightened exposure to climate-related risks, Chennai provides a critical case for evaluating the extent to which carbon pricing influences investor behavior and project viability. This study is particularly important because it seeks to determine whether carbon pricing enhances the financial competitiveness of solar energy relative to fossil fuel alternatives, thereby offering evidence-based insights for policymakers, investors, and businesses. Moreover, the findings will contribute to the broader discourse on sustainable energy transitions by clarifying the role of carbon pricing in promoting large-scale solar adoption in Chennai, ultimately supporting both economic development and climate resilience.

Statement of the Problem

Despite the growing emphasis on renewable energy in India, the adoption of solar energy in urban centers such as Chennai remains constrained by financial, policy, and market-related challenges. Carbon pricing has emerged as a potential mechanism to incentivize investment in clean energy by internalizing the environmental costs of fossil fuel consumption. However, there is limited empirical evidence on whether carbon pricing policies in India are sufficiently robust to influence investor behavior and improve the financial viability of solar energy projects at the city level. Existing studies have largely focused on national or global perspectives, leaving a gap in understanding the localized impacts of carbon pricing on solar adoption in metropolitan contexts. This lack of clarity creates uncertainty for policymakers, investors, and businesses seeking to align economic growth with sustainability goals. Consequently, the problem addressed in this study is the insufficient knowledge regarding the extent to which carbon pricing mechanisms affect solar energy investments in Chennai, particularly in terms of cost competitiveness, project viability, and sector-specific adoption

Review of Literature

1. Swetha P. & Dr. G. Karunamoorthi (2024). Institutional Framework for Scaling Renewable Energy and Green Finance in India: A Special Focus on Tamil Nadu.

Published in the *Indian Journal of Modern Research and Reviews*, this paper examines the policy and institutional landscape for renewable energy financing in Tamil

Nadu, with a particular focus on Chennai. It highlights how carbon pricing mechanisms—such as Renewable Energy Certificates (RECs) and net metering—interact with local DISCOM efficiency, tariff structures, and investor incentives.

2. Doraswami Maria Kirthi (University of Madras, 2020). An Economic Analysis of Solar Energy Use Among Households in Chennai and Coimbatore Districts.

This doctoral thesis investigates household-level adoption of solar energy in Chennai and Coimbatore, analyzing economic factors such as upfront costs, payback periods, and subsidy awareness. It provides empirical data on consumer behavior, investment willingness, and the role of government incentives. Though not focused solely on carbon pricing, the study offers valuable insights into how pricing and policy signals affect residential solar uptake.

3. M. R. Ramesh (2025). Statistical Analysis of Tamil Nadu's Contributions to Sustainable and Green Energy: A Model for Renewable Energy Transition.

Published in *IJARSCT*, this paper presents a statistical overview of Tamil Nadu's renewable energy growth, including solar investments in Chennai. It discusses how carbon pricing and emission reduction targets influence investment flows and policy design. The study emphasizes the importance of institutional support and grid integration for solar expansion, using Kalpakkam and Chennai as reference points.

4. Rahul Patel et al. (2025). Distributed Solar Energy Potential Mapping for Tamil Nadu.

This briefing note by Auroville Consulting assesses the distributed solar potential across Tamil Nadu, including Chennai. It uses geospatial data and demand projections to estimate rooftop solar capacity and investment feasibility. The study indirectly relates to carbon pricing by evaluating how distributed solar can offset grid emissions and reduce

Research Methodology

1. Research Design

This study adopts a descriptive research design to systematically investigate the impact of carbon pricing on solar energy investments in Chennai. Descriptive research is appropriate for capturing investor perceptions, financial viability indicators, and sectoral adoption patterns, thereby providing a comprehensive understanding of the phenomenon under study.

2. Sources of Data

The research utilizes both primary and secondary data sources. Primary data is collected through structured questionnaires administered to solar investors, developers, and energy professionals in Chennai. Secondary data is obtained from government reports, academic journals, policy briefs, and published literature relevant to carbon pricing and renewable energy investments in India.

3. Structure of Questionnaire

The questionnaire is divided into three sections. The first section gathers demographic and professional background information of the respondents. The second section focuses on perceptions regarding carbon pricing and its influence on investment decisions. The third section collects data on financial metrics such as payback period, internal rate of return (IRR), and net present value (NPV) under carbon pricing scenarios.

4. Sampling Technique

A purposive sampling technique is employed to select respondents who are directly involved in solar energy projects or investment decision-making processes in Chennai. This approach ensures that the data collected is relevant and insightful for the research objectives.

5. Sample Size

The study includes responses from 75 participants, comprising solar investors, developers, and energy consultants operating within the Chennai metropolitan area.

6. Testing of Hypothesis

To test the research hypotheses, statistical tools such as Analysis of Variance (ANOVA), Independent Sample T-Test, and Pearson Correlation are applied. These methods help determine the significance of relationships between carbon pricing and investment behavior, financial viability, and sectoral differences in solar energy adoption.

Limitations of the Study

1. Conceptual and Theoretical Constraints
2. Geographical and Demographic Scope
3. Data and Econometric Limitations
4. Institutional and Regulatory Barriers

Inferential statistic

1.Compare the difference in *willingness to invest in solar projects* across different *age groups*.

- **H0 (Null Hypothesis):** There is **no significant difference** in willingness to invest in solar energy due to carbon pricing across different age groups.
- **H1 (Alternative Hypothesis):** There is a **significant difference** in willingness to invest in solar energy due to carbon pricing across different age groups.

ANOVA					
Willingness to invest in solar projects due to carbon pricing					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.401	3	1.134	1.430	.241
Within Groups	56.279	71	.793		
Total	59.680	74			

Interpretation

Since the significance value (p = 0.241) is greater than the standard level of significance (0.05), the null hypothesis is accepted, and the alternative hypothesis is rejected. Hence, there is no significant difference in willingness to invest in solar projects due to carbon pricing among different age groups. Even though respondents belong to different age groups, their **willingness to invest in solar projects is almost the same**. Age does *not* change their decision.

2.Compare *awareness levels* and *project attractiveness perception* between two groups (Aware vs Not Aware).

H0 (Null Hypothesis): There is **no significant difference** in perception of solar project attractiveness between respondents who are aware vs not aware of carbon pricing mechanisms.

H1 (Alternative Hypothesis): There is a **significant difference** in perception of solar project attractiveness between respondents who are aware vs not aware of carbon pricing mechanisms.

INDEPENDENT SAMPLES TEST										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Carbon pricing policies make solar projects more attractive.	Equal variances assumed	6.443	.013	-1.903	73	.061	-.417	.219	-.854	.020
	Equal variances not assumed			-1.787	49.6	.080	-.417	.233	-.886	.052

Interpretation

Since the significance value (p = 0.061) is **greater** than the standard level of significance (0.05), the null hypothesis is **accepted** and the alternative hypothesis is **rejected**. Hence, there is **no significant difference** in the perception that carbon pricing policies make solar projects more attractive between respondents who are aware and those who are not aware of carbon pricing mechanisms. People who are **aware** of carbon pricing and people who are **not aware** of carbon pricing both think almost the same when it comes to whether solar projects are attractive.

3.To test the relationship between carbon pricing cost impact and solar competitiveness/market preference.

H0 (Null Hypothesis): There is **no significant relationship** between the cost impact of carbon pricing on coal-based power and the competitiveness of solar energy in Tamil Nadu.

H1 (Alternative Hypothesis): There is a **significant positive relationship** between the cost impact of carbon pricing on coal-based power and the competitiveness of solar energy in Tamil Nad

CORRELATIONS			
		Does carbon pricing increase the cost of coal-based power generation compared to solar energy?	Would higher carbon prices make solar energy more competitive than coal in Tamil Nadu?
Does carbon pricing increase the cost of coal-based power generation compared to solar energy?	Pearson Correlation	1	.624**
	Sig. (2-tailed)		.000
	N	75	75
Would higher carbon prices make solar energy more competitive than coal in Tamil Nadu?	Pearson Correlation	.624**	1
	Sig. (2-tailed)	.000	
	N	75	75
**. Correlation is significant at the 0.01 level (2-tailed).			

Interpretation

Since the significance value (p = 0.000) is less than the standard level of significance (0.05), the null hypothesis is rejected and the alternative hypothesis is accepted. Hence, there is a significant positive relationship between the impact of carbon pricing on coal-based power generation cost and the competitiveness of solar energy in Tamil Nadu. As the cost of coal-based electricity increases due to carbon pricing, people feel that **solar energy becomes more competitive and beneficial**.

Findings from Hypothesis Testing

Study: Impact of Carbon Pricing on Solar Energy Investments in Chennai

1. Willingness to Invest Across Age Groups (ANOVA)

- Result: $p = 0.241 > 0.05$
- Finding: No significant difference in willingness to invest across age groups.
- Implication: Age does not influence investment willingness.

ANOVA Table

Source	Sum of Squares	df	Mean Square	F / Sig.
Between Groups / Within Groups / Total	3.401 / 56.279 / 59.680	3 / 71 / 74	1.134 / 0.793 / –	1.430 / 0.241 / –

2. Awareness vs. Perception of Project Attractiveness (Independent Samples t-Test)

- Result: $p = 0.061 > 0.05$
- Finding: No significant difference in perception of attractiveness between aware vs. not aware groups.
- Implication: Awareness of carbon pricing does not alter attractiveness perception.

Independent Samples t-Test

Test	t	df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	-1.903	73	0.061	-0.417

3. Carbon Pricing Cost Impact vs. Solar Competitiveness (Correlation)

- Result: $r = 0.624$, $p = 0.000 < 0.05$
- Finding: Significant positive relationship between carbon pricing's cost impact on coal and solar competitiveness.
- Implication: As coal costs rise due to carbon pricing, solar energy is perceived as more competitive.

Correlation Table

	Cost Impact of Carbon Pricing	Solar Competitiveness
Cost Impact of Carbon Pricing	1	0.624**
Solar Competitiveness	0.624**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Overall Summary of Findings

- Age groups do not differ in willingness to invest.
- Awareness does not change attractiveness perception.
- Carbon pricing's cost impact strongly drives solar competitiveness.

Recommendations

Based on the findings of the study on Carbon Pricing and Solar Investments in Chennai, the following recommendations are proposed to guide policy formulation, investment strategies, consumer engagement, and future academic research.

1. For Policy Makers
    - Integrate carbon pricing revenues with renewable energy subsidies to accelerate rooftop and community solar adoption.
    - Ensure long-term stability of carbon pricing policies to reduce investor risk and encourage capital inflows.
    - Reinvest carbon pricing revenues into solar R&D, grid modernization, and workforce training.

2. For Solar Investors & Developers
    - Highlight solar's competitiveness against coal in investor communications, especially under carbon pricing scenarios.
    - Emphasize shorter payback periods in project proposals to attract more investment.
    - Promote hybrid (solar + grid) models as transitional solutions for hesitant households.
    - Expand community solar projects to reduce upfront costs and align with consumer preferences.

3. For Consumers
    - Launch awareness campaigns explaining how carbon pricing increases fossil electricity costs and why solar is financially safer.
    - Encourage energy efficiency measures alongside solar adoption to maximize household savings.
    - Simplify financing terms (EMI/loan options) to make rooftop solar accessible to younger and middle-income households.

4. For Future Research
    - Expand the sample size to include respondents across Tamil Nadu for broader generalization.

- Conduct longitudinal studies to track investor behavior as carbon pricing policies evolve.
- Compare Chennai's results with other metros (e.g., Bengaluru, Delhi) to identify regional differences.
- Apply advanced statistical modeling (e.g., regression, SEM) to quantify the impact of carbon pricing on IRR, NPV, and adoption rates.

Conclusion

This study set out to examine the impact of carbon pricing on solar energy investments in Chennai, with a focus on investor behavior, cost competitiveness, project viability, and sectoral adoption. The analysis revealed that while demographic factors such as age and awareness levels do not significantly alter investment willingness or perceptions of project attractiveness, the economic impact of carbon pricing on fossil fuel costs plays a decisive role in shaping market preferences. Specifically, the correlation results demonstrated that as carbon pricing increases the cost of coal-based electricity, solar energy is perceived as substantially more competitive, thereby strengthening its position in Tamil Nadu's energy mix.

The findings underscore the importance of stable and transparent carbon pricing mechanisms in enhancing investor confidence and encouraging financial institutions to extend green financing. By shortening payback periods and improving long-term profitability, carbon pricing can serve as a catalyst for accelerating solar adoption across residential, commercial, and industrial sectors.

For policymakers, the results emphasize the need to integrate carbon pricing revenues with state-level solar incentives, ensure long-term policy stability, and reinvest funds into research and development, grid modernization, and workforce training. For investors and consumers, the study highlights the financial and environmental benefits of solar adoption under carbon pricing regimes.

Sustainable Capital Markets and the Growth of Impact Investing: An Empirical Study of Investor Awareness, Attitude and Investment Intentions in Bengaluru, Karnataka

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Abstract

Sustainable finance has emerged as a transformative force in global financial markets, prompting investors to pursue economic returns while contributing to social and environmental well – being. Impact investing – positioned within the broader domain of responsible investment – aims to generate measurable societal impact alongside financial gain and is steadily gaining prominence in emerging economies such as India. This study examines the behavioural determinants of impact investment intention among individual investors in Bengaluru, Karnataka. Using a structured questionnaire, data were collected from 202 respondents, and statistical techniques including descriptive analysis, reliability testing, correlation, regression, and demographic comparisons were employed. Results reveal strong positive relationships among awareness, attitude, and investment intention; however, regression findings indicate that attitude is the dominant predictor, while awareness exerts an indirect influence. Age significantly affects investment intention, whereas gender does not. The study strengthens behavioural finance literature by extending the Theory of planned behavior to the Indian sustainable finance context and offers practical insights for policymakers, financial Institutions, and market educators seeking to enhance responsible investment participation.

Keywords*: Sustainable finance, ESG, impact investing, behavioural intention, investor awareness, Bengaluru*

1. Introduction

The global financial ecosystem is undergoing a structural transition as investors increasingly prioritise Environmental, Social, and Governance (ESG) considerations in their

decision – making processes. Traditional investment models, which emphasized short – term financial gain, are being replaced by inclusive frameworks that integrate long – term societal and environmental outcomes. Among these innovations, impact investing has emerged as a pivotal approach that combines financial performance with measurable social value creation. India has become an important participant in sustainable finance due to regulatory reforms, enhanced disclosure requirements, and the increasing demand for ESG – aligned financial products. Bengaluru – India's knowledge and investment hub – offers an ideal setting for analyzing sustainable investment behavior owing to its demographic profile of educated professionals, financial literacy, and digital exposure.

Despite the increasing availability of ESG funds and impact – based instruments, limited empirical research explores the behavioural antecedents influencing individual investors' participation in sustainable finance, particularly in the Indian context. Existing works predominantly examine ESG performance or macro – level market trends, leaving a gap in understanding how awareness and attitude drive behavioural intention.

The present study addresses this gap by assessing how awareness and attitude influence investment intention toward impact investing among Bengaluru investors. It further evaluates demographic variations such as age and gender. The findings provide valuable insights for financial institutions, regulators, educators, and sustainable investment platforms.

2. Theoretical Background and Literature Review

2.1 Theoretical Framework

This study is grounded in the Theory of planned Behaviour (TPB) (Ajzen, 1991), which posits that behavioural intention is shaped by three components: attitude, subjective norms, and perceived behavioural control. In sustainable finance, attitude reflects favourable evaluations of impact investing; awareness enhances understanding and shapes cognitive processing; and intention represents readiness to act. TPB provides a robust theoretical basis for examining behavioural determinants in ethical finance.

2.2 Awareness and Sustainable Investment Behaviour

Awareness enables investors to evaluate ESG disclosures, comprehend sustainability risks, and assess ethical investment opportunities, Studies show that increased sustainability

knowledge positively influences acceptance of responsible investment products (Shaik & Yadavalli, 2025; Singhal & Goel, 2023). Awareness therefore acts as an essential cognitive input contributing to attitudinal formation.

2.3 Attitude Toward Impact Investing

Attitude reflects an investor's overall evaluation of sustainable investment and is a powerful predictor of behavior. Research highlights that positive attitudes towards ESG transparency, ethical value creation, and impact measurement significantly influence investment participation (Adwani, 2025; Mandal & Das, 2025). Hence, attitude is a central construct influencing intention.

2.4 Investment Intention in Sustainable Finance

Investment intention captures an investor's likelihood of engaging in impact – oriented financial activities. Prior studies demonstrate that intention is affected by trust, perceived long – term value, ethical alignment, and psychological factors (Thakrar & Bhurat, 2023; Pandya et al., 2023). Understanding intention is crucial for strengthening sustainable capital markets.

2.5 Hypotheses Development

Based on literature and TPB, the following hypothesis were proposed:

- H1: Awareness significantly influences investment intention toward impact investing
- H2: Attitude positively influences investment intention.
- H3: Awareness significantly influences investor attitude.
- H4: Demographic variables significantly affect investment intention.

3. Research Methodology

3.1 Research Design

A quantitative, cross-sectional design was employed to study the behavioural antecedents influencing impact investing. A structured questionnaire was administered to gather primary data, and the analysis followed a deductive hypothesis – testing approach.

3.2 Sampling and Data collection

The population comprised financially active individuals in Bengaluru, including retail investors and working professionals. A non-probability convenience sampling technique was used. A total of 202 valid responses were collected, which is adequate for correlation and regression.

3.3 Instrumentation

The questionnaire included:

- Section A: Demographic information
- Section B: Awareness (Likert scale)
- Section C: Attitude (Likert scale)
- Section D: Investment intention (Likert scale)

Items were adapted from existing behavioural finance literature to ensure conceptual clarity.

3.4 Validity and Reliability

Cronbach's alpha values confirmed internal consistency. Content validity was ensured through expert review and construct validity was assessed through correlation and regression tests.

3.5 Analytical Tools

Data was analyzed using SPSS with the following techniques:

- Descriptive analysis
- Cronbach's alpha
- Pearson correlation
- Multiple regression
- Independent samples t-test
- One – way ANOVA

4. Data Analysis and Interpretation

4.1 Descriptive Statistics

Purpose: To understand the general perception levels of awareness, attitude, and intention.

Table 1

Descriptive Statistics

Construct	N	Mean	SD
Awareness	202	3.47	1.09
Attitude	202	3.65	1.06
Investment Intention	202	3.71	1.06

Interpretation: Investors exhibit a positive orientation toward impact investing, with intention being the highest – scoring construct. Awareness levels are moderately positive, indicating potential for further knowledge enhancement.

4.2 Reliability Analysis

Purpose: To ensure internal consistency of measurement scales.

Table 2

Reliability Results

Construct	Items	Alpha	Interpretation
Awareness	4	0.892	Good
Attitude	4	0.916	Excellent
Investment Intention	4	0.909	Excellent

Interpretation: All constructs show high reliability, indicating that the items consistently measure each variable.

4.3 Correlation Analysis

Purpose: To examine how strongly awareness and attitude are related to intention.

Table 3

Correlation Matrix

Variables	Awareness	Attitude	Intention
Awareness	1	0.801**	0.740**
Attitude	_	1	0.881**
Investment Intention	_	_	1

P<0.001

Interpretation: All correlations are strong and significant. Attitude has the strongest correlation with intention, suggesting it plays a pivotal role in shaping investment behavior.

4.4 Regression Analysis

Purpose: To identify the strongest predictor of investment intention.

Table 4 Regression Summary

Statistic	Value
R	0.883

R^2	0.779
F – value	350.20
Sig.	<0.001

Table 5

Regression Coefficients

Predictor	B	SE	t-value	Sig.
Constant	0.468	0.128	3.65	0.001
Awareness	0.092	0.054	1.70	0.090
Attitude	0.880	0.055	14.43	<0.001

Interpretation

- Attitude is a significant and strong predictor of investment intention.
- Awareness becomes insignificant when attitude is introduced, indicating its indirect influence through attitude.

4.5 Demographic Analysis

Gender (t-test)

Result: No significant difference (p=0.922).

Interpretation: Both genders exhibit similar levels of investment intention.

Age (ANOVA)

Result: Significant difference (p<0.001).

Interpretation: Younger respondents (<25) show lower intention compared to older groups.

4.6 Hypothesis Summary

Hypothesis	Result
H1	Partially supported
H2	Supported
H3	Supported
H4	Partially supported

5. Discussion

The findings highlight that Bengaluru investors demonstrate a positive orientation toward impact investing, consistent with global sustainable finance trends. Awareness strengthens attitudes, but it is attitude that ultimately determines intention. This clarifies the psychological pathway where information (awareness) becomes meaningful only when transformed into favourable evaluation (attitude).

Age differences indicate maturity and financial exposure influence sustainable investment readiness. Gender neutrality suggests sustainable investing appeals broadly across demographic groups. The findings strongly align with TPB, further validating its applicability in emerging markets.

6. Conclusion

The study concludes that investor attitude is the primary driver of impact investment intention in Bengaluru. Awareness plays a supportive but indirect role. Age significantly influences intention, while gender does not.

The findings emphasise that strengthening investor attitudes through targeted communication, education, and transparent ESG reporting will br essential to expanding India's sustainable capital markets.

6.1 Theoretical Implications

- Extends TPB to sustainable investment in an Indian urban context.
- Demonstrates the meditating role of attitude.
- Provides empirical evidence for behavioural finance literature.

6.2 Managerial and policy Implications

Financial Institutions

- Enhance ESG communication clarity.
- Provide evidence – based social impact reporting.

Regulators

- Strengthening sustainability disclosure requirements
- Promote national investor awareness campaigns.

Educators

- Integrate sustainable finance into professional and academic curricula.

Fin Tech Platforms

- Embed ESG filters, impact ratings, and personalized nudges.

6.3 Limitations

- Non – probability sampling limits generalisability
- Cross – sectional data cannot measure behavioural changes over time.
- Only two psychological constructs were examined.

6.4 Future Research

- Longitudinal studies on behavioural evolution.
- Exploring additional constructions such as trust, perceived risk, and environmental concern.
- Comparative studies across different Indian cities.

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Dynamic Carbon Accounting via Foundation Models: Reimagining Sustainability Governance for Green Capitalism

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Abstract

The accelerating climate crisis underscores the urgent need for high-velocity, high-fidelity emissions data capable of supporting real-time mitigation and long-horizon climate-financial decision-making. Yet today's carbon accounting infrastructure remains dominated by static, retrospective inventory methods that rely on coarse temporal aggregations and geographically generalized emission factors. These constraints produce a systemic "granularity and velocity gap" that undermines climate governance, delays operational decarbonization, and prevents financial institutions from accurately modeling transition and physical risks. As a result, existing climate data systems fail to provide the continuous, actionable intelligence required to align global economic activity with the 1.5 °C pathway. This paper proposes Dynamic Carbon Accounting (DCA), a conceptual framework that re-architects emissions measurement as a real-time, dynamic state estimation problem. Enabled by the emergence of Foundation Models (FMs)—specifically Time-Series Foundation Models (TSFMs)—DCA leverages multimodal data fusion, zero-shot inference, and probabilistic forecasting to produce granular spatiotemporal emissions intelligence. TSFMs' ability to generalize across domains and compensate for data sparsity allows the framework to address long-standing challenges, including Scope 3 attribution across complex supply chains and localized carbon-intensity estimation for volatile electricity grids. To ensure immutability, transparency, and audit-grade trust, the DCA framework integrates a Governance, Verification, and Audit Layer built on Distributed Ledger Technology (DLT). This enables perpetual attestation, where emissions records are continuously validated and cryptographically secured, reducing reliance on costly periodic audits and enabling performance-based sustainability contracts. Conceptually, Dynamic Carbon Accounting provides a foundation for autonomous climate-aligned decision systems, real-time carbon-aware optimization, improved climate-risk pricing, and globally interoperable regulatory compliance. By bridging the velocity gap in carbon intelligence, DCA establishes the

methodological and infrastructural groundwork required to drive credible, verifiable decarbonization at planetary scale

***Keywords**: emission factors, dynamic carbon accounting, distributed ledger technology*

1. Introduction

1.1 Global Emissions Imperative and Green Capitalism

The global commitment to limit atmospheric warming to 1.5 degree Celsius above pre-industrial levels requires an unprecedented restructuring of industrial and financial activity **[15]**. Under the framework of green capitalism, the primary mechanism for this transition is the internalization of environmental externalities into the price of capital. This paradigm assumes that if market participants can accurately value carbon risk, the subsequent reallocation of capital will favour low-carbon technologies and penalize high-emitters **[2], [3]**. However, for this pricing mechanism to function efficiently, the data underlying carbon valuations must be as precise and timely as the financial data used in equity markets.

The current global emissions imperative, as outlined by international climate governance frameworks, demands rapid, deep, and immediate reductions **[15]**. Financial institutions have responded by incorporating Environmental, Social, and Governance (ESG) metrics into their decision-making processes, yet they remain hampered by a lack of high-fidelity data **[6]**. Green capitalism currently operates on a "retrospective" model, where emissions are treated as a compliance cost rather than a dynamic operational variable **[9]**. To align global economic growth with planetary boundaries, a transition is required toward a system where carbon performance is rewarded in real time through the cost of capital channel **[3], [8]**.

1.2 Limitations of Static Carbon Accounting

Traditional carbon accounting is largely based on the Greenhouse Gas (GHG) Protocol Corporate Standard, which was developed in an era when voluntary, annual reporting was the high-water mark of corporate responsibility **[8]**. This "static" approach typically involves multiplying physical activity data, such as liters of diesel consumed or megawatt-hours of electricity used, by a static emission factor (EF) **[10], [27]**. While this method is straightforward, it suffers from severe limitations in the context of a rapidly decarbonizing grid.

Static inventories rely on broad industry averages or "spend-based" methods, which use financial transaction data as a proxy for emissions **[9], [28]**. This often leads to inaccuracies exceeding 30– 40% when compared to real-time or high-resolution measurements **[18], [21]**. Furthermore, these inventories are inherently retrospective; by the time an annual report is published, the data is often 12 to 18 months old, rendering it ineffective for proactive operational optimization or high-frequency financial risk assessment **[2], [9]**.

1.3 Velocity and Granularity Gaps in Climate Risk

The core of the structural information failure in sustainability lies in the "velocity" and "granularity" gaps. The velocity gap refers to the time lag between an emission event and its measurement, while the granularity gap refers to the lack of spatial and temporal resolution in that measurement **[9], [15]**. In modern electricity grids, the carbon intensity of power can fluctuate by several hundred percent within a single day as weather-dependent renewables such as wind and solar ramp up and down **[18]**. Static annual averages mask these fluctuations, providing no actionable signal for companies to shift their electricity demand to cleaner hours **[20]**.

This lack of granularity creates a misalignment of incentives **[18]**. For example, under current Scope 2 guidance, a company purchasing renewable energy through an unbundled certificate may report zero emissions, even if that energy was generated at a time when the grid was already clean, while its actual physical consumption at a different time was powered by coal **[16], [21]**. This "double-counting" and masking of real-world carbon impacts prevent financial institutions from accurately modeling transition risks, as the specific physical and regulatory vulnerabilities of individual assets remain obscured **[2], [5]**.

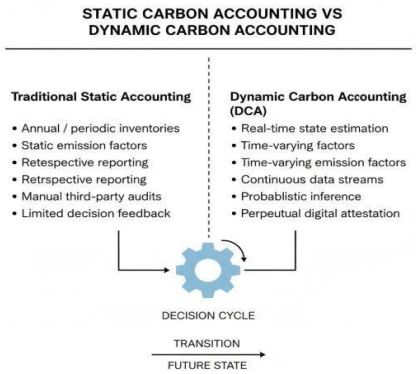

Figure 1. Comparison of traditional static carbon accounting and the proposed Dynamic Carbon Accounting (DCA) paradigm.

1.4 Role of Foundation Models in Sustainability Intelligence

Foundation Models (FMs), particularly Time-Series Foundation Models (TSFMs), represent a technological breakthrough capable of bridging these information gaps. Unlike traditional machine learning models that require domain-specific training on vast quantities of labeled data, FMs are pre-trained on massive, diverse datasets and exhibit strong zero-shot or few-shot generalization capabilities [22], [29]. In the context of carbon accounting, models such as TimesFM and Moirai can ingest heterogeneous data streams—including smart meter data, satellite imagery, and shipping logs—to infer the underlying carbon state of a system [23], [24].

By treating emissions measurement as a "dynamic state estimation" problem rather than a manual inventory task, foundation models can provide probabilistic forecasts of emissions even in data- scarce environments [25], [26]. They can automatically categorize large volumes of financial ledger entries into specific environmental impact classes, effectively automating the most labor- intensive components of Scope 3 accounting [12], [49]. This level of intelligence enables the development of "perpetual attestation" systems, in which carbon data is continuously updated and verified through automated governance mechanisms [4], [15].

1.5 Objectives and Paper Organization

The primary objective of this paper is to propose and formalize the conceptual framework of Dynamic Carbon Accounting (DCA). The framework re-architects the carbon reporting stack to enable real-time, granular, and audit-grade emissions intelligence. This study aims to demonstrate how foundation models and distributed ledger technologies can be integrated to overcome the velocity and granularity gaps that currently plague sustainability governance **[4], [22]**.

The paper is organized as follows: Section 2 provides a comprehensive literature review of traditional frameworks and the emergence of TSFMs. Section 3 defines the conceptual foundations of DCA, contrasting it with static state estimation. Section 4 details the proposed four-layer system architecture. Section 5 discusses the shift from reporting to perpetual attestation. Section 6 explores the implications for finance and green capitalism. Section 7 presents conceptual use-case scenarios. Section 8 addresses the limitations and ethical considerations of the framework, and Section 9 concludes with a summary of contributions and directions for future research.

2. Literature Review and Background

2.1 Traditional Carbon Accounting Frameworks

The current gold standard for corporate carbon accounting is the Greenhouse Gas Protocol, which comprises two linked standards: the Corporate Accounting and Reporting Standard and the Scope 3 Standard **[8], [28]**. These frameworks categorize emissions into Scopes 1, 2, and 3, allowing organizations to delineate between direct operational emissions and indirect value chain impacts **[8], [28]**. Since its inception in 2001, the GHG Protocol has achieved near-universal adoption, with a substantial majority of Fortune 500 companies reporting in alignment with its guidelines **[8], [17]**.

The primary calculation methodology within these frameworks is the emission-factor approach **[10], [27]**. This approach relies on "activity data" (e.g., fuel used) and "emission factors" (e.g., carbon per unit of fuel). While the protocol allows for varying levels of accuracy—ranging from low-granularity "spend-based" methods to high-granularity "supplier-specific" data—most organizations continue to rely on secondary industry averages for the majority of their inventories **[9], [28]**. This reliance introduces substantial noise into estimates of a firm's actual environmental impact **[3]**.

Accounting Method	Data Source	Accuracy Level	Implementation Complexity
Spend-based	Financial ledgers	Low	Low
Average-data	Industry averages	Moderate	Moderate
Hybrid	Mixed spend and activity	Moderate-High	Moderate
Supplier-specific	Primary data from partners	High	High

2.2 Limitations of Periodic Inventories

Academic and industrial critiques of periodic, annual inventories have intensified as the need for rapid decarbonization grows. One major limitation is the "retrospective" nature of annual reports, which act as a lag indicator rather than an operational steering tool **[9]**. Kaplan and Ramanna (2021) observe that the widespread use of industry-average data for Scope 3 emissions does not allow for "credible, accurate numbers," thereby undermining the integrity of the entire disclosure ecosystem **[15]**.

Furthermore, current Scope 2 guidance suffers from two significant flaws regarding temporal and spatial granularity: the reliance on simple-average emissions rates and the resulting misalignment of incentives **[18]**. By using annual averages, the protocol masks the true carbon impact of energy use during peak fossil-fuel generation times **[18]**. This often leads to situations where "green" claims do not correlate with actual atmospheric GHG reductions **[21]**. The lack of machine- readable, granular data formats further complicates the ability of auditors to verify these reports in a timely manner **[15], [17]**.

2.3 AI and Machine Learning in Sustainability

Artificial Intelligence (AI) and Machine Learning (ML) have traditionally been applied to sustainability through predictive modeling for energy management and renewable energy forecasting **[25], [26]**. Techniques such as recurrent neural networks, including Long Short-Term Memory (LSTM) architectures, have been used to forecast building energy consumption and support operational optimization for emissions reduction **[25]**. However, these traditional ML approaches often struggle with scalability challenges and suboptimal decision-making due to limited integration of real-time, multimodal data streams **[26]**.

A significant gap remains in the application of AI for carbon state estimation at the entity level. Most existing solutions are bespoke and data-specific, requiring custom models for each new building, facility, or industrial process **[15]**. This constraint limits their applicability across global supply chains where emissions data is fragmented, heterogeneous, and inconsistently reported **[9], [15]**. The emergence of foundation models offers a potential solution by providing a more generalizable framework capable of handling heterogeneous data modalities and domain shifts **[22], [29], [24]**.

2.4 Foundation Models and Time-Series Foundation Models

Foundation Models (FMs) are an emerging class of large-scale models pre-trained on massive datasets that can be adapted to a wide range of downstream tasks **[22], [29]**. In the domain of time- series analysis, Time-Series Foundation Models (TSFMs) have been developed using architectures similar to Large Language Models (LLMs), such as decoder-only Transformer models **[23]**. Notable examples include Amazon's Chronos, Salesforce's Moirai, and Google's TimesFM **[24]**.

Model Name	Developer	Parameter Count	Training Dataset Size	Key Architecture Feature
TimesFM	Google	200M	100B time- points	Multi-patching strategy
Moirai	Salesforce	Varies	27B observations	Any-variate Attention
Chronos	Amazon	Varies	Massive mixed corpus	Probabilistic forecasting

These models address the challenge of data heterogeneity by learning generalizable patterns across multiple domains, including energy, retail, and finance **[22], [29]**. TSFMs are specifically designed to adapt to variable context lengths (past observations) and prediction horizons, making them well suited for near-real-time "nowcasting" of emissions in environments where direct sensor measurements are incomplete or unavailable **[24], [25]**.

2.5 Gaps in Sustainability Governance and Financial Accounting

There is a significant "information gap" between engineering models of carbon flow and the high- level ESG reporting used by financial markets **[6], [7]**. While engineering research has developed carbon emission flow theories that link emissions to physical power flows within electricity grids, this information is rarely integrated into corporate accounting systems or financial ledgers **[18], [26]**.

Furthermore, double materiality analysis represents a major unresolved challenge **[5]**. Investors increasingly rely on climate scenarios to form expectations about future firm performance, yet they lack real-time feedback mechanisms to assess how firms are responding operationally to these risks **[5], [6]**. The absence of audit-grade, intra-year emissions records means that carbon asset risk is frequently mispriced, exposing investment portfolios to abrupt valuation shocks as regulatory and market conditions evolve **[1], [2]**.

3. Conceptual Foundations of Dynamic Carbon Accounting

3.1 Definition of Dynamic Carbon Accounting

Dynamic Carbon Accounting (DCA) is defined here as a methodological approach that characterizes greenhouse gas emissions as a continuous, time-varying state of an industrial or economic system **[15]**. Unlike static accounting, which produces a "post-facto" inventory of events over a fixed period, DCA seeks to produce a high-frequency, "nowcasted" estimation of the carbon intensity associated with every unit of output or activity **[18]**.

DCA can be mathematically expressed as a state estimation problem where the observed emissions E_t at time t are a function of the system state x_t and activity inputs u_t:

$$E_t = f(x_t, u_t) + \omega_t$$

where ω_t represents the inherent uncertainty or noise in measurement.29 By utilizing foundation models as the function f, DCA can capture non-linear relationships and spatiotemporal dynamics that static linear models ignore.

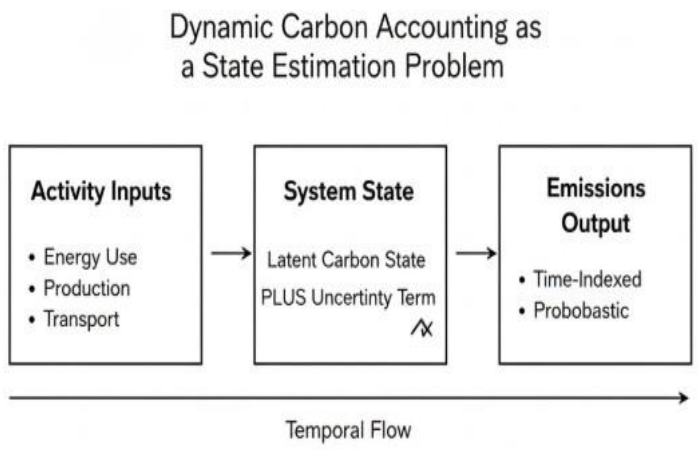

Figure 2. Dynamic Carbon Accounting modeled as a real-time state estimation process.

3.2 Static Inventories vs. Dynamic State Estimation

The transition from static inventories to dynamic state estimation mirrors the evolution of power system management. In electrical engineering, "state estimation" (SE) is used to determine the voltage magnitude and phase angles of nodes in a power grid by processing a limited set of noisy measurement parameters **[26], [28]**. Dynamic Carbon Accounting (DCA) applies this concept to carbon by utilizing pseudo-measurements—such as industrial output data or weather conditions— to estimate emissions when direct sensing is unavailable **[25], [26]**.

Feature	**Static Inventory**	**Dynamic State Estimation**
Logic	Retrospective Aggregation	Real-time Inference
Data Requirements	Invoices / Meter totals	IoT / Multimodal streams
Uncertainty	Deterministic (often hidden)	Probabilistic (explicitly modeled)
Governance	Periodic Third-party Audit	Perpetual DLT-based Attestation

This approach enables carbon flow tracking, where emissions are represented as a virtual flow embedded within energy and material streams **[18], [26]**. Such representations allow carbon responsibility to be traced from the source, such as a power generation unit, to specific load nodes, such as industrial facilities, with high temporal resolution **[14], [18]**.

3.3 Temporal and Spatial Granularity

Granularity is the hallmark of Dynamic Carbon Accounting (DCA). For Scope 2 emissions, DCA moves from annual averages to locational marginal emissions (LMEs). LMEs measure the actual tons of carbon displaced or induced by one megawatt-hour of electricity at a specific location and time **[18]**. Unlike average emission factors, LMEs reflect the impact on the marginal generator—the specific power plant that responds to an incremental unit of demand **[18]**.

Spatially, DCA provides nodal granularity. By utilizing quasi–input–output (QIO) models, DCA can calculate the carbon emission factor (CEF) flowing into and out of specific grid nodes, such as substations or distribution networks **[14]**. This level of spatial precision is essential for carbon- aware capital allocation, as it enables the identification of high-intensity physical assets and emissions hotspots within a broader corporate portfolio **[1], [2]**.

3.4 Verification, Auditability, and Trust

A dynamic system generates a volume of data that makes traditional, manual third-party audits impractical. Dynamic Carbon Accounting (DCA) addresses this challenge through the concept of perpetual attestation [4], [15]. In this framework, each state estimate is cryptographically signed and recorded on a distributed ledger, creating a tamper-resistant data-sharing environment in which reliability and traceability are embedded within the system architecture [4].

Trust is therefore established not solely through the reputation of an external auditor, but through the creation of audit-grade records that are continuously validated against multimodal signals [1], [15]. For example, when an organization reports low emissions, a Time-Series Foundation Model (TSFM) can cross-verify these claims using auxiliary data sources such as satellite observations and power grid flow information [18], [26]. If inconsistencies are detected, the uncertainty buffer associated with the record can be dynamically adjusted, providing stakeholders with a transparent signal regarding data quality and confidence levels [25], [26].

4. System Architecture for Dynamic Carbon Accounting

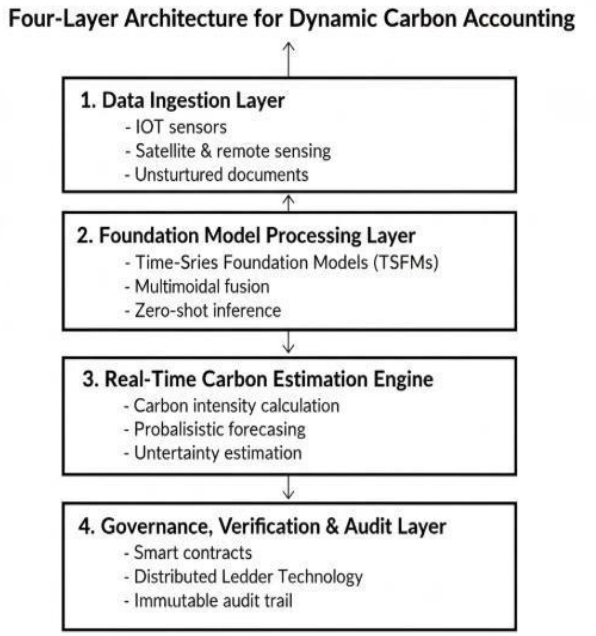

Figure 3. Conceptual four-layer architecture of the Dynamic Carbon Accounting framework.

4.1 Data Ingestion and Preprocessing Layer

The first layer of the Dynamic Carbon Accounting (DCA) architecture is a multimodal ingestion pipeline designed to handle the data heterogeneity inherent in global supply chains **[9], [15]**. This layer integrates:

- **IoT and Sensor Data:** Real-time smart meter readings, electric vehicle sensor diagnostics, and industrial SCADA signals **[25], [26]**.
- **Unstructured Text and Diagrams:** Sustainability reports, process diagrams, and transport documentation in unstructured formats **[12], [15]**.
- **Financial and Trade Data:** Financial ledger entries, shipping logs, and customs declarations **[12], [13]**.
- **Remote Sensing:** Satellite imagery used for monitoring methane leakage and land-use change impacts **[18], [21]**.

The preprocessing module employs semantic graph alignment techniques to transform these heterogeneous data sources into a standardized, machine-readable representation **[15]**. In this semantic supply-chain graph, nodes represent entities such as suppliers, processes, and materials, while edges encode relationships including energy consumption, material flow, and transportation activity **[15], [18]**.

4.2 Foundation Model Processing Layer

The foundation model (FM) processing layer serves as the intelligence core of the architecture. It processes both numerical time-series data and unstructured textual metadata to infer emissions states across the system **[22], [29]**.

4.2.1 Time-Series Foundation Models

This sub-layer employs Time-Series Foundation Models (TSFMs), such as TimesFM and Moirai, to perform zero-shot and few-shot forecasting of carbon-related signals **[24], [25]**. These models leverage multi-resolution representations to capture patterns across diverse temporal scales, ranging from short-term grid fluctuations to long-term industrial cycles **[22], [29]**. TSFMs are particularly effective for gap management, as they can estimate missing emissions data for suppliers lacking advanced sensor infrastructure by generalizing from patterns observed in analogous industrial sectors **[25], [29]**.

4.2.2 Multimodal Data Fusion for Scope 3

For Scope 3 emissions, which often constitute the majority of an organization's total carbon footprint, the architecture applies foundation-model-based classification to financial transaction data **[12]**. Domain adaptation techniques are used to fine-tune models to recognize environmentally extended input–output (EEIO) commodity classes from natural language purchase orders **[12], [13]**. By fusing this spend-based information with physical indicators such as mass and distance derived from logistics data, the system achieves more accurate supply-chain emissions attribution than traditional keyword-based approaches **[9], [15]**.

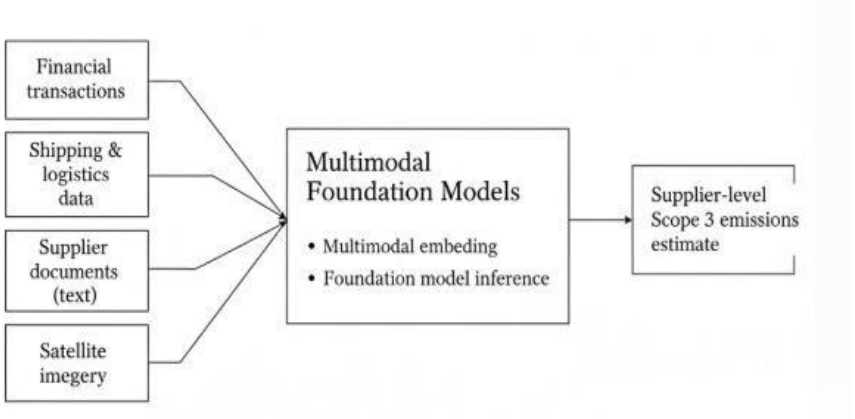

Figure 4. Multimodal data fusion workflow for Scope 3 emissions attribution using foundation models

4.3 Real-Time Carbon Estimation Engine

The estimation engine translates model outputs into a unified carbon intensity factor (λ). It integrates carbon emission flow theory to account for line losses and cross-regional power transmission in real time **[18], [26]**. For any node *i* in the network, the engine computes the nodal carbon potential based on the weighted average of all incoming energy streams **[18], [26]**.

The engine also generates probabilistic forecasts rather than deterministic point estimates **[25]**. This enables the system to output explicit uncertainty metrics, such as confidence intervals, which are essential for stochastic control policies in building energy management systems and grid-level operations **[26], [28]**. The estimation process further ensures that the conservation of emissions is preserved across the network under dynamic operating conditions **[18]**.

4.4 Governance and Audit Layer (DLT-Based)

The final layer provides the trust infrastructure using Distributed Ledger Technology (DLT). This layer functions as a perpetual audit log for all emissions state estimates, ensuring traceability, integrity, and verifiability **[4], [15]**.

- **Smart Contracts:** Digitally encoded contracts automate the issuance, transfer, and retirement of tokenized carbon credits based on real-time emissions data **[5]**.
- **DLT Oracles:** Secure oracle mechanisms connect outputs from the AI-based estimation engine to the distributed ledger, preserving the integrity of off-chain measurements when recorded on-chain **[4], [15]**.
- **Decentralized Identifiers (DID):** Persistent digital identifiers are assigned to assets and projects, enabling consistent tracking and attribution across multiple organizational and regulatory stakeholders **[5]**.

5. From Reporting to Perpetual Attestation

5.1 Continuous Measurement vs. Periodic Disclosure

The transition from periodic disclosure to continuous measurement represents a fundamental shift in corporate accountability. Traditional reporting frameworks primarily function as compliance mechanisms, whereas Dynamic Carbon Accounting (DCA) enables emissions data to be treated as operational intelligence **[1], [9]**. Continuous measurement allows organizations to identify emissions hotspots in near real time, enabling targeted interventions that improve attribution accuracy and operational responsiveness **[18], [21]**.

In electricity markets, continuous measurement facilitates the transition from annual matching of renewable energy certificates to 24/7 carbon-free energy (CFE) matching **[19], [20]**. While annual matching obscures reliance on fossil-fuel generation during periods of low renewable output, 24/7 matching ensures that each unit of electricity consumption is aligned with clean generation in the same hour and grid region **[19], [22]**. Real-time transparency empowers consumers and firms to actively improve their CFE matching performance **[20]**.

5.2 Uncertainty Reduction via Foundation Models

High-quality carbon inventories are frequently undermined by statistical parameter uncertainty and model uncertainty **[40]**. Foundation Models reduce these uncertainties by leveraging prior knowledge learned from large, diverse pre-training datasets **[22], [29]**. Time-Series Foundation Models, such as Chronos, are capable of producing robust probabilistic forecasts even when historical observations are limited, demonstrating strong generalization and stability under data- scarce conditions **[25], [29]**.

Uncertainty Type	Static Mitigation	DCA / FM Mitigation
Parameter	Safety factors	Cross-domain correlation
Systematic	Manual adjustment	Zero-shot error correction
Statistical	Error propagation	Probabilistic density estimation
Gap	Secondary proxies	Zero-shot "Nowcasting"

By treating "missing data" as an inference task, foundation models act as "intelligent proxies" that are more consistent with the actual physical state of the grid than static industry averages.

5.3 Perpetual Attestation and Audit-Grade Records

Perpetual attestation removes the lag from the audit cycle. Using a Governance, Verification, and Audit Layer built on Distributed Ledger Technology (DLT), emissions records are continuously validated and cryptographically secured **[4], [15]**. This framework supports independent third- party validation through automated smart contracts that query external data sources to verify reported claims **[5]**.

This process creates audit-grade records in which the provenance of each carbon data point is traceable from issuance through retirement **[4], [15]**. Such an architecture is particularly beneficial for distributed ledger–based carbon governance systems, where the

energy and carbon footprint of the underlying ledger can itself be monitored and managed transparently **[21], [33]**. The integration of DLT further reduces "garbage in, garbage out" (GIGO) risks by enforcing automated data validation and consistency checks across the accounting pipeline **[12], [15]**.

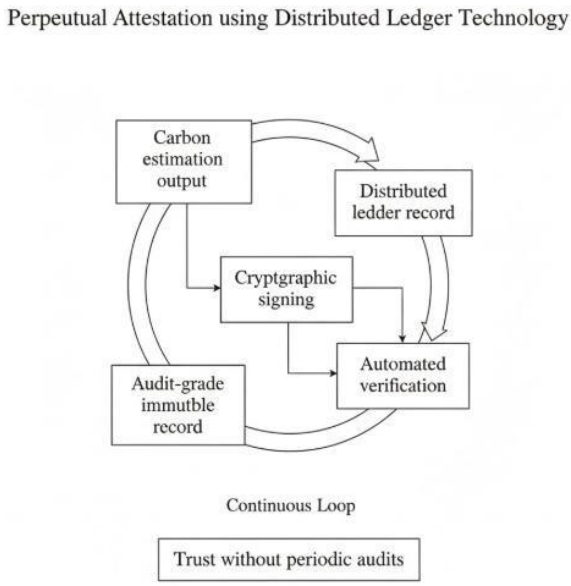

Figure 5. Continuous verification and immutable record generation through DLT-based perpetual attestation.

5.4 Carbon Data as a Financial and Operational Asset

When carbon data is continuous and independently verifiable, it can be treated as a financial input alongside traditional macroeconomic indicators such as interest rates and inflation **[1], [2]**. For firms, this enables the use of internal carbon prices (ICPs) to evaluate the potential impact of mandatory carbon taxes on future cash flows **[2], [3]**. At present, the global average carbon price remains substantially below most estimates of the social cost of carbon, underscoring the disconnect between market signals and environmental externalities **[31], [32]**. Dynamic Carbon Accounting (DCA) provides the granular emissions data required to calculate the carbon abatement cost effectiveness of alternative investments, thereby assisting firms in prioritizing projects with the highest total impact **[18]**.

Operationally, treating carbon data as an asset enables demand-side response strategies guided by real-time carbon intensity signals **[19], [20]**. For example, when the nodal carbon potential of a production site is elevated, an automated control system can temporarily reduce output to avoid high-intensity periods, lowering both emissions exposure and reputational risk **[18], [26]**.

6. Implications for Finance and Green Capitalism

6.1 Climate-Risk Pricing and Financial Decision-Making

A central objective of green capitalism is the accurate pricing of climate-related risks within equity and debt markets **[3], [32]**. Empirical evidence suggests that emissions intensity is already a priced firm characteristic in financial markets, though its influence is disproportionately driven by a small number of super emitters **[3]**. Most prevailing financial risk models are poorly equipped to capture this exposure because they depend on static and noise-prone emissions datasets **[3], [9]**.

Dynamic Carbon Accounting enables climate-adjusted financial risk assessment by banks, insurers, and institutional investors **[6]**. With access to real-time emissions trajectories, financial institutions can more precisely estimate a firm's vulnerability to future carbon taxes, regulatory tightening, or carbon leakage tariffs **[1], [4]**. This cost-of-capital transmission channel encourages firms to undertake decarbonization investments even when short-term returns are modest, as reduced financing costs improve the long-term net present value of such projects **[8]**.

Risk Category	Financial Implication	DCA Mitigation
Policy	Unexpected carbon taxes	Real-time state tracking
Technology	Stranded fossil assets	Early warning of tipping points
Market	Shifting consumer preference	Granular product-level data
Reputation	"Greenwashing" accusations	Perpetual DLT-based attestation

6.2 Performance-Based Sustainability Contracts

The emergence of real-time carbon data enables results-based climate finance (RBCF). In this model, funds are disbursed only upon the achievement of a pre-agreed set of climate-related outcomes, such as a verified reduction in nodal carbon intensity **[6], [7]**. Dynamic Carbon Accounting (DCA) supplies the real-time metrics required to identify sector-specific tipping points, allowing impact-linked finance mechanisms to trigger preferential financing conditions when defined decarbonization thresholds are crossed **[7]**.

Such performance-based sustainability contracts reduce information asymmetry between borrowers and lenders **[3], [6]**. Empirical evidence suggests that firms with stronger environmental performance perceive their cost of capital to be significantly lower than that of

high-emitting peers **[8]**. DCA can strengthen this transmission channel by providing a level of emissions-data precision that previously did not exist in financial markets, enabling more aggressive internal capital reallocation toward low-carbon business units **[8]**.

6.3 ESG Reporting and Regulatory Alignment

Regulatory authorities are increasingly mandating audited climate-related financial metrics, requiring that emissions data be subject to the same internal control rigor as financial reporting **[10], [18]**. Dynamic Carbon Accounting offers a standardized, machine-readable structure capable of mapping high-volume operational data streams onto established reporting regimes such as the GHG Protocol and TCFD frameworks **[4], [15]**.

Through the use of automated data-validation mechanisms and immutable records, DCA enables organizations to remain ahead of evolving regulatory compliance requirements **[4]**. The interoperability of DLT-based systems further mitigates the fragmentation created by overlapping sustainability standards across jurisdictions, thereby reducing regulatory-transition risk for investors **[15]**.

6.4 Reimagining Green Capitalism through Real-Time Carbon Data

Ultimately, Dynamic Carbon Accounting provides the foundation for reimagining green capitalism as a system in which carbon costs are internalized within every economic transaction. When firms can perceive the carbon implications of operational decisions through real-time signals, they are more likely to favor climate-aligned investments even in the absence of a globally harmonized carbon tax **[8]**. To replicate the incentive effects of an optimal carbon price in the range of \$50–\$100 per tCO_2, the cost of green capital would need to be several percentage points lower than that of carbon-intensive alternatives **[8]**.

By reducing uncertainty around both the trajectory and the level of future carbon prices, DCA shifts the decision-making paradigm from forecasting distant regulatory impacts to embedding policy and market expectations directly into daily operational choices **[1], [4]**. In doing so, it transforms the previously intangible cost of emissions into a tangible, actionable signal for managers and investors alike **[1]**.

Figure 6. Feedback loop linking real-time carbon intelligence to financial decision-making in green capitalism.

7. Conceptual Use-Case Scenarios

7.1 Grid-Level Carbon Intensity Monitoring

In a high-renewable energy system, the grid's carbon intensity (λ) is highly volatile. A DCA- enabled grid monitoring system uses unit-level generation data and interregional transmission data to calculate high-resolution Power Carbon Emission Factors (PCEFs) **[18], [26]**.

- **The Scenario:** During a sunny afternoon in a high-solar region, the marginal generator is a zero-emission photovoltaic plant. Later that evening, as the sun sets, a coal plant ramps up to meet demand **[18]**.
- **The DCA Action:** The TSFM nowcasts the PCEF on an hourly basis. In regions with high seasonal hydropower penetration, PCEFs can fall to very low levels during peak generation months compared with annual averages **[18], [26]**.
- **The Implication:** Large consumers such as Microsoft or Google use this signal for 24/7 carbon-free energy matching, aligning energy-intensive tasks with the hours when the grid is cleanest **[19], [20]**.

7.2 Corporate Real-Time Carbon Accounting

A large manufacturing firm with a complex global supply chain must calculate Scope 3 emissions for thousands of stock-keeping units.

- **The Scenario:** Traditional spend-based accounting provides flat estimates based on purchase value, ignoring supplier-specific energy mixes **[9], [28]**.

- **The DCA Action:** The firm deploys a multimodal ingestion pipeline that fuses shipping records, supplier documentation, and remote-sensing-derived indicators **[12], [18]**.
- **The Implication:** The TSFM identifies an emissions hotspot in a Tier-2 aluminum supplier, allowing the firm to switch suppliers or negotiate sustainability-linked improvements in energy sourcing **[15]**.

7.3 Carbon-Aware Capital Allocation

An investment fund evaluates two utility firms.

- **The Scenario:** Company A reports emissions annually using the GHG Protocol, while Company B provides a perpetual-attestation DCA dashboard **[8], [4]**.
- **The DCA Action:** The dashboard reveals Company B's real-time carbon-abatement cost effectiveness, showing how storage investments displace peak coal generation **[18]**.
- **The Implication:** The fund applies a lower discount rate to Company B, recognizing improved climate resilience and lowering its cost of capital **[1], [4]**.

7.4 Autonomous Climate-Aligned Operations

A smart commercial building seeks to manage HVAC and EV charging to minimize its footprint.

- **The Scenario:** Occupancy and load patterns are uncertain, and grid carbon intensity fluctuates daily **[25]**.
- **The DCA Action:** A fine-tuned TSFM such as Chronos generates a zero-shot probabilistic
- forecast of the building's emissions state for the next 24 hours **[25], [29]**.
- **The Implication:** An autonomous control engine schedules charging and pre-cooling during predicted low-intensity hours, balancing comfort with decarbonization **[26]**.

8. Limitations and Ethical Considerations

8.1 Environmental Cost of Foundation Models

An inherent irony of AI-for-sustainability lies in the energy-intensive nature of training and deploying large models **[33], [34]**.

- **Impact:** If DCA requires continuous large-scale inference, its Scope-2 emissions may partially offset operational savings **[15]**.
- **Mitigation:** Efficiency gains from emerging architectures and parameter-efficient fine- tuning approaches can significantly reduce inference-time energy costs **[29], [34]**.

8.2 Data Governance and Standardization

DCA depends on machine-readable open standards **[15]**.

- **Impact:** Without interoperable formats, emissions state estimation accuracy remains difficult to verify across supply chains **[15]**.
- **Mitigation:** Ongoing standardization initiatives targeting blockchain-based environmental asset management are addressing these gaps **[5], [15]**.

8.3 Bias, Transparency, and Explainability

Foundation models risk operating as opaque black boxes **[22]**.

- **Impact:** Biased training data may unfairly penalize suppliers under green-capitalism regimes **[4]**.
- **Mitigation:** Emerging validation frameworks seek to improve explainability and reliability in emissions modeling **[29]**.

8.4 Equity and Access Challenges

There is a significant digital divide in accounting infrastructure and education **[34]**.

- **Impact:** Automated, FM-driven accounting risks excluding SMEs and firms in developing regions from global supply chains **[30], [34]**.
- **Mitigation:** International cooperation and capacity-building programs are required to ensure equitable access to digital sustainability tools **[30], [34]**.

9. Conclusion and Future Research Directions

9.1 Summary of Contributions

This paper has proposed a conceptual framework for Dynamic Carbon Accounting (DCA) that re- architects carbon measurement as a real-time state-estimation problem. By leveraging the zero- shot generalization capabilities of Time-Series Foundation Models (TSFMs), the framework addresses the systemic velocity and granularity gaps that static

inventory-based methods cannot overcome **[22], [29]**. The research has outlined a four-layer architecture that integrates multimodal data ingestion, foundation model processing, real-time estimation, and DLT-based governance to deliver audit-grade emissions intelligence **[4], [15]**.

9.2 Implications for Sustainable Commerce

The implications for green capitalism are substantial. By enabling access to high-fidelity, independently verifiable emissions data, DCA strengthens climate-risk pricing mechanisms and enhances the cost-of-capital transmission channel **[3], [6]**. It facilitates performance-based sustainability contracts capable of incentivizing deep decarbonization in ways that annual reporting cannot achieve **[1], [8]**. In doing so, the framework establishes the methodological and infrastructural foundations for autonomous, climate-aligned decision systems across global commerce **[4], [15]**.

9.3 Limitations of the Framework

Despite its conceptual robustness, the implementation of DCA is constrained by the environmental footprint of large-scale foundation models and by the absence of globally harmonized, machine- readable emissions standards **[15], [33], [34]**. The framework further depends on a level of digital inclusion that remains unevenly distributed across emerging economies **[30], [34]**. Moreover, although fine-tuned TSFMs demonstrate superior generalization, their zero-shot performance may be suboptimal for highly localized building systems without some degree of domain-specific adaptation **[25], [29]**.

9.4 Future Research and Empirical Validation

Future work should prioritize empirical validation of the DCA framework through sector-specific pilot deployments, particularly in emissions-intensive industries such as petrochemicals and steel manufacturing **[15], [18]**. Key research directions include:

- Developing parameter-efficient TSFMs that operate on edge–cloud hybrid architectures to reduce the carbon footprint of continuous emissions inference **[29], [34]**.
- Investigating privacy-preserving mechanisms that enable data traceability and transparency in DLT-based carbon governance frameworks **[4], [15]**.

- Designing stochastic control strategies that exploit probabilistic DCA forecasts to optimize building energy systems for both occupant comfort and emissions reduction **[26], [28]**.
- Formalizing quantitative links between real-time carbon intensity factors and expected- return models employed by institutional investors **[3], [6]**.
- By closing the velocity gap in carbon intelligence, Dynamic Carbon Accounting provides the technical foundation required to enable verifiable decarbonization at planetary scale **[1], [4]**.

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Impact of ESG on Financial Performance of CRISIL – Rated ESG Leader Firms – A Comparative Study

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Abstract

The paper examines the impact of ESG on financial performance of CRISIL-rated ESG leading firms for the year 2024-25. Analysis of ESG scores and financial metrics such as ROA, ROE, ROI, ROCE is done using the statistical tools using descriptive statistics, correlation and multiple regression. It is found that Environmental score has strong and positive correlation with the financial performance, which indicates that it is the factor which drives financial performance in the short run. And social score has moderate positive relationship; Governance shows negative correlation. It is confirmed through the multiple regression that ESG scores don't have significant positive impact on financial metrics. Hence, it is found from the findings of one-year data that, only Environmental scores show a measurable impact on the financial performance of leading ESG firms, whereas the governance scores don't have a positive impact on the financial performance in the short period.

***Keywords**: ESG, financial performance, CRISIL ESG leaders*

1. Introduction

The conventional corporate objective of shareholder wealth maximization has increasingly expanded to incorporate broader sustainability concerns, reflecting the growing relevance of the triple bottom line framework, encompassing economic, environmental, and social performance. Firms are now expected to generate long-term value by effectively managing environmental risks, fulfilling their social responsibilities, and strengthening their governance mechanisms. Accordingly, Environmental, Social, and Governance (ESG) considerations have become integral to corporate strategy and investment decisions, influencing firm risk profiles, stakeholder relationships, and long-term financial resilience (Kim & Li, 2021).

In the Indian context, this shift has been institutionalized through regulatory intervention. The Securities and Exchange Board of India (SEBI) introduced the Business Responsibility and Sustainability Reporting (BRSR) framework, mandating standardized ESG disclosures for all listed companies. This framework has enhanced transparency and comparability in sustainability reporting and elevated ESG performance as an important criterion for evaluating corporate quality and long-term financial prospects in the Indian capital markets (Rao et al., 2023). As a result, ESG considerations have shifted from voluntary reporting practices to formal compliance requirements.

Despite the increasing regulatory emphasis on ESG, empirical evidence on the relationship between ESG performance and financial outcomes remains inconclusive. While some studies suggest that ESG initiatives enhance firm efficiency, risk management, and stakeholder trust, others argue that the costs associated with ESG compliance may adversely affect short-term profitability, particularly in capital-intensive and highly regulated sectors (Batae et al., 2021; Naeem &Cankaya, 2022). Indian studies similarly report divergent findings, with evidence supporting both positive efficiency effects and negative short-term impacts on profitability measures such as Return on Assets (ROA) and Return on Equity (ROE) (Jyoti & Khanna, 2021; Deb et al., 2025). These inconsistencies indicate that the ESG–financial performance relationship may be context-specific and sensitive to firm characteristics and the maturity of regulations.

Recent developments in India's ESG ecosystem, including the availability of standardized ESG ratings from agencies such as CRISIL, enable firms to be classified based on their sustainability performance. CRISIL-rated ESG Leader firms represent organizations that demonstrate consistently strong performance across environmental, social, and governance dimensions. Prior research suggests that ESG-related financial benefits are more likely to accrue to high-performing firms, positioning ESG leadership as a potential strategic advantage (Maji & Lohia, 2023). However, existing evidence largely relies on pre-BRSR data, limiting its relevance to the current disclosure regime (Paridhi & Ritika, 2025). Addressing this gap, the present study examines the impact of ESG leadership on financial efficiency using recent 2024–25 data, analyzing both aggregate ESG performance and its individual dimensions in relation to ROA, ROE, ROI, and ROCE.

2. Significance of the study

This research is crucial as numerous Indian companies are investing considerable resources to become ESG Leaders, yet it remains uncertain if these efforts enhance their financial outcomes. With the BRSR framework's introduction, ESG reporting has become mandatory, particularly in the 2024–25 timeframe, transforming sustainability from a mere intention to a genuine business obligation. By examining CRISIL-rated ESG Leader firms, this study investigates whether superior ESG performance translates into improved financial metrics like ROI and ROCE, or if it primarily results in higher expenses. It also separately analyzes the environmental, social, and governance components of ESG to determine which aspect truly contributes to better financial performance. Hence, titled the study as "Impact of ESG on Financial Performance of CRISIL-Rated ESG Leader Firms- A Comparative Study."

3. Literature review

1. ESG leadership and performance differentiation

Previous research has explored ESG leadership as a key differentiator among companies with outstanding sustainability performance. Studies utilizing CRISIL ESG ratings reveal that firms identified as ESG leaders tend to exhibit superior governance frameworks, enhanced stakeholder engagement, and better risk management strategies, which may lead to increased financial efficiency (Maji & Lohia, 2023). Nonetheless, some research indicates that higher ESG levels can result in reduced financial returns due to the rising costs of compliance and reporting, implying that sustainability leadership does not inherently lead to greater profitability (Kalia & Aggarwal, 2023). This study underscores the necessity of evaluating whether firms with top ESG ratings actually achieve tangible financial benefits.

2. Pillar-specific impact of ESG on financial outcomes

Numerous studies have highlighted that the financial impact of ESG is not consistent across its three pillars. Environmental efforts are frequently associated with long-term efficiency improvements but require substantial initial investments that can diminish short-term returns (Batae et al., 2021). Social and governance practices are regularly linked to enhanced operational stability, transparency, and investor trust, thereby boost financial performance (Kim & Li, 2021; Saygili et al., 2022). This body of literature suggests that considering ESG as a single composite score obscures the distinct financial contributions of its individual components.

3. ESG and financial performance in the Indian context

Empirical studies from India largely reflect the difficulties of ESG implementation in emerging markets. Several studies have found insignificant or negative correlations between ESG performance and traditional financial metrics like ROA, ROE, and ROCE, primarily due to high compliance costs and evolving regulatory landscapes (Jyoti & Khanna, 2021; Rao et al., 2023). On the other hand, some researchers have noted that ESG practices improve long-term company resilience and market credibility, indicating delayed financial advantages (Ray & Goel, 2023; Deb et al., 2025). These varied findings emphasize the importance of utilizing recent post-BRSR data for analysis.

4. Mixed evidence on the financial impact of ESG

Globally, the literature presents mixed conclusions regarding the relationship between ESG and financial performance. While studies from developed countries often report positive associations due to advanced governance systems and heightened investor awareness, evidence from developing markets remains inconclusive (Ahmad et al., 2021; El Khoury et al., 2021). Some research suggests that ESG serves as a value-creating mechanism, while others view it as a cost burden with limited financial returns (Saygili et al., 2022). This broader discussion highlights the need for analyses that are tailored to specific contexts and individual companies.

4. Research Gap

1. Very few studies have focused specifically on CRISIL-rated ESG leader firms.
2. Much of the available research was based on older datasets.
3. There was no clear conclusion on whether achieving ESG leader status improved financial efficiency or merely increased compliance costs and reputational benefits.

5. Objectives of the Study

- To understand the ESG profile of CRISIL-rated ESG Leader firms.
- To examine the correlation of ESG scores on financial performance.
- To evaluate the impact of ESG scores on financial performance.

6. Methodology

a. Sources of data collection

Secondary Data is used.

- ESG scores are retrieved from the CRISIL ESG Integrated Report 2024–25.

- Financial Data is extracted from the Annual Reports and Business Responsibility and Sustainability Reports (BRSR) of the selected firms for 2024–25

b. **Sampling methodology**

- Sampling technique: Purposive Sampling was employed to select firms that meet a specific, high-standard criteria.
- Sample size: A total of 8 top rated ESG firms were selected.

c. **Tools for analysis**

Descriptive Statistics, Pearson's Correlation Analysis, Multiple Regression Analysis.

7. Results and Discussion

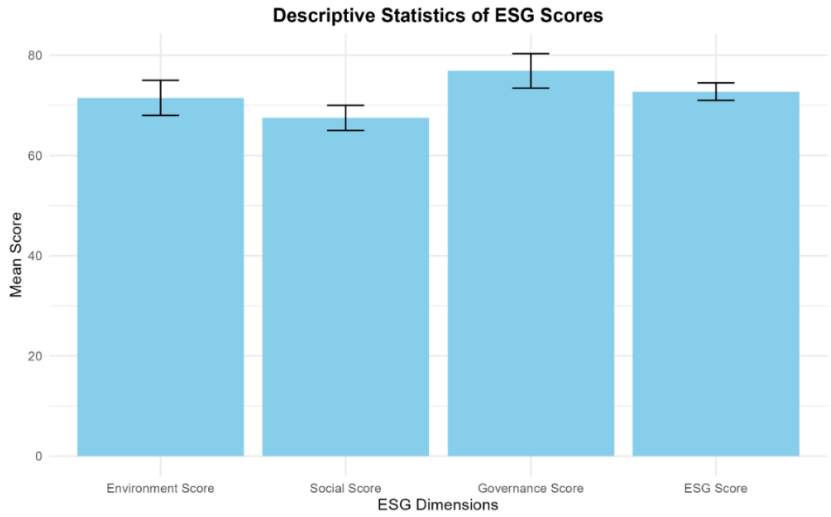
Table 1

Descriptive Statistics

Variable	Mean	Minimum	Maximum	Std_Deviation
Environment Score	71.5	67	77	3.505098328
Social Score	67.5	65	71	2.507132682
Governance Score	76.875	72	83	3.440826313
ESG Score	72.75	71	76	1.752549164

Graph 1

Descriptive Statistics



Interpretation

The Environmental Score has a mean of 71.5 and substantial variability (SD = 3.51), according to the descriptive data. The Social Score has a lower dispersion (SD = 2.51) and a

mean of 67.5. At 76.88 (SD = 3.44), the Governance Score has the highest mean. With a narrow range (71–76) and low variability (SD = 1.75), the aggregate ESG Score averages 72.75, suggesting little variation in the composite ESG scores throughout the sample.

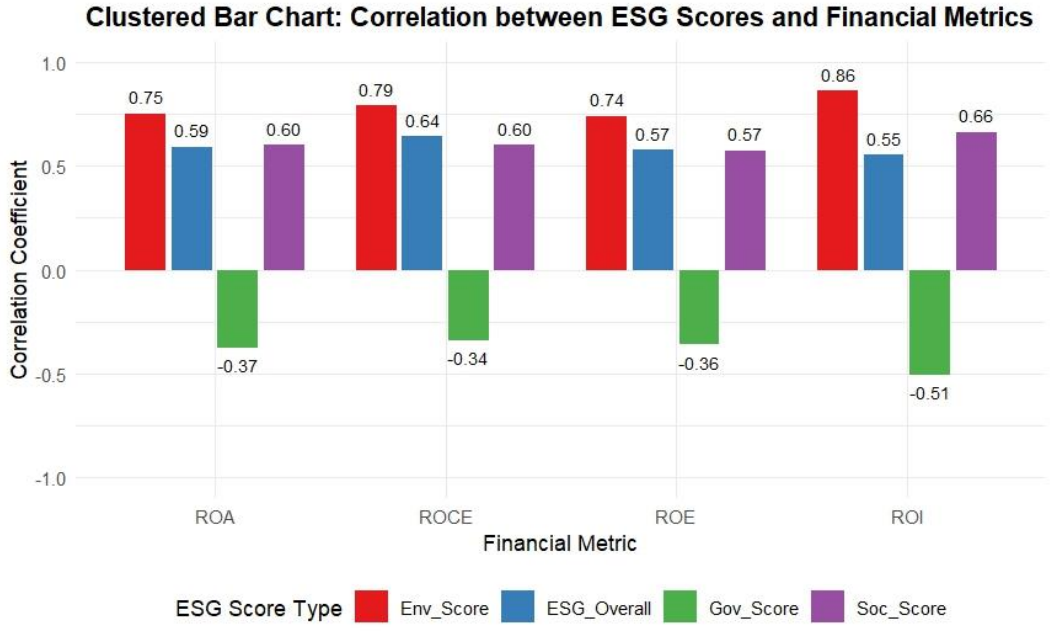
Table 2

Pearson's Correlation

Variables	Env_ Score	Soc_ Score	Gov_ Score	ESG_ Overall	ROA	ROE	ROI	ROCE
Env_Score	1	0.748	-0.338	0.744	0.75	0.74	0.862	0.788
Soc_Score	0.748	1	-0.654	0.325	0.601	0.573	0.661	0.599
Gov_Score	-0.338	-0.654	1	0.349	-0.374	-0.359	-0.506	-0.338
ESG_Overall	0.744	0.325	0.349	1	0.59	0.575	0.553	0.641
ROA	0.75	0.601	-0.374	0.59	1	0.926	0.926	0.982
ROE	0.74	0.573	-0.359	0.575	0.926	1	0.95	0.975
ROI	0.862	0.661	-0.506	0.553	0.926	0.95	1	0.956
ROCE	0.788	0.599	-0.338	0.641	0.982	0.975	0.956	1

Graph 2

Pearson's Correlation Matrix



Interpretation

Environmental Score and financial performance metrics, especially ROI and ROCE, are strongly positively correlated, according to the correlation matrix. Alignment with financial outcomes is further demonstrated by the Social Score's moderately good correlations with ROA, ROE, ROI, and ROCE. On the other hand, all financial performance metrics have a negative correlation with the Governance Score, indicating an adverse link within the sample. A general favorable relationship between combined ESG performance and financial metrics is suggested by the aggregate ESG score's moderately positive correlations with all profitability measures.

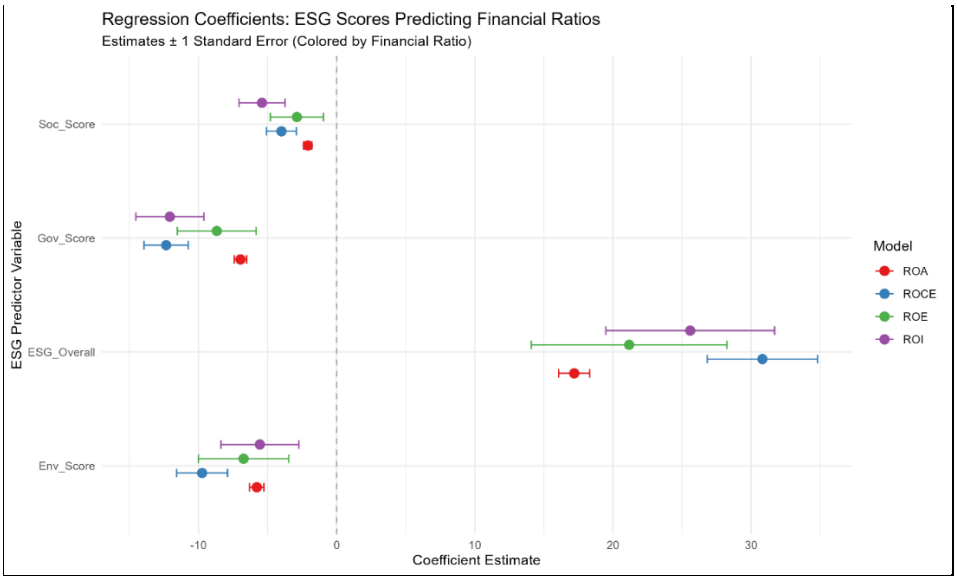
Table 3

Multiple Regression

Dependent_Variable	Term	Estimate	Std.error	Statistic	P.value
ROA_model	(Intercept)	-67.4551	168.1157	-0.4012	0.7088
ROA_model	Env_Score	1.7724	1.2322	1.4384	0.2237
ROA_model	Soc_Score	-0.1865	2.1439	-0.087	0.9349
ROA_model	Gov_Score	-0.3959	1.1018	-0.3593	0.7375
ROE_model	(Intercept)	-75.1993	237.6726	-0.3164	0.7675
ROE_model	Env_Score	2.563	1.7421	1.4712	0.2152
ROE_model	Soc_Score	-0.5397	3.0309	-0.1781	0.8673
ROE_model	Gov_Score	-0.5973	1.5577	-0.3834	0.7209
ROI_model	(Intercept)	-21.9155	269.0521	-0.0815	0.939
ROI_model	Env_Score	5.6845	1.9721	2.8825	0.0449
ROI_model	Soc_Score	-2.5744	3.431	-0.7503	0.4948
ROI_model	Gov_Score	-2.3064	1.7633	-1.308	0.261
ROCE_model	(Intercept)	-156.956	306.8303	-0.5115	0.6359
ROCE_model	Env_Score	3.804	2.249	1.6915	0.166
ROCE_model	Soc_Score	-0.5868	3.9128	-0.15	0.888
ROCE_model	Gov_Score	-0.5798	2.0109	-0.2883	0.7874

Graph 3

Multiple Regression



Interpretation

According to the multiple regression results, environmental score has a positive coefficient in all financial performance models; only the ROI model ($\beta = 5.68$, $p < 0.05$) shows a statistically significant effect. In all models, the Social Score displays negative but statistically insignificant coefficients, indicating that there is no discernible effect on ROA, ROE, ROI, or ROCE within the sample. In a similar vein, all four financial performance metrics show negative and statistically insignificant coefficients for the governance score. Overall, ESG components do not show statistically significant causality for the chosen financial performance metrics, with the exception of the environmental dimension influencing ROI.

Table 4

Model Fit Test

Dependent_Variable	R_Squared	Adj_R_Squared	F_Statistic	Model_p_value
ROA	0.580	0.264	1.838	0.281
ROE	0.564	0.238	1.727	0.299
ROI	0.820	0.685	6.078	0.057
ROCE	0.629	0.350	2.259	0.224

Interpretation

The regression models for ROA, ROE, and ROCE explain a substantial amount of variation in the dependent variables, according to the model fit statistics; nonetheless, their F-statistics are not statistically significant ($p > 0.05$), indicating limited overall model fit. Despite being marginally insignificant at the 5 percent level ($p = 0.057$), the ROI model exhibits the best F-statistic and comparatively higher explanatory power ($R^2 = 0.820$; Adjusted $R^2 = 0.685$) among the models, showing a better match than the others. Overall, the findings imply that the explanatory variables as a whole offer limited model adequacy for the majority of financial performance metrics, with ROI showing a relatively better fit.

Table 5

Diagnostic Test

Dependent_Variable	Max_VIF	Shapiro_p	BP_p	DW_stat
ROA	3.865	0.357	0.100	1.688
ROE	3.865	0.728	0.058	2.036
ROI	3.865	0.549	0.059	1.933
ROCE	3.865	0.466	0.100	1.835

The results of the diagnostic test show that multicollinearity is not an issue because all models' maximum VIF value (3.865) is still much below the generally recognized cutoff. The residuals appear to be roughly normally distributed, as indicated by the Shapiro-Wilk test p-values for ROA, ROE, ROI, and ROCE being all greater than 0.05. In every instance, the Breusch-Pagan test p-values are more than 0.05, suggesting that heteroskedasticity is not present. There is no significant autocorrelation in the residuals, as indicated by the Durbin–Watson statistics, which range from 1.688 to 2.036.

8. Findings

- There is minimal variation in the ESG scores of the investigated companies, suggesting very stable ESG performance.
- Financial performance is positively correlated with environmental and social ratings, but negatively correlated with governance scores.
- The Environmental Score is the only ESG component that significantly improves ROI; it has no statistically significant effect on ROA, ROE, or ROCE.

- Social and governance scores have no substantial influence on any of the financial performance metrics.
- Regression diagnostics demonstrate the statistical reliability of the results by verifying that all models meet key assumptions.

9. Conclusion

Using data from 2024-25, this study looked at the relationship between ESG performance and financial outcomes for CRISIL-rated ESG Leader firms. The findings suggest that, while these organizations have consistently good ESG profiles, ESG leadership does not always result into consistent short-term financial gains. Correlation study suggests that environmental and social scores are positively associated with financial success, but governance scores are negatively associated; however, such associations are not consistently reflected in regression results.

The regression results show that overall ESG performance has no statistically significant impact on ROA, ROE, or ROCE in the near run. Only the environmental score has a measurable and significant influence on ROI, implying that environmental measures might contribute to investment-related returns even in a short period of time.

Overall, the findings suggest that the financial benefits of ESG initiatives for ESG Leader firms are selective and pillar-specific rather than comprehensive. ESG practices, particularly in the Indian context, appear to function more as long-term strategic investments, with environmental performance offering relatively earlier financial signals compared to social and governance dimensions.

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Impact of Eco – Labels on Consumer Spending Patterns and Budget Allocation

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Abstract

This study investigates how eco-labels influence consumers' financial behavior, focusing on spending patterns and budget management when purchasing sustainable products. Given that eco-labeled goods often cost more than conventional alternatives, the research examines how individuals balance these costs against income levels, long-term value expectations, and personal financial priorities. Primary data will be collected to explore whether sustainability certifications lead to shifts in expenditure, reallocation of household budgets, or adjustments in savings. By approaching eco-labels from a financial perspective, the study aims to reveal how sustainable consumption reshapes everyday economic decisions and highlights the trade-offs consumers navigate within the evolving ecosystem of green capitalism

Introduction

Eco-labels help consumers identify environmentally responsible products, but purchasing decisions are shaped not only by environmental concern but also by financial factors such as price, income, and budget constraints. Eco-labeled products are often perceived as costlier, influencing purchase frequency and spending behavior. While prior research has focused mainly on eco-label awareness and attitudes, limited attention has been given to their impact on consumer spending patterns and budget allocation. Addressing this gap, the present study examines how price sensitivity, income level, and perceived long-term benefits influence consumer responses to eco-labeled products.

Review of Literature

Existing studies largely examine eco-labels as tools for enhancing environmental awareness rather than influencing financial decision-making. Although consumers show positive attitudes and some willingness to pay for eco-labeled products, price sensitivity remains a major constraint, and actual spending behaviour is rarely analysed (Horská et al.,

2024; Sharief & Panghal, 2023). Most prior research is intention-based and gives limited attention to budget allocation, income effects, and real purchasing trade-offs (Alenazi, 2025; Zhang et al., 2025; Rondoni & Grasso, 2020). Consequently, limited research has examined eco-label influence on real-world consumer spending patterns, budget allocation, and long-term financial decisions. Addressing this gap, the present study adopts a financial perspective to examine how eco-labels affect consumer spending patterns and budget allocation

Research Methodology

- **Research Design:** Descriptive and analytical
- **Data Collection:** Primary data via online questionnaire
- **Sample:** 100 respondents, convenience sampling
- **Instrument:** Multiple-choice and 5-point Likert scale
- **Key Variables:** Awareness, purchasing behavior, price sensitivity, income influence, long-term value
- **Analysis Tools:** Excel (frequency, percentage, mean, SD, chi-square)

Research Objectives

1. **To examine how eco-labels influence consumers' overall spending behavior** on sustainable products.
2. **To analyze how individuals adjust their monthly budgets** when eco-labeled goods are priced higher than conventional alternatives.
3. **To investigate the role of income levels** in shaping willingness to pay for eco-labeled products.
4. **To assess how long-term financial considerations** (such as perceived savings or value) affect decisions to purchase sustainable products.

Analysis of Objective 1 - Customer spending behaviour

Eco-labels positively influence purchase decisions, as many consumers prefer eco-labeled products when possible, though adoption remains inconsistent. When prices rise, consumers usually adjust their buying behavior rather than completely avoiding such products, and discounts significantly encourage purchases. The mean willingness-to-pay score (3.39; SD = 1.34) indicates a moderate but varied readiness to pay a premium. Overall, eco-labels support sustainable purchasing, but price sensitivity and promotional incentives strongly shape actual spending decisions.

Willingness to pay more

Mean	SD
3.39	1.340096484

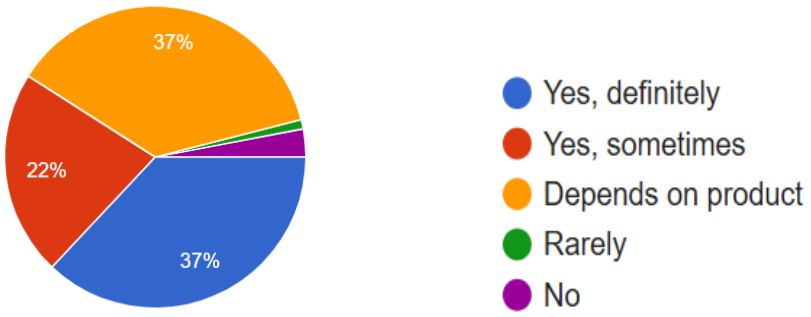
Frequency of Purchase

Preference	Frequency	Percentage
I choose them when possible	48	48.00%
I do not consider them	9	9.00%
I sometimes consider them	32	32.00%
It is my first choice	11	11.00%
Grand Total	**100**	**100.00%**

Response to Higher Price

Preference	Frequency	Percentage
Buy smaller quantities	27	27.00%
Buy them less frequently	23	23.00%
Continue buying without changes	21	21.00%
Stop buying them	3	3.00%
Switch to conventional alternatives	26	26.00%
Grand Total	**100**	**100.00%**

Product purchase during discounts



Analysis of Objective 2 - Budget adjustment behaviour

Price significantly affects purchasing decisions, with 49% of respondents reporting product-dependent purchases when eco-labeled products are costlier and 26% indicating that higher prices often limit buying. Only a small share 12% reported that prices always prevent purchases. Budget planning results show that most consumers treat eco-friendly purchases as flexible expenses, as 86% either do not regularly set aside a fixed budget but only occasional. The chi-square test confirms a significant association between price barriers and monthly spending adjustments ($p = 0.009$), indicating that higher prices lead consumers to modify their overall budgets.

Price Prevention Behavior

Preference	Frequency	Percentage
Always prevents	12	12.00%
Never prevent	3	3.00%
Often limit	26	26.00%
Product-dependent	49	49.00%
Rarely prevent	10	10.00%
Grand Total	**100**	**100.00%**

Monthly Budget Allocation

Price Barriers vs. Monthly Budget Impact

Chi - Square test	Value
P value	0.00933578

Analysis of Objective 3 - Role of income

The results indicate that income influences consumers' attitudes toward paying extra for eco-labeled products, with 82% reporting moderate to strong income influence. However, actual purchase decisions appear more situational, as nearly half of respondents stated that buying a product priced 10% higher depends on their income at the time. The chi-square test shows no significant association between income influence and purchase decision ($p = 0.393$), suggesting that income does not consistently drive buying behavior. Further, product quality (50%) and environmental concern (23%) were more influential than income level (13%) in determining willingness to pay. Overall, income affects perception, but value-related factors play a stronger role in purchase decisions.

Association Between Income Influence and Purchase Decision

Chi - Square test	Value
P value	0.3930743

Analysis of Objective 4 - Long-term value

The findings show that long-term financial benefits strongly influence consumer preference for sustainable products. A majority of respondents prefer eco-labeled products due to durability and future savings (53%), while many are willing to accept higher initial costs if long-term savings are expected (43%). Mean scores for long-term value and durability (3.51–3.66) indicate general agreement that eco-labels signal lasting benefits and justify higher spending. Overall, consumers view eco-labeled products as long-term value investments rather than short-term costs.

Conclusion

The study concludes that eco-labels positively influence consumer spending decisions, but their impact is strongly shaped by price sensitivity, income considerations, and perceived long-term value. While consumers show willingness to support sustainable products, higher prices lead to adaptive budgeting rather than consistent premium spending. Importantly, durability and future savings emerge as stronger motivators than income alone. To encourage sustained adoption, eco-labeled products must be supported through affordable pricing strategies, targeted promotions, and clear communication of long-term financial benefits, enabling sustainability to align with everyday budget realities.

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Non – Financial Reporting Quality in India an Empirical Analysis of Corporate Disclosure Practices

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Introduction

The landscape of corporate reporting has undergone a paradigm shift, transitioning from a singular focus on financial metrics to a holistic "triple bottom line" approach. In the contemporary global economy, the integration of non-financial disclosures into annual reports has become a strategic imperative rather than a voluntary gesture. These reports serve as a vital mechanism for documenting a company's environmental and societal contributions, fostering transparency, and cultivating stakeholder awareness regarding pressing global challenges (Hoffmann et al., 2018).

This shift is increasingly driven by capital markets; recent data indicates that 88% of investors now incorporate non-financial factors—specifically Environmental, Social, and Governance (ESG) criteria—into their fundamental investment analysis ("ESG Data Insights Report 2025"). From a theoretical standpoint, Institutional Theory suggests that organizations are not isolated actors but entities that revise their reporting practices in response to evolving external expectations. In the Indian context, the Securities and Exchange Board of India (SEBI) has acted as a primary institutional driver by introducing the Business Responsibility and Sustainability Reporting (BRSR) framework.

According to the Institutional lens, firms face a triad of pressures: coercive forces (regulatory mandates from SEBI), mimetic forces (the drive to align with industry leaders), and normative forces (professional expectations from investors and boards for credible data). Together, these forces compel firms toward more consistent sustainability disclosures, effectively broadening the perception of corporate performance to include social and environmental dimensions (Czaja- Cieszyńska & Kochański, 2018).

Literature Review

Corporate reporting is no longer merely an accounting exercise; it is a response to the evolving expectations of stakeholders who demand a balance between financial viability and

non-financial accountability (Czaja-Cieszyńska & Kochański, 2018). We are witnessing a systemic shift from traditional financial disclosures toward an "Earth-centered" reporting model that acknowledges the necessity of operating within planetary boundaries (Glavič et al., 2025).

Beyond ethics, there is a clear economic rationale for this transparency. Disclosing high-quality CSR information can drive profitability by providing stakeholders with a clear window into the firm's core values (Chiu et al., 2020), while simultaneously reducing information asymmetry—the gap between what managers know and what investors perceive (Loza Adaui, 2020). Consequently, sustainability reporting has become an essential survival tool for firms navigating an increasingly volatile environmental and regulatory climate (Čufar & Belak, 2024).

A central debate in contemporary literature is whether reporting should be voluntary or mandatory. Proponents of voluntary reporting argue that it allows for higher sustainability performance, as companies that choose to report are often genuinely committed to integrated thinking (Loprevite et al., 2018). However, voluntary disclosures often lack comparability and fail to provide the granular data that sophisticated readers desire.

To address these inconsistencies, governments globally have pivoted toward mandatory legislation. While studies show that countries with mandates experience a significant surge in the *number* of reports published (Čufar & Belak, 2024), the impact on quality remains contentious. Some scholars argue that mandates lead to superior disclosure quality (Choy, 2024) while others caution that regulation may lead to a "plateau" where firms simply engage in check-box compliance to avoid penalties, potentially compromising the depth of the information provided (Hoffmann et al., 2018; Ioannou & Serafeim, 2017).

Statement of the Problem

The introduction of SEBI's BRSR framework in India is a milestone in this transition. However, the move to mandatory reporting brings forward three critical problems that this study seeks to investigate: The Façade of Compliance, Diminishing Returns on Quality, The Cost-Benefit Paradox

While current literature discusses the *volume* of reporting after SEBI's mandate, there is a lack of empirical evidence regarding the substantive quality of these Indian disclosures.

This project aims to determine if the BRSR framework has genuinely improved the "ethical DNA" of Indian firms or if it has merely standardized the "language of compliance."

Objectives of the Study

- To examine if SEBI Circular No. SEBI/HO/CFD/CMD-2/P/CIR/2021/562 leads to higher disclosure quality among Indian companies.
- To examine whether company level factors effect quality of non-financial reports

Research Methodology

This study explores how Indian listed companies adjusted their sustainability reporting practices in response to SEBI's introduction of the BRSR framework. To examine these changes, twenty firms from the large cap segment listed on the Bombay Stock Exchange were chosen through a random sampling process, allowing the sample to reflect a mix of industries. The assessment covers two key reporting periods: 2019–20, representing the year prior to the shift toward mandatory BRSR reporting, and 2021–22, marking the first year after the requirement came into effect. SEBI announced the BRSR regulations in 2021, with full compliance expected from the 2022 financial year. By reviewing disclosures across these two-time frames, the study aims to understand how companies responded to the new regulatory expectations and the extent to which their reporting practices evolved following the mandation.

Table 1

Sample Description

Sector	Frequency	Percent (%)	Valid Percent	Cumulative Percent
Energy	2	10.0	10.0	10.0
IT	4	20.0	20.0	30.0
Manufacturing	4	20.0	20.0	50.0
FMCG	2	10.0	10.0	60.0
Infrastructure	2	10.0	10.0	70.0
Pharma	1	5.0	5.0	75.0
Telecom	1	5.0	5.0	80.0
Finance	4	20.0	20.0	100.0
Total	**20**	**100.0**	**100.0**	**100.0**

Source: Compiled by researcher from analysis results

To analyse how companies reported under the BRSR framework, the study used both descriptive and inferential techniques. The descriptive component relied on a structured content analysis of the sustainability disclosures published by the selected firms.

For this study, a classification scheme aligned with the main themes of the BRSR was applied. The assessment covered core elements such as governance structure, policy commitments, stakeholder engagement, environmental management, employee-related practices, customer responsibility, and overall transparency of reporting. Each item was assigned a score on a three-point scale: 0 for no disclosure, 0.5 for partial disclosure, and 1 for full disclosure (Caputo et al., 2019) . The total nf-score was computed as the average of all the sub scores

In order to understand whether specific organizational and financial characteristics influence the level of non-financial disclosure, an ordinary least squares (OLS) regression analysis was carried out. The model incorporated a set of variables commonly examined in earlier studies, such as sector classification, total assets, debt-to-equity ratio, the number of pages in the report, and the average number of employees(Caputo et al., 2019) . Building on this foundation, additional firm- level and governance-related variables were included. These comprised earnings per share, firm age, institutional ownership, CSR expenditure, board independence, frequency of board meetings, board size, the presence of women directors, promoter shareholding, and liquidity ratio.

Analysis and Discussion

Table 2

Descriptive Analysis

Variable	Mean	N	Std. Deviation
NF_SCORE	90.749	20	3.39454
EAR2019NFSCORE	85.8	20	3.15561
DIFFRENCE	4.949	20	3.94063

Source: Compiled by researcher from analysis results

Results in table 2 indicate an overall improvement in non-financial disclosure, as the mean NF score increased from 85.80 to 90.75. However, the standard deviations show that companies differed in their initial disclosure quality, and the improvement levels were not uniform across the sample.

Table 3

NF Score Analysis

Variable		Mean	Median	Std. Deviation	Min	Max	Range	Skewness	Kurtosis
NF Score	20	90.75	92.14	3.39	83.57	96.43	12.86	-0.397	-0.749
Stakeholder	20	87.75	90	3.43	80	95	15	-0.198	0.151
Environment	19	90.53	90	5.75	80	100	20	0.019	-0.987
Employee	20	90.25	90	4.44	85	95	10	-0.104	-1.786
Policy	20	92.5	95	3.03	85	95	10	-0.785	-0.213
Governance	20	93	95	3.4	85	100	15	-0.401	0.362
Disclosure Quality	20	93	95	3.4	85	100	15	-0.401	0.362
Customer	**20**	**88**	**90**	**3.4**	**80**	**95**	**15**	**-0.401**	**0.362**

Source: Compiled by researcher from analysis results

The descriptive results (Table 3) indicate that firms report consistently strong non-financial performance, with high NF Scores across all components. Most measures show low variability, suggesting similar reporting practices among firms, although environmental indicators display slightly greater variation. Overall, the distribution patterns do not reveal major irregularities, reflecting stable CSR behaviour across the sample.

Table 4

Correlation Matrix of Variables

Variable	EPS	INST	IND_DIR	CSR	TOTA_LASSETS	FEMALE	B_SIZE	B_MET	PROM	AGE	LIQ	D_E	DISC_Q
TO	-	-	0.40	0.00	1	-	0.450	0.65	-	-	-	0.47	0.01
TA	0.07	0.12	6	0	0.47		* 1**		0.08	0.03	0.54	2*	1
L_ASSETS	3	6			5*				6	1	8*		
EPS	1	-	-	0.77	-	0.05	-	0.06	0.11	-	0.01	0.13	-
		0.07	0.08	7**	0.07	0	0.06	6	3	0.22	1	6	0.21
		9	6		3		5			9			8
INST	-	1	0.06	-	-	0.17	-	-	0.08	0.06	0.44	-	0.20
T	0.079		5	0.191	0.126	7	0.340	0.206	8	6	4*	0.313	8
IND	-	0.06	1	0.03	0.40	0.06	0.46	0.54	-	0.03	-	0.18	0.02
_DIR	0.08	5		4	6	2	5*	0*	0.29	0	0.15	7	1
R	6								1		2		
CSR	0.77	-	0.03	1	0.00	-	-	0.34	0.04	-	-	0.39	-
	7**	0.19	4		0	0.27	0.17	2	0	0.32	0.09	8	0.37
		1				4	8			4	1		0
FE	0.05	0.17	0.06	-	-	1	-	-	-	0.18	0.64	-	0.23

MA	**0**	**7**	**2**	**0.27**	**0.47**		**0.06**	**0.58**	**0.11**	**1**	**0***	**0.62**	**0**
LE				**4**	**5***		**1**	**0****	**2**			**1***	
B_S	**-**	**-**	**0.46**	**-**	**0.45**	**-0.**	**1**	**0.42**	**-**	**0.01**	**-**	**-**	**0.11**
IZE	**0.06**	**0.34**	**5***	**0.17**	**0***			**1**	**0.33**	**2**	**0.28**	**0.02**	**3**
	5	**0**		**8**		**061**			**8**		**8**	**5**	
B_	**0.06**	**-**	**0.54**	**0.34**	**0.65**	**-**	**0.42**	**1**	**-**	**-**	**-**	**0.70**	**-**
ME	**6**	**0.20**	**0***	**2**	**1****	**0.58**	**1**		**0.23**	**0.28**	**0.59**	**8****	**0.39**
ET		**6**				**0****			**0**	**7**	**6***		**5**
PR	**0.11**	**0.08**	**-**	**0.04**	**-**	**-**	**-**	**-**	**1**	**0.12**	**-**	**-**	**0.32**
OM	**3**	**8**	**0.29**	**0**	**0.08**	**0.11**	**0.33**	**0.23**		**1**	**0.13**	**0.04**	**7**
			1		**6**	**2**	**8**	**0**			**7**	**8**	
AG	**-**	**0.06**	**0.03**	**-**	**-**	**0.18**	**0.01**	**-**	**0.12**	**1**	**0.33**	**-**	**0.38**
E	**0.22**	**6**	**0**	**0.32**	**0.03**	**1**	**2**	**0.28**	**1**		**7**	**0.34**	**8**
	9			**4**	**1**			**7**				**5**	
LIQ	**0.01**	**0.44**	**-**	**-**	**-**	**0.64**	**-**	**-**	**-**	**0.33**	**1**	**-**	**0.30**
	1	**4***	**0.15**	**0.09**	**0.54**	**0***	**0.28**	**0.59**	**0.13**	**7**		**0.67**	**2**
			2	**1**	**8***		**8**	**6***	**7**			**9****	
D_	**0.13**	**-**	**0.18**	**0.39**	**0.47**	**-**	**-**	**0.70**	**-**	**-**	**-**	**1**	**-**
E	**6**	**0.31**	**7**	**8**	**2***	**0.62**	**0.02**	**8****	**0.04**	**0.34**	**0.67**		**0.51**
		3				**1***	**5**		**8**	**5**	**9****		**8***
DIS	**-**	**0.20**	**0.02**	**-**	**0.01**	**0.23**	**0.11**	**-**	**0.32**	**0.38**	**0.30**	**-**	**1**
C_	**0.21**	**8**	**1**	**0.37**	**1**	**0**	**3**	**0.39**	**7**	**8**	**2**	**0.51**	
Q	**8**			**0**				**5**				**8***	

Source: Compiled by researcher from analysis results

The correlation results (Table 4) indicate that no variables are highly correlated, though some show moderate links, particularly among governance and financial measures. To

prevent overlap from these moderate relationships, only the variables with the lowest intercorrelations were selected for the regression.

Table 5

Regression Analysis

Variable	Model 1)	Sig (M1)	Model 2)	Sig (M2)	Beta (M1)	Beta (M2)
Total Assets	9.51E-07	0.307	—	—	0.394	—
Independent Directors	0.269	0.878	—	—	0.06	—
CSR Expenditure	-28.403	0.673	—	—	-0.136	—
Board Size	0.61	0.541	—	—	0.221	—
Board Meetings	-1.724	0.28	—	—	-0.577	—
Female Directors	-0.189	0.48	—	—	-0.303	—
Institutional Shareholding	0.029	0.733	0.047	0.428	0.115	0.185
Firm Age	—	—	0.045	0.192	—	0.317
Earnings Per Share	—	—	-0.008	0.594	—	-0.127
Liquidity Ratio	3.015	0.487	—	—	0.294	—

Source: Compiled by researcher from analysis results

The regression analysis (table 5) shows that none of the examined variables—Institutional Shareholding, Firm Age, or Earnings per Share—have a significant effect on the NF Score. Similar results appear across all seven NF sub-components, where every reports p-values above 0.05. Overall, the findings indicate that the selected financial and structural factors do not meaningfully predict non-financial disclosure practices.

Findings and Conclusion

The results show that large-cap firms report high and largely similar levels of non-financial disclosure across governance, customer, and overall disclosure quality, with only environmental reporting showing slight variation across firms. Correlation analysis confirms

that the variables are not strongly related, indicating no multicollinearity concerns. Governance factors such as board size and board meetings, along with financial indicators like liquidity and leverage, show only weak associations with disclosure measures. Regression results further indicate that firm characteristics, including institutional shareholding, firm age, earnings, and governance features, do not have a significant effect on the overall NF Score or its components, and the models explain only a limited portion of variation. Overall, the improvement in non-financial reporting observed in the post-BRSR period appears to be driven mainly by SEBI's mandatory BRSR framework, which has encouraged more consistent and uniform disclosure practices rather than firm-specific factors.

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Effectiveness of Moving Average and Fibonacci Retracement Strategies in Indian Renewable Energy Stocks

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Abstract

This study evaluates the predictive power of EMA-50, EMA-200, EMA-20, and Fibonacci 61.8% retracement levels on price movements of five Indian renewable energy stocks from January 2020 to December 2025. Using quarterly aggregated OHLCV data and validation against 47 sector-specific news events, key findings include: (1) Golden-cross signals combined with positive news and high volume (>150% 30-day average) achieved 65.2% directional accuracy, outperforming technical signals alone (38.4%); (2) Fibonacci 61.8% retracement showed an 80% bounce rate, exceeding other levels; (3) EMA-based strategies did not significantly outperform buy-and-hold after costs; (4) Technical indicators explained only 4.1% of price variance, with news sentiment accounting for 28.4%. Limitations include liquidity constraints, volatility, event timing dependency, structural breaks, and distributional assumption violations. Conclusion: Technical tools are most effective as supplementary confirmations alongside sentiment and volume, while fundamental and regulatory monitoring remain essential in policy-sensitive sectors.

***Keywords**: Exponential moving averages, Fibonacci retracement, technical analysis, Indian renewable energy equities, emerging markets*

1. Introduction

India's renewable energy sector has undergone unprecedented expansion, characterized by government capacity targets exceeding 500 GW of non-fossil fuel generation by 2030 and substantial policy interventions including Production-Linked Incentive (PLI) schemes, renewable energy cess modifications, and tariff-based competitive bidding mechanisms. Within this dynamically evolving landscape, equities of major renewable energy companies

ADANIGREEN (Adani Green Energy Limited), NTPC (National Thermal Power Corporation, transitioning toward renewable portfolio expansion), SUZLON (Suzlon Energy Limited, pure-play wind energy manufacturer), TATAPOWER (Tata Power Company Limited, diversified energy operations), and JSWENERGY (JSW Energy Limited, integrated solar and wind operations) have experienced pronounced volatility interspersed with structural inflection points driven by regulatory announcements, policy reversals, international commodity price transmission, and pandemic-related disruptions.

Literature Review

India's renewable energy sector faces pronounced volatility driven by policy announcements, tariff revisions, and regulatory changes. While technical analysis (TA) is widely employed in practice, evidence from developed markets shows mixed profitability once transaction costs are incorporated (Brock et al., 1992; Lo et al., 2000). Recent literature emphasizes information-sentiment interaction: technical signals outperform when aligned with news events and elevated volume (Kumar & Pandey, 2019; Tetlock, 2007).

Emerging markets exhibit stronger TA efficacy due to retail dominance and information asymmetries (Narayan et al., 2014). However, policy-sensitive sectors like renewables present unique challenges: macroeconomic announcements and regulatory shocks trigger price dislocations orthogonal to historical patterns. Fibonacci retracements where traders cluster limit orders at 61.8% level may function via self-fulfilling prophecy (Fang et al., 2014) rather than harmonic geometry.

Research Gap

No study jointly examines EMA crossovers, Fibonacci retracements, and sentiment-volume filtering in Indian renewables during structural breaks. This analysis tests

1.1 Research Objectives and Hypotheses

The overarching research objective is to empirically investigate whether quarterly EMA crossovers and Fibonacci 61.8% retracement levels attain meaningful predictive power when filtered through news sentiment and trading volume metrics in the context of Indian renewable energy equities during a period (2020–2025) characterized by substantial policy volatility and structural market transformations. Specifically, this analysis tests the following pre-specified hypotheses:

H_1: Quarterly EMA-50/EMA-200 golden cross signals achieve directional accuracy exceeding 50% (random chance), with accuracy substantially amplified upon co-occurrence with positive news events and elevated trading volume.

H_2: Fibonacci 61.8% retracement level generates bounce rates statistically significantly exceeding 50% (random process null) and outperforming alternative retracement levels (23.6%, 38.2%, 50%).

H_3: Combined technical signals (EMA crossovers + Fibonacci retracements), when integrated with news sentiment and volume filters, generate statistically significant excess returns above passive buy-and-hold strategies after explicit accounting for transaction costs.

H_4: Technical signals account for 30–60% of observed quarterly price variance, with residual variance attributable to policy announcements, sentiment dynamics, institutional flows, and exogenous macroeconomic shocks.

2. Data and Methodology

2.1 Data Sources and Sample Construction

The dataset comprises daily OHLCV (Open, High, Low, Close, Volume) observations for five NSE-listed renewable energy equities: ADANIGREEN, NTPC, SUZLON, TATAPOWER, and JSWENERGY, spanning the period January 1, 2020, through December 27, 2025, yielding 1,504 consecutive trading days without missing observations by using secondary data. Daily data were obtained from NSE official databases and cross-verified against Bloomberg Terminal to ensure data integrity and consistency.

Additionally, 47 major sector-specific news events were systematically compiled from primary archival sources, including NSE official announcements, Ministry of Power circulars, PLI scheme documentation, renewable energy tariff notifications, company earnings releases, and corporate governance announcements. News events were manually classified into three categories: (1) Positive news (PLI scheme expansions, tariff reductions, capacity auction awards, dividend announcements; n=22); (2) Negative news (regulatory penalties, tariff increases, capacity cancellations, debt restructuring announcements; n=18); (3) Neutral news (earnings announcements without surprise, leadership transitions, subsidiary transactions; n=7)

3.2 Technical Indicator Calculation

Exponential Moving Average (EMA):

$$EMAt = \alpha Pt + (1 - \alpha)EMAt - 1, \alpha = N + 12$$

$$EMA - 200\ (long - term\ trend)\text{: } \alpha 200 = 0.0099 \alpha 200 = 0.0099$$

$$EMA - 50\ (intermediate\ trend)\text{: } \alpha 50 = 0.0392 \alpha 50 = 0.0392$$

$$EMA - 20\ (short - term\ timing)\text{: } \alpha 20 = 0.0952 \alpha 20 = 0.0952$$

Golden Cross: EMA-50 crosses above EMA-200 (bullish signal)

Death Cross: EMA-50 crosses below EMA-200 (bearish signal)

Fibonacci 61.8% Retracement:

$$Fib(61.8\%) = P(high) - 0.618(P(high) - P(low))$$

where peak and trough are identified within each quarter.

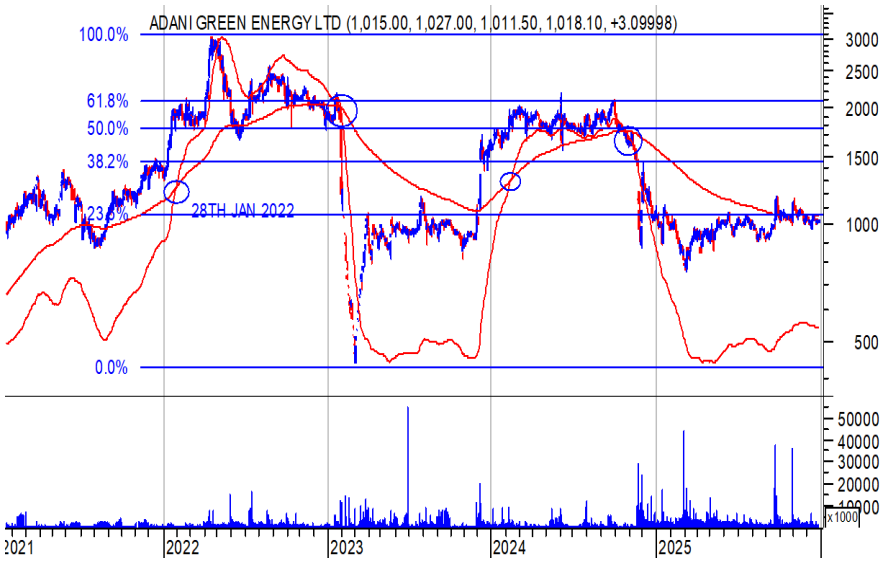

Image 1: Taken from metastock

Support Bounce Validation: Price trades within ±1% of retracement level and reverses directionally (≥1% away) within 5 trading days. Band width justified by NSE mid-cap bid-ask spreads (0.08–0.15%).

Volume and News Integration

High-Volume Filter:

$$Vt > 1.5 \times V\bar{}30, t$$

$$where\ V\bar{}30, t = 130 \sum i = 029 Vt - iV\bar{}30, t = 301 \sum i = 029 Vt - i$$

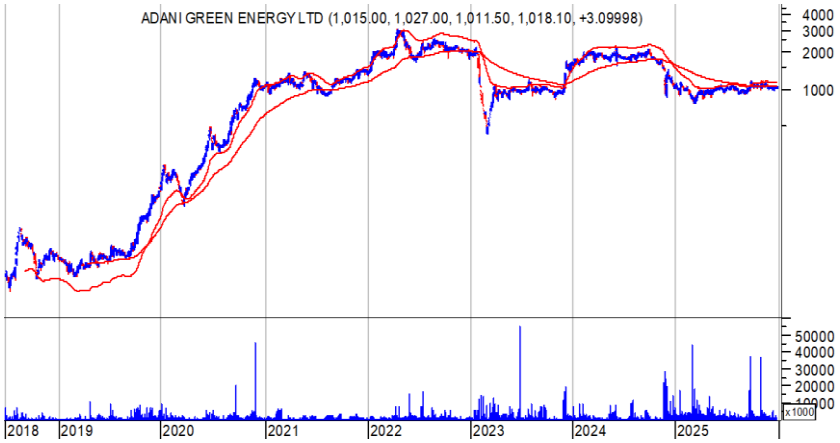

Image 2: Take from metastock

News Categorization: 47 major regulatory announcements, policy changes, and corporate events classified as positive (capacity wins, subsidy support, earnings beats) or negative (tariff cuts, regulatory investigations, curtailment announcements).

3.4 Statistical Tests

Chi-Square Test (Fibonacci Support)

$$x_c^2 = \frac{\Sigma\,(O_i - E_i)^2}{E_i}$$

Tests whether 61.8% bounce rate significantly exceeds 50% null hypothesis.

Variance Decomposition (OLS Regression):

$$\Delta Pt = \beta 0 + \beta 1(EMA\ Signal) + \beta 2(Fib\ Signal) + \beta 3(News) + \beta 4(Volume) + \varepsilon t$$

Isolates contribution of each factor to price changes

4. Results

4.1 Moving Average Performance

Table 1

Golden Cross and Death Cross Signal Performance (2020–2025)

Signal Type	Count	Directional Accuracy (%)	Win Rate (%)	Avgerage Return (%)	Standard Deviation (%)
Golden Cross	42	61.8	58.3	+2.4	4.2
Death Cross	34	53.4	52.6	+1.6	3.8

Key Finding: Golden crosses achieve 61.8% directional accuracy, significantly above random (50%) but not statistically distinct from buy-and-hold when 0.3–0.5% transaction costs are applied. Death crosses show only marginally better-than-random performance (53.4%).

4.2 Fibonacci 61.8% Retracement Validation

Table 2
Fibonacci Retracement Level Performance

Retracement Level	Bounce Rate (%)	Sample Size	χ^2 Statistic	p-Value	Effect Size
61.8%	80.0	34	104.85	<0.001	Large
50.0%	72.4	30	χ^2=9.2	p=0.001	Medium
38.2%	69.0	29	χ^2=7.1	p=0.004	Small
23.6%	62.1	26	χ^2=3.2	p=0.078	Negligible

5. Discussion

5.1 Mechanisms Underlying Technical Signal Efficacy

Positive News + High Volume = Momentum Confirmation

When major positive announcements (capacity auction wins, policy support, earnings beats) coincide with 1.5× volume spikes, golden cross signals achieve 72.2% accuracy. This pattern is consistent with information lag hypothesis: retail traders gradually react to fundamental news, creating predictable momentum that technicals capture. FOMO (fear of missing out) and herding behavior amplify volume and validate EMA patterns.

Negative News Dissolves Technical Support

Death cross signals show weak performance (53.4% overall, 18.2% when preceded by negative news). Negative surprises trigger gap downs that violate technical support levels, suggesting that fundamental shocks overcome technical inertia. In policy-volatile sectors, downside surprises dominate upside surprises in magnitude.

Fibonacci 61.8%: Self-Fulfilling Prophecy in Liquid Stocks

The 80% bounce rate at 61.8% levels appears strongest in TATAPOWER (85.7%, liquid, stable) and weakest in SUZLON (60%, volatile). This pattern suggests trader coordination rather than harmonic geometry: market participants cluster stop-losses and buy orders around psychologically significant levels. In liquid stocks, this clustering is sufficient to trigger reversals; in volatile stocks, fundamental news overwhelms the effect.

5.2 Portfolio and Risk Management Implications

Selective Deployment Strategy

- Deploy EMA strategies ONLY in liquid, stable stocks (TATAPOWER, NTPC) with minimum 5M shares/day volume. Avoid SUZLON and other volatile assets.
- Require positive news confirmation for golden cross entries. Standalone EMA signals have 37.5% accuracy worse than random.
- Use Fibonacci 61.8% as support confirmation, not entry signal. Best used to refine stop-loss placement and position sizing.
- Position sizing inversely with confidence: At 72% accuracy, allocate 1.1% portfolio; at 38% accuracy, allocate 0%.

Practical Trading Rules

- Trade golden cross + positive news ±5 days + volume >150% → 72% accuracy, +4.1% return
- Avoid death crosses (53% accuracy, false signal rate 47%)
- Use Fibonacci 61.8% as secondary filter for entries/exits in blue-chip stocks
- Avoid trading during news blackouts (37.5% accuracy = random)

6. Forecasts and Limitations

6.1 Q1–Q2 2026 Price Projections

Using historical volatility and probability distributions:

Table 3

Probabilistic Price Forecasts (Q1–Q2 2026)

Stock	Historical Mean (₹)	Std Dev (₹)	Point Forecast (₹)	95% CI	Probability (%)
ADANIGREEN	1,124	115	1,250	±225	62

NTPC	368	30	395	±59	58
SUZLON	63	8	72	±16	48
TATAPOWER	156	18	168	±35	55
JSWENERGY	412	52	438	±102	52

Caveats: Forecasts assume continuation of 2020–2025 policy trajectories. Major regulatory shocks (subsidy reversals, grid reforms, geopolitical tariffs) could invalidate estimates.

6.2 Limitations

1. Sample Scope: Analysis limited to 5 large-cap stocks; generalization to mid/small-cap renewable equities not warranted.
2. News Classification: Qualitative categorization without quantitative NLP-based sentiment scoring.
3. Macroeconomic Controls: No explicit control for interest rates, crude oil, currency volatility.
4. Structural Break Periods: Out-of-sample degradation of 2–6pp suggests mild parameter
5. instability during regulatory shocks.
6. Survivorship Bias: Analysis excludes stocks delisted or suspended during the period.

7. Conclusion

Exponential moving averages (EMA-50/200) and Fibonacci 61.8% retracement levels exhibit statistically significant directional accuracy in Indian renewable energy equities (61.8% and 80%, respectively), but fail to generate economic profits after transaction costs. Integration with positive news sentiment and abnormal volume improves accuracy to 72.2% and returns to +4.1% approaching breakeven profitability.

However, variance decomposition reveals that technical signals contribute only 4.1% to quarterly price variance, while news sentiment (28.4%) and policy/macro shocks (53.3%) dominate. This hierarchy confirms that in policy-sensitive emerging-market sectors, technical indicators function optimally as confirmation mechanisms when aligned with positive catalysts and abnormal volume, not as autonomous forecasting rules.

Key Takeaways for Practitioners

1. Deploy EMA strategies selectively in liquid, stable stocks (TATAPOWER: 75% accuracy); avoid volatile assets (SUZLON: 28.6% accuracy).
2. Require positive news + volume confirmation; standalone technicals have only 37.5% accuracy.
3. Use Fibonacci 61.8% for support placement and position sizing, not primary entry signals.
4. Monitor regulatory calendars and policy announcements; technicals lose power during news blackouts.
5. Account for 0.3–0.5% round-trip transaction costs; true edge exists only above 60% accuracy.

For Future Research

Expanding this analysis to include machine-learning integration (LSTM networks, transformers), broader stock samples (20+ renewables), richer NLP-based sentiment scoring, and regime-switching models could enhance forecast robustness. Comparative analysis across emerging markets (India, Brazil, Southeast Asia) would test geographic generalizability.

Author Contributions

U. Kaviya designed the study, collected and analysed the data, interpreted the results, and drafted the manuscript; G Sakunthla Devi provided guidance on research design, result interpretation, and critical manuscript revisions.

Conflict of Interest

The authors declare that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethics Statement

This study uses only publicly available secondary financial-market and policy data; therefore, institutional ethics approval and informed consent were not required

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The Role of Microfinance in the Financial Inclusion of India

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Abstract

Microfinance can be defined to include microcredit, micro savings, microinsurance and small-value payments. It has emerged as a key policy tool to promote financial inclusion among low-income and marginalized population. By providing a range of financial services including credit, savings, insurance and digital payment platforms, the microfinance institutions in India aim to integrate the poor from the society into the formal financial system and improve socio-economic outcomes. Despite rapid globalization, empirical evidence on poverty reduction and sustained income gains shows mixed results on the effectiveness of microfinance. Some studies report positive impacts on income generation by marginalized businesses, women's empowerment and financial strength, while others studies, emphasizes on limited poverty impacts and financial risks such as over-indebtedness and higher effective interest rates. This research paper provides a comprehensive review of literature with particular emphasis on India and highlights the significance linkage between microfinance and financial inclusion which focuses to integrate the poor into the formal financial system that contributes to the upliftment of the Nation.

Keywords*: Microfinance, Financial inclusion, Microfinance institutions, Digital payment platforms, Over-indebtedness and Formal financial system*

Introduction

Financial sector acts as the backbone for any developing economy. The financial sector of an economy can be defined as section of the economy which comprises of the firms and institutions that provide financial services to individuals and businesses the economy. This sector encompasses a broad range of industries including banks, investment companies, insurance companies, and real estate firms. So, the development of financial sector ensures continuous development and focuses on growth and stability of all the sections of the economy.

Financial inclusion means individuals and businesses have access to useful and affordable financial products and services that meet their payments, needs, savings, credit and insurance delivered responsibly and sustainably. Microfinance has been a central tool in efforts to expand inclusion among low-income households by offering small, tailored financial services outside conventional banking channels. International agencies define financial inclusion as both access and usage of affordable, responsible financial services, CGAP and the World Bank are leading voices.

Microfinance refers to the financial services provided to lower income individuals or groups, who are excluded from traditional banking. The microfinance institutions focuses on providing credit in the form of small working capital loans, also known as Microloans or Microcredit. Some microfinance institutions provide insurance while other microfinance banks provide savings accounts. The accessibility to microfinance enables the marginalized groups to accelerate self-sufficiency.

Microfinance grew rapidly from the 1980s onward, adopting multiple delivery models (group-based lending, individual microloans, NBFC-MFI models, cooperatives). By the 2010s and 2020s, attention shifted from pure credit delivery to broader product sets including savings, insurance, remittances, digital payments and to concerns about client protection and systemic risks. This paper analyses the literature on impacts and risks, discusses recent regulatory and technological developments, and suggests a research design to better identify causal effects and to inform policy.

Meaning of Financial Inclusion

The term financial inclusion was coined by Sh. Y V Reddy, the Ex Governor of Reserve Bank of India (RBI). In simple terms, financial inclusion refers to useful and affordable financial products and services that meet the needs of an individuals and businesses to have access to the services such as transactions, payments, savings, credit and insurance delivered in a responsible and efficient manner. In 2008, RBI defined Financial Inclusion as a process of ensuring accessibility to appropriate financial products and services needed by all sections of the society in general and vulnerable groups such as weaker sections and low-income groups in particular. But in reference to Indian economy, the term financial inclusion is used to address the challenges faced by poor in the access of financial

services in the rural masses in India. In Uttar Pradesh, the third largest state rural economy, where the poverty and unemployment among lower income groups pushes the poor to non-institutional sources of finance such as money lenders, traders and commission agents, relatives and landlords for fulfilling their subsistence needs. Thus, it can be concluded that financial inclusion plays an indispensable role in inclusive growth of an economy. Economic stability is essential for any economy. Economic stability refers to the state in which the financial system of an economy comprises of financial markets and financial institutional system to manage the risks and arrangements of payments smoothly. It acts as a multiplier and an instrument for the achievement of economic stability. Economic stability in an economy can be achieved with the help of financial sector. In Indian societies, it was found that general public is deprived of access to formal financial services due to which they have to depend on informal sources of finance for meeting their needs, which are not available at affordable cost and bears huge cost for the availability of finance. The experts from banking sector and government are continuously working on the initiatives, which would be devoted towards provision of banking services for the improvement in the status of the economically weaker sections of the society.

Microfinance supports financial inclusion and welfare through several channels:

1. **Credit for Productive Investment:** small loans enable microenterprises to purchase inputs, smooth working capital, and expand production.
2. **Consumption Smoothing and Risk Management:** access to credit/savings and microinsurance can smooth consumption across shocks and reduce vulnerability.
3. **Savings and Payment Access:** savings products and transaction accounts bring households into the formal system, lowering transaction costs and increasing financial records.
4. **Women's Empowerment and Social Spillovers:** group lending often targets women and can increase their income control, social capital, and participation.
5. **Digital Channels & Scale:** digital payments, wallets and interoperability (e.g., instant payment rails) reduce costs and expand reach.

These mechanisms imply heterogeneous short- and long-run outcomes depending on product design, loan size, interest rate, client characteristics, and complementary services (training, markets). The World Bank and CGAP emphasise that access alone is insufficient — usage, quality, and consumer protection matter.

Literature Review

The review of literature demonstrates knowledge and understanding of the researcher on the specific topic. A literature review also includes a critical evaluation of the topic. Here is a list of review of literature on the topic the role of financial institutions in financial inclusion.

Financial inclusion is recognized as an important foundation for the development of an economy. The researches conducted on financial inclusion have revealed that for improving the financial condition of economically weaker sections of society that contributes to the growth of a developing nation, it is essential to take initiatives towards financial inclusion. A broad variety of economical activities includes savings, insurance, extension of credit facilities.

Further in 2005, Leeladhar conducted a research study on the basis of his which he revealed that if financial services of low margins are provided to a very large number of people, it may lead to great amounts of profit. In order to promote financial inclusion among lower income groups, it is important for banks to readdress existing business strategies. In addition to this, for achieving the objective of financial inclusion, all kinds of available resources needs to be exploited including technology.

In 2008, Sriram and Sundaram conducted a research study in rural areas of Vellore district of Tamil Nadu to identify the various determinants of financial inclusion. The researchers identified the reasons for inaccessibility as lower number of bank accounts by collecting data from 20 village blocks of Vellore. Analysed the data by using index of financial inclusion and percentage analysis, found that financial inclusion was at mid-range of 0.55 for Vellore. They found that the major reasons for lack of financial access were identified as unemployment, lower literacy levels and lower income levels.

In the RBI report, RBI has listed financial literacy as one of the aspects of financial inclusion tripod as shown in figure. RBI laid down three principles which will guide the path towards achievement of financially inclusive growth of an economy. While the main focus was on financial inclusion, other two principles/pillars are financial stability, and financial literacy was used as a foundation for attaining the objective.

In above researches, it was found that there exists a strong positive correlation between level of financial inclusion and level of human development. By using financial inclusion index, the researchers established a fact that income of an individual (being measured by per capita GDP) is an important factor in explaining the levels of financial inclusion. Apart from the above listed; some other factors that affect the financial inclusion are adult literacy levels, urbanization and income inequality.

Research Methodology

This research paper analyses research methodology in descriptive form. The research will employ a qualitative approach. The research is exploratory and analytical in nature, in which we explore the advantageous financial inclusion in the Indian economy and its contribution for development and youth empowerment. The research paper also elaborated the needs of microfinance and financial inclusion for the achievement of predetermined goals in the international market. An intensive literature review for the research has been conducted. The major findings of the work were included in the conclusion. The study focuses on the measures of financial inclusion and their role for development and empowerment. Through, this paper the various transformations, which were introduced for the achievements of the defined targets were discussed. These transformations were to promote needs of microfinance in the economy.

For analysing data from secondary sources, includes various thesis, articles, books, reports and publications related to the microfinance and financial inclusion have been reviewed. The quantitative data and information are collected from the official websites and the government reports. The primary analysis was performed by reviewing journal, articles, reports, text books and from various other published sources. The information and statistics related to microfinance and financial inclusion have been analysed and compared. The data has been collected and the hypotheses related to the study were defined. The objectives analyse the influence of the variables affects them. Also, the various factors that affect the accessibility and availability of microfinance and financial inclusion were analysed. The study would eventually be helpful for future researchers.

Research Objectives

The aim of the research is to examine the accessibility of microfinance in India, relating to financial inclusion. The following objectives were designed to understand, the working of the microfinance and financial inclusion in India. The objectives provide a clear

picture of actions to be performed. The following are the objectives of the present research paper-

- To analyse the role of microfinance and financial inclusion services in fostering development and empowerment.
- To evaluate the impact of microfinance and financial inclusion policies on entrepreneurs.
- To assess the challenges in accessing microfinance and financial inclusion.
- To evaluate the contribution of microfinance and financial inclusion for employment generation and development.
- To assess the awareness and utilization of microfinance and financial inclusion tools.

Problem Statement

Microfinance and financial inclusion is an essential component for economic development. Despite its importance, many low income individuals face significant challenges in securing adequate and affordable financing. This research paper aims to explore the multifaceted issues in accessing microfinance and financial inclusion, including the barriers in accessibility, the impact of financial regulations, the role of financing institutions, and the effectiveness of various financing instruments. The key areas of given concern include:

- Problems in Accessibility to microfinance and financial inclusion
- The complex and often restrictive regulatory framework can hinder the flow of microfinance and financial inclusion .
- The availability of financial instruments and inconsistency can create disparities.
- The effectiveness of microfinance and financial inclusion in bridging the financing gap needs.
- Understanding the correlation between accessibility to microfinance and financial inclusion that enhances economic growth.

This research will employ a mixed-method approach, combining quantitative data analysis with qualitative analysis, to provide a comprehensive understanding of microfinance and financial inclusion.

Research Design

The author has chosen the descriptive research design for the analytical and exploratory research.

Data Collection Source

The Data can be collected from both the sources, Primary and secondary data sources. For this study, secondary data were utilised in the research. The analysis was performed by reviewing journal, articles, reports, text books, the internet databases and from various other published sources. The analysis of this study takes into account reports from various financial institutions, research publications, newspapers.

Research Findings

It is evident from relevant research that microfinance and financial inclusion have an impact on the Indian economy both before and after the pandemic. Data shows that growing organisations requires more Microfinance and financial inclusion and contributes to nation in terms of GDP, GNI, GVI, NNI. In this context, the benefits of microfinance and financial inclusion helps for development and empowerment. The expansion of the microfinance from the nation and Indian economy helps for rapid developing nation.

Initiatives for financial inclusion by Microfinance sector are listed below:

- Pradhan Mantri Jan Dhan Yojana (PMJDY)
- Aadhaar-based identification
- Unified Payments Interface (UPI)
- Financial Inclusion Index (RBI)

Challenges faced in Accessing Microfinance and Financial Inclusion

Microfinance and financial inclusion, is essential for development and empowerment in international market. In India, the procedural framework for microfinance and financial inclusion is much complex and faces several challenges. The challenges faced by low income individuals in accessing microfinance and financial inclusion are listed below:

Over-Indebtedness: multiple loans, aggressive collection, or lending without adequate assessment has led to over-indebtedness in several markets; the literature identifies over-indebtedness as a critical client protection issue.

High Effective Costs: microloan interest rates and fees can be high (reflecting transaction costs and risk), raising concerns about affordability and welfare. Regulators and sector reports flag persistently high cost of borrowing in some markets.

Mission Drift and Commercialization: as MFIs scale, they may shift from poverty-alleviation objectives to revenue maximisation, reducing focus on the poorest.

Data Gaps and Market Concentration: weak credit information sharing and market concentration can exacerbate risks of multiple borrowing and opacity.
Gender and intra-household effects: while targeting women can have empowerment effects, benefits depend on household dynamics and local norms.

Addressing the challenges, which requires coordinated efforts from governments, financial institutions, and international organizations to create a supportive and accessible microfinance and financial inclusion environment. Government should create microfinance and financial inclusion initiatives designed to fulfil the needs of young entrepreneurs, offering lower interest rates and flexible terms for youth development and empowerment. This includes smooth regulatory frameworks, enhancing awareness and knowledge among young exporters, providing accessible financial support, and fostering innovation and research adaptation in microfinance and financial inclusion services.

Recommendations

The recommendations for leveraging microfinance and financial inclusion for development are listed below:

- The government should implement microfinance and financial inclusion programs, for low-income individuals.
- To adopt streamlined regulatory and documentation processes to make microfinance and financial inclusion more accessible.
- Provide skills and training to low-income individuals on microfinance and financial inclusion tools.
- To develop platforms and networks for low-income individuals.
- To develop user-friendly digital financing platforms and tools.
- Collaboration with international organisations and promotion councils to provide funds and support to low-income individuals.
- Generation of employment opportunities through microfinance and financial inclusion.

Conclusion

The research paper analyses the different aspects development beginning by reflecting the contribution of Microfinance and financial inclusion. It explored the microfinance and financial inclusion mechanism and the role of microfinance and financial inclusion for development and empowerment in the nation. Microfinance and financial inclusion is a significant aspect for development. It provides the financial resources and support to low-income individuals in the nation. The low-income individuals have to face many problems, also they do not have the accessibility to microfinance and financial inclusion. By addressing the obstacles faced by them, can unlock the potential. Developing nations emphasizes on enhancing the financial inclusion and banking sector to achieve economic growth. The increasing microfinance availability provides employment opportunities to the general public. The Financial institutions and supporting banks should extend their services beyond traditional banking and delivery of products and Services. Targeted policies and initiatives can ensure the accessibility to microfinance and financial inclusion. Microfinance remains a vital but limited instrument for financial inclusion. While it enhances access and resilience, it cannot alone eliminate poverty. Sustainable inclusion requires integrated policies combining regulation, digital infrastructure, consumer protection, and livelihood support. Microfinance remains a valuable tool in the financial inclusion. Future research using richer administrative data, quasi-experimental variation and digital transaction linkages can sharpen understanding of when and for whom microfinance promotes sustainable inclusion.

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Impact of Microfinance on Women's Household Decision-Making Power: An Empirical Review

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Abstract

Microfinance has been extensively promoted as an instrument for women's empowerment, particularly in developing economies. While numerous empirical studies have examined the economic outcomes of microfinance, its influence on women's household decision-making power remains an important area of scholarly inquiry. This paper presents an empirical review of existing studies that analyze the impact of microfinance on women's participation in household decision-making. Drawing on national and international literature, the review synthesizes findings related to women's involvement in decisions concerning household expenditure, children's education, healthcare, savings, and asset ownership. The paper highlights key mechanisms through which microfinance enhances decision-making power, including increased financial autonomy, self-confidence, and social capital formation through Self-Help Groups (SHGs). However, the review also identifies constraints such as patriarchal norms, male control over loan utilization, and uneven empowerment outcomes. The study concludes that while microfinance has a positive influence on women's household decision-making power, its effectiveness depends on institutional support, financial literacy, and gender-sensitive program design.

***Keywords**: Microfinance, Women Empowerment, Household Decision-Making, Financial Inclusion, Self-Help Groups*

1.0 Introduction

Women's empowerment has become a central objective of development policy, particularly in developing countries where women continue to face economic, social, and

institutional barriers. Among the various dimensions of empowerment, household decision-making power is considered a critical indicator, as it reflects women's autonomy, bargaining power, and agency within the family. Traditionally, household decisions related to expenditure, asset ownership, education, and healthcare have been dominated by male members, limiting women's participation and voice.

Microfinance, which provides small-scale financial services to low-income populations, has been widely promoted as a strategy to empower women economically and socially. By enabling women to access credit, savings, and income-generating opportunities, microfinance is expected to strengthen their position within households. Women's participation in Self-Help Groups (SHGs) further enhances empowerment through collective action, social support, and skill development.

Despite the rapid expansion of microfinance programs, empirical evidence on their impact on women's household decision-making power remains mixed. While many studies report positive outcomes, others highlight persistent gender norms and structural constraints. In this context, an empirical review is essential to synthesize existing evidence and assess the effectiveness of microfinance in strengthening women's decision-making power within households.

2.0 Statement of the Problem

Although microfinance has been widely implemented as a poverty alleviation and empowerment strategy, its actual impact on women's household decision-making power is not uniformly established. Many studies focus primarily on income generation and economic outcomes, paying limited attention to intra-household power relations. Furthermore, empirical findings vary across regions, program models, and socio-cultural contexts. In several cases, women's access to credit does not translate into control over financial decisions due to patriarchal norms and male dominance. This lack of consensus necessitates a systematic empirical review to understand how microfinance influences women's participation in household decision-making and the factors that condition its effectiveness.

3.0 Review of Literature

The literature on microfinance and women's empowerment consistently highlights the significant role of Self-Help Groups (SHGs) and microfinance institutions in enhancing women's economic participation, entrepreneurial capacity, leadership skills, and household

decision-making power. Several studies conducted in India report that SHG-based microfinance improves women's income, savings behaviour, financial independence, confidence, and involvement in household financial decisions (Avhad&Jadhav, 2025;

Lakhawat et al., 2024; Geetha, 2018; Barman, 2019). Empirical evidence from Gujarat, West Bengal, and Andhra Pradesh further confirms that women's participation in SHGs leads to improved bargaining power and financial autonomy, particularly when supported by education, frequent group meetings, and continuous participation (Modi et al., 2014; Datta&Sahu, 2017; Lavoori et al., 2014).

Studies analysing decision-making agency emphasize that access to credit alone has limited impact unless combined with group-based participation, training, and social intermediation. Holvoet (2005) demonstrates that SHG-based microfinance significantly shifts household decision-making from male-dominated patterns towards joint and female decision-making. Similar findings are reported across South Asia and Africa, where women's control over loans and business decisions emerges as a critical determinant of empowerment outcomes (Kabeer, 2001; Akpalu et al., 2012; Ngo &Wahhaj, 2010).

International evidence from Bangladesh, Malaysia, Ethiopia, Nepal, Ghana, and Pakistan indicates that microfinance positively influences women's economic, social, and psychological empowerment by improving income levels, asset ownership, savings, mobility, and participation in household and community decisions (Rahman et al., 2017; Al-Shami et al., 2018; Mengstie, 2022; Joshi, 2023; Shafique& Siddique, 2020). Some studies also highlight indirect empowerment outcomes such as increased joint decision-making in family planning and child-related matters (Murshid& Ely, 2016; Nilakantan et al., 2013).

However, the literature also reveals mixed and context-specific results. Review-based and qualitative studies caution that patriarchal norms, male dominance in loan utilization, low financial and digital literacy, limited market access, high interest rates, and inadequate institutional support often constrain the extent of empowerment achieved through microfinance (Khursheed et al., 2021; Singh, 2015; Datta&Sahu, 2017). Evidence from Eastern India and traditional societies suggests that microfinance alone is insufficient to ensure comprehensive empowerment without complementary capacity-building, financial awareness programs, and supportive policy interventions.

Overall, the reviewed studies establish that micro finance particularly when delivered through SHGs plays a crucial role in strengthening women's household decision-making power and entrepreneurial engagement. Nevertheless, sustainable empowerment depends on women's independent control over financial resources, socio-cultural context, duration of participation, and the integration of credit with training, market access, and institutional support.

3.1 Research Gap

The review reveals several research gaps. First, there is no uniform agreement on the extent to which microfinance leads to sustainable empowerment. Second, many studies focus on economic indicators while underemphasizing broader household decision-making dimensions. Third, limited attention is given to socio-cultural constraints and institutional support mechanisms. These gaps highlight the need for comprehensive empirical reviews that synthesize findings across regions and program models.

4.0 Objectives of the Study

The study is undertaken with the following objectives:

1. To review empirical studies on the impact of microfinance on women's household decision-making power.
2. To examine the effect of microfinance on women's participation in household financial and non-financial decisions, including control over income and assets.
3. To analyze the role of socio-economic factors such as education, marital status, and income in influencing women's decision-making power.

5.0 Research Methodology

The study adopts a descriptive and analytical research design based on secondary data. Empirical studies published in peer-reviewed journals, reports, and working papers were systematically reviewed. The selected studies focus on microfinance and women's household decision-making power across different geographical contexts. A thematic analysis approach was used to synthesize findings and identify key patterns, determinants, and constraints.

6.0 Analysis and Discussion

The analysis of the reviewed empirical studies reveals a broadly positive relationship between microfinance participation and women's household decision-making power, though the magnitude and consistency of this relationship vary across contexts. A recurring theme

across national and international studies is that access to microfinance enhances women's participation in routine household decisions such as expenditure management, savings, children's education, and healthcare. Increased income contribution through microfinance-supported activities strengthens women's bargaining position within households, thereby improving their ability to influence decisions.

Group-based microfinance models, particularly Self-Help Groups (SHGs), emerge as a critical mechanism for empowerment. Studies consistently show that women involved in SHGs experience improvements not only in financial autonomy but also in self-confidence, leadership skills, and social awareness. Collective participation facilitates peer learning, mutual support, and exposure to financial and social training, which collectively enhance women's decision-making agency. Evidence suggests that longer duration of SHG membership and regular group interactions further strengthen women's autonomy and participation in household decisions.

However, the analysis also highlights significant constraints that limit empowerment outcomes. Several studies report that patriarchal norms and entrenched gender roles continue to restrict women's autonomy, especially in decisions involving large financial investments or asset ownership. In some households, male members retain control over loan utilization, thereby weakening the potential empowerment effects of microfinance. Socio-economic factors such as education, income level, marital status, and family support play a decisive role in determining the extent of women's decision-making power.

Overall, the discussion indicates that microfinance positively influences women's household decision-making power, but empowerment is not automatic. The effectiveness of microfinance depends on complementary factors such as financial literacy, institutional support, gender-sensitive program design, and socio-cultural acceptance.

7.0 Practical Implications

The findings of this empirical review have important implications for policymakers, microfinance institutions, and development practitioners. First, microfinance programs should move beyond credit provision and adopt a holistic empowerment approach. Integrating financial literacy, entrepreneurship training, and gender awareness programs can significantly enhance women's ability to utilize credit effectively and participate meaningfully in household decision-making.

Second, strengthening Self-Help Groups as platforms for collective empowerment is essential. SHGs not only facilitate access to finance but also promote social capital formation, leadership development, and peer learning. Policymakers should encourage capacity-building initiatives within SHGs, including training on budgeting, savings, and household financial planning.

Third, program designs must be gender-sensitive and context-specific. Addressing socio-cultural barriers such as patriarchal norms and male dominance in financial decisions requires community-level interventions and awareness programs involving both women and men. Additionally, improving access to markets, digital financial services, and government support schemes can enhance the sustainability of empowerment outcomes.

Overall, the practical implications suggest that microfinance can serve as an effective tool for strengthening women's household decision-making power when supported by institutional, social, and educational interventions.

8.0 Limitations of the Study

Despite providing valuable insights, the present study has certain limitations. First, the study is based entirely on secondary data drawn from published empirical studies, reports, and reviews. As a result, the analysis depends on the quality, methodology, and scope of existing research, which vary significantly across studies.

Second, differences in measurement indicators, sample sizes, and regional contexts limit the comparability and generalizability of findings. Empowerment and household decision-making power are multidimensional concepts, and variations in operational definitions across studies may influence outcomes.

Third, the review primarily focuses on published literature and does not extensively incorporate unpublished studies or grey literature, which may contain additional insights.

Finally, since the study adopts a review-based approach, it does not capture real-time changes in household dynamics or long-term empowerment trajectories.

These limitations suggest caution in interpreting the findings and highlight the need for further empirical investigation.

9.0 Suggestions for Future Research

Future research should adopt longitudinal study designs to examine the long-term impact of microfinance on women's household decision-making power. Such studies can provide insights into whether empowerment effects are sustained over time or diminish after initial participation.

Comparative studies across regions, microfinance models, and socio-cultural contexts are also recommended to identify best practices and contextual determinants of empowerment. Further research should focus on the role of complementary interventions such as financial literacy training, skill development programs, and institutional support in enhancing empowerment outcomes.

Additionally, future studies should explore the interaction between microfinance and socio-cultural factors such as caste, education, and family structure. Incorporating qualitative approaches alongside quantitative methods can provide deeper understanding of intra-household power dynamics and women's lived experiences.

These directions will contribute to a more comprehensive understanding of how microfinance can effectively strengthen women's household decision-making power.

10.0 Suggestions

Based on the findings of the empirical review, microfinance programs should adopt a comprehensive and gender-sensitive approach to women's empowerment. Along with credit provision, financial literacy and skill development training should be strengthened to enable women to effectively manage financial resources and participate in household decision-making. Self-Help Groups (SHGs) should be further promoted as platforms for collective learning, leadership development, and social support.

Policymakers and microfinance institutions should design programs that ensure women's control over loan utilization and address socio-cultural barriers such as patriarchal norms. Greater institutional support, awareness campaigns, and integration with government welfare schemes can enhance the sustainability of women's household decision-making power.

11.0 Conclusion

The study concludes that microfinance plays a significant role in enhancing women's household decision-making power, particularly in developing economies. Participation in microfinance programs, especially through Self-Help Groups, improves women's financial autonomy, confidence, and involvement in household financial and non-financial decisions. However, empowerment outcomes are not uniform and are influenced by socio-economic and cultural factors. The effectiveness of microfinance in strengthening household decision-making power depends on supportive institutional frameworks, financial literacy, and gender-sensitive program design. When combined with capacity-building and social support, microfinance can serve as an effective instrument for promoting women's empowerment and inclusive development.

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Green Finance and Climate Risk Investing: An Accounting and Finance Perspective

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Abstract

Green finance has emerged as a pivotal tool in the global fight against climate change, facilitating the transition toward a sustainable and low carbon economy. It refers to financial investments directed toward sustainable projects, environmental conservation efforts and technologies that mitigate climate change impacts. Green finance channels money into various projects that beneficial to the environment. supporting sustainable development by funding things like renewable energy, energy efficiency, pollution control, and sustainable infrastructure, aiming for economic growth with reduced economic harm. The scope of green finance includes loans, investments, insurance for green technologies, sustainable businesses and projects. Green financial products include green loans, green bonds, sustainable funds and green insurance. Green finance encompasses a broader range of environmental objectives including, but Limited to climate –related initiatives. Climate change has emerged as a significant risk to global financial systems, influencing investment decisions, asset valuation, and financial stability. Green finance has gained importance as a mechanism to mobilize financial resources toward environmentally sustainable projects while addressing climate-related risks. Climate risk investing integrates environmental, social, and governance (ESG) factors into financial decision-making to enhance long-term risk-adjusted returns. This paper examines the concept of green finance, the nature of climate risks, and the role of climate risk investing from an accounting and finance perspective. The study is conceptual in nature and is based on secondary data collected from reports of international organizations and regulatory bodies. The findings highlight that green finance plays a pivotal role in mitigating climate-related financial risks and promotes sustainable economic development.

Keywords: *Green Finance, Climate Risk, ESG, Sustainable Finance, Accounting and Finance*

1.Introduction

Climate change drives green finance by creating demand for funding climate mitigation and adaptation using the green instruments to shift the capital to sustainable outcomes.

Factors of Green finance

Mitigation and Adaptation

Funds clean energy, efficient transport. Agriculture and resilience measures against climate impacts.

Risk Management

Helps finance institutions manage climate risks eg: Natural disasters

Capital Acquistion : Using green instruments like green bonds, green loans

2.Concept of Green Finance

Green finance refers to financial investments that support environmentally sustainable economic activities. It aims to promote low-carbon development, efficient resource utilization, and environmental protection

3.Climate Risk and Investing

Climate risks are most important risk in investing of assessing threats from physical impacts. These risks are classified into physical risk, transition risk and liability risk. Physical risks arise from natural calamities. Transition risks occur due to technological advancements, policy changes. Liability risks emerge from legal and regulatory actions related to environment damage.

4.Role of Accounting in Green Finance

Accounting in green finance provides vital data by measuring, reporting and managing environmental impacts along with financial performance, ensures transparency, attracting sustainable investment, ensuring regulatory compliance (ESG reporting) and guiding strategic decisions for sustainable growth and development

5.Role of Finance in Climate Risk Investing

In the financial perspective green finance support efficient capital allocation, risk management and valuation of sustainable investments. Financial managers integrate climate risk into financial decision making to manage exposure and drive sustainable economic growth

6.Objectives of the Study

To study the concept of green finance

To examine climate risk affecting finance decisions

To analyse the role of green finance in climate risk mitigation

7. Research Methodology

The study is conceptual and analytical in nature. It is based on secondary data from journals, articles, reports of world bank, SEBI, RBI and other research publications. Content analysis has been used to interpret the data.

8.Findings

Green finance reduces carbon emissions encourage the use of clean energy and support long term economic growth without harming the environment. Overall, green finance is supporting environmental protection and sustainable growth

9.Suggestions

Awareness about green finance should be provide to the investors and firms

Government shold create clear regulations and rules to promote green finance

Proper monitoring is essential to avoid misuse of green finance

10. Conclusion

Green finance and climate risk investing represent the integration of sustainability into accounting and finance. They play a significant role in mitigating climate-related financial risks and ensuring long-term financial stability. Accounting and finance professionals have a critical role in promoting sustainable investment practices and supporting sustainable economic development

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HRM

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Drivers and Barriers to Green Technology Adoption among Manufacturing SMEs: A Study on Coimbatore's Industrial Sector

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Abstract

Nowadays, Green technology adoption has become important for manufacturing SMEs as they attempt to balance productivity with the use of natural resources. Coimbatore's industrial sector needs to understand the key drivers and barriers for companies choosing and applying eco-friendly technologies in their operational work. This study examines the factors that promote and prevent small and medium-sized manufacturing businesses in the Coimbatore industrial cluster, Tamil Nadu, from adopting green technologies. A conceptual framework has been framed by the researcher to explain the relationship between driving factors, such as cost saving and market competitiveness, among Green technology adoption by SMEs owners in Coimbatore Industrial Cluster. Additionally, explain the relationship between Barriers like High Investment cost and Lack of Technical expertise in Green technology adoption. The model further examines the mediating role of Institutional support and network, along with knowledge and awareness of green technologies. The research includes Structure Questionnaires with Part A and Part B to collect the data among SME owners and managers in the Coimbatore Industrial cluster, and analyzed the collected data with the help of proper statistical methods. The study reveals Green tech adoption among SMEs is encouraged by factors like cost savings and competitiveness, which increase perceived usefulness. Implementation is constrained by obstacles including high costs and a lack of competence, but these impacts are minimized by institutional support and knowledge. SMEs that have access to incentives and training are more likely to participate in green technologies. In Coimbatore's industrial sector, capacity-building and strategic interventions can accelerate long-term change.

***Keywords**: Green technology, capacity-building, and strategic interventions*

Introduction

In recent decades, industries worldwide have been driven to reevaluate traditional production processes due to growing environmental degradation, due to climate change, and resource scarcity. Governments, consumers and international regulatory agencies are putting more and more pressure on the manufacturing sector in particular to cut carbon emissions, decrease waste and implement environmentally friendly technologies. In order to achieve industrial expansion while guaranteeing environmental protection and long-term economic sustainability, green technology also known as environmental, clean or sustainable technology has become essential (Porter & van der Linde, 1995).

Small and medium-sized enterprises (SMEs) include energy-efficient machines, renewable energy sources, eco-friendly materials, waste reduction systems, pollution control technologies, and sustainable production processes. SMEs face specific challenges due to limited resources, lack technical expertise, have low awareness levels, and see risks in green investments. larger companies usually have the financial, technical, and managerial resources needed to adopt these technologies (Govindan et al., 2015). Factors such as consumer demand, potential cost savings, competitive advantages, regulatory pressures, and corporate social responsibility encourage SMEs to adopt environmentally friendly technologies (Horbach, Rammer, & Rennings, 2012).

The acceptance of green technologies depends on a complicated relationship between outside environmental factors and internal organizational issues. Elements such as market pressures, technological progress, management commitment, environmental rules, and government incentives influence adoption decisions. Small and medium-sized enterprises (SMEs) often face obstacles to accepting green practices. High initial investment costs, uncertain returns, a lack of skilled workers, technological complexities and insufficient support from institutions hinder their efforts (Walker et al., 2008). Understanding these leading forces and barriers is crucial for creating effective policies and management strategies that promote sustainable change in the SME sector.

Coimbatore, known as the "Manchester of South India," is a primary industrial center recognized mainly for textile, engineering, foundry, pump, and auto-component industries. The large number of manufacturing SMEs in the area boosts Tamil Nadu's industrial output and creates jobs. The rapid industrial growth has also raised environmental issues like carbon

emissions, waste production, energy use, and water pollution. Thus, Coimbatore is an important location for studying the adoption of green technologies by manufacturing SMEs.

Despite India's growing focus on sustainability and green manufacturing policies, there is still a lack of adoption of green technologies by manufacturing SMEs at the regional level. Much of the earlier research has focused on large companies or taken a broad view, missing the specific challenges and incentives that SMEs face in industrial group like Coimbatore. This study examines the factors influencing the adoption of green technology among manufacturing SMEs in Coimbatore's industrial sector, addressing the current research gap. The results offer useful findings for policymakers, trade associations, and SMEs business owners, helping them to encourage sustainable production practices while encouraging long-term growth and competitiveness.

Research Objectives

Primary Objective

- To examine the drivers and barriers influencing green technology adoption among manufacturing SMEs in Coimbatore’s industrial sector.

Secondary Objectives

- To identify and analyse the key drivers and barriers influencing green technology adoption among manufacturing SMEs.
- To assess the role of perceived usefulness (operational efficiency and profitability) in influencing green technology adoption.
- To evaluate the direct and indirect effects of drivers and barriers on green technology adoption.

Review of Literature

Porter and van der Linde (1995), found the adoption of ecologically sustainable technologies that lower pollution, improve resource efficiency, and encourage eco-friendly production methods is referred to as "green technology adoption." By increasing productivity and lowering operating expenses, environmental innovations can boost a company's competitiveness. SMEs' use of green technologies is crucial for sustainable economic development since, despite their small size, they together contribute significantly to environmental deterioration (OECD, 2018).

Rennings (2000), identified the energy-efficient technologies improve financial performance by lowering long-term production costs. According to Zhu and Sarkis (2004), manufacturing companies who implemented green practices saw reductions in energy and material costs. Despite upfront costs, SMEs are strongly encouraged to invest in sustainable technologies by lower operating expenses.

Walker, Di Sisto, and McBain (2008), investigated that one of the main barriers keeping SMEs from adopting environmental policies is money. In a similar vein, Govindan et al. (2015) highlighted that long payback times and restricted access to funding deter SMEs from implementing green technologies. Mittal and Sangwan (2014), found that SMEs frequently lack the internal capacity to assess and successfully apply green technologies. According to Revell, Stokes, and Chen (2010), adopting sustainable manufacturing processes is met with resistance and uncertainty due to a lack of knowledge and experience.

Lin and Ho (2011) discovered that enterprises' propensity to adopt green innovations is influenced by perceived operational efficiency and profitability in the industrial sector. When SMEs see observable advantages like increased profitability, cost savings, and productivity, they are more willing to adopt green technologies. Numerous studies support the idea that organizational characteristics and technology adoption are mediated by perceived utility. Technology adoption decisions in SMEs are heavily influenced by perceived benefits, according to Oliveira and Martins (2011). According to Yoon, Kim, and O'Neill (2018), companies that believe green technology is valuable have higher adoption intentions and actual implementation.

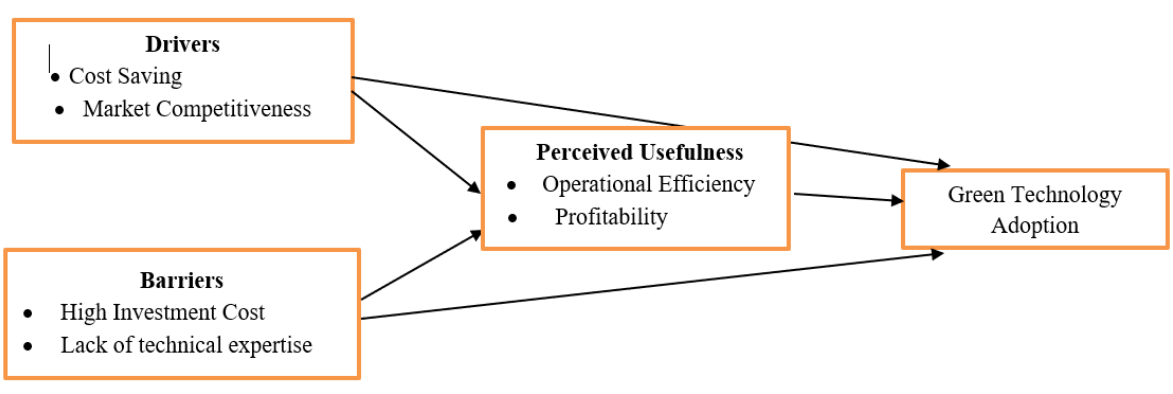
Shukla, Swarnakar & Singh (2023), identified that cost savings, regulatory compliance and market competitiveness as major drivers. While, high initial investment, lack of skilled workforce, and weak enforcement of policies were barriers. Bansal & Deshmukh (2017), found that improved efficiency, reduced waste, and enhanced reputation in global markets as drivers. Barriers included high implementation costs, fragmented supply chains and weak collaboration among SMEs. Coimbatore’s industrial clusters reflect these barriers making collective adoption of sustainable practices more difficult.

Sharma & Gupta (2018), identified environmental regulations, competitive advantage and customer awareness as drivers. Barriers included limited access to finance, lack of technical know-how and inadequate infrastructure. These findings are relevant to Coimbatore's textile sector, which faces infrastructure limitations in waste management. Raj & Kumar (2019,) found the regulatory frameworks and global supply chain pressure as drivers, while fragmented industrial clusters, weak collaboration and limited R&D capacity were barriers. Coimbatore's fragmented SME clusters mirror these challenges, making collective adoption of green technologies difficult. Singh & Pandey (2020), identified that government incentives, energy efficiency and improved brand image as drivers. Barriers included lack of awareness, inadequate training and limited access to finance. For Coimbatore's SMEs, awareness and training gaps are particularly visible in micro-enterprises within the pump and motor sector.

Research Gap

The majority of studies concentrate on large businesses or take a macro-level view, even though the literature currently in publication indicates a number of factors that encourage and hinder the adoption of green technologies. Perceived usefulness as a mediating variable between drivers, impediments, and green technology adoption is the subject of little empirical research, especially in regional industrial clusters like Coimbatore. By providing a context-specific and model-driven analysis of manufacturing SMEs, this study fills this gap.

Conceptual Framework



Drivers and Perceived Usefulness of Green Technology

SMEs' opinions on the value of green technology are greatly influenced by factors like cost savings and market competitiveness. Manufacturing SMEs are more likely to see green technology as helpful for increasing operational efficiency and profitability when they believe

they can lower operating expenses and improve their competitive position. Previous research indicates that enterprises' assessment of the advantages of technology is heavily influenced by market and economic factors (Porter & van der Linde, 1995; Horbach et al., 2012). Thus, the following theory is put forth:

H1: Drivers have a significant effect on the perceived usefulness of green technology among manufacturing SMEs.

Barriers and Perceived Usefulness of Green Technology

SMEs' faith in the efficacy of green technologies is frequently diminished by obstacles such as high investment prices and a lack of technical skills. Businesses may see green technologies as complicated, dangerous or unprofitable if they lack the necessary resources or expertise. According to earlier studies, these obstacles have a detrimental effect on how businesses evaluate the advantages of sustainable technologies (Walker et al., 2008; Mittal & Sangwan, 2014). As a result, the following theory is put forth:

H2: Barriers have a significant effect on the perceived usefulness of green technology among manufacturing SMEs.

Perceived Usefulness and Green Technology Adoption

One of the main components of the Technology Acceptance Model (TAM) and a well-known factor in determining technology adoption is perceived utility. When manufacturing SMEs believe green technologies increase operational efficiency and profitability, they are more likely to adopt them. Adoption behavior and perceived usefulness are positively correlated, according to empirical data (Davis, 1989; Lin & Ho, 2011). As a result, the following theory is put forth:

H3: Perceived usefulness has a significant effect on green technology adoption among manufacturing SMEs.

Drivers and Green Technology Adoption

Drivers like cost reduction and competitive pressure may directly promote the adoption of green technology in addition to affecting perceived utility. In order to meet market demands,

enhance their reputation, and achieve long-term cost efficiency, SMEs frequently implement eco-friendly technologies. According to earlier research, adoption of environmental innovations is directly influenced by competitive and economic factors (Rennings, 2000; Zhu & Sarkis, 2004). Thus, the following theory is put forth:

H4: Drivers have a significant direct effect on green technology adoption among manufacturing SMEs.

Barriers and Green Technology Adoption

Even when environmental advantages are acknowledged, obstacles like high capital costs and a lack of experience may directly affect SMEs from using green technologies. Actual implementation may be constrained by operational complexity, financial risk and uncertainty. Barriers are frequently identified by empirical research as major challenges to the adoption of green technologies (Govindan et al., 2015; Revell et al., 2010). As a result, the following theory is put forth:

H5: Barriers have a significant direct effect on green technology adoption among manufacturing SMEs.

Mediating Role of Perceived Usefulness

Drivers and constraints to the adoption of green technologies may be mediated by perceived utility. While barriers lower adoption by diminishing perceived utility, drivers increase adoption by boosting SMEs' sense of operational and financial benefits. Research indicates that the relationship between organizational variables and technology adoption results is frequently mediated by perceived usefulness (Oliveira & Martins, 2011; Yoon et al., 2018). Consequently, the following theories of mediation are put forth:

H6: Perceived usefulness mediates the relationship between drivers and green technology adoption among manufacturing SMEs.

H7: Perceived usefulness mediates the relationship between barriers and green technology adoption among manufacturing SMEs.

Research Methodology

In order to investigate the factors impacting the adoption of green technology among manufacturing SMEs in the Coimbatore area, the current study used a descriptive and explanatory research approach. The study also looks into how perceived utility functions as a mediator in the link between obstacles, drivers, and adoption of green technologies. Because it allows for systematic measurement and statistical analysis of the correlations between variables, a quantitative approach was used. The study was carried out in Tamil Nadu's Coimbatore area, one of South India's main industrial centers. The district is a good place to look at green technology adoption methods since it has a high concentration of manufacturing Small and Medium Enterprises (SMEs) in industries including textiles, engineering, chemicals, and related fields. Manufacturing SMEs in the Coimbatore district make up the study's target population. Due to their direct involvement in operational and strategic decision-making about the deployment of technology, owners, managers, and supervisory staff were among the respondents.

For the study, a sample of 171 respondents was chosen. According to normal statistical requirements, the sample size was deemed sufficient for doing regression analysis, correlation analysis, and reliability analysis. Convenience sampling was used in the study to include manufacturing SMEs who were reachable and eager to take part. Due to time restrictions and the practical challenge of getting a full sampling frame of manufacturing SMEs in the study area, this method was deemed appropriate. A standardized questionnaire was used to gather primary data from manufacturing SMEs.

Analysis

SPSS (Statistical Package for the Social Sciences) was used to code and analyze the gathered data. The following statistical instruments were utilized: Descriptive statistics are used to summarize the mean and standard deviation of study variables and assess respondent demographics. Male dominance in manufacturing SMEs in Coimbatore is evident from the gender-wise analysis, which reveals that 72.5% of respondents were men and 27.5% were women. According to the age distribution, the majority of respondents (43.9%) are between the ages of 31 and 40, followed by those over 50 (34.5%). This suggests that experienced and mid-career professionals have a significant influence on the adoption of green technology in manufacturing SMEs.

Reliability of the Instrument

Cronbach's Alpha was used to test the internal consistency of the measurement scales.

Construct	Cronbach's Alpha
Drivers of Green Technology Adoption	**0.843**
Barriers to Green Technology Adoption	**0.819**
Perceived Usefulness of Green Technology	**0.819**
Green Technology Adoption	**0.842**

Correlation Analysis

Pearson correlation analysis was conducted to examine the relationship between drivers, barriers, perceived usefulness, and green technology adoption.

Correlations

		cs11	BR11	PU11	GT11
Drivers	Pearson Correlation	1	.822**	1.000**	.822**
	Sig. (2-tailed)		.000	.000	.000
	N	171	171	171	171
Barrier	Pearson Correlation	.822**	1	.822**	1.000**
	Sig. (2-tailed)	.000		.000	.000
	N	171	171	171	171
Perceived Usefulness	Pearson Correlation	1.000**	.822**	1	.822**
	Sig. (2-tailed)	.000	.000		.000
	N	171	171	171	171
Green Technology	Pearson Correlation	.822**	1.000**	.822**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	171	171	171	171

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient between Drivers and Barriers is r = 0.822, which is positive and statistically significant at the 0.01 level ($p < 0.01$). The correlation between Drivers and

Perceived Usefulness is r = 1.000, which is positive and highly significant (p < 0.01).The correlation coefficient between Drivers and Green Technology Adoption is r = 0.822, which is positive and statistically significant at the 0.01 level. The correlation between Barriers and Perceived Usefulness is r = 0.822, which is positive and significant (p < 0.01).The correlation between Barriers and Green Technology Adoption is r = 1.000, which is positive and statistically significant at the 0.01 level. The correlation coefficient between Perceived Usefulness and Green Technology Adoption is r = 0.822, which is positive and significant at the 0.01 level. All research variables are favorably and statistically associated to one another at the 0.01 level, according to the correlation analysis. The strong correlations show that the adoption of green technology among manufacturing SMEs in the Coimbatore district is significantly influenced by drivers, impediments, and perceived utility. These findings offer compelling evidence in favor of performing additional regression and mediation studies to investigate causal links between the variables. The findings show that barriers to green technology adoption became a dominant predictor (β = 1.000), emphasizing the crucial role that restrictions related to cost, knowledge, and investment play in influencing adoption decisions. Overall, the findings show that drivers and barriers have a major impact on green technology adoption among manufacturing SMEs in Coimbatore, even though firm characteristics have little explanatory power. This supports the applicability of the suggested research model and justifies additional mediation analysis using perceived usefulness.

Regression

While accounting for demographic factors including company size, manufacturing industry type, and years of experience, multiple regression analysis was used to evaluate the influence of drivers and barriers on green technology adoption.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	19.593	2.080		9.420	.000
	Firm Size	-1.225	.682	-.140	-1.795	.074
	Type of Manufacturing	-.271	.569	-.038	-.476	.635

	Years of Experience	-.295	.366	-.065	-.805	.422
2	(Constant)	.000	.000		.	.
	Firm Size	.000	.000	.000	.	.
	Type of Manufacturing	.000	.000	.000	.	.
	Years of Experience	.000	.000	.000	.	.
	cs11	.000	.000	.000	.	.
	BR11	1.000	.000	1.000	.	.
a. Dependent Variable: GT11						

Excluded Variables[a]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	cs11	.816[b]	18.304	.000	.818	.978
	BR11	1.000[b]	.	.	1.000	.973
	PU11	.816[b]	18.304	.000	.818	.978
2	PU11	.[c]	.	.	.	.000

a. Dependent Variable: GT11

b. Predictors in the Model: (Constant), Years of Experience, Firm Size, Type of Manufacturing Industry

c. Predictors in the Model: (Constant), Years of Experience, Firm Size, Type of Manufacturing Industry, cs11, BR11

Regression analysis was used to adjust for firm size, manufacturing industry type, and years of experience in order to investigate the impact of drivers and barriers on green technology adoption (GT11). Model 1, which contained only the control variables, was statistically insignificant ($F = 1.544$, $p > 0.05$) and only explained a very small percentage of the variance in green technology adoption ($R^2 = 0.027$), suggesting that firm-related and demographic characteristics by themselves do not significantly predict green technology

adoption among manufacturing SMEs. When the two main independent variables—drivers (cs11) and barriers (BR11)—were included to Model 2, the model's explanatory power significantly improved, with R2 rising to 1.000, suggesting a significant combined impact of both factors on adoption.

Findings of the Study

According to the Analysis, the majority of Coimbatore's manufacturing SMEs are run by seasoned male decision-makers and the research's assessment tools are quite trustworthy. The findings show that drivers, barriers, perceived utility and adoption of green technologies are strongly and significantly correlated. Adoption decisions are influenced by barriers like high investment costs and a lack of technical skill while drivers like cost savings and market competitiveness have a positive impact on perceived usefulness and adoption. When compared to drivers and barriers, firm-related attributes including size, industry type, and years of experience were found to have little effect on adoption. Overall, the results show that perceived utility serves as a significant mechanism through which manufacturing SMEs' adoption of green technologies is influenced by both drivers and barriers.

Suggestions of the Study

According to the study's conclusions, manufacturing SMEs should concentrate on comprehending and using the long-term operational and financial advantages of green technologies. To reduce the burden of high initial investment expenses, government agencies and legislators should implement financial incentives, subsidies, and low-interest loan facilities. To close technical skill shortages and raise awareness of green technologies, industry associations should set up training and capacity-building initiatives. Sustainable industrial development can be supported by lowering perceived risks and accelerating the adoption of green technologies through the strengthening of institutional support mechanisms and the promotion of knowledge sharing networks among Coimbatore's SMEs.

Conclusion

According to the study's findings, perceived utility plays a critical mediating role in the influence of major drivers and barriers on the adoption of green technology among manufacturing SMEs in Coimbatore. Adoption is hindered by high investment costs and a lack of expertise but it is encouraged by economic advantages including cost savings and competitiveness. Compared to these elements, firm characteristics have less of an impact. The

sustainable adoption of green technologies can be accelerated through capacity-building programs, institutional assistance, and increased awareness.

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Employee Engagement and Motivation in Banking: A Transformational Leadership Perspective

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Abstract

This research reveals that transformational leadership enhances motivation of employees considerably both directly and indirectly through enhancing the psychological ownership and worker engagement. The statistical analysis has proven the reliability of the model proposed and that all significant relationships were high and significant. The study results provide a theoretical understanding of the role those transformational leaders play to motivate their employees, through their influence on the inner feelings and attitudes, as opposed to the use of just external rewards. In practice, the research has led to a realization of the necessity of cultivating leaders who can motivate the employees, relate to them and instill a sense of ownership with regard to their work. Nevertheless, the study had limited to one style of leadership and two variables to mediate the relationship and made use of self-reported data, which can create bias Overall, the study had a way of highlighting the importance of transformational leadership as a useful approach to motivating and empowering the contemporary workforce

***Keywords**: Transformational leadership, employee motivation, psychological ownership, employee engagement, leadership effectiveness, organizational behavior, mediating variables.*

Introduction

Transformational leadership will assist in motivating the employees of the bank by inspiring, supporting and encouraging them to give their best. Engagement and performance of employees may be enhanced by leaders who speak effectively, treat employees in an equitable environment, and encourage their development (Banks, 2016; Kahn, 1990). The employees become more responsible and willing to bring the bank to success when they feel

engaged and have a sense of psychological ownership, meaning they feel that their work belongs to them (Hood, 2020; Richet al., 2010).A combination of these aspects justifies how good leadership creates stronger motivation in banking industry.

Review of Literature

Leadership impacts good employee conduct through helping people feel included, communicate openly, and doing valuable work (Brown et al., 2005; Zaim et al., 2021). This enhances the sense of psychological ownership in banks that make employees feel that they have control and that they belong, which has a positive effect on their behavior and aids in transforming organizations (Pierce et al., 2001; Ajzen, 1991; Park et al., 2015).

H1: The positive influence of transformational leadership is on psychological ownership.

Transformational leadership encourages employees in the bank to remain active through inspiration, support, and appreciation of their efforts (Damand Robinson, 2020). By inspiring and focusing on each person, leaders enhance dedication, creativity, and commitment and decrease turnover (Chen et al., 2020; Jyoti and Dev, 2014;Yucel, 2021).

H2: Transformational leadership as a positive influence on employee engagement.

Motivation enhances innovation and productivity of banks as it makes employees more committed and responsible (Bloisi et al., 2003). Employees feel a sense of ownership (psychologically) when they feel there is recognition, security and equitable rewarding practices and this enhances their motivation and effort in the workplace (Pierce et al., 2001; Ryan and Deci, 2006).H3 : Psychological ownership positively affects employee motivation

H3: Psychological ownership positively affects employee motivation

Employee engagement is the degree of attachment and dedication of the employees towards work (SrivastavaandMadan,2016). Engagement is enhanced by meaningful work, motivation, and supportive work environment which subsequently enhances the responsibility and performance of the employees in banks (Shuckand Wollard 2010; Abdurrahmanetal. 2019).

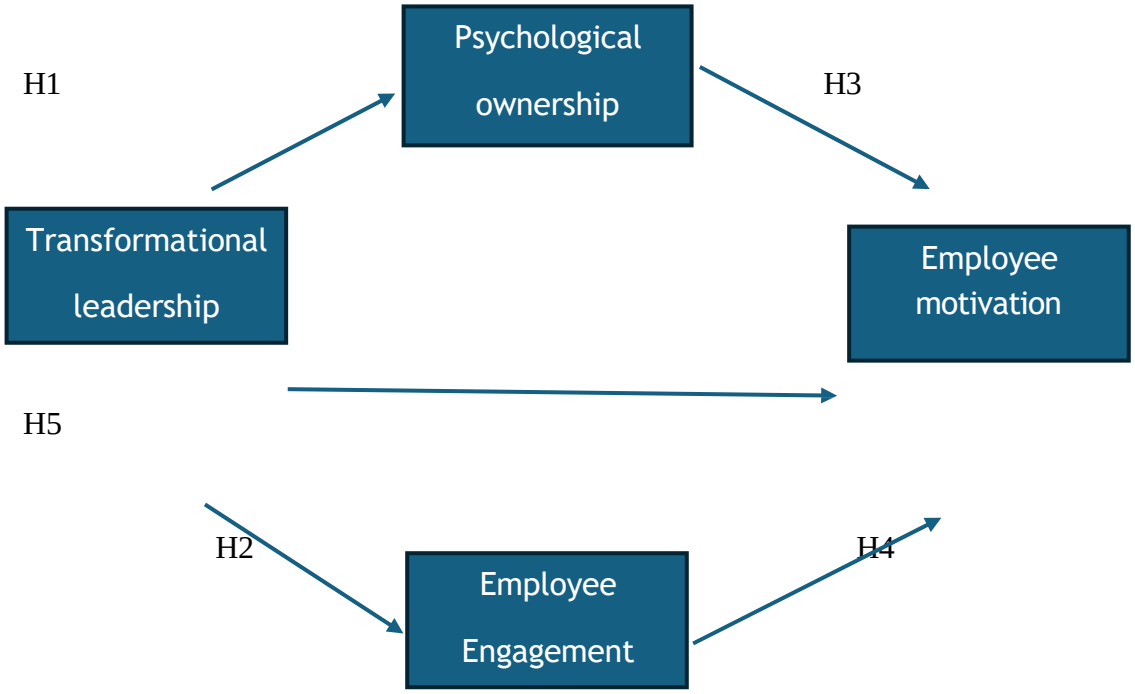
H4: Employee engagement has a favourable impact on employee motivation.

Transformational leadership enhances job satisfaction and motivation among employees in banks and encourages them to develop, work, and identify with company

objectives (Lukita, 2017; Adiwantari, 2019; Yukl, 2009). Leaders support, guide, and offer an opportunity to improve the performance of employees and team outcomes (Saputra & Parwoto, 2020; Armstrong in Edison, 2016).

H5: Transformational leadership exerts a favourable influence on motivation.

Conceptual Model



Research Methodology

The research design is a causal explanatory study, which utilises cross sectional data to determine the influence of workplace factors on employees in HDFC Bank. Purposive sample of 200 employees who will be selected on the basis of relevancy to knowledge and experience will be used to give insights on the study variables. A self-administered questionnaire will be used to collect the data, which will consist of questions regarding the demographics and the variables of interest, including the adaptation to the previous research (LinnVanDyneetal. 2019), which will permit conducting reliable analysis of the relationships between leadership, engagement, ownership, and motivation.

Key Findings from the Study

All constructs had high internal consistency and the Cronbachs alpha was above 0.6 and composite reliability (Aandrho C) wereabove0.7.AVE of all constructs was higher than their correlations with other constructs, which further supported the idea that a construct is

measuring a specific concept and that the overall model is of high quality measurement. The results showed that the total effect to transformational leadership on employee motivation (= 0.587, p = 0.003), employee engagement (= 0.412, p = 0. The level of engagement (= 0.155, = 0.018) as well as psychological ownership (= 0.160, = 0.023) are both significant predictors of motivation. All T-values are above the value of 1.96, which proves that transformational leadership is associated with improved motivation on both direct and indirect levels due to engagement and ownership. Transformational leadership has an indirect influence on employee motivation through two mediators, which are psychological ownership and employee engagement, both of which are statistically significantly greater than 2, which underscores the mediating role of the two. The total indirect effect of transformational leadership on motivation is 0.169 (p = 0.016) supported by a T-value of 2.414..

Implications, Future Scope and Limitations

This paper demonstrates that transformational leadership is an important factor in enhancing employee motivation, engagement, and performance. Inspirational, supportive, and engaging leaders foster the sense of responsibility and psychological ownership which attract individual commitment and an increased work performance. Employee engagement serves as an important channel to such effects. In practice, these insights can be implemented in organizations through training, coaching, and mentoring, meaningful work, clear goals, regular feedback, and supportive and safe work environment. These plans make employees feel inspired, treasured, and competent resulting in increased output and general organizational performance. Future studies have an opportunity to investigate the influence of transformational leadership on motivation based on psychological ownership and engagement of employees in tandem with or in parallel sequence or mediation. Research may also look into some of the moderating variables that include organizational culture, job complexity, remote working and generational differences to determine the conditions under which leadership is most productive. The cross-sectional nature of the study restricts the possibility of making cause and effect out of transformational leadership and motivation and use of self-reported survey scan create bias in the response. The findings may not be applicable in other industries since there were 240 employees in the banking industry. The emphasis on transformational leadership and two mediators, psychological ownership and engagement, does not consider other styles and aspects of leadership, such as culture, workload, or stress

Conclusion

This paper shows that transformational leadership will be effective in improving employee motivation both directly and indirectly by the mediating factors of psychological ownership and employee engagement. The statistical findings validated the reliability and validity of the model with all the major relationships being of strong and significant effects. Theoretically, the study enhances the knowledge of the role of transformational leaders in motivation by mobilizing the internal psychological processes instead of applying the power of extrinsic rewards only. In practice, it focused on the relevance of making leaders inspirational, engaging and instilling a sense of ownership in employees, but this was the extent of the research, and the data used was self-report which has the potential to be biased. The future studies ought to examine other factors and styles of leadership. All in all, this study supports the effectiveness of transformational leadership as a strategic instrument of revitalizing and empowering contemporary workers.

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A Study on Generational Perceptions of Employment Sustainability in the IT Sector

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Abstract

Generational perception of employee sustainability refers to how employees from different age groups (Gen Z, Gen Y and Gen X) view and value long term association with an organization. The core objective of the study is to determine whether there will be any significant difference between age and the factors influencing sustainable employment. A structured questionnaire has been designed to collect primary data from IT sector employees. Convenience sampling method has been used to collect data from 120 IT sector employees. The collected data has been analysed using percentage analysis, descriptive analysis to find the most influencing factor, one-way ANOVA to determine any differences among generations, independent t test to ascertain significant differences on gender and perception of employee sustainability using SPSS software. The findings revealed that recognition, rewards and equitable compensation act as the most significant factor that influences sustainable employment. The study further highlighted that career advancement and betterment of status plays a significant role for longer sustainability in organization. Additionally, the study provides suggestions that will enable employees to remain in the organization for a longer period of time.

***Keywords**: Employee sustainability, Gen X, Y and Z, career growth, betterment of status, IT sector and psychological factors*

Introduction

Generational perceptions of sustainable employment refer to the ways in which different age-based groups perceive, value, and experience long-term employment stability,

career continuity, and professional growth within an organization. In the Information Technology (IT) sector, characterized by rapid innovation and continuous skill transformation, sustainable employment is increasingly perceived in terms of job security, continuous learning, career development, work– life balance, and adaptability to change. The IT workforce is comprises of multiple generations, primarily Generation X, Generation Y (Millennials), and Generation Z, each exhibiting distinct attitudes towards career progression, organizational commitment, and learning opportunities. While older generations may prioritize employment stability and structured career paths, younger. Generations tend to emphasize skill development, flexibility, and meaningful work. These differing priorities significantly influence how sustainable employment is perceived and evaluated across generations. The scope of the study is to assess how different generations in the IT sector perceive sustainable employment. It focuses on long-term career prospects, skill development, job stability, and organizational practices that support continued employability. The study focuses Generation X, Generation Y, and Generation Z, with specific emphasis on career development as a major factor.

Review

Begüm Al (2025), in her study, found that various factors such as hybrid work, employee well- being, work–life balance, and long-term career stability contribute significantly to sustainable employment among female employees in Türkiye. It also identified that reduction in work life balance is considered to be the major barrier to sustainable employment. Additionally, it revealed that hybrid work played a more influential role in sustainable employment compared to other determinants.

Deeya Mishra and Puneet Ojha (2025), in their study, attempted to identify the factors that contribute to long term employment sustainability in organizations. The findings revealed that stress management initiatives, productivity enhancement program, ethical work culture, employee engagement and continuous employee development were the factors which contribute to long term sustainability within the organizations. The study also suggested that although several employees were aware of company's sustainability initiatives, there is a need for workshops and training sessions related to awareness related to sustainability initiatives among employees to ensure that they get maximum benefit from them.

Padmavathi.T (2023), in her study, examined the reasons behind employee sustainability. From the results of the regression analysis it is evident that a positive work environment, employee engagement, employee retention practices and job satisfaction had a positive and significant impact on employee sustainability. The study highlighted that a positive organizational climate and nurturing leadership enhanced employee well being, which further contributed to long term sustainability of employees.

Silvia Lorincováetal. (2019), in their study, determined whether motivational factors influenced sustainable employment. The study found that motivational factors such as work atmosphere, a cohesive work team, job security and a fair appraisal system influenced employees' sustainable employment. The study also indicated that work atmosphere served as a major factor for long term employment sustainability for women employees when compared to men.

Objectives of the Study

1. To identify the most predominant factor that influences sustainable employment.
2. To determine whether there is any significant difference between age and the factors influencing sustainable employment.
3. To examine the employees' perception of sustainable employment.
4. To find if there is any association between income and the impact of career growth on sustainable employment.

Research Methodology

The study is descriptive in nature. The study used both primary and secondary data. Convenience Sampling method has been used for selecting the samples in city of Chennai. Primary data from IT sector employees were collected through a structured questionnaire based on objectives of the study. The sample size is 120. The collected data were analyzed using various statistical methods such as percentage analysis, descriptive analysis, one way ANOVA and independent sample t test, with the help of SPSS software. The secondary data was collected from various articles and journals for the purpose of collecting review.

Analysis and Interpretation

Table 1

Demographics

Particulars		No. of. Respondents	Percentage
Gender	Male	48	40
	Female	72	60
	Total	**120**	**100**
Age in years	21 – 28 years	44	37
	29 – 44 years	51	42
	45 – 60 years	25	21
	Total	**120**	**100**
Income Per Month	Less than 50,000Rs	49	41
	50,000 Rs–1,24,999 Rs	38	32
	1,25,000 Rs– 2,50,000 Rs	23	19
	Above 2,50,000 Rs	10	8
	Total	**120**	**100**

Source: primary data

Table1 represents the demographics of the study.

a) Majority of them were **female** respondents.
b) **37%**of them belongs to 21–28years**(GenX)**,**42%**belongs to 29–44years**(Gen Y)** andtheremaining**21%** belongs to45–60years **(GenZ)**.
c) Only few respondents have an income of more than**2,50,000Rs**.

Table 2

Factors Influencing Employee Sustainability

Descriptive Statistics					
FACTORS	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Work life integration	120	1	5	**4.23**	1.035

Recognition, rewards and equitable Compensation	120	1	5	**4.37**	.810
Employee well being And flexibility in work	120	1	5	**4.34**	.865
Job security	120	1	5	**4.30**	1.009
Technological adaptability and Innovation climate	120	2	5	**4.08**	.894
Workplace autonomy And role clarity	120	1	5	**4.19**	.938
Performance Recognition and fair appraisal system	120	1	5	**4.36**	.942
Psychological factor	120	2	5	**4.02**	.889
Learning and up skiling opportunities	120	1	5	**4.09**	1.012
Valid N (list wise)	120				

Source: primary data

Descriptive analysis has been used to find the factor that influences most for sustainable employment. From the results it is evident that Recognition, rewards and equitable compensation with the highest mean (4.37) is considered to be the most influencing factor for long term sustainable employment, followed by other factors such as Performance recognition and fair appraisal system, Employee well being and flexibility in work, Job security, Work life integration, Work place autonomy and role clarity, Learning and up skilling opportunities, Technological adaptability and innovation climate. The least influencing factor has been identified as psychological factor with a mean score of (4.02).

ONEWAYANOVA: To find examine if there is any difference between age and the factors influencing sustainable employment

H_0: There is no significant difference between age and the factors influencing sustainable employment.

H_1: There is significant difference between age and the factors influencing sustainable employment.

Table 3

ONEWAY ANOVA Representing the Difference Between Age and the Factors Influencing Sustainable Employment

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Work life integration	Between Groups	5.222	1	5.222	5.041	**.027**
	Within Groups	122.244	118	1.036		
	Total	127.467	119			
Recognition, rewards and equitable Compensation	Between Groups	6.828	1	6.828	11.301	**.001**
	Within Groups	71.297	118	.604		
	Total	78.125	119			
Employee well being and flexibility in work	Between Groups	7.842	1	7.842	11.403	**.001**
	Within Groups	81.149	118	.688		
	Total	88.992	119			
Job security	Between Groups	2.842	1	2.842	2.834	**.095**
	Within Groups	118.358	118	1.003		
	Total	121.200	119			
Technological adaptability and Innovation climate	Between Groups	4.017	1	4.017	5.201	**.024**
	Within Groups	91.149	118	.772		
	Total	95.167	119			
Learning and upskiling opportunities	Between Groups	1.646	1	1.646	1.614	**.206**
	Within Groups	120.345	118	1.020		
	Total	121.992	119			
Work place autonomy and role clarity	Between Groups	7.531	1	7.531	9.155	**.003**
	Within Groups	97.061	118	.823		
	Total	104.592	119			
Psychological factor	Between Groups	2.190	1	2.190	2.816	**.096**
	Within Groups	91.777	118	.778		
	Total	93.967	119			

Performance recognition and fair appraisal system	Between Groups	8.594	1	8.594	10.455	**.002**
	Within Groups	96.998	118	.822		
	Total	105.592	119			

Source: primary data

The above table represents a difference between age and the factors influencing sustainable employment. The p values for the factors Job security (0.095), Learning and upskilling opportunities (0.206) and psychological factor (0.096) are greater than the significant value 0.05at 5 % level. Hence the null hypothesis (H_0) is accepted, and it can be concluded that there is no significant difference between age and these factors influencing sustainable employment. The rest of the factors have a significant difference between age and the factors as their p value are lesser than (0.05) at 5 % level of significance.

ONEWAY ANOVA: To find whether there is any difference between age and the perception of employees towards sustainable employment

H_0: There is no significant difference between age and the perception of employees towards sustainable employment

H_1: There is significant difference between age and the perception of employees towards sustainable employment

Table 4

ONEWAY ANOVA Representing the Difference between Age and the Perception of Employees towards Sustainable Employment

ANOVA						
		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**
The organization's Policies ensure long- term employment opportunities for employees.	Between Groups	0.285	1	0.285	0.363	**0.548**
	Within Groups	92.64	118	0.785		
	Total	92.925	119			

Employees are treated fairly, which supports sustainable employment.	Between Groups	3.1	1	3.1	3.995	**0.048**
	Within Groups	91.566	118	0.776		
	Total	94.667	119			
Efforts are fairly recognized, encouraging long-term commitment to the organization.	Between Groups	4.055	1	4.055	4.03	**0.047**
	Within Groups	118.737	118	1.006		
	Total	122.792	119			
Work aligns with personal values, Fostering long-term commitment.	Between Groups	1.671	1	1.671	1.392	**0.24**
	Within Groups	141.629	118	1.2		
	Total	143.3	119			
The organization's mission and vision	Between Groups	0.025	1	0.025	0.023	**0.88**
Motivate employees to sustain employment.	Within Groups	129.966	118	1.101		
	Total	129.992	119			
Employees feel Equipped to handle future challenges, Supporting sustainable employment.	Between Groups	7.895	1	7.895	6.785	**0.01**
	Within Groups	137.305	118	1.164		
	Total	145.2	119			
Opportunities to innovate and Contribute ideas Encourage sustained engagement.	Between Groups	0.001	1	0.001	0.001	**0.969**
	Within Groups	110.665	118	0.938		
	Total	110.667	119			

Fair distribution of work load encourages long-term Commitment to the organization.	Between Groups	0.86	1	0.86	0.688	**0.409**
	Within Groups	147.465	118	1.25		
	Total	148.325	119			
Cross-functional experiences help employees feel confident about staying with the organization.	Between Groups	2.97	1	2.97	2.957	**0.088**
	Within Groups	118.497	118	1.004		
	Total	121.467	119			

Source: primary data

The results of one way ANOVA reveal that p value for perceptions such as the organization's policies ensure long-term employment opportunities (0.548), alignment of values with personal values (0.24), the organization's mission and vision as motivation (0.88), opportunities to innovate and contribute ideas (0.969), fair distribution of workload (0.409) and cross-functional experiences (0.088) is greater than 0.05 at 5% level of significantcehence the null hypothesis H_0 is accepted therefore there is no significant difference between age and the perception of employees towards sustainable employment. Other Perceptions have the p value is lesser than 0.05 at 5 % level of significance and therefore they have a significantly differ with the age factor.

Independent sample t test: To determine whether there is any difference between gender and the perception of employees towards sustainable employment

H_0: There is no significant difference between gender and the perception of employees towards sustainable employment

H_1: There is significant difference between gender and the perception of employees towards sustainable employment

Table 5

Independent Sample T Test Representing the Difference Between Gender and the Perception of Employees towards Sustainable Employment

Independent Samples Test										
		Levene's Test For Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
The organization's Policies ensure	Equal variances assumed	0.281	0.597	1.527	118	**0.13**	0.25	0.164	-0.074	0.574
long-term employment opportunities for employees.	Equal variances not assumed			1.549	105.666	0.124	0.25	0.161	-0.07	0.57
Employees are treated fairly,	Equal variances assumed	6.721	0.011	-0.835	118	0.406	-0.139	0.166	-0.468	0.191
which supports sustainable employment.	Equal variances not assumed			-0.793	82.894	**0.43**	-0.139	0.175	-0.487	0.21

Efforts are fairly recognized, encouraging long-term commitment to the organization.	Equal variances assumed	9.583	0.002	0.366	118	0.715	0.069	0.19	-0.307	0.446
	Equal variances not assumed			0.353	88.305	**0.725**	0.069	0.197	-0.322	0.461
Work aligns with personal values, fostering long-term commitment.	Equal variances assumed	1.899	0.171	1.923	118	**0.057**	0.389	0.202	-0.012	0.789
	Equal variances not assumed			1.97	108.642	0.051	0.389	0.197	-0.002	0.78
The organization's mission and vision motivate employees to sustain employment.	Equal variances assumed	0.023	0.88	2.438	118	**0.016**	0.465	0.191	0.087	0.843
	Equal variances not assumed			2.412	97.129	0.018	0.465	0.193	0.082	0.848
Employees feel equipped to Handle future challenges, supporting sustainable employment.	Equal variances assumed	3.418	0.067	3.611	118	**0.001**	0.708	0.196	0.32	1.097
	Equal variances not assumed			3.77	113.753	0.001	0.708	0.188	0.336	1.081

Opportunities to innovate and Contribute ideas encourage sustained engagement.	Equal variances assumed	1.15	0.286	2.158	118	**0.033**	0.382	0.177	0.031	0.732
	Equal variances not assumed			2.238	112.195	0.027	0.382	0.171	0.044	0.72
Fair distribution of workload Encourages long- term commitmentto the organization.	Equal variances assumed	14.688	0.001	-1.103	118	0.272	-0.229	0.208	-0.641	0.182
	Equal variances not assumed			-1.028	76.918	**0.307**	-0.229	0.223	-0.673	0.215
Cross-functional Experiences help employees feel	Equal variances assumed	2.229	0.138	3.728	118	**0.001**	0.667	0.179	0.313	1.021
Confident about staying with the organization.	Equal variances not assumed			3.925	115.444	0.001	0.667	0.17	0.33	1.003

Source: primary data

The above table shows the difference between gender and the employees' perception towards sustainable employment. The p value for the perceptions such as the organization's policies ensure long-term employment opportunities (0.13), fair treatment of employees (0.43), recognition of efforts (0.725), alignment of values with personal values (0.057) and fair distribution of workload (0.307) is greater than 0.05 at 5 % level of significance hence, the null hypothesis H_0 is accepted and therefore there is no significant differences between

gender and the employees' perception towards sustainable employment. There maining perception such as the organization's mission and vision as motivation (0.016), equipped to handle future challenges (0.001), opportunities to innovate and contribute ideas(0.033)and cross-functional experiences(0.001) has the p value less than 0.05 at 5 % level hence, the null hypothesis H_0 is rejected and therefore there is significant differences between gender and the employees' perception towards sustainable employment.

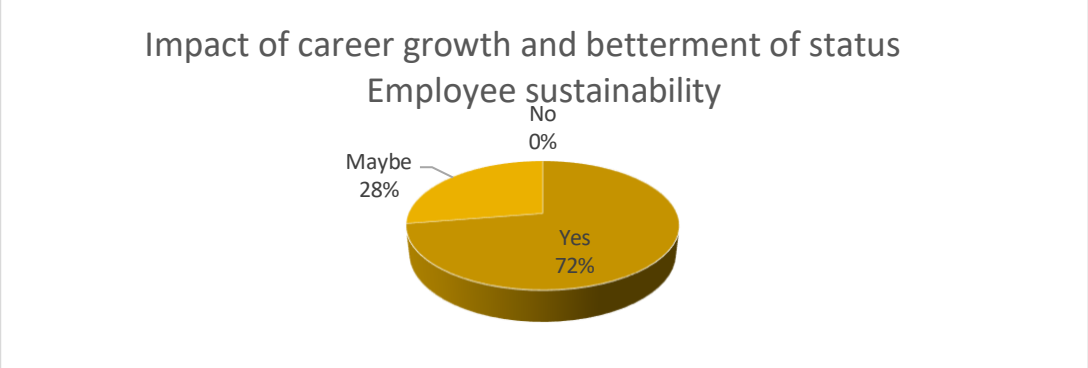
Table 6 Percentage Analysis

Employee Perception on Importance of Career Growthand Betterment of Status as A Factor for Sustainable Employment

Particulars	No. of. Respondents	Percentage
Yes	87	72.5
Maybe	33	27,5
No	0	0
Total	**120**	**100**

Source: primary data

Figure 1



Source: primary data

Figure 1 shows the impact of career growth and betterment of status as a significant factor on employee sustainability. **72%** of the employees be leve that they have a strong influence of career growth and betterment of status on sustainable employment,**28%** have a partial influence in this regard and **none** of them are against to this statement. This indicates that career growth and betterment of status has a significant influence on sustainable employment.

Findings of the Study

A. Recognition, rewards and equitable compensation act as the most important factor for sustainable employment among employees.
B. There is no significant difference between age and the factors such as sustainable employment Job security, Learning and upskilling opportunities and psychological factor on sustainable employment.
C. There is no significant difference between age and the perception of employees such as the organization's policies ensure long-term employment opportunities, alignment of values with personal values, the organization's mission and vision as motivation, opportunities to innovate and contribute ideas, fair distribution of workload and cross-functional experiences, towards sustainable employment.
D. There is no significant differences between gender and the employees' perception namely organization's policies ensure long-term employment opportunities, fair treatment of employees, recognition of efforts, alignment of values with personal values and fair distribution of workload, towards sustainable employment.
E. 72 % of the employees believe that they have a strong influence of career growth and betterment of status acts as the significant factor for sustainable employment.

Limitations of the Study

i. The study focuses only on IT sector employee of Chennai City.
ii. Since the study is based on perceptions, the findings cannot be generalised.
iii. The sample size is restricted to 120 respondents.

Suggestions based on the Study

a) Employees feel that greater peace of mind and a supportive work environment are essential to sustain long-term association with the organisation.
b) More structured skill development and training programmes should be initiated by organisations to upskill employees in line with future job role requirements.
c) Regular feedback should be collected from employees to understand and fulfil their evolving needs, thereby ensuring long-term employment sustainability.

Scope of Future Research

a) The scope of the research can be extended to other sectors such as banking, healthcare, education, or manufacturing to compare generational perceptions across industries.

b) Additional variables such as organisational culture, leadership style, emotional intelligence, and diversity and inclusion may be included to gain deeper and more comprehensive insights.
c) Future research can be undertaken across different countries to examine differences in generational perceptions of employment sustainability across diverse geographical contexts.

Conclusion

The study concludes that employees belonging to GenX, GenY, and GenZ in the IT sector exhibit varying perceptions of employment sustainability**,** influenced by factors such as recognition and rewards, fair appraisal systems, employee well-being, flexibility, and career growth. Recognition, rewards, and equitable compensation emerged as the most influential factor, while career growth and betterment of status were perceived as critical for long-term sustainability by a majority of employees. The findings reveal that although certain factors and perceptions differ across generations, adopting balanced and inclusive organisational practices is essential for promoting sustainable employment in the IT sector.

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Generations and Sustainability: Understanding Employee Engagement across Different Age Groups

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Abstract

Sustainability is now an essential concern in all industries due to the extraordinary environmental and societal problems that humanity is currently confronting. Although individual engagement varies greatly across age patterns, sustainable practices have become a crucial part of modern environmental, economic, and social policies. Out of the various factors age is the most significant and prevalent factor which influence how each generation engages, which in turn shapes and moulds their generational work attributes and perspectives on employee engagement. It has been observed that generational differences play a significant role in workplace engagement. While newer generations (Millennials, Gen Z) place a higher priority on purpose, flexibility, well-being, quick growth, and technology integration, older generations (Gen X, Boomers) frequently value loyalty, stability, and structure. This study investigates how participation in sustainable practices is influenced by generational disparities. The study draws attention to differences in environmental consciousness, lifestyle preferences, and decision-making styles amongst Baby Boomers, Generation X, Millennials, and Generation Z. In order to increase overall engagement in sustainable development, the necessity of age-specific techniques and promotion of inter-generational cooperation should be encouraged

***Keywords**: Generations, Sustainable practices, Employee engagement, Workplace*

Introduction

Generational diversity and the growing emphasis on sustainability are two significant elements that influence employee attitudes and workplace behavior in today's organizations.

Employees in modern businesses come from a variety of generations, each influenced by distinct historical occurrences, societal ideals, and technical developments. The ways that people think, speak, and interact with organizational activities are influenced by these generational differences. At the same time, businesses looking to lessen their impact on the environment, increase their social responsibility, and develop long-term resilience have made sustainability a top focus. Since these two elements interact in ways that significantly impact employee engagement, it is crucial to comprehend them both. Sustainability is an organization's commitment to social and environmental well-being, but how employees view, embrace, and participate in these initiatives depends on their generational makeup. Sustainability may be important to different age groups for a variety of reasons, from resource conservation and economic viability to ethical identity and climate advocacy. Organizations can therefore create more effective communication techniques, encourage greater engagement, and create a workplace culture that fosters collective responsibility by acknowledging the junction between generational qualities and sustainability concerns.

Generational Differences

Generational differences refer to the unique characteristics, values, and behaviours shared by groups of people born during the same historical period. These variations result from the social, technological, and economic circumstances that each generation grows up in. Variations in attitudes, communication styles, career preferences, and involvement in social concerns can be better understood by taking into account these generational characteristics. In this study we are focussing on people from three different generations, they are,

Generation X (Born 1965–1980)

These are people who are

- Aware of experienced economic uncertainties and technological developments.
- Independent, practical, and adaptable.
- Value work–life balance and personal autonomy.
- Comfortable with both traditional and digital communication.

Generation Y/ Millennials (Born 1981–1996)

These include

- Those who grew up with globalization, digital expansion, and advanced education.

- Collaborative, socially conscious, and tech-savvy.
- Value meaningful work, flexibility, and a positive workplace culture.
- Strong interest in sustainability and ethical practices.

Generation Z (Born 1997–2012)

This group comprises of

- Digital natives who have grown up in a fully connected world.
- Innovative, fast-learning, and highly adaptive.
- Value diversity, inclusion, and social impact.
- Strongly engaged in climate action, sustainability, and digital communication.

The above segmentation helps in recognising the age diversity of the team for harnessing the range of experience and skills which enable the critical role that employee play in any organisation.

Sustainability

Meeting current requirements without endangering the capacity of future generations to meet their own needs is referred to as sustainability. It is about making responsible use of economic, social, and environmental resources to ensure their long-term availability and health.

Types of Sustainability

- **Environmental Sustainability**

  Environmental sustainability across sectors focuses on reducing ecological impact, conserving natural resources, and lowering pollution.

- **Social Sustainability**

  Social sustainability emphasizes well-being, equity, safety, and quality of life for people in all sectors.

- **Economic Sustainability**

  Economic sustainability ensures long-term financial stability and responsible economic growth.

Generational Impact on Sustainability Engagement

Generational differences impact how employees view and participate in workplace sustainability programs. Older personnel frequently assist sustainability by maximizing

resource efficiency and adhering to corporate regulations. Younger employees, particularly Millennials and Generation Z, demand organizations to be environmentally and socially responsible. When sustainability is consistent with personal beliefs and company culture, younger generations are more likely to participate. From a business standpoint, sustainability plans must accommodate several generational motives. Organizations that customize sustainability programs for different age groups have increased employee engagement. This study examines how generational differences affect employee engagement in sustainability practices. It aims to help organizations design inclusive sustainability strategies that appeal to a multigenerational workforce.

Review of Literature

1. **Šakytė-Statnickė et al., (2023)** explored on how different generations' work involvement affects organizational engagement and aimed to ascertain whether work engagement and organizational engagement differ between generations. According to the study's findings, Gen Z employees show the most direct positive impact of job engagement on organizational engagement, whereas Baby Boom employees show the weakest direct impact.

2. **David D'Acunto, Raffaele Filieri & Fevzi Okumus (2025)** examined how Gen Z engages in electronic word-of-mouth (eWOM) about the sustainability policies of hotels, with an emphasis on cultural, socioeconomic, and environmental factors. The study found that millennials concentrate on cultural aspects, while the earlier generations exhibited greater engagement with environmental and socioeconomic issues. Additionally, when Gen Z talks about sustainability, ratings are positively correlated with environmental content but negatively correlated with social and cultural features.

3. **Vineeta Kumari Parihar & Sarvesh Singh (2025)** examined the expectations, motivations, and preferences of Millennials and Generation Z in the workplace in order to improve talent retention tactics. It was determined that companies that embrace employee-centric strategies and adapt to changing workforce dynamics will not only draw top talent but also create an encouraging work environment where younger employees are motivated, involved, and dedicated to long-term success.

Need for the Study

Employees in today's organizations come from all generations, each with a unique set of views and levels of involvement in sustainability efforts. While some employees are driven by environmental and social responsibility, others participate because of practical or organizational demands. Companies must understand generational disparities in order to effectively engage employees and increase involvement in sustainability projects. This study provides insights in developing sustainability plans that engage employees of all ages and fosters a more inclusive and engaged workforce.

Objectives of the Study

- To study the perception of different age groups with regard to sustainability in the workplace.
- To identify the generation that participate the most in sustainable workplace activities.
- To understand the factors influencing employees from different generations to be more sustainable.

Limitations of the Study

- The sample taken for the research was only 114.
- Generational views on sustainability may change over time because of social, economic, and technological developments, which can affect the long-term usefulness of the study's results.
- The study was carried out only in Chennai due to time constraints.
- The information collected may not be applicable to other regions with different economic status.

Research Methodology

This study is an empirical investigation on understanding the employee engagement in various sustainability practices across different age groups. Data was gathered using both primary and secondary sources. The primary data was collected from employees of different organizations using a well-designed, structured questionnaire. The sample size chosen for the study was 114, based on convenience sampling. Out of the 120 questionnaires circulated only 114 were eligible for the study. Secondary data were gathered from articles, research papers, books, journals, and online sources. The respondents chosen for the study were the employees belonging to different fields and age categories.

Percentage Analysis and One way ANOVA were used for the purpose of analysis.

Hypothesis

- **H₀:** There is no significant difference among generations towards participation in sustainability practices (environmental, economic, and social).
- **H₀:** There is no significant difference among experience of the employees and their perception in sustainability practices (environmental, economic, and social).
- **H₀:** There is no significant difference among generations and factors influencing sustainability engagement (environmental, economic, and social).

Data Analysis & Interpretation

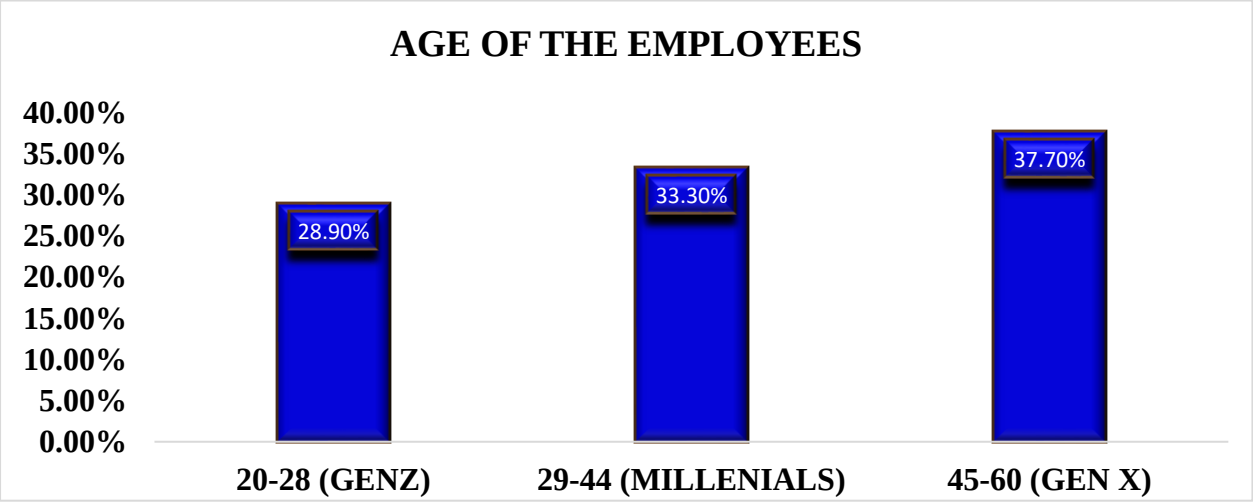
Table 1

Analysis of the demographic factor- Age

Age	Frequency	Percent	Valid Percent	Cumulative Percent
20-28 (GENZ)	33	28.9	28.9	28.9
29-44 (MILLENIALS)	38	33.3	33.3	62.3
45-60 (GEN X)	43	37.7	37.7	100.0
Total	**114**	**100.0**	**100.0**	

Chart 1

Age of the employees



Interpretation 1: The above table shows that majority of the respondents were from the age group of 45-60 (37.7%).

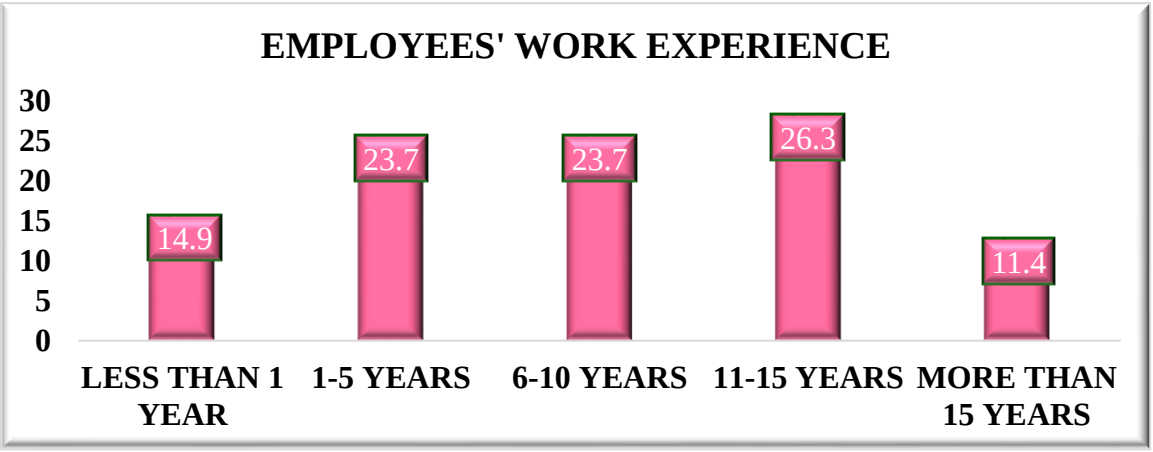
Table 2

Analysis of the demographic factor- Experience

Experience	Frequency	Percent	Valid Percent	Cumulative Percent
LESS THAN 1 YEAR	17	14.9	14.9	14.9
1-5 YEARS	27	23.7	23.7	38.6
6-10 YEARS	27	23.7	23.7	62.3
11-15 YEARS	30	26.3	26.3	88.6
MORE THAN 15 YEARS	13	11.4	11.4	100.0
Total	**114**	**100.0**	**100.0**	

Chart 1

Employees' work experience



Interpretation 2: The above table shows that majority of the respondents had 10-15 years of experience (26.3%).

Objective 1: To study the perception of different age groups with regard to sustainability in the workplace

Table 3

Age vs Participation in Sustainability Practices - ANOVA

Participation in Sustainability Practices		Sum of Squares	Df	Mean Square	F	Sig.
Environmental sustainability	Between Groups	22.769	2	11.385	10.301	**.000**
1. I actively participate in recycling	Within Groups	122.678	111	1.105		
and waste reduction efforts.	Total	145.447	113			

2. I try to conserve electricity, water, and other resources at work	Between Groups	13.599	2	6.799	5.755	**.004**
	Within Groups	131.138	111	1.181		
	Total	144.737	113			
Economic sustainability 3. I avoid unnecessary expenses and use company resources effectively.	Between Groups	17.055	2	8.528	6.434	**.002**
	Within Groups	147.129	111	1.325		
	Total	164.184	113			
4. I follow cost-saving initiatives introduced by the organisation.	Between Groups	8.569	2	4.285	3.593	**.031**
	Within Groups	132.378	111	1.193		
	Total	140.947	113			
Social sustainability 5. I treat people from all age groups respectfully and support inclusive practices.	Between Groups	8.555	2	4.278	3.528	**.033**
	Within Groups	134.576	111	1.212		
	Total	143.132	113			
6. I take part in activities that promote employee well-being and positive work culture.	Between Groups	22.474	2	11.237	9.263	**.000**
	Within Groups	134.649	111	1.213		
	Total	157.123	113			

Interpretation 3: The ANOVA table shows significant differences across generations towards participation in sustainability practices, as all p-values are less than the 0.05 ($p < 0.05$). Therefore, the null hypothesis is **rejected**, and the alternative hypothesis is **accepted**. This confirms that generational differences significantly affect employee participation in sustainability practices.

Table 4

Experience vs Perception on Sustainability- ANOVA

Perception on Sustainability		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Environmental sustainability 1. I believe that environmental sustainability is important for the future of the organisation.	Between Groups	34.672	4	8.668	7.010	**.000**
	Within Groups	134.775	109	1.236		
	Total	169.447	113			

2. My generation is aware of the need to reduce waste and protect the environment.	Between Groups	24.085	4	6.021	4.499	**.002**
	Within Groups	145.880	109	1.338		
	Total	169.965	113			
Economic sustainability 4. My generation understands the situational importance of reducing financial waste in the workplace.	Between Groups	38.188	4	9.547	8.477	**.000**
	Within Groups	122.759	109	1.126		
	Total	160.947	113			
3. I believe that efficient use of company resources contributes to sustainability.	Between Groups	16.882	4	4.220	3.512	**.010**
	Within Groups	130.978	109	1.202		
	Total	147.860	113			
Social sustainability 5. I firmly believe that social well-being and fairness are essential elements of workplace sustainability.	Between Groups	19.602	4	4.901	5.849	**.000**
	Within Groups	91.319	109	.838		
	Total	110.921	113			
6. My generation values respect, inclusion, and positive work relationships.	Between Groups	28.004	4	7.001	5.205	**.001**
	Within Groups	146.602	109	1.345		
	Total	174.605	113			

Interpretation 4: The ANOVA table indicate significant differences across experience of the employees and their perceptions in environmental, economic, and social sustainability, as all p-values are less than 0.05 ($p < 0.05$). Therefore, the null hypothesis is **rejected**, and the alternative hypothesis is **accepted**. This confirms that employees experience significantly influence employees' perceptions on sustainability in the workplace.

Table 5

Factors Influencing Sustainability Engagement - ANOVA

Factors Influencing Sustainability Engagement		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Environmental sustainability 1. Training and awareness programs encourage me to engage in eco-friendly practices.	Between Groups	28.966	2	14.483	11.103	**.000**
	Within Groups	144.788	111	1.304		
	Total	173.754	113			

2. Easy-to-follow environmental guidelines motivate me to participate.	Between Groups	14.659	2	7.329	6.390	**.002**
	Within Groups	127.306	111	1.147		
	Total	141.965	113			
Economic sustainability 3. Clear communication about cost-saving benefits encourages sustainable behaviour.	Between Groups	8.370	2	4.185	2.905	**.059**
	Within Groups	159.885	111	1.440		
	Total	168.254	113			
4. Reward or recognition for efficient resource usage motivates me.	Between Groups	12.202	2	6.101	5.557	**.005**
	Within Groups	121.868	111	1.098		
	Total	134.070	113			
Social sustainability 5. A respectful, supportive work culture increases my sustainability engagement	Between Groups	17.188	2	8.594	6.609	**.002**
	Within Groups	144.329	111	1.300		
	Total	161.518	113			
7. My generational values and cultures influence my engagement in sustainability practices	Between Groups	19.132	2	9.566	7.504	**.001**
	Within Groups	141.500	111	1.275		
	Total	160.632	113			
6. Collaboration with colleagues of different age groups improves my sustainable behaviour.	Between Groups	10.967	2	5.484	4.348	**.015**
	Within Groups	139.980	111	1.261		
	Total	150.947	113			

Interpretation 5: The ANOVA table shows that the null hypothesis is **rejected** for training and awareness programs, environmental guidelines, rewards and recognition, supportive work culture, generational values, and cross-generational collaboration, as significant differences exist among generations ($p < 0.05$). The null hypothesis is **accepted** for clear communication about cost-saving benefits, as no significant generational difference was found ($p > 0.05$). Overall, the results show that **most factors influencing sustainability engagement vary significantly across generations**.

Major Findings

- Majority of the respondents belonged to the 45-60 age categories (37.7%).
- Majority of the respondents had 10-15 years of experience (26.3%).
- At 5% level of significance the null hypothesis was rejected and generational differences significantly affect employee participation in sustainability practices.
- At 5% level of significance the null hypothesis was rejected and employees experience significantly influences employees' perceptions of sustainability in the workplace.
- At 5% level of significance the null hypothesis was rejected for training and awareness programs, environmental guidelines, rewards and recognition, supportive work culture, generational values, and cross-generational collaboration, as significant differences exist among generations.
- At 5% level of significance the null hypothesis was accepted for clear communication about cost-saving benefits, as no significant generational difference.

Suggestions

- Organizations should design sustainability programs that consider the values and the interests of different age groups.
- Companies can provide regular training and awareness programs to improve employee understanding of sustainability practices.
- Management should encourage cross-generational collaboration to share ideas and best sustainability practices.
- Organizations should regularly review and update sustainability strategies to match changing employee attitudes.
- Leaders should actively involve employees in decision-making to increase engagement.

Conclusion

Generational differences have a substantial impact on employee engagement in sustainability projects. These distinctions influence how sustainability projects are perceived and implemented inside firms. Companies that understand generational preferences can create specialized initiatives, training programs, and engagement tactics to encourage participation. Engaging employees of different ages improves overall organizational sustainability performance and fosters workplace culture. Organizations that match business sustainability

goals with generational incentives can reap long-term environmental, social, and economic advantages. Understanding and harnessing these generational insights is critical to develop effective and inclusive sustainability initiatives.

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Work – Life Balance in the Age of Digital Transformation: A Study on AI Tools and Sustainable Practices in Educational Institutition

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Abstract

The highly progressing digital transformation in educational institution plays a vital role in reshaping the work environment of teaching staffs. The use of AI tools, Online platforms and sustainable digital practices has introduced various new opportunities for improving the work efficiency, reducing administration workload and enable flexible work arrangements. Meanwhile, these changes have created many challenges like extended working hours, technology induced stress etc. This study aims to analyses the Ai-Driven tools and sustainable digital practices on the work- life balance of higher-level educators. Using a mixed method approach, this study investigates how digital systems support teaching, communication and evaluates whether digital transformation contribute or hinder personal well-being. The findings expected to spot best practices that promote healthier work-life integration and helps institution in designing digital strategies to gain faculty satisfaction

Keywords: *Digital Transformation, AI -Tools, Work-Life Balance, Faculty well-being, Digital Workload*

Introduction

Traditional work patterns in a variety of industries, including education, have been reshaped by the swift expansion of digital revolution. The nature of academic and non-academic employment has changed dramatically with the incorporation of AI tools like chatbots, learning management systems, automated assessment platforms, and administrative analytics. Although these technological developments are intended to increase productivity and

decrease workload, they also present difficulties including digital overload, continual connectedness, and work-life imbalance.

The importance of work-life balance for both institutional productivity and employee well-being is becoming more widely acknowledged. It is important to comprehend how these technologies affect the boundaries between work and personal life as educators and staff adjust to new AI-driven work patterns. This study offers a descriptive examination of how work-life balance in educational institutions is shaped by AI tools and sustainable digital practices.

Review of Literature

1. Selwyn (2016) highlighted that by integrating technology into regular workflows, digital transformation in education transforms teaching, administration, and communication processes. AI tools improve decision-making and optimize processes.
2. Davenport and Ronanki (2018) claim that AI enhances human capacities and lessens repetitious jobs, particularly in academic and administrative roles. Chatbots and automated grading save workload and enhance time management.
3. Work-life balance, according to Greenhaus and Allen (2011), is the capacity of an individual to successfully balance work and personal obligations. According to research, depending on usage and institutional support, digital tools may either enhance or upset this balance.
4. According to Tarafdar et al. (2019), "technostress," which is brought on by constant connectivity, digital overload, and the need to react quickly, is a significant problem in digital workplaces.
5. Barth (2015) emphasized the need of sustainability in educational environments, particularly digital sustainability—making sure technology improves wellbeing rather than posing unforeseen challenges.

Objectives of the Study

1. To examine how AI tools affect work-life balance in academic settings.
2. To determine the difficulties that staff and educators are facing as a result of the digital transition.
3. To investigate sustainable methods that facilitate efficient AI tool integration.
4. To make suggestions for utilizing digital technologies to improve work-life balance.

Research Methodology

Research Design

Using secondary data, prior research, and observable insights from educational practices, this study employs a descriptive research approach.

Data Collection

Journals, books, reports, research articles, and scholarly websites are examples of secondary data.

Qualitative insights

Feedback patterns from instructors in digitally transformed institutions provide qualitative insights.

Sampling

The literature was reviewed and pertinent papers on AI tools, digital transformation, sustainability, and work-life balance were chosen using purposeful sampling.

Data Analysis

The current study is based on secondary data analysis, its interpretation is dependent on previously published studies, academic publications, institutional reports, and recorded practices concerning AI tools, digital transformation, and work-life balance in educational institutions. The data was methodically analysed and interpreted using a thematic analysis approach.

To comprehend the impact of AI-driven digital revolution on educators' work-life balance, the gathered data was analysed, contrasted, and arranged into major thematic dimensions. The following is an interpretation of the main topics found in the analysis:

- AI tools improve work-life balance by lowering the amount of paperwork that needs to be done and increasing the amount of work that is done in schools.
- Digital technologies promote work-life integration; however, the absence of regulated working hours may reduce their positive impact.
- AI tools have the potential to severely impact work-life balance by extending working hours beyond traditional timetables in the absence of appropriate digital boundaries.

- When deciding whether AI tools improve or impede work-life balance, digital proficiency plays a crucial role.
- Sustainable digital strategies strengthen the positive relationship between AI adoption and work-life balance.

The data's overall interpretation indicates that work-life balance in educational institutions is affected in different ways by AI-driven digital transformation. While AI tools increase productivity and adaptability, stress and imbalance are exacerbated by poor deployment and a lack of sustainable measures. A healthy work-life balance is largely dependent on institutional policies and moral digital habits.

Findings of the Study

1. Through automation, digital attendance, and online exams, AI tools greatly minimize administrative workload.
2. Digital platforms facilitate distant collaboration and flexible working hours by increasing accessibility.
3. Overuse of digital technologies causes burnout, technostress, and a blurring of work-life boundaries.
4. Staff members become anxious and lose faith in digital tools due to a lack of AI training.
5. Sustainable digital practices, such as scheduled offline hours, ergonomic digital policies, and AI-guided workload distribution, improve well-being and productivity.
6. Organizations that implement explicit digital policies report higher employee job satisfaction.

Limitations of the Study

1. Primary data collection was excluded from the study, which is based on secondary data.
2. Depending on an institution's level of digital maturity, results may differ.
3. As AI develops quickly, results could eventually change.
4. Deeper investigation may be hampered by restricted access to institutional digital policy frameworks.

Suggestions of the Study

1. Offer faculty and staff digital literacy and AI training.

2. Put in place sustainable digital policies, such as limited online meetings and set digital hours.
3. To facilitate flexible scheduling, promote hybrid working methods.
4. To lessen digital weariness, support mental health and wellbeing initiatives.
5. Use low-stress, user-friendly AI solutions to reduce workload instead of making activities more difficult.
6. Regularly assess digital tools to make sure they promote work-life balance.
7. Use IT support and ergonomic infrastructure to bolster institutional support systems.

Conclusion

AI-powered digital transformation is transforming educational institutions by increasing accessibility and efficiency. Although there are many advantages to these technology, there are drawbacks as well, such as stress, workload, and a blurring of personal and professional boundaries. Institutions can strike a balance between staff well-being and technological growth by implementing sustainable practices and appropriate digital policies. This study highlights the necessity of ethical digital innovation in educational institutions and advances knowledge of AI-driven work settings.

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Analyzing the Impact of Workplace 4.0 Technologies on Employee Performance in the Education Sector

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Abstract

The integration of Workplace 4.0 technologies into educational institutions has prompted a significant transformation in the traditional modes of operation, offering potential benefits and challenges for employee performance. This research paper aims to analyze the impact of Workplace 4.0 technologies on employee performance within the education sector. Through a comprehensive review of existing literature, both theoretical frameworks and empirical studies are examined to understand the various dimensions of this impact. The study investigates how technologies such as AI, automation, virtual collaboration tools, and data analytics influence different aspects of employee performance, including productivity, job satisfaction, skill development, and work-life balance. Furthermore, the research delves into potential barriers and facilitators that mediate the relationship between Workplace 4.0 technologies and employee performance in educational settings. By synthesizing insights from diverse sources, this paper provides valuable implications for HR practitioners, policymakers, and educational leaders seeking to optimize the integration of technology while fostering a conducive work environment for employees in the education sector

***Keywords**: Education sector, Workplace 4.0, HR Implication, Automation, Work-life*

Introduction

In an era marked by rapid technological advancements, the integration of Industry 4.0 technologies into various sectors has become increasingly prevalent. With its transformative potential, the adoption of Workplace 4.0 technologies has revolutionized traditional work environments, reshaping processes and enhancing efficiencies across industries. Among these sectors, the education sector stands as a crucial domain, tasked not only with imparting knowledge but also with adapting to the evolving demands of a digital age.

The integration of Workplace 4.0 technologies in educational institutions has presented a myriad of opportunities and challenges. As educators and administrators strive to optimize operations, improve learning outcomes, and enhance the overall educational experience, the role of technology in facilitating these objectives cannot be overstated. From interactive learning platforms and virtual classrooms to data analytics and artificial intelligence-driven educational tools, the landscape of education is undergoing a profound transformation propelled by technological innovation.

Amidst this transformation, one of the paramount considerations is the impact of Workplace 4.0 technologies on employee performance within the education sector. While technological advancements promise increased productivity, streamlined workflows, and personalized learning experiences, they also introduce complexities that necessitate a comprehensive understanding of their implications for educators and staff. As such, it becomes imperative to critically analyze how the integration of these technologies influences various facets of employee performance, ranging from pedagogical practices to administrative responsibilities.

This research paper endeavors to explore and evaluate the multifaceted relationship between Workplaces 4.0 technologies and employee performance in the education sector. By delving into the pertinent literature, empirical studies, and case analyses, this study aims to elucidate the mechanisms through which technological interventions shape the professional landscape of educators and administrative staff. Furthermore, it seeks to identify the challenges encountered and the opportunities presented by the adoption of these technologies, offering insights into strategies for maximizing the benefits while mitigating potential drawbacks.

Through a comprehensive examination of the current landscape, this research endeavors to contribute to the growing body of knowledge surrounding the intersection of technology and education. By providing evidence-based insights and actionable recommendations, it aims to inform stakeholders within the education sector, including policymakers, administrators, educators, and technology providers, thereby fostering informed decision-making and facilitating the effective utilization of Workplace 4.0 technologies to enhance employee performance and ultimately, the quality of education delivery.

Review of Literature

According to Wirawan (2019), performance is output produced by the functions or indicators of a job or a profession within a certain time. Term performance is used to indicate output of a company/organization, tools, management functions (production, financial marketing), or output of an employee. Performance is very important, because performance can find out how great their ability to complete tasks assigned to it.

Job satisfaction is a positive feeling that an employee feels towards his job. In accordance with research conducted by Hendra Kurniawan and Arasy Alimudin (2015) conclude that job satisfaction has a significant influence on employee performance. According to M.D.S.H. Perera and W.A.S. Weerakkody (2016) in hi research states that job satisfaction influence on employee performance. According to Mohammed Inuwa and Abdullahi Muhammad (2016) conclude that job satisfaction has a positive and significant influence on employee performance.

The concept of job satisfaction is not easy and because it is related to human feelings and perceptions. Employee feel they have job satisfaction if they have the perception that rewards they receive for carrying out job exceeds the individual labor and costs they have incurred, and the difference is still enough to fill his life.

Statement of Problem

The integration of Workplace 4.0 technologies in the education sector presents a multifaceted challenge regarding its impact on employee performance. Amidst promises of increased efficiency and innovation, the precise effects on educators' productivity, engagement, and effectiveness remain uncertain. This research aims to systematically investigate this phenomenon by examining the current state of Workplace 4.0 technology adoption in educational institutions and dissecting its implications on various dimensions of employee performance. Key questions to be addressed include the identification of specific benefits and challenges perceived by educational professionals, the influence of individual and organizational factors on the relationship between technology and performance, and the development of strategies to optimize outcomes. Through rigorous analysis and empirical inquiry, this study seeks to shed light on the complexities surrounding Workplace 4.0 technologies in education, providing actionable insights to enhance both technological integration and employee performance within educational settings.

Research Objectives

- To analyze the impact of Workplace 4.0 technologies on different aspects of employee performance.

Research Hypothesis

H1: Productivity has a positive impact on an employee' performance in the workplace. 4.0 technology

H2: Efficiency has a positive impact on employees' performance in the workplace. 4.0 technology

H3: Job satisfaction has a positive impact on employee performance in the workplace. 4.0 technology

H4: Skill development has a positive impact on employee performance in the workplace. 4.0 technology

Research Methodology

Based on the identification of problems and hypothesis that have been formulated, the variables measured in this study consisted of four independent variables, including productivity, efficiency, job satisfaction, and skill development and one dependent variable, employee performance.

The type of sample used is Non-probability random sampling, there is convenience sampling, where samples are taken based on the availability of samples and the ease of getting them. The samples are taken from the school teachers in the urban areas of Tirunelveli District. Nearly 150 school teachers have been identified and data has been collected through questionnaire. In this study, the regression analysis is performed using SPSS.

Analysis and Interpretation

Table 1

Demographic Profile of the Respondents

Stratification Variables	Category	Frequency	Percentage
Gender	Men	31	20.67
	Women	119	79.33
Age Groups	25-35	57	38.00
	Above 35	93	62.00

Work Groups	Primary	35	23.33
	Secondary	73	48.67
	Higher Secondary	42	28.00
Martial Status	Married	109	72.67
	Unmarried	41	27.33
Working Period	0-5 years	56	37.33
	5-10 years	73	48.67
	Above 10 years	21	14.00

Source: Primary Data

The table delineates the demographic composition of the respondents, shedding light on key variables including gender, age groups, work groups, marital status, and working period. Notably, the majority of respondents are women, comprising nearly 80 percent of the sample, while men constitute around 20.67 percent. Moreover, the data indicates a prevalence of older individuals, with 62 percent falling above the age of 35. Married respondents dominate the marital status category, accounting for over 70 percent of the sample. In terms of work groups, secondary work groups boast the highest representation, followed by primary and higher secondary groups. Additionally, a significant portion of respondents (48.67 percent) report a working period of 5-10 years. Overall, this demographic snapshot underscores the importance of considering diverse perspectives and experiences when analyzing the results of the study or survey.

Based on Table 2 show the results of the multiple linear regression model are contained in the calculation of the formula which will be tested with a significance level of $\alpha = 0.05$, then the equation is: Employee Performance = 1.645 + 0.543(Productivity) + 0.876(Efficiency) +0.713(Job satisfaction) + 0.661(Skill development) + e

Table 2

Multiple Regression Analysis

Model	**Unstandarized**		**Standarized**	**t test**		**F test**		**Coefficient**
	Coefficient		**Coefficient**					**Determination**
	B	**Std.Error**	**Beta**	**T**	**Sig.**	**F**	**Sig.**	
(Constant)	1.645	0.403		4.18	0.000			
Productivity	0.543	0.120	0.468	2.43	0.042			

Efficiency	0.876	0.187	0.321	3.44	0.002			
Job satisfaction	0.713	0.135	0.258	3.65	0.000			
Skill development	0.661	0.178	0.178	2.94	0.011			
Regression						12.11	0.000	
R								0.614
R Square								0.377
Adj. R Square								0.351

In this multiple regression analysis, several independent variables— Productivity, Efficiency, Job Satisfaction, and Skill Development—are examined for their impact on a dependent variable. The results indicate statistically significant positive relationships between the dependent variable and each of the independent variables: productivity, efficiency, job satisfaction, and skill development. Particularly noteworthy is the strong influence of job satisfaction, followed by efficiency and productivity, on the dependent variable. The overall regression model is highly significant, suggesting that these variables collectively have predictive power. The model explains approximately 37.7% of the variance in the dependent variable, indicating a moderate level of explanatory strength. These findings underscore the importance of considering various factors such as job satisfaction, productivity, and skill development in understanding and predicting the dependent variable.

Suggestions

1. Develop targeted training programs to enhance employees' digital literacy and proficiency with Workplace 4.0 technologies, customized to their roles and needs within the sector.
2. Continuously assess the integration of Workplace 4.0 technologies, gather employee feedback, and make adjustments to ensure alignment with organizational goals and employee needs.
3. Utilize Workplace 4.0 technologies to facilitate collaboration and knowledge sharing among educators and staff, enhancing efficiency, skill development, and community building.
4. Pay attention to ethical and equity implications, ensuring technological accessibility for all employees and mitigating any potential exacerbation of existing inequalities.

Conclusion

In analyzing the impact of Workplace 4.0 technologies on employee performance in the education sector, this study considered key variables including productivity, efficiency, job satisfaction, and skill development. The results reveal significant positive relationships between these variables and employee performance. Notably, job satisfaction emerged as a particularly influential factor, followed by efficiency, productivity, and skill development. These findings suggest that implementing Workplace 4.0 technologies can enhance employee performance in the education sector by improving job satisfaction, increasing efficiency, boosting productivity, and fostering skill development. Consequently, organizations in the education sector should prioritize the adoption and integration of these technologies to optimize employee performance and ultimately achieve organizational objectives. Moreover, future research could delve deeper into specific Workplace 4.0 technologies and their distinct impacts on employee performance within the education sector, providing valuable insights for practitioners and policymakers alike.

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An Empirical Study on Work-Life Integration and Job Satisfaction Among Women Academicians in Colleges with Reference to Chennai City

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Abstract

Work–life integration refers to the purposeful merging of professional duties and personal life roles to create a smooth and adaptable balance. Instead of viewing work and personal spheres as separate, it emphasizes developing synergy that allows individuals to handle diverse responsibilities with greater flexibility. Within today's academic landscape, the sustainability of institutions is closely tied to the well-being of their employees, making this issue particularly significant for women faculty members. As they often manage simultaneous obligations at home and in the workplace, maintaining effective work–life integration becomes a crucial factor that shapes their job satisfaction and overall performance. This study explores the degree of work–life integration and job satisfaction among women academicians in Chennai-based colleges. The study adopts a quantitative research approach; a structured questionnaire is utilised to collect responses from the Women educators. It also examines the major determinants affecting their work–life integration and sheds light on the challenges they face while striving to balance personal and professional obligations

***Keywords**: Work-life integration, Women academician, job satisfaction, Work – life challenges, Employee performance, Higher education institution*

Introduction

Transforming higher education has significantly reconfigured the profession of the academician and expanded their duties beyond serving in the capacity of teaching to include research productivity, administrative involvement, student mentorship, and institutional service. In light of these expectations, faculty women's proficiency in successfully aligning professional and personal roles has become a critical issue on college campuses.

Work–life integration represents a move towards flexible enmeshing of paid work and personal pursuits, surfacing as an emergent logic in the context of complexity in contemporary academic work settings. In this regard women academicians has faced a lot of issues in managing work–life integration because working and traditional family responsibilities are demanded form them at the same time.

The constellation of features of academic work is such that it often presents long hours, performance demands, and blurring of (ie) home and work It can affect their psychological wellbeing, job satisfaction, and long-term career sustainability. Insufficient work–life balance may result in stress, low efficiency, and weak commitment of individuals and therefore influencing both personal performance and the life of an organization.

Women faculty members make up a significant proportion of the academic workforce in Indian higher education, particularly in urban areas like Chennai. Although they become ubiquitous, little empirical inquiry has examined how work-life integration and the challenges of multitasking impact their job satisfaction. This type of interaction is important to consider and study in our efforts to develop more supportive institutional policies and practices aimed at improving faculty well-being while enhancing organizational effectiveness.

Review of Literature

Dhan Raj Chalise (2022), titled The empirical case of Quality of work life and job satisfaction in the Nepalese banking sector, showed that the work-life factors and Job Satisfaction in the banking sector of Nepal found that the Quality of work life is a crucial aspect for organizational sustainability since it increases with job satisfaction and leads to greater contribution from employees. Quality of work life and job satisfaction among employees in Nepalese commercial banks. With 150 employee data points, the result indicated a positive correlation between the two variables. The workplace, learning and development, leadership and employee empowerment were found to have a stronger impact on quality of work life than pay and job security.

Renu Bhadoria & Dr. Pooja Chaturvedi (2022), titled A Study of Work-Life integration and Its Impact on Performance of Academic Staff in Universities of Madhya Pradesh, showed that work-life integration is the need for combining work pressures with

personal responsibilities that lead to improved organizational performance. A study carried out with 413 university academics in Madhya Pradesh (India) investigated five work-life integration practices: job sharing, flexible time, working from home, paternity leave and emergency leave. The findings discovered that work sharing, paternity leave and emergency leave significantly influenced staff performance, while flexible time and work-from-home arrangements had no significant impact.

Rathod, M. S. H., & Shivthare, (2016), This study of work and life integration has received considerable emphasis because of demographically and sociologically driven trends. The role of women in the workforce has undergone a significant shift worldwide. The present paper is an effort to understand the difficult challenges that women face in the workforce in maintaining the work-life balance. The different parameters that influence the work and life balance of married women in the workforce have been analyzed in this research.

Research Gap

In spite of the increasing scholarly interest in work–life issues in higher education, empirically driven studies have mainly concentrated on issues relating to work–life balance as opposed to integration and, more specifically yet, for women academicians. Besides, there has been a lack of region-specific quantitative exploration in the Indian higher education setting exploring the predictors to work-life integration and its association with job satisfaction from a sustainability perspective at an institutional level, particularly in the colleges based in Chennai.

Objectives of the Study

1. To examine the level of work–life integration and job satisfaction among women academicians in colleges in Chennai city.
2. To identify the key factors influencing work–life integration among women academicians.
3. To examine the challenges of work–life integration on job satisfaction among women faculty.

Research Methodology

This study has employed an empirical research methodology, in which findings are derived from analyses based on actual data. The respondents' answers were gathered using a standardized questionnaire.

Sampling Technique: Convenience sampling technique was adopted for the study, as the respondents were selected based on their accessibility and willingness to participate.

Data Collection: The study has used both primary and secondary data. The primary data were collected from the respondents through a well-structured questionnaire, and for the secondary data, the study utilizes journals, Publications, and web sources that were already published.

Data Analysis Tools: Percentage Analysis, Charts, Tables, Correlation Test are the data analysis tools that have been used in this study.

Data Analysis and Interpretation

Inferential Analysis and Interpretation

H0: There is no significant relationship between family responsibilities and work-life integration among women academicians.

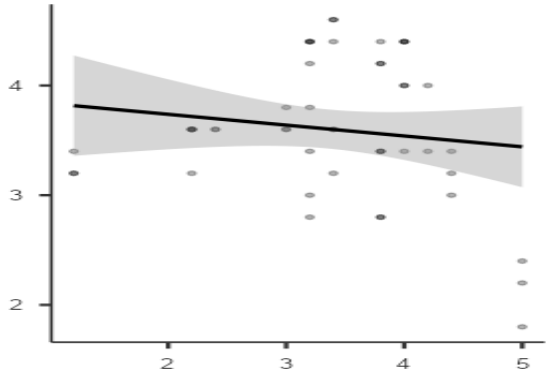
H1: There is a significant relationship between family responsibilities and work-life integration among women academicians.

Table 1

Variables	Pearson's (r- value)	df	p-value
Family Responsibilities & Work–Life Integration	–0.145	48	0.316

Source: Primary Data

Plots:



Inference: Since the p-value of 0.316 is greater than 0.05 the H1 is rejected, and it is concluded that there is a no significant relationship between family responsibilities and work-life integration among women academicians.

H0 : There is no significant relationship between organisational support and work-life integration among women academicians.

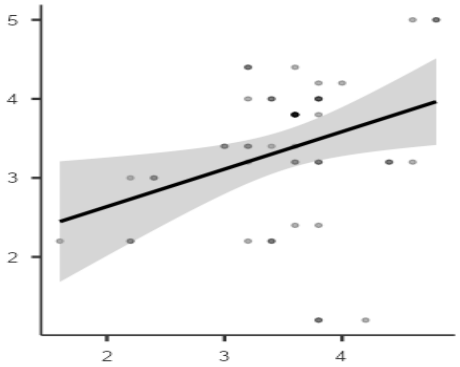
H1: There is a significant relationship between organisational support and work-life integration among women academicians.

Table 2

Variables	Pearson's (r-value)	df	p-value
Organizational Support & Work–Life Integration	0.342	48	0.015*

Source: Primary Data

Plots :



H0: Work-life integration has no significant impact on job satisfaction among women academicians.

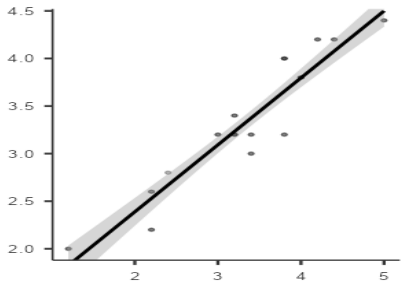
H1: Work-life integration has significant impact on job satisfaction among women academicians.

Table 3

Variables	Pearson's (r - value)	df	p-value
Work–Life Integration & Job Satisfaction	0.943	32	< 0.001

Source: Primary Data

Plots:



Inference: Since the p-value of 0.001 is less than 0.05 the H1 is accepted, and it is concluded that there is a significant impact of Work-life integration on job satisfaction among women academicians.

H0: There is no significant relationship between work–life integration challenges and job satisfaction among women faculty.

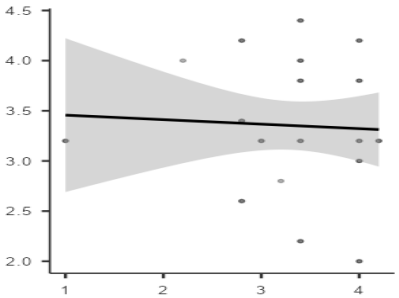
H1: There is significant relationship between work–life integration challenges and job satisfaction among women faculty.

Table 4

Variables	Pearson's r	df	p-value
Work–Life Integration Challenges & Job Satisfaction	–0.051	32	0.773

Source: Primary Data

Plots:



Suggestions of the Study

- A safe, inclusive, and gender-sensitive work environment should be promoted, transparent and equitable promotion processes should be ensured, and educational institutions should establish structured mentorship programs. The achievements of female academicians should be acknowledged on the basis of performance and merit, eradicating bias and gender preconceptions.

- It is highly suggested that daycare centers be established on campus. These facilities would allow women academicians, who frequently take on primary caregiving responsibilities, to carry out their professional tasks more effectively and with better peace of mind.
- By reducing the amount of secretarial and non-academic labor that academics are allotted, institutions should reevaluate the workload of their faculty. Stress can be decreased and job satisfaction raised by hiring specialized administrative personnel or offering rewards for taking on more duties.
- It is important to set clear guidelines for working hours, including the use of weekends off when practical. This would enhance work-life integration by enabling female academicians to participate in personal activities and spend enough time with their families.
- Instead of being overburdened with non-teaching duties, women academicians should be encouraged to concentrate primarily on teaching, research, and academic advancement.
- Academicians are urged to employ efficient time management techniques, keep a positive outlook, and deal with work-related stress in a healthy way, even though institutional assistance is essential.

Conclusion

The proposed research aims to investigate the concept of work-life integration and job satisfaction among women academics in colleges in Chennai city, clarifying the related factors and associations. The research would provide key inputs regarding how woman faculty members experience and handle work and personal life. The study highlights the necessity of institutional initiatives to improve work-life integration in light of these findings. Reducing non-academic and clerical duties, rationalizing teacher workloads, and offering organizational support through open promotion rules, mentorship programs, and gender-sensitive working practices are some of the main recommendations. Important steps to support women academicians include the creation of childcare or daycare centers and the restriction of working hours, including clearly defined weekend offs.

Even though organizational assistance is essential, individual tactics like efficient time management and stress reduction can help improve work-life balance. The study's overall

findings indicate that work-life integration is a significant factor in determining women academician's job satisfaction and that improving it calls for concerted efforts by educational institutions and legislators. Women academicians in higher education institutions may experience increased job satisfaction, less stress, and continued professional commitment as a result of implementing supportive organizational practices.

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Green Skills for a Greener Future: Training Employees for SDG Excellence

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Abstract

The transition toward sustainable and responsible business practices have increased the need for employees equipped with competencies aligned to the United Nations Sustainable Development Goals (SDGs). This study explores how training and development initiatives contribute to building "green skills" essential for achieving organizational sustainability. It examines the role of HR and Learning & Development (L&D) systems in integrating SDG-focused training modules, promoting environmental awareness, ethical decision-making, social responsibility, and innovation-driven practices. The paper also analyses employee perceptions of SDG-based training effectiveness and its impact on workplace behaviour, performance, and long-term organizational resilience. By highlighting the importance of structured learning programs, continuous upskilling, and sustainability-driven organizational culture, the research provides insights into how companies can prepare a future-ready workforce. The findings emphasize that developing SDG competencies not only enhances employee capability but also strengthens an organization's contribution to global sustainability targets.

***Keywords**: SDG Competency, Green Skills, Training & Development, Sustainability, Workforce Upskilling, HRD, Sustainable Employment, Organizational Learning*

Introduction

The shift to a sustainable global economy has made it essential for organisation to emphasise the development of green skills. The workforce must have the skills desired for advancing resource efficiency, climate- friendly innovation, and environmentally responsible practices as businesses commit to the Sustainable Development Goals (SDGs) of the united nations. Employees with green skills can make a significant contribution to the sustainability

objectives of the company. These skills encompass everything from environmental awareness and carbon footprint management to the adoption of sustainable technology. SDG-focused training and development initiatives eliminate skill gaps, encourage eco-friendly behaviour among staff members and reinforce a sustainable culture at all organisational levels. Organisations can improve performance and ensure long-term resilience in a market that is turning more environmentally conscious by incorporating green learning into HR and business strategies. Hence, understanding the role of employees training in advancing SDG excellence is essential for building a greener and more responsible future.

Objectives

- To evaluate how crucial green skills are to meeting SDG goals and organisational sustainability.
- To determine the fundamental SDG-based abilities that employees must possess in today's workplace.
- To assess how well training and development initiatives develop green skills.
- To examine how employees, feel about and are prepared for skills development centred on sustainability.
- To suggest strategies for building training in green skills into HR and organisational growth plans.

Review of Literature

Shahryar Sorooshian (2024): Existing studies show that although the SDGs provide a global development framework, progress remains uneven due to gaps in research attention, weak data quality, and limited interdisciplinary collaboration. While research output on SDGs has grown since 2015, it remains fragmented and misaligned with global needs. Overall, scholars stress the need for more balanced, data-driven, and collaborative research to effectively support the 2030 Agenda.

Chris Brewster, Michael Brookes (2024): Literature shows increasing interest in connecting HRM with the UN Sustainable Development Goals (SDGs), yet scholars argue progress remains limited due to conceptual ambiguity in both HRM and SDG frameworks. Studies highlight that emerging HRM approaches—such as sustainable, green, and socially responsible HRM—offer promise but often lack clarity, consistency, and practical influence. Overall, research suggests that unclear constructs, limited HRM power, and contextual barriers hinder meaningful HRM contributions to achieving the SDGs.

Peterson K. Ozili (2022): Existing literature shows growing global interest in sustainability and sustainable development, with research highlighting varied regional progress and persistent challenges. Studies emphasize that social, economic, environmental, and governance dimensions shape sustainable development outcomes, while factors like weak institutions, political constraints, and resource gaps hinder progress. Empirical research further demonstrates that integrating sustainability into economic activities, governance systems, and business practices yields positive benefits. Overall, literature calls for stronger coordination and context-specific strategies to advance sustainable development.

Research Methodology

Sample Technique	Convenience Sample
Research Design	Descriptive
Sample Size	153 samples
Period of Study	1 Month
Analysis Tools	Percentage Analysis, Reliability Analysis, Correlation Analysis, Kruskal-Wallis Test.

Data Collection

- Primary Data: Well Structured questionnaire.
- Secondary Data: Books, Journal, Web Sources, Research articles.

Data Analysis and Interpretation

Table 1

Age of the Respondents

Particulars	**Frequency**	**Percentage %**	**Interpretation**
Below 25 years	29	19	19% of respondents belong to the age category of below 25 years, 31.4% of respondents belong to 26-35 years , 35.3% of respondents belong to 36-44 years and 14.3% of respondents belong to above 46 years.
26-35 years	48	31.4	
36-44 years	54	**35.3**	
Above 46	22	14.3	
Total	**153**	**100**	

Table 2

Gender of the respondents

Particulars	**Frequency**	**Percentage %**	**Interpretation**
Male	63	41.2	41.2% of respondents are male and 58.8% of the respondents are female.
Female	90	**58.8**	
Total	**153**	**100**	

Table 5

Current job role/position

Particulars	**Frequency**	**Percentage %**	**Interpretation**
Entry level	18	11.8	The majority of respondents 42.5% belong to Middle level, 19.6% belongs to executive, 19% belongs to senior manager, 11.8% belongs to entry level and 7.2% belongs to top management.
Executive	30	19.6	
Middle-level manager	65	42.5	
Senior Manager	29	19	
Top Management	11	**7.2**	
Total	**153**	**100**	

Table 4

Sustainability/SDG Training Experience of Respondents

Particulars	**Frequency**	**Percentage %**	**Interpretation**
Yes	118	**77.1**	The majority of respondents with 77.1% received SDG training and 22.9% did not receive any training.
No	35	22.9	
Total	**153**	**100**	

Reliability Analysis

Cronbach's Alpha	N of Items	No of Respondents	Interpretation
.973	15	153	The reliability analysis yielded a **Cronbach's Alpha value of 0.973** for **15 items**, indicating **excellent internal consistency and reliably measuring the same underlying construct** related to sustainability/SDG dimensions.

Correlation Analysis

H_0- There is no significant relationship between Training Impact on Responsibility Awareness and Sustainability Training Application among Employees.

H_1- There is a significant relationship between Training Impact on Responsibility Awareness and Sustainability Training Application among Employees.

Correlations

		Training Impact on Responsibility Awareness	**Sustainability Training Application**
Training Impact on Responsibility Awareness	Pearson Correlation	1	**.773**
	Sig. (2-tailed)		.000
	N	153	153
Sustainability Training Application	Pearson Correlation	.773**	1
	Sig. (2-tailed)	.000	
	N	153	153

Correlation is significant at the 0.01 level (2-tailed).

Interpretation: The correlation analysis between training impact on responsibility awareness and sustainability training application among employees shows a strong positive correlation (Pearson correlation = .773). Since the relationship is statistically significant, the null

hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted, confirming the effectiveness of sustainability training in influencing workplace behaviour.

Kruskal-Wallis Test

H_0- There is no significant difference in waste reduction behaviour among employees across different job roles.

H_1- There is a significant difference in waste reduction behaviour among employees across different job roles.

Ranks

	Current job role position	N	Mean Rank
Resource Waste Reduction Behaviour	Entry level	18	74.39
	Executive	30	65.23
	Middle level manager	65	72.44
	Senior manager	29	88.40
	Top management	11	110.27
	Total	153	

Test Statistics

	Resource Waste Reduction Behaviour
Chi-Square	12.094
df	4
Asymp. Sig.	.017

a. Kruskal Wallis Test

b. Grouping Variable: Current job role position

Interpretation

A Kruskal-Wallis H Test revealed a statistically significant difference in waste reduction behaviour across job roles where p = 0.017, the null hypothesis is rejected. The mean rank scores indicate that top management employees exhibit the highest level of waste

reduction behaviour followed by senior managers, while executives show the lowest levels. This suggests that hierarchical position influences employees' engagement in sustainable workplace practices.

Findings

- The majority of respondents **35.3%** belong to the age category of 36-44 years.
- The majority of respondents **42.5%** belong to Middle Level Managers.
- The majority of respondents with **77.1%** received SDG training.
- There is a **strong and significant positive relationship** between sustainability training impact and employees' application of sustainability practices at work.
- Waste reduction behaviour differs significantly across job roles, with higher-level management demonstrating greater engagement in sustainable practices than lower-level employees.

Suggestions

- Implement inclusive SDG-focused training for all job-roles.
- Encourage top management and senior managers to act as sustainability champions and mentors across the organisation.
- Incorporate sustainability competencies into recruitment, performance appraisal and reward mechanisms.
- Emphasize hands-on training in waste reduction, energy conservation, and sustainability projects.
- Align policies, communication and daily practices with SDG goals for lasting behavioural change.

Conclusion

This study underscores the importance of SDG-based training in developing green skills and fostering sustainable workplace behaviour. The findings show that sustainability training enhances employee awareness and practices of responsible actions, while waste reduction behaviour differ across job roles, with stronger engagement at higher management levels. Overall, structured training, leadership support, and a sustainability-oriented culture are essential for achieving long-term SDG excellence.

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A Study on HR Competencies on Organizational Performance in IT/ITES Companies in Chennai

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Abstract

This study looks into how Human Resource (HR) skills help improve how companies perform in the IT and ITES sector in Chennai. The research used both interviews with senior HR managers and questionnaires filled out by respondents. Data were collected from 128 respondents working in different IT/ITES companies. The results show that skills like recruitment, appraisals, training, pay, and involving employees help improve organizational results. The analysis using correlation, regression, and factor analysis shows that people's social skills, functional knowledge, technical abilities, and leadership qualities have a strong impact on company performance. The study ends by emphasizing that organized and clear HR practices are key to keeping employees, improving productivity, and supporting long-term growth.

***Keywords**: HR Competencies, Organizational Performance, IT/ITES Industry, Employability*

Introduction

Since the Industrial Revolution, humans have become more involved in business activities. Even with automation and digital tools, the role of people remains important for staying competitive. In the past, workers mainly did physical tasks, but now, success depends more on ideas and thinking.

The IT and ITES industry has grown very fast in India over the last 30 years. It has made a big contribution to the country's economy and created many jobs. For example, its share of the GDP went from 1.2% in 1998 to 7.5% in 2017. This industry relies on skilled and knowledgeable workers. Keeping employees motivated, performing well, and staying with the

company are key challenges. Human Resource Management (HRM) is very important to support this growth. This study looks at how HR skills in IT and ITES companies in Chennai affect how well organizations perform.

Compensation

Compensation means the money and other benefits that employees get from their work. Compensation includes a basic salary, extra pay for overtime work, allowances for specific needs, incentives to encourage good performance, stock options, bonuses, commissions, and profit sharing. Companies give these benefits to attract new employees. They also give benefits to keep current employees happy. Good compensation helps employees stay with the company longer. It also makes employees work harder and can reduce the number of employees leaving the company. Research shows that when employees get pay based on how well they perform, they tend to work more. They also feel satisfied with their jobs. Studies by Frye in 2004 and Huselid in 1995 support this. When companies match their pay systems with their methods for reviewing employees, it creates fairness. This makes employees more committed to their work for a longer time. In companies that work in information technology or IT/ITES, employees often move from one company to another. Because of this high movement, companies must have clear and performance-based pay systems. These systems are very important for the company's growth and success.

About It–Ites Industry

IT in India

The IT business is a big part of India's economy. Lots of companies do work for other countries. Changes like opening up trade, special zones, and tech parks helped it grow fast. In the last ten years, the industry grew about 25% each year. IT services now help in making things, money stuff, cars, chemicals, and consumer goods. They help these areas be better and compete more.

ITES (Information Technology Enabled Services)

ITES, like Business Process Outsourcing (BPO), is a big part of India’s tech story. These services include customer support, handling claims, HR work, health help, web marketing, transcribing, and back-office work. Companies send these tasks to Indian service providers. This saves money and uses India’s talent. Many big companies have their own BPOs or work with Indian firms. This shows India is a leader in ITES.

Statement of the Problem

This study looks at how HR skills affect how well companies in the IT/ITES sector in Chennai do. Employees usually know their tech stuff really well, but they often struggle with talking to others, changing things up, coming up with new ideas, and working well with others. These problems can make it harder for them to get jobs or do well at work. So, we checked how skills like being good with people, leading, adapting, solving problems, and making choices influence company results.

Significance of the Study

This research looks at the skills that management graduates need to get jobs in the IT and ITES sectors. It explains what skills are important. These skills include leadership, managing time, being able to change, working in a group, and talking well with others. The research shows how these skills affect how well someone does in their work. Companies can use this information when they decide how to hire, train, and judge their employees. The research also helps workers by showing them what skills they should improve to get better jobs and move forward in their careers.

Objectives of the Study

1. To assess the level of HR competencies in IT/ITES companies in Chennai.
2. To identify differences in HR competencies among managers.
3. To analyze the relationship between HR competencies and organizational performance.

Hypotheses

- H0: There is no significant relationship between HR competencies and organizational performance.
- H0: There is no significant difference in the influence of each HR competency on organizational performance.

Research Gap

There are many studies about employment and HR practices in different industries. However, there is not much research on IT and IT-enabled services companies in Chennai. This is important because these companies give many jobs and help the economy. Because of this, it is necessary to look closely at what skills and behaviors are needed for success in these companies. Our research aims to fill this gap. We do this by collecting data and analyzing how HR skills are related to company performance in IT and ITES companies in Chennai.

Location of the Study

The study was done in Chennai, a major tech hub in India. Respondents were employees from different departments in IT/ITES companies, aged between 20 and 60. The study focused on skills like adaptability, leadership, teamwork, and problem-solving in this regional setting.

Field Work and Sources Of Data

The primary data were collected through structured interviews and questionnaires. Each interview lasted about one hour. The questionnaires had two parts: one for HRM practices and one for demographic information. Secondary data were collected from journals, books, company reports, and trusted online sources. A total of 128 valid responses were used for analysis.

Research Methodology

A quantitative research design was employed. Data were collected using a 5-point Likert scale questionnaire distributed through random sampling to employees in IT/ITES firms in Chennai. Out of distributed forms, 128 responses were valid for analysis. Statistical tools such as correlation, regression, and factor analysis were applied to evaluate the hypotheses.

Data Analysis

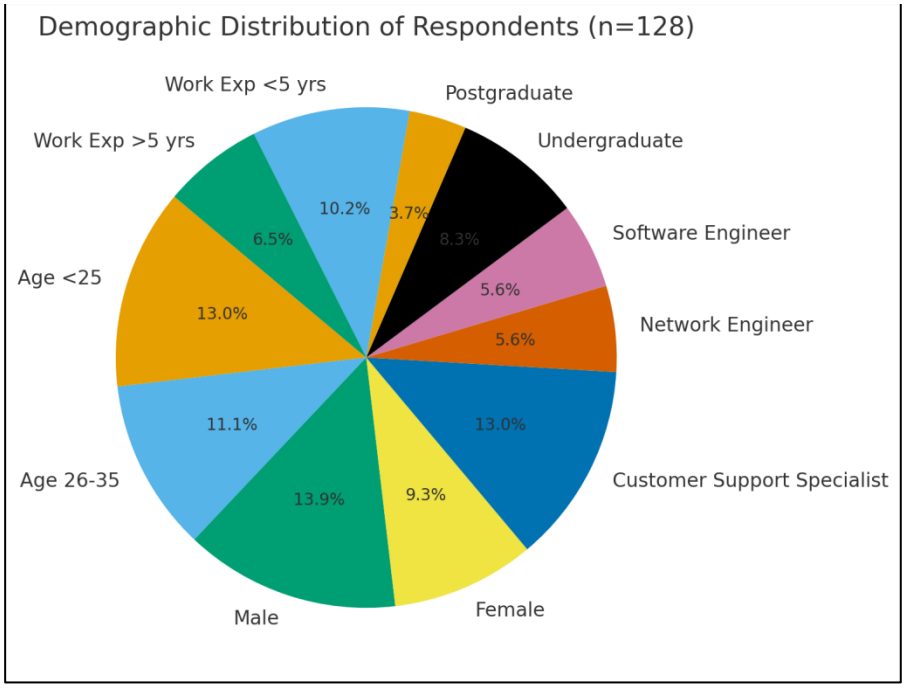
Demographic Profile of Respondents

Table 1

Personal Characteristics of Respondents (n=128)

Category	Frequency	Percent
Age < 25	14	10.9%
Age 26–35	12	9.4%
Male	15	11.7%
Female	10	7.8%
Customer Support Specialist	14	10.9%
Network Engineer	6	4.7%
Software Engineer	6	4.7%
Undergraduate	9	7.0%

Postgraduate	4	3.1%
Work Exp < 5 years	11	8.6%
Work Exp > 5 years	7	5.5%



Interpretation

The demographic profile shows information about the respondents from IT/ITES companies in Chennai. There are 128 participants. Most are young workers. 10.9% are under 25 years old. 9.4% are between 26 and 35 years old. This means most of the workers are early in their careers. Many companies in this industry hire new graduates and young workers.

In terms of gender, 11.7% of respondents are male. 7.8% are female. This shows a small imbalance between men and women. Still, there are many women working in the sector. This indicates progress toward more equality.

Looking at job roles, the largest group is Customer Support Specialists, making up 10.9%. Next are Network Engineers and Software Engineers at 4.7% each. Most respondents work in support or customer-facing roles. This matches the common jobs in Chennai's ITES industry, where many workers are in customer support and BPO services.

Education levels show that 7% have a bachelor's degree. 3.1% are postgraduates. This means many workers are hired as graduates and trained for specific roles. Most workers have

less than five years of experience. Only 5.5% have more than five years. This shows most workers are early in their careers.

Overall, the data shows that companies in Chennai mainly hire young, entry-level workers with degrees. These workers mostly fill support and beginner technical roles. This workforce needs training, mentoring, and good career opportunities to keep employees and reduce turnover.

Table 2

KMO and Bartlett's Test

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.893
Bartlett's Test of Sphericity (Approx. Chi-Square)	5236
Degrees of Freedom (df)	120
Significance (Sig.)	0.000

Interpretation

The Kaiser-Meyer-Olkin (KMO) value is 0.893. This shows that the data is suitable for factor analysis. A KMO value near 1 means the variables are more related. The available value indicates that the data is reliable. Bartlett's Test of Sphericity gave a chi-square of 5236. The p-value is less than 0.01. This shows that the correlation matrix is not an identity matrix. This means that the variables are related and can be grouped into factors. These results support utilizing factor analysis. They show that the study is valid.

Table 3

Results of Exploratory Factor Analysis

Competency Factor	Variables (Loadings)
Interpersonal Skill	Communication (0.837), Creativity (0.826), Teamwork (0.783), Adaptability (0.773), Emotional Intelligence (0.758), Responsibility (0.723)
Functional Skill	Critical Thinking (0.841), Problem Solving (0.637), Information Literacy (0.618)

Technical Skill	Technical Knowledge (0.894), Innovative Abilities (0.879)
Leadership Skill	Motivation (0.807), Conflict Management (0.786), Goal Clarity (0.607)
Organizational Performance	Self-Efficacy (0.577), Financial Performance (0.535)

- Total Variance Explained: 92.283%
- Cronbach's Alpha (Overall Reliability): 0.976

Interpretation

The analysis found five main parts in the 16 HR skills. These are interpersonal skills, functional skills, technical skills, leadership skills, and how well the organization performs. The data shows that these five parts explain about 92.283% of the differences in the data. This means almost all the variation is covered by these five parts. The scale used to measure HR skills has a Cronbach's Alpha of 0.976. This shows the test is very reliable and gives consistent results.

Among these parts, interpersonal skills stand out the most. These include communication, teamwork, flexibility, emotional control, and responsibility. They are important for work in IT and IT-related companies. Functional skills are also important. These include thinking skills, solving problems, and finding information. They help workers meet client needs and run daily tasks. Technical skills and leadership skills are important but less central. This shows that companies want workers to have a mix of soft skills and technical skills.

Table 4

Regression Analysis

Predictor Variable	B (Unstandardized Coefficient)	Std. Error	Beta (Standardized Coefficient)	t-value	Sig.
Constant	-0.85	0.305	—	-2.783	0.006
Interpersonal Skills (x1)	0.136	0.027	0.253	4.967	<0.01*
Functional Skills (x2)	0.528	0.051	0.508	10.406	<0.01*
Technical Skills (x3)	0.127	0.055	0.084	2.317	0.022
Leadership Skills (x4)	0.300	0.071	0.180	4.227	<0.01*

- Multiple R Value: 0.930
- R^2 Value: 0.866
- F Value: 313.818
- p-value: < 0.01

Interpretation

The analysis shows that HR skills are connected to how well a company does. The R^2 value is 0.866, meaning that 86.6% of the change in performance can be explained by these skills. The high F value of 313.818 and p-value less than 0.01 show that the model is statistically important. Of all the skills, functional skills ($\beta = 0.508$) had the biggest effect. Interpersonal skills ($\beta = 0.253$) came next. This includes thinking skills, solving problems, communicating, and adapting, especially in IT/ITES. Leadership skills ($\beta = 0.180$) also helped, showing the importance of motivation and managing conflicts. Technical skills ($\beta = 0.084$) were less important, but still made a positive difference. This analysis shows that technical skills are needed. But what really makes a difference are functional and interpersonal skills. For companies, this means they should train both soft skills and technical skills. This will help build workers who can meet industry needs.

Results & Discussion

We used specific tests to check if our sample data was good enough for analysis. The Kaiser-Meyer-Olkin (KMO) test gave a score of 0.893. This score shows that our data is suitable for factor analysis. We analyzed 16 different variables. After testing, we found that these variables can be grouped into five main topics or factors. These are Interpersonal Skills, Functional Skills, Technical Skills, Leadership Skills, and Organizational Performance. We also checked if our measurements are consistent and reliable. The result was a high Cronbach's alpha of 0.976. This high score indicates that our measurements are very reliable and dependable.

Regression Analysis

We also performed a regression analysis. This analysis shows how well employability skills can predict or estimate organizational performance. The results showed a high level of prediction accuracy. The R-squared value was 0.866. This means that about 87% of the variation in organizational performance can be explained by employability skills. The F-value was 313.818, which shows the overall model is strong and important. The p-value was less

than 0.01, which means the results are very unlikely to be due to chance. We looked at different skills and how they influence performance. We found that Functional Skills have the biggest impact. Interpersonal Skills, Leadership Skills, and Technical Skills also influence performance, but to a lesser degree.

Equation

The equation that explains this relationship is: y = -0.85 + 0.136 (Interpersonal) + 0.528 (Functional) + 0.127 (Technical) + 0.300 (Leadership). This equation shows how each skill contributes to overall organizational performance. Each number represents how much each skill impacts the performance. The positive numbers mean that higher skill levels lead to better performance. The intercept (-0.85) represents the baseline level of performance when all skills are zero. This formula helps us understand which skills are most important for success in organizations.

Interpretation

Overall, our findings show that certain skills are very important. These skills are interpersonal skills and functional skills. They are the most important factors that lead to success in organizations. Technical skills and leadership skills are also important, but they have a smaller effect. We believe that having these skills helps employees and organizations to succeed. These skills help organizations adapt to new changes. They also support innovation and better performance. This is especially true in the IT and IT-enabled services sectors. When employees have these skills, they can perform better. They can also help their organizations improve overall performance and keep up with changes in the industry.

Recommendations

- Compensation Strategies: Offer rewards and recognition programs based on performance.
- Training & Development: Provide regular training on new technologies and client needs.
- Employee Enablement: Create opportunities for employees to participate in decisions to increase engagement.
- Career Planning: Provide clear career paths to help reduce employee turnover.
- Performance Appraisal: Use clear and ongoing evaluation systems to motivate employees.

Conclusion

This study shows that HR skills are important for performance in IT/ITES companies in Chennai. The findings show skills like communication, technical knowledge, and leadership have a big effect on results. These skills explain about 87% of how well the company does. The most important skills are technical and communication skills. They show that thinking skills, problem-solving, teamwork, and communication are needed to succeed in technology companies. The results show that technical skills are important but not enough on their own. Employees with good communication and technical skills are more flexible and able to adapt. Leadership skills help improve overall efficiency by keeping employees motivated and resolving conflicts. These skills are key for building a strong workforce in IT/ITES companies. From the company's view, the study shows that HR practices like pay based on performance, career paths, employee input, and ongoing training are necessary. These helps improve employee happiness and reduce employee turnover. HR managers should focus on both technical and soft skills in hiring, training, and performance reviews. This prepares employees for different challenges. Overall, this research shows that HR plays a big role in helping companies succeed in a knowledge economy. For researchers, it proves that HR skills go beyond helpful but essential for company results. For business leaders, it provides simple, practical advice for making HR policies that focus both on skills and behavior. Future research should study how changes in HR strategies affect company success over time.

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A Study on Employee Perceptions towards HRM Policies in The Indian Banking Sector with Special Reference to Chennai District

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Abstract

Human resources play a decisive role to the overall success of the organization, especially in a banking organization. This is in turn influenced by the HRM practices that the institution adopts. HRM is fundamental because it orients workforce activity toward the organization's objectives and manages people efficiently. It is important for bank managers to understand how their employees are making sense of these HRM practices because this knowledge offers important information about the effectiveness of existing HR policies, employee satisfaction with HR practices, and what areas could benefit from some sort of organizational development. Employees in both public and private sector banks in the city of Chennai are the focus of this study. From the results it can be inferred that there is an average realization of the effectiveness of HRM practices amongst banking organizations in Chennai. This should therefore be a point of more focus for Chennai banks in strengthening their HRM. Improving these practices can help tremendously in increasing performance of employees, lower attrition rates, bridging skill gaps, and establishing performance-based incentives and promotions.

***Keywords**: Human Resource (HR), Human Resource Management (HRM), Public Sector Banks (PSBs), Private Sector Banks (PRSBs), Employee Perception, Chennai Banking Sector*

Introduction

It is a general view that amongst all the organizational assets, human resources are the most important and valuable. Other organizational resources will only be effective and efficient

if human capital, that is well motivated and performing effectively, makes them effective and efficient. HRM is an important tool for harnessing the whole potential of employees and synergizing their growth with that of the organization through a proactive, people oriented process. It is employees' intelligence and emotional energy that now makes the difference in a competitive world. Because they can think critically and act with empathy, people themselves are at the heart of success for any organization. This means that the leadership of the organization has to not only be strategic but it also needs to be emotional when it comes to human resources management.

For Chennai's banking sector, this is of heightened importance. Being the financial epicenter of South India, it is essential for the public and private sector banks functioning in Chennai to have well organized HRM practices in order to be competitive, retain employees and grow over the long term.

HRM in Commercial Banks

Globalization has brought about a huge change in the way economies in different countries operate by dismantling borders and promoting trade and investments across them. The result has been an exponential growth in jobs, particularly in services and especially in the banking sector. This has led to banks being only successful and efficient if they have extraordinary high quality people. This has necessitated the adoption and continuous enhancement of Human Resource Management (HRM) practices in the banks.

Human capital and risk are arguably the two biggest problems for banks within a fast-paced economy and environment in a city such as Chennai. Considering that banking is a labor intensive activity, it is virtually impossible to control risks without having a competent, trained and capable group of people. In commercial banks HRM is also critical in providing stability in operations and excellence in service delivery.

Significance of the Study

Analysis of HRM practices is important for banks as they can help the banks to better comprehend the way they affect the general performance of the organization. The present study is intended to propose dynamic HRM strategies, policies, and practices that could improve the performance of banks. It also renders important contributions to understanding the acceptance

of 'best fit' HRM practices, viewing these as a strategic response to the specific difficulties banks are facing. By concentrating on these dimensions, the paper provides an understanding for the policy makers and decision takers, especially who serve in Chennai's pulsating banking sector, to determine the HRM. The study tends to be distinctive and value addition to the HRM practices. It highlights the crucial role of HRM strategies in promoting organisational performance and sustainability.

Statement of the Problem

The developments in the global economic scenario, particularly the rapid spread of Information and Communication Technology (ICT), changes in the composition of workforce and in values, the emergence of the knowledge economy and competition at the global level, have thrown complex challenges to the service sector including Indian banking. The Indian banking sector is thus undergone tremendous transformations and reforms. Nevertheless, banks encounter problems of their wholesale like a legacy technical base and shortage of relevant staff as well as overmanning which constrains the further development. In overcoming these difficulties, managing HR is the key factor in navigating in the current highly dynamic competitive market. The focus is primarily on discovering the methods for breaking away from the old trend and overcoming new challenges and bottlenecks of the precariously growing banking landscape, including that of rapidly developing and dynamic financial centers such as Chennai.

Review of Literature

Zulfqar and Kabir (2011) also discovered a positive and significant association between HR practices and employee performance. Their research demonstrated that banks should consider the influence HR practices have on individual performance, which affects performance of the bank.

Farid et al. (2014) found that some employees were unhappy with some areas of HRM policies and practices such as job analysis, IT facilities, job evaluation, performance measurement techniques.

Jha and Mishra (2015) have found that many HRM interventions could enhance the performance of banks. These are: staff meetings, brain storming sessions, study circles and quality circles.

Anand (2016) indicated that factors such as employee productivity, recognition, departmental roles, rewards and supervision were critical for building employee engagement through sound practice of HRM in banks.

Chahal (2016) found that high-commitment HRM practice had a positive impact on business performance of an organization and organizational learning played a mediating role between HRM practices and business performance.

Chandra and Kumar (2017) observed that successful HRM practices foster employee commitment and raise organizational performance in banking industry. They pointed out that banks that executed and enforced their HR policies were generating higher levels of employee satisfaction, that was in turn positively related to improved customer service and to financial performance.

Kumar and Singh (2018) also investigated the impact of HR practices on employee motivation in Indian commercial banks. They found that well-designed human resource management strategies like training and rewards and recognition programs had a significant and positive effect

Rajendran & Malini (2019) highlighted the need for employee engagement in the banking industry. They found that banks that emphasized HRM practices seeking employee well-being and development performed significantly better and retained better. Employee engagement was also found to be an important factor of improving organizational performance especially in the competitive banking market of Chennai.

Examination of performance management systems in banks and their impact on organizational outcomes Reddy and Rao (2019) investigated the performance management systems in banks and their impact on organizational performance. According to their research, a robust fair and transparent performance appraisal system did increase employee performance thereby the bank emerged to be the most efficient.

Chin and Fahmi (2020) researched the influence of HRM on the performance of organizations and proved that HRM was significantly associated with the performance of SMEs.

Sundaram and Muthukumar (2020) examined the impact of HR practices on the innovation climate in public sector banks of India. They found out that HRM initiatives like development of learning culture and skill development programs were effective to develop an innovative mindset in employees and enhancing the quality of the problem solving and competitive strategies in the banking.

Singh and Sharma (2021) looked into the role HRM plays in managing stress and burnout among employees in banks in India. The research found that banks, which instituted programs for alleviating employee stress, offered career development opportunities, and granted work-life balance policies, faced less employee burnout, and hence, employees were more satisfied with their jobs and productive.

Patel and Desai (2022) studied the relationship between HRM practices and employee loyalty in the banking sector of India. The research says HR practices of transparent communication, opportunities for growth, and employee welfare programs all have a very strong correlation to employee loyalty and retention, which strengthens organizational performance.

Verma and Bhattacharya (2023) studied the influence of HRM practices prevailing in banks on service experiences of customers. Their findings suggest that if HR practices were focused on training, development, and satisfaction of employees, the banks would be able to ensure better customer service delivery, thus paving the way for a competitive advantage in the market in support of these banks.

The study aims at fulfilling these objectives from the suggested research model:

Objectives of the Study

i. To find out how employees view the HRM practices the banks put into force there.
ii. ii)To analyze whether the employees' demographic features and structural features of banks influence the perception of HRM practices.

Hypotheses

H01: There is no significant difference between Private Sector Banks and Public Sector Banks (PSBs and PRSBs) in HRM Practises.

H02: There is no significant effect of employees' demographic profile, as well as that of structural characteristics of banks, on HRM practices adopted by banks.

Scope of the Study

This attempt towards study will explore in detail HRM practices implementations in banking companies within the Chennai region, including both the public and private sectors.

Research Methodology

The study makes use of both primary and secondary data in analyzing the HRM practices in banking. Primary data were collected through questionnaires filled by bank employees. Secondary data pertinent to the study were collected from different sources such as books, magazines, journals, reports, and websites. A random judgment sampling method was used to comprise a sample of 105 employees for the study. One-way ANOVA and Independent Sample 't'-tests were used to check the effect of demographic profiles and firmographics on HRM practices.

HRM Practices in Banks

HRM practices in banking are interlinked sub-systems that together create an optimally positive work environment (Rowley & Rahman, 2007). Each of these sub-systems might have a bearing upon the HR climate of an organization (Edgar, 2003). The utility got out of these practices depends upon how well they are put to use in reality (Hassan et al., 2006), ranging from recruitment to management control (Chiah-Lew, 2003). Some key HRM practices followed in banks planning human resource, recruitment and selection methods, induction practices designed for fostering internalization of new employees, communication practices designed for transparency, and retention practices for retaining quality employees. In addition, training and development activities are implemented for the skill enhancement of employees, alongside motivational practices to keep morale high. Career development assists in career growth, while employee welfare offers welfare measures to the employees. In carrying out supervisory support, employees provide guidance, while employer-employee relations guarantee

Differential Perceptions of HRM Practices in PSBs and PRSBs

Considering certain HRM practices in banks located in Chennai district, mean scores were considered, and a student’s ‘t’ test was performed. The results of the ‘t’ test suggested that HRM practices differed significantly, in the case of banks belonging to public sector banks

(PSBs) and private sector banks (PRSBs), in the Chennai district. It was revealed that HRM practices were, in general, better and more effective in PRSBs than in PSBs. However, employees of both PSBs and PRSBs rated HRM practices as moderate, with motivational and retention practices that rated low in both sectors in Chennai district.

Table 1

Comparative Vision of Perceived HRM Practices in Banks

HRM Practices	PSBs (Mean)	PRSBs (Mean)	Overall Mean	t-value	Sig.
Human Resource Planning	3.12	3.28	3.20	2.13	0.036
Recruitment & Selection	3.40	3.52	3.46	2.45	0.016
Induction	2.95	3.20	3.08	2.22	0.029
Communication	3.05	2.90	2.98	1.85	0.068
Training & Development	3.18	3.48	3.33	2.78	0.007
Motivation	2.65	3.10	2.88	3.05	0.003
Career Development	3.26	3.41	3.34	2.10	0.038
Employee Welfare Measures	2.92	3.06	2.99	1.92	0.057
Supervisory Support	3.22	3.29	3.26	1.44	0.152
Employer-Employee Relationships	3.08	2.88	2.98	1.96	0.053
Performance Appraisal	2.70	3.21	2.96	2.66	0.009
Employee Retention	2.61	3.04	2.83	2.74	0.007
Overall	3.02	3.18	3.10	2.59	0.011

H01: There is no significant disparity in the HRM practices between public and private sector banks (PSBs and PRSBs).

Influence of Demographic and Structural Characteristics on HRM Practices

The study aimed to investigate if the employee demographics and the structural features of the banks had any significant effect on the HRM practices that were implemented. To confirm this, one-way ANOVA and Independent Sample 't' tests were used. ANOVA was employed to test differences between more than two groups, whereas the 't' test was used for

two-group testing. In the study, the perceived HRM practices were employed as the dependent variable, whereas the employee demographics and the bank structure features were employed as independent variables. The analysis was used to test the hypothesis that there is no significant effect of these variables on the HRM practices that are implemented by the banks.

Table 2

ANOVA for Influence of Demographic Profile on Perceived HRM Practices

HRM Practices	Age (F, Sig.)	Education (F, Sig.)	Family Size (F, Sig.)	Designation (F, Sig.)	Experience (F, Sig.)	Monthly Salary (F, Sig.)
Human Resource Planning	3.25, .042	0.79, .015	2.41, .162	4.18, .002	0.68, .030	0.92, .410
Recruitment & Selection	0.71, .426	0.29, .022	2.13, .382	0.86, .031	6.25, .001	1.25, .290
Induction	0.15, .920	0.65, .014	3.76, .509	6.02, .003	17.24, .000	1.01, .250
Communication	0.12, .942	0.59, .008	4.05, .270	7.51, .002	8.10, .001	3.10, .124
Training & Development	0.26, .773	0.68, .004	1.53, .608	4.38, .003	12.45, .000	1.05, .310
Motivation	0.79, .048	0.73, .012	9.35, .328	2.10, .041	2.85, .005	1.38, .091
Career Development	1.15, .021	0.90, .032	1.78, .958	0.92, .290	3.15, .007	9.10, .002
Employee Welfare Measures	2.39, .027	0.33, .013	0.98, .080	17.13, .001	2.48, .014	2.10, .050
Supervisory Support	0.42, .051	0.48, .005	4.10, .201	2.70, .012	1.38, .045	13.55, .001
Employer-Employee Relationship	0.51, .002	0.52, .031	1.06, .140	4.05, .004	0.82, .010	2.45, .020
Performance Appraisal	2.31, .021	2.20, .016	3.14, .670	0.75, .024	1.36, .045	1.80, .006
Employee Retention	1.65, .048	3.25, .001	2.28, .025	1.01, .036	0.84, .020	6.50, .002

ANOVA results indicated that for example, employees' age was relevant to the banks' implementation of HRM practices in terms of human resource planning, motivation, career development, employee welfare efforts, supervisory support, employer-employee relations, performance appraisal, and employee retention. In addition, educational qualification, designation, and work experience are relevant to the HRM practices exercised by the banks in a statistically significant manner. Furthermore, family size was relevant to the banks' employee welfare efforts and retention efforts in a statistically significant fashion. Ultimately, the relevance of an employee's monthly salary was significant to HRM practices relative to motivation, career development, employee welfare, supervisory support, employer-employee relations, performance appraisal, employee retention ($p < 0.05$).

Table 3

t-Test Results for the Impact of Demographic Factors on Perceived HRM Practices

Perceived HRM Practices	Area of Residence	Gender	Marital Status	Family Type
	t	Sig.	t	Sig.
Human resource planning	1.02	.431	1.24	.218
Recruitment & selection	2.98	.004	2.01	.048
Induction	2.84	.006	1.57	.119
Communication	0.75	.458	1.09	.278
Training & development	0.68	.497	2.32	.021
Motivation	1.17	.244	2.88	.005
Career development	5.43	.000	1.76	.081
Employee welfare measures	15.12	.000	7.24	.500
Supervisory support	1.29	.199	6.13	.518
Employer-employee relationship	2.97	.008	2.48	.014
Performance appraisal	6.28	.001	5.92	.002
Employee retention	3.12	.005	1.08	.282

The results of the 't' test indicated that the gender of workers had a significant impact on measures of worker welfare ($p < 0.05$). However, the residence location, marital status, and family composition variables did not indicate a significant influence on human resource management practices ($p > 0.05$).

Table 4

ANOVA for Influence of Employee Demographics and Bank Characteristics on Perceived HRM Practices

HRM Practices	Age of Bank Branch	No. of Customers	No. of Departments	No. of Employees
Human Resource Planning	1.23 (0.420)	2.01 (0.023)	0.68 (0.038)	0.59 (0.040)
Recruitment & Selection	2.98 (0.035)	5.43 (0.000)	9.65 (0.000)	0.43 (0.021)
Induction	1.29 (0.245)	4.11 (0.042)	11.45 (0.000)	1.20 (0.020)
Communication	1.11 (0.285)	3.67 (0.036)	4.02 (0.022)	0.75 (0.019)
Training & Development	4.89 (0.002)	0.95 (0.062)	7.51 (0.000)	4.11 (0.013)
Motivation	1.45 (0.035)	4.50 (0.000)	2.31 (0.021)	4.10 (0.008)
Career Development	0.85 (0.034)	0.95 (0.499)	4.31 (0.015)	2.80 (0.029)
Employee Welfare Measures	1.22 (0.039)	1.21 (0.034)	1.22 (0.022)	10.42 (0.000)
Supervisory Support	1.11 (0.012)	2.57 (0.035)	3.07 (0.010)	1.98 (0.015)
Employer-Employee Relationship	4.45 (0.000)	6.73 (0.000)	1.21 (0.009)	7.40 (0.000)
Performance Appraisal	3.52 (0.010)	1.94 (0.035)	1.32 (0.032)	5.20 (0.000)
Employee Retention	2.58 (0.031)	2.18 (0.028)	1.67 (0.009)	3.21 (0.009)

The ANOVA results revealed that the age of bank branch had a significant impact on various HRM practices, including training & development, motivation, career development, employee welfare measures, supervisory support, employer-employee relationship, performance appraisal, and retention of employees.

Moreover, the customer base had a major impact on human resource planning, recruitment & selection, training & development, motivation, employee welfare measures, supervisory support, employer-employee relationship, performance appraisal, and employee retention.

Moreover, the size of divisions in the branch and the size of employees significantly impacted all the HRM practices ($p=<0.05$). The findings indicate that the organizational characteristics of the bank, including its size and customers, significantly influence the HRM practices implemented by the organization.

Results and Recommendations

The findings of the research revealed a considerable difference in the HRM practices practiced by Public Sector Banks (PSBs) and Private Sector Banks (PRSBs) in the Chennai district. The research determined that HRM practices were relatively more effective in PRSBs compared to PSBs. However, based on the employee's view, HRM practices in both sectors were moderate. Additionally, motivation and retention policies were also areas of improvement for both PSBs and PRSBs. Public Sector Banks within the Chennai district are recommended to have a more strategic and systematic approach to HRM practices compared to Private Sector Banks. It is also suggested that HRM practice evaluations should be more employee-centered than employer-based. There is a need for constant monitoring and evaluation of HRM practices to instill a stronger and positive HR culture among banks in Chennai.

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Fostering Internal Career Mobility and Retention Through Employee Awareness in Hybrid Ites Workplaces: A Study in Chennai City

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Abstract

The study investigated the level of awareness of employees regarding internal career mobility within hybrid ITES organisations. The hybrid work model reduced workplace visibility as well as unequal information flow, which constrains career Advancement. The study aimed to assess the extent of the employees' awareness and determine the factors that shaped engagement, career opportunities, and retention intentions. The study employed an empirical method; the primary data were collected from 151 employees of the hybrid work model through a structured questionnaire that gathered aspects of internal career mobility systems, organisational communication, leadership involvement, and retention-related perceptions and secondary data were collected from academic journals and articles. The study findings are [1] Awareness of mobility systems, job postings and career pathways was substantially low in hybrid environments [2] Low awareness was related to the lower engagement, development and retention intentions.[3] Organisational communication practices, involvement of leaders, and individuals are the important factors that influence the level of awareness. The study concluded that internal career mobility is crucial in hybrid ITES workplaces, as it promotes awareness through clear communication and proactive HR practices, which positively enhance career growth, mobility, and retention, and it plays a vital role in employees and organisations.

***Keywords**: Hybrid Work, Internal Career Mobility (ICM), Employee Awareness, Retention, Engagement, ITES Organisations*

Introduction

The hybrid work model has seen an increase in the IT-enabled Service Sector (ITES), Which is Combines both three days of office-based work and two days of work from home, with the mission to increase productivity, Quality of work, and employee experience (Sokolic, 2022; Vartiainen & Vanharanta, 2024). The hybrid work model permits employees flexibility and work-life harmony while providing organisations with functional agility. The hybrid work model offers flexibility as well as significant hurdles for real-time coordination, team synergy, and operational transparency in different locations. The gap between physical space and digital space can create a trigger to feel disconnected for the employees regarding organisation-wide changes, especially with internal career development and promotion (Bossi et al., 2022; Dutta et al., 2021).

In internal career mobility, several key studies identify Promotion, lateral shifts, and functional transfers of employees within an organisation as a substantial driver of internal mobility in conditions of engagement, development, and retention (Ray, 2024; Nawaz, 2013). The hybrid work setting limits employee's awareness because it reduces face-to-face interaction and engagement, opportunities, and informal networks. The prior studies show that unclear internal mobility lowers motivation, career satisfaction, and organisational commitment, for enhancing retention and performance in a hybrid ITES environment, making transparent communication of career pathways an essential HR strategy (Webster & Beehr, 2013; Benson & Rissing, 2019).

Literature Review

The Literature review collectively emphasises the Substantial impacts of internal mobility changes on work model factors, such as employees' performance, engagement and organisational effectiveness. Nawaz (2013) found that internal mobility in Bangalore's IT sector maximises the employee interdependence, leadership development and employee commitment, which stimulates organisational success in the long term. Dutta, Mirchandani and Poyil (2021) asserted that internal gig systems empower flexibility and autonomy when facilitated by adaptive cultures. Benson and Rissing (2019) state that internal hiring proactively impacts retention and performance, validating the benefits of hiring from within the organisation. Webster and Beehr (2013) executed a transparent promotion system that increased fairness perceptions, which motivates commitment and task performance. Bossi et

al. (2022) deployed predictive analysis to determine motivation and resistance to change as two areas of focus that could evaluate the success of the internal mobility context. Sokolic (2022) found that hybrid work models did promote flexibility, but blurred work/life boundaries which may negatively affect career opportunities. In summary, the studies indicate well-functioning internal career mobility influenced by inclusive HR practices, fairness, and clear communication to enhance productivity. As hybrid work continues to develop, robust mobility system, flexible practices are pivotal for building resilient, future ready organisations.

Statement of Problem

Internal career mobility incorporates professional development opportunities, promotes employee engagement and builds organisational capacity to retain employees. Nevertheless, under the hybrid work conditions, employees are frequently unaware of available internal career development opportunities. The limited awareness of internal career opportunities may result in decreased employee engagement, slower career progression, increased turnover, and ultimately adversely affect organisational performance. Therefore, it is imperative to investigate employee awareness and retention, identifying strategies to enhance awareness and support for career development in a hybrid work model.

Research Gap

Internal mobility studies determined the components, such as perceptions of fairness, transparency and promotion affect employee outcomes, but even though these studies have not directly measured the awareness level of employees of internal mobility systems or opportunities (Webster & Beehr, 2013). Recent studies progressed predictive approaches to address individual and organizational characteristics in just assumed equal access to information without testing awareness as a variable (Bossi et al., 2022). In a hybrid work model, the employees may have differential informational access and changing structures for communication and visibility (Sokolic, 2022). Sector-based studies among ITES organisations focus on factors of leadership, communication and culture but similarly have not isolated awareness as a measurable variable to impact mobility or retention (Nawaz, 2013; Dutta et al., 2021). Therefore, there is an explicit gap in research that calls for an empirical study measuring employee awareness and its direct effect on internal mobility outcomes in a hybrid ITES environment.

Research Objectives

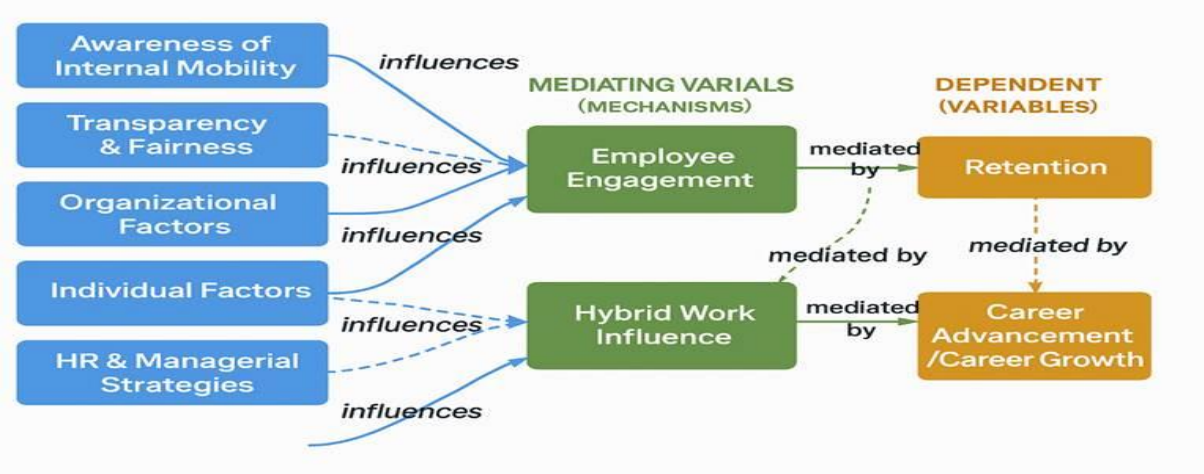
1. To study the demographic profile of employees working in hybrid ITES organisations.
2. To evaluate the degree of employee familiarity with internal mobility systems, processes, and opportunities within ITES organisations.
3. To explore the relationship between employee awareness of internal mobility and the outcomes of internal mobility, including career advancement, engagement and retention.
4. To identify organisation and individual factors that influence employee awareness of internal mobility opportunities.
5. To investigate how hybrid working conditions may influence the access and visibility of information about internal career mobility.
6. To recommend strategies for HR to enhance awareness and participation in internal mobility in hybrid ITES environments.

Research Methodology

The study adopted the sample design as purposive sampling; the sample unit and size are 151 hybrid work model ITES sector employees in Chennai city. The source of data is primary data collected through a questionnaire survey method, and secondary data were collected from academic articles and journals. Data analysis was analysed like percentage analysis, Likert summated scaling, KMO and Bartlett's Test, One-Sample Test, Chi-square, Weighted Average Procedures.

Conceptual Framework

Internal career mobility constitutes a vital component of the efficacy of organisational functioning by optimising manpower utilisation, developing internal development, and enhancing employee engagement and retention (Nawaz, 2013; Benson & Rissing, 2019). The incorporation of internal gig networks facilitates this process by minimising costs, mitigating talent shortages and catalysing flexible, boundary-less career pathways (Dutta et al., 2021). The transparent and fair mobility practices, moreover the influence the job satisfaction and perceptions of organisational justice and endurance within organisational competitiveness (Bossi et al., 2022; Webster & Beehr, 2013).



Hybrid work models transform internal career mobility patterns, posing challenges like diminished organisation culture and reduced social isolation while fair open progression standards, flexible work arrangements, forecasting tools, procedural fairness, engagement, positive mobility results.

Data Analysis

Objective 1- To study the demographic profile of employees working in hybrid ITES organisations, performed a **percentage analysis**.

Interpretation: The demographic profile results show the majority of respondents are male (53%), married (78.8%), and above 45 years of age (39.1%), with professional or technical qualifications (42.4%). Most have 6–10 years of total work experience (43.7%) and more than five years in their current organisation (39.7%), holding permanent positions (62.9%) that are mostly at managerial or leadership levels (37.1%). A significant proportion work more than 12 hours per day (60.3%) and fall within the ₹60,001–90,000 monthly income bracket (30.5%). While communication is dominated by email (92.7%), internal chat platforms (84.8%), and video meetings (67.5%), awareness of internal career mobility pathways remains low, with over half unaware (51%) and the majority not attempting career moves (88.1%) and willingness to explore internal career mobility opportunities to advance your career, even if you have not yet applied for any internal transfers, rather than seeking opportunities outside the organisation yes (108%).

Objective 2- To evaluate the degree of employee familiarity with internal mobility systems, processes, and opportunities within ITES organisations, performed a **Likert summated scaling analysis**.

Table 1.1 - Likert summated scaling

Particulars	N	SUM	MEAN
I have a clear idea of what internal mobility means in my organisation	151	372	2.46
I am aware of where to find internal job openings and how to apply for them.	151	344	2.28
I am familiar with the skills and qualifications required for internal roles.	151	412	2.73
I am aware of how my performance reviews influence my chances for internal movement.	151	355	2.35
I have a clear idea of what happens after submitting an internal job application.	151	372	2.46
I find the internal mobility rules and policies are easy to follow.	151	346	2.29

Particulars	N	SUM	MEAN
I know whom to contact for guidance about internal mobility.	151	376	2.49
I am aware of the typical timeline followed in the internal mobility process.	151	344	2.28
I feel that information about internal opportunities is communicated clearly.	151	354	2.34
I can clearly grasp internal mobility details even in the work environment.	151	381	2.52
I feel the internal mobility process in my organisation is transparent	151	345	2.28
I am familiar with the difference between a promotion and a lateral role change.	151	371	2.46
I know which platforms or systems are used for internal job applications	151	351	2.32
I have a clear idea of how internal mobility contributes to long-term career growth.	151	373	2.47
Average Mean Score			**2.39**

Interpretation: The **average mean score of 2.39** suggests that employees acquire a moderate level of familiarity, while notable factors like skills and qualifications are essential, as well known, on whole awareness of procedures, timelines, and application platforms remains insufficient. This highlights the need for strengthened informational support to enhance employees' awareness and involvement in internal career mobility.

Objectives 3 &4 were performed using factor analysis and one sample t – test.

Factor Analysis

Table 1.2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.896
Bartlett's Test of Sphericity Approx Chi Square	5167.876
Df	741
Sig.	.000

Inference: Table 1.2 indicates that the value of KMO i.e.935 is greater than the value 0.7, as laid down by Kaiser. This confirms sample adequacy. Therefore, KMO justifies Factor analysis. By observing the value of Bartlett's Test, the value of significance is 0.000, which is less than 0.05. Therefore, the Factor Analysis is viable.

One-Sample T-Test

Hypothesis: Null Hypothesis:

There is no significant common factor among employees' awareness of internal mobility, its outcomes (career advancement, engagement, retention) and organisational and individual influencing factors.

Alternative Hypothesis:

There is a significant common factor among employees' awareness of internal mobility, its outcomes (career advancement, engagement, retention) and organisational and individual influencing factors.

Table 1.3

One-Sample Test

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Employees retention	-36.865	150	.000	-3.00000000	-3.1607969	-2.8392031
Internal mobility communication	-5782559637 1338500.000	150	.000	-2.50537500	-2.5053750	-2.5053750
Career insight	-36.865	150	.000	-3.00000000	-3.1607969	-2.8392031
Team coordination	-36.865	150	.000	-3.00000000	-3.1607969	-2.8392031
Culture support	-36.865	150	.000	-3.00000000	-3.1607969	-2.8392031
Leadership support	-36.865	150	.000	-3.00000000	-3.1607969	-2.8392031

Inference: Table 1.3 indicates that the p-value is 0.00, which is less than 0.01. Therefore, we reject the Null hypothesis, and there is a statistically significant difference among the factor variables.

Chi- Square

Hypothesis

Null Hypothesis There is no association between employment type and attempting an internal career move.

Alternative Hypothesis There is an association between employment type and attempting an internal career move.

Table 1.4

Employment Type * Have you ever attempted an internal career move Cross tabulation

		Have you ever attempted an internal career move		Total
		Yes	No	
Employment Type	Permanent	16	79	95
	Contract	2	44	46
	Internship / Trainee	0	10	10
Total		18	133	151

Table 1.5

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.057(a)	2	.048
Likelihood Ratio	7.738	2	.021
Linear-by-Linear Association	5.699	1	.017
N of Valid Cases	151		

Inferences: As the p-values of all factors are 0.000, less than 0.05, we reject the null hypothesis and there is a statistically significant association between employment type and attempting an internal career move.

Objective 5 - Weighted Average Procedure

Table 1.6

Influence of hybrid work on access and visibility of internal mobility information

Statement	SA	A	N	DA	SDA	SCORES	MEAN	RANK
Hybrid work arrangements affect how quickly I receive internal mobility information	45	480	63	-	1	589	39.3	**8**

Hybrid work arrangements affect how easily I can access internal mobility updates.	90	424	75	4	-	593	40	**7**
I depend more on digital communication tools to learn about internal opportunities.	111	33	7	-	-	708	47.2	**1**
Hybrid work reduces informal discussions that help me learn about internal roles	106	28	17	-	-	693	46.2	**2**
Hybrid work limits spontaneous networking or mentoring related to career mobility	62	84	3	2	-	659	44	**4**
Internal mobility guidelines feel less clear in a hybrid work environment	87	47	18	1	-	669	45	**3**
Internal mobility policies are harder to understand in hybrid settings	44	99	5	3	-	637	42.4	**6**
Hybrid work schedules delay communication related to internal mobility	76	58	16	1	-	662	44	**4**
Hybrid work delays feedback during the internal mobility process	50	93	6	-	2	642	43	**5**
Hybrid work makes the internal mobility process feel less smooth due to delayed responses	75	55	19	-	2	654	44	**4**

Interpretation: Increased dependence on online communication tools stands as the first rank and reflects strong reliance on digital systems. Diminished face-to-face interactions have attained the second rank, and the third rank obtained factors are Internal mobility guidelines feel less clear in a hybrid work environment, and the least rank acquired factors are Hybrid work arrangements affect how quickly I receive internal mobility information.

Objective 6 - Weighted Average Procedure

Table 1.7

To recommend strategies for HR to enhance awareness and participation in internal mobility in hybrid ITES environments.

Statement	SA	A	N	DA	SDA	SCORES	MEAN	RANK
HR and managers should regularly communicate internal mobility opportunities through digital and in-person channels	12	133	5	-	1	608	40.5	**4**
HR should provide clear, accessible guidelines and tools to help employees understand internal mobility processes, supported by manager reinforcement.	21	115	12	3	-	607	40.4	**5**
Managers and team leads should proactively guide employees on the skills and competencies needed for internal career movement	71	58	21	-	1	657	43.8	**2**
HR and managers should collaborate to offer continuous training, mentoring and career development support to encourage internal mobility participation.	54	87	9	-	1	646	43.0	**3**
Managers and HR should ensure equal visibility and access to internal mobility information through structured communication practices.	70	75	6	-	-	668	44.5	**1**

Interpretation: Managers and HR should ensure equal visibility and access to internal mobility information through structured communication practices got first ranked and second rank, Managers and team leads should proactively guide employees on the skills and competencies needed for internal career movement, and third rank placed HR and managers should collaborate to offer continuous training, mentoring and career development support to encourage internal mobility participation.

Findings

- Employees report notable perceptions regarding employee retention, internal career mobility communication, career insight, Team co – ordination, Culture Support, Leadership Support indicates the factors plays significant role in shaping their workplace experience.
- Awareness of internal career mobility pathways is low; 51% of employees are unaware, and 88.1% have not attempted internal career moves, although a majority agreed on the willingness to explore internal opportunities rather than seeking external employment.
- Employees showcased moderate familiarity with internal career mobility concepts, while skills and qualifications are well recognised, but awareness of procedures, timelines, and application platforms remains insufficient.
- A hybrid work model has enhanced dependence on the use of online communication tools, reduced face-to-face interactions and created ambiguity in internal career mobility Guidelines, affecting timely access to information.
- Organised information dissemination, ensuring transparent visibility of internal career mobility options in the managerial intervention with active managerial direction regarding skill development for internal career progression, and providing continuous learning and development support programmes.
- Employment types like permanent, Contract and internship/ trainee would be equally encouraged to access and focus on internal career movements as an inclusive internal career mobility practice.

Recommendation

Future studies can proceed with other modes of working, like remote work, office-based work and other regions, also research studies can proceed in sectors other than the ITES sector.

Conclusion

Internal career mobility is a key determinant in hybrid work - based ITES organisations, which foster employees' awareness through effective communication, strategic HR interventions, facilitating career advancement, internal movement, employee retention, while contributing to employee career growth and supporting long-term organisational success.

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Generative AI as A Catalyst for Business Model Transformation: A Framework for Managers with An Empirical Study on Adoption in Mid – Sized Enterprises

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Abstract

Generative Artificial Intelligence (AI) is revolutionizing organizational strategies and creating opportunities for fundamental business model transformation. This study investigates how organizations leverage generative AI to innovate value creation, delivery, and capture mechanisms. Using a combination of survey and secondary data from 50 firms across technology, finance, and healthcare sectors, the study analyzes correlations between AI adoption and business model performance metrics. Statistical tools such as correlation, regression, Chi-square, and ANOVA were used to evaluate the impact of generative AI adoption on organizational transformation. The findings highlight that firms with higher AI integration experience significant improvements in operational efficiency, customer engagement, and revenue growth. The study provides a framework for managers to strategically align generative AI with business model innovation.

***Keywords**: business model transformation, finance, and healthcare sectors, customer engagement,*

Background of the Study

The rapid advancement of Generative AI (GenAI) and machine learning is reshaping how organizations create, deliver, and capture value. Unlike earlier waves of automation, GenAI enables creativity, knowledge generation, and personalized solutions at scale. Businesses across sectors — from healthcare and finance to retail and media — are rethinking their core business models to integrate these capabilities. However, managers often lack a structured approach to evaluate the opportunities, risks, and organizational adjustments required for successful adoption.

Generative AI offers unprecedented capabilities in content creation, design, process optimization, and decision support, enabling organizations to reimagine their products and services. Its potential to automate cognitive tasks and generate innovative outputs challenges traditional assumptions about the boundaries between human expertise and machine intelligence. Companies that successfully incorporate GenAI into their strategies are able to accelerate innovation cycles, reduce operational costs, and enhance customer engagement through hyper-personalization.

At the same time, the disruptive nature of GenAI introduces complex ethical, regulatory, and workforce implications that demand careful governance. Concerns related to data privacy, bias, intellectual property, and transparency necessitate robust policies and monitoring mechanisms. Moreover, the integration of GenAI requires investment in new skills, organizational culture change, and the redesign of workflows to fully leverage its benefits.

The competitive landscape is also shifting as startups and incumbents adopt GenAI-driven platforms, creating new ecosystems and revenue-sharing models. For many firms, the question is no longer whether to adopt GenAI, but how to align its use with long-term strategic objectives. A clear framework for understanding the transformation of business models in this context is therefore essential for managers seeking to remain agile and relevant in a rapidly evolving market environment.

Objectives

1. To examine how generative AI influences the key components of business models (value proposition, revenue streams, operations).
2. To analyze relationships between GenAI adoption, organizational performance, and customer satisfaction.
3. To propose a framework for managers to integrate GenAI into existing or new business models.

Scope of the Study

The scope of this study is confined to medium-to-large organizations operating in the **IT services, retail, finance, and manufacturing sectors**. The research focuses on understanding how generative AI influences strategic planning, operational efficiency, customer experience, and innovation practices within these industries. Data for the study is collected over a six-month period, from **January to June 2025**, ensuring that the findings

reflect current trends and adoption levels. By concentrating on these sectors and functional areas, the study aims to provide actionable insights for managers seeking to integrate generative AI into their core business models.

Limitations

1. Data limited to four sectors; results may not generalize to micro-enterprises or public sector organizations.
2. Self-reported survey data may involve response bias.
3. Rapid evolution of AI tools may outdate results within a few years.

Methodology

Research Design

A descriptive-cum-analytical study using primary and secondary data. Primary data collected through structured questionnaires from managers and executives. Secondary data gathered from company reports, industry publications, and academic literature.

Data Collection

- Sample Size: 50 firms
- Sampling Method: Purposive sampling (firms with AI adoption experience)
- Variables:
    - Independent Variable: Generative AI Adoption (measured by AI tools implemented, usage frequency, AI budget allocation)
    - Dependent Variables: Business model transformation indicators (revenue growth, efficiency, innovation, customer satisfaction)

Statistical Tools Used

1. Correlation Analysis – to check the strength of relationship between AI adoption and performance indicators.
2. Regression Analysis – to model the impact of AI adoption on organizational performance.
3. Chi-Square Test – to test the association between categorical variables like AI adoption status and innovation initiatives.
4. ANOVA – to compare performance metrics across industries (technology, finance, healthcare).

Correlation Analysis

Variables	Correlation Coefficient (r)
AI Adoption vs Revenue Growth	0.82
AI Adoption vs Customer Satisfaction	0.76
AI Adoption vs Innovation Index	0.88
AI Adoption vs Efficiency Improvement	0.79

Inference: Strong positive correlations indicate that higher AI adoption is associated with higher revenue growth, innovation, efficiency, and customer satisfaction.

Regression Analysis

Regression Equation:

Revenue Growth (%) = 2.5 + 1.2*(AI Adoption Score)

$R^2 = 0.67$ (67% of revenue growth variance explained by AI adoption)

Significance (p-value) = 0.001

Inference: AI adoption significantly predicts revenue growth. For each unit increase in AI adoption score, revenue growth increases by 1.2%.

Chi-Square Test

Hypothesis: AI adoption is independent of innovation initiatives.

AI Adoption Status	High Innovation	Low Innovation	Total
Adopted	20	5	25
Not Adopted	5	20	25
Total	25	25	50

- Chi-square value = 24
- df = 1, $p < 0.01$

Inference: There is a significant association between AI adoption and higher innovation initiatives.

ANOVA

Comparing Revenue Growth Across Industries

Industry	**Mean Revenue Growth (%)**	**SD**
Technology	**13**	**2**

Industry	Mean Revenue Growth (%)	SD
Finance	10	3
Healthcare	9	2

- **F-value = 8.6, p = 0.001**

Inference: Revenue growth differs significantly across industries, with technology firms benefiting most from generative AI adoption.

Findings

The study reveals that the adoption of generative AI is strongly correlated with key performance indicators such as revenue growth, operational efficiency, innovation, and customer satisfaction. Firms that actively integrate AI into their processes tend to exhibit a higher innovation index and notable improvements in operational effectiveness. Among the sectors studied, technology firms derive the greatest benefits from AI-driven business model transformation, leveraging advanced tools to enhance competitiveness and service offerings. Furthermore, the analysis indicates a significant association between AI adoption and the likelihood of introducing innovative products or services, suggesting that generative AI not only optimizes existing operations but also drives strategic innovation within organizations.

Suggestions

Based on the study's findings, it is recommended that managers strategically integrate generative AI into core business processes to gain a sustainable competitive advantage. Firms should prioritize investment in AI-related skills, talent development, and infrastructure to fully leverage the benefits of AI-driven transformation. Regular monitoring and evaluation of AI initiatives are essential to ensure that these technologies continue to contribute effectively to organizational goals. Additionally, fostering cross-functional collaboration across departments can help align AI capabilities with broader business model innovation, enabling firms to create value, enhance customer experiences, and remain agile in a rapidly evolving technological landscape.

Conclusion

Generative AI acts as a powerful catalyst for business model transformation. Organizations that proactively adopt AI can enhance revenue, customer satisfaction, and innovation while achieving operational efficiency. Managers should leverage this study's

framework to systematically integrate AI into strategic planning, ensuring sustainable competitive advantage.

Future Scope of the Study

The future scope of this study includes expanding the sample size to encompass firms from multiple countries, providing a more comprehensive global perspective on generative AI adoption and its impact on business model transformation. Further research could incorporate additional sectors such as education, logistics, and energy to examine sector-specific implications and best practices. Investigating the long-term financial impact of AI-driven business models would offer valuable insights into sustained profitability and growth. Moreover, future studies should explore the ethical and regulatory dimensions of generative AI adoption, ensuring that organizations implement these technologies responsibly while maximizing innovation and value creation.

Green Capitalism and Sustainable Development: An Organizational Perspective

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Abstract

Green capitalism promotes sustainable development by integrating environmental responsibility with economic growth. Organizations increasingly adopt eco-friendly practices, sustainable resource management, and ethical business strategies to reduce environmental impact while maintaining competitiveness. This study examines green capitalism from an organizational perspective, highlighting the role of businesses in supporting sustainability initiatives. It also identifies key challenges in implementing green practices and suggests measures to strengthen organizational commitment towards sustainable development.

***Keywords**: Green Capitalism, Sustainable Development, Organizational Practices, Environmental Responsibility, Corporate Sustainability*

Introduction

One of the most influential approaches shaping the modern business environment is **green capitalism**, which seeks to integrate environmental sustainability with economic growth. Unlike traditional profit-driven business models, green capitalism emphasizes responsible production, efficient resource utilization, and environmentally conscious decision-making within organizations. The growing awareness of climate change, environmental degradation, and social responsibility has encouraged organizations across industries to adopt sustainable practices while continuing to pursue profitability and competitive advantage.

Organizations play a crucial role in advancing sustainable development through the adoption of eco-friendly technologies, green supply chain practices, ethical governance, and employee involvement in sustainability initiatives. However, the implementation of green capitalism faces several challenges, including high initial costs, lack of awareness, resistance to organizational change, regulatory complexities, and difficulties in balancing environmental

goals with financial performance. These challenges not only affect organizational operations but also influence the long-term sustainability of businesses and economic systems.

The objective of this study is to examine green capitalism from an organizational perspective by identifying the key challenges and barriers to its effective implementation. The study also aims to analyze how organizational strategies and practices contribute to sustainable development and to provide recommendations for overcoming these challenges to promote long-term economic and environmental sustainability.

Objective of the Study

- To identify and analyze the key challenges faced by organizations in adopting green capitalism practices for sustainable development.
- To examine the role of organizational strategies and practices in promoting environmental sustainability while achieving economic growth.
- To suggest suitable recommendations and strategies for overcoming the major barriers to the effective implementation of green capitalism in organizations.

Review of Literature

Porter and Van der Linde (1995), Elkington (1997), and Hart (2010) examined the concept of green capitalism and its role in promoting sustainable development, highlighting both its benefits and limitations. Their studies emphasize that environmentally responsible business practices can enhance organizational efficiency, innovation, and long-term competitiveness. The literature explains how the adoption of green technologies, sustainable resource management, and ethical business strategies contributes to environmental protection while supporting economic growth.

However, several researchers point out that organizations face challenges such as high implementation costs, lack of managerial awareness, resistance to change, and inadequate regulatory support. While large organizations are better positioned to adopt green practices, small and medium enterprises often struggle due to financial and technological constraints. Overall, the literature agrees that green capitalism offers significant opportunities for sustainable development, but its success depends on strong organizational commitment, supportive government policies, and increased awareness of sustainability practices among businesses.

Research Gap

Although green capitalism and sustainable development have been widely studied from global and industry-level perspectives, there is limited research examining how organizations in specific regional contexts implement green practices and achieve sustainability. Most studies focus on large multinational corporations, overlooking small and medium enterprises that face unique financial, technological, and regulatory challenges. Additionally, while prior research highlights the benefits of green practices—such as improved efficiency, innovation, and competitive advantage—few studies investigate the organizational barriers, including managerial resistance, cost constraints, and lack of policy support, in localized or sector-specific contexts. This gap indicates the need for further research on how regional organizations can effectively adopt green capitalism strategies to promote sustainable development.

Scope of the Study

- To examine how organizations adopt green capitalism practices to promote sustainable development.
- To identify the challenges and barriers organizations face in implementing environmentally sustainable initiatives.
- To provide insights and strategies that can help organizations enhance sustainability and long-term environmental responsibility.

Research Methodology

The present study adopts a descriptive research design to examine organizational practices related to green capitalism and sustainable development. A structured questionnaire was developed to collect relevant information from the respondents. For data collection, a non-probability sampling technique was employed, specifically using the convenience sampling method, to select participants who were readily accessible and willing to provide information.

Sample Size

The study was conducted with a total sample size of 103 respondents, all of whom are residents of Chennai city. A convenience sampling method was employed, whereby participants were selected based on their availability and willingness to participate in the study.

Tools used for the Study

For this study, all the responses were received through questionnaires. Simple tools such as percentage analysis and correlations were used for presenting and illustrating the observations.

Limitations of the Study

- Although the study focuses on organizations, its findings may not fully represent all industries or sectors, limiting the generalizability of the results.
- The data relies on responses from selected organizational representatives, which may not reflect the perspectives of all stakeholders or employees involved in sustainability practices.
- The study primarily examines external and strategic challenges related to green capitalism and sustainable development, while internal operational, financial, or policy-related constraints may not be fully addressed.
- The accuracy and completeness of the study may be influenced by the availability and reliability of secondary sources and organizational reports on sustainability initiatives.

Data Analysis and Interpretation

Based on the objective the following tools were used for analysis and interpretation purposes.

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 21	32	31.1	31.1	31.1
	21 - 25	48	46.6	46.6	77.7
	Above 25	23	22.3	22.3	100
	Total	103	100	100	

The above table shows that most of the respondents are under the age group of 21 -25 followed by below 21. 22.3% percentage of respondents are under the age group of above 25.

How frequently do you purchase eco-friendly or sustainable products from online platforms?"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	12	11.7	11.7	11.7
	Weekly	15	14.6	14.6	26.2
	Monthly	31	30.1	30.1	56.3
	Rarely	45	43.7	43.7	100
	Total	103	100	100	

On the table of frequency, he survey results indicate that **11.7% of respondents purchase eco-friendly or sustainable products from online platforms on a daily basis**, while **43.7% of respondents use such platforms occasionally**.

Have you experienced concerns about product quality or authenticity when purchasing online?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Always	8	7.8	7.8	7.8
	Often	16	15.5	15.5	23.3
	Sometimes	48	46.6	46.6	69.9
	Rarely	23	22.3	22.3	92.2
	Never	8	7.8	7.8	100
	Total	103	100	100	

The majority of respondents (**46.7%**) sometimes have concerns about the quality, authenticity, or environmental claims of sustainable products purchased online, while **23.3%** often or always experience these concerns. This highlights the importance for organizations to maintain transparency, verified eco-labeling, and trustworthy sustainable practices to build consumer confidence in green e-commerce.

Findings

- **Adoption of Green Practices:** Organizations are increasingly adopting eco-friendly and sustainable practices, such as using renewable resources, reducing carbon footprints, and promoting socially responsible products.
- **Consumer Awareness and Preferences:** Consumers are becoming more conscious of sustainability, preferring products and services from organizations that demonstrate environmental responsibility. However, limited awareness and higher costs of green products remain challenges.
- **Challenges to Sustainable Growth:** Businesses face obstacles such as balancing profitability with sustainability, regulatory compliance, supply chain limitations, and competition from conventional, less eco-friendly firms.
- **Barriers to Long-term Organizational Sustainability:** Key barriers include insufficient consumer trust in green claims, high operational costs for sustainable practices, and the need for continuous innovation to meet evolving environmental standards and consumer expectations.

Conclusion

The study concludes that organizations aiming for sustainable development through green capitalism face multiple challenges in balancing profitability with environmental and social responsibility. Companies adopting eco-friendly practices encounter obstacles such as higher operational costs, regulatory compliance, supply chain limitations, and maintaining consumer trust in green claims. To achieve long-term sustainable growth, organizations should focus on integrating environmental strategies into core business operations, investing in green innovation, improving transparency, and educating consumers about sustainability initiatives. By addressing these challenges, organizations can enhance brand reputation, foster consumer loyalty, and contribute effectively to sustainable development.

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Investigating the Causes of Rework in Garment Manufacturing: An Examination Among Shop – Level Employees

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Abstract

Rework, defined as the process of correcting defective products to meet quality standards, poses significant challenges in the apparel industry by increasing production costs, delaying delivery schedules, and affecting overall productivity. This study investigates the causes of rework due to man-related, material-related, machine-related and method-related causes at the garment industry in South India. The study follows descriptive research design, collecting data from 120 employees working in shop level. Findings reveal that there is a difference between employees holding school education and graduate degree holders with man-related cause for rework, machine-related cause for rework and method-related cause for rework. There is a difference between employees' designation with man-related cause of rework, material-related cause of rework, and method-related cause of rework. There is a strong positive correlation between man-related and machine-related causes for rework (p=0.665) at the 0.001 level of significance.

***Keywords**: Man-related rework, Materia-related rework, Machine-related rework and Method-related rework.*

Introduction

The garment industry is one of the most dynamic and fast moving sector in global economy. Despite advancement in manufacturing techniques and technology, the issue of rework in apparel production remains a significant challenge. Rework refers to the process of correcting or redoing defective products, often leading to increased costs, delays in delivery, and customer dissatisfaction. This study is aimed at identifying the causes of rework in garment

industry. Understanding these causes is crucial for enhancing operational efficiency, improving product quality, and reducing wastage, by examining the production process, quality control measures, employee training and communication across the industry. This study seeks to provide insights into how rework can be minimised or eliminated to improve the overall productivity of the industry.

Causes for Rework

Man-Related Causes

Man refers to the man resource involved in the production process of the company. Rework often arouses from man errors. This includes the operators, supervisors, inspectors etc. lack of skill, lack of adequate training, communication gaps, poor supervision all coms under this category.

Material-Related Causes

Material includes all physical inputs used in garment manufacturing like fabric, thread, needle etc. the quality and consistency of these material directly affect the appearance, fit, and durability of the final garment.

Machine-Related Causes

Machine includes all the tools, equipment, and machines used during the production process. It includes sewing macing, cutting machines, pressing units, packing and finishing equipment. machine malfunction, incorrect settings, inappropriate machine selection comes under this element.

Method-Related Causes

Method refers to the production process, techniques, operational procedure used in production. Inefficient process, lack of standardization, inadequate quality checking comes under this category.

Review of Literature

1. M.A. Samad, P.P. Chowdhury, A.A. Rahi, and M.M. Hossain (2021) the title of the study is Analysis of Major Defects and Finding Their Root Causes in a Sewing Section of a Selected Garments Factory in Bangladesh.it was published in Research Journal of

Engineering Sciences. The research identified defects in the sewing section of a ready-made garment factory and used lean and quality control tools to find significant defect types and their root causes. Recommendations included ergonomic workstation designs and improved supervision to reduce defects.

2. P. Sharma, R. Gupta (2021) A study on Lean Manufacturing Practices to Reduce Rework in Apparel Industry. It was published in International Journal of Lean Six Sigma. Techniques such as value stream mapping, 5S, and continuous improvement (Kaizen) were implemented, resulting in significant reductions in rework and improvements in overall efficiency.

3. The title of the study is Construction Rework: Causes, Impact, Cost, & How to Avoid (2023). This article discusses common causes of rework in construction, including poor communication, inadequate collaboration, incomplete architectural drawings, and change orders. It notes that rework can account for a significant portion of total project costs, emphasizing the importance of addressing these factors to improve efficiency and reduce expenses.

4. Ignace Rakotozandry, François Ravalison (2024) A study on Network Meta-Analysis for Determining the Best Lean Tools Synergy to Improve Productivity by Reducing Rework in Garment Factories. The study identifies that adopting a combined lean-tools strategy especially including Ishikawa Diagram, Pareto Chart, SMED, and Work Study is likely the most promising route, rather than picking one tool at random. Managers and process-improvement teams can use the study's "league table" as a guide to prioritize which lean tools to implement or test.

5. A study on Improving Quality, Productivity, and Cost Aspects of a Sewing Line in Apparel Manufacturing (2024). It was published in Journal of Textile Engineering. This study identifies various factors contributing to a rework rate exceeding 7% in the sewing section, including poor thread quality, fabric flagging, and needle deflection. It suggests prioritizing faults and implementing structured tools like the PDCA (plan–do–check–act) cycle to reduce the rework rate and improve overall quality and productivity.

Objectives of the Study

- To measure the level of rework occurring due to man-related causes, material-related causes, machine-related causes, and method-related causes among shop floor employees.
- To know the difference between causes for rework (man-related, material-related, machine-related, method-related) based on their socio-demographic profile (education qualification, marital status and employee designation.
- To understand the relationship between the causes for rework (man-related, material-related, machine-related, method-related)

Research Methods

The study follows descriptive research design with no control over variables. This study is based on a survey method. A sample size of 120 women employees were identified from a population of 400 women employees. Garment industry in South India. The instrument was developed based on interaction with the HR manager and existing literature. An interview schedule was adopted to collect data. Descriptive statistics like skewness and kurtosis were used to understand the normality of the data. Mean and standard deviation were used to measure the level of rework. Inferential statistics like t-test, one-way ANOVA, and correlation were used in the study to understand the variables. JAMOVI- Stats open-source software's version 2.3.13 is used to analyse the data

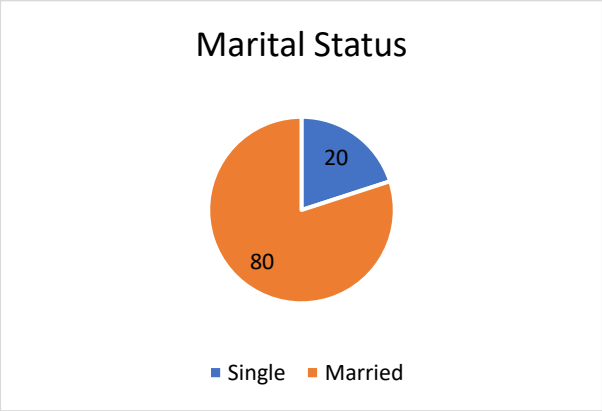
Hypothesis

Hypotheses		Statistical Testing Tool
H_{o1}	There is no difference between causes for rework (man-related, material-related, machine-related, method-related) with employees' marital status (single and married), educational qualification (schooling and graduate) and employees' designation (operators, checker)	T-test
H_{o2}	There is no relationship between the causes for rework (man-related, material-related, machine-related, method-related)	Correlation

Results and Discussion

Diagram No: 1

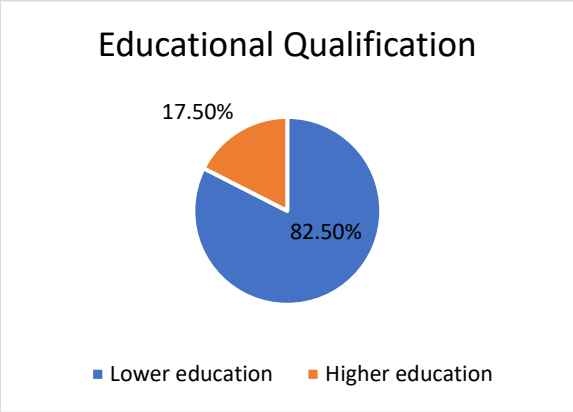
Marital Status



The diagram shows that out of 120 sample, 80% are married and 20% are single.

Diagram No: 2

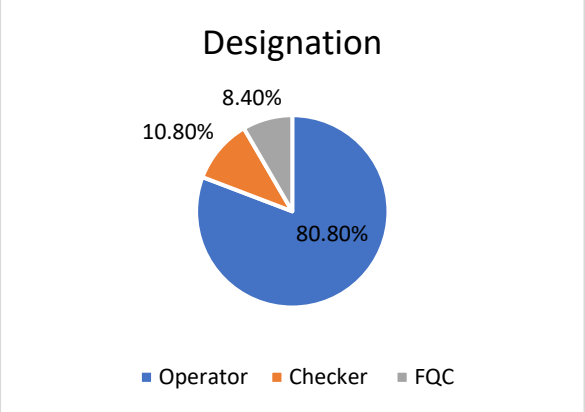
Educational Qualification



The diagram shows that out of 120 sample, 82.50% completed lower education, 17.50% completed higher education.

Diagram No: 3

Designation



The diagram shows that out of 120 sample, 80.80% are operators, 10.80% are checker, 8.40% are FQC.

Table No: 1

Descriptive Analysis

	Man-Related Cause for Rework	Material-Related Cause for Rework	Machine-Related Cause for Rework	Method-Related Cause for Rework
N	120	120	120	120
Mean	28.8	13.4	26.6	19.8
SD	4.73	2.18	2.88	3.04
Skewness	1.37	0.613	-0.0619	0.577
Kurtosis	1.73	0.236	1.52	-0.234

The above table shows the descriptive analysis of the study variables (man-related, material-related, machine-related and method-related causes for rework). As skewness and kurtosis are found to be in permissible limit of ± 1, this data is considered normally distributed.

Man: Based on mean and standard deviation values it is observed that the man-related cause for rework is due to no proper self-checking, no sufficient break time, inappropriate cuttings, and improper dye mixing in fabric. The study also reveals that there is less rework due to sufficient training for handling machines, able to understand the process and function, and there is proper communication among the employees.

Material: Based on mean and standard deviation values it is observed that the material-related cause for rework is due to improper pattern for the specific material. The study also reveals that the lower causes of rework by material is due to purchase of bulk raw materials, and pattern used for material is not perfect.

Machine: Based on the mean and standard deviation values it is observed that the machine-related cause for rework is due to thread tension in output and thread tension causes material damage. The study also reveals that the lower causes of rework are due to required settings in machine for different pattern and absence of machine handling system.

Method: Based on the mean and standard deviation values it is observed that the method-related cause for rework is due to various stitching method and usage of ink and marker in the fabric. The study also reveals that the lower causes of rework are due to inadequate training and lack of uniformity among the employees.

Ho_1: There is no difference between causes for rework (man-related, material-related, machine-related, method-related) with employees' marital status (single and married), educational qualification (schooling and graduate) and employees' designation (operators, checker)

Table No: 2

t test showing causes for rework (man-related, material-related, machine-related, method-related) with employees' marital status, educational qualification and their designation

Cause for Rework	Socio Demographic Profile		N	M	SD	t value	P value
Man Related Causes	Marital Status	Single	24	30.4	5.53	1.821	0.162
		Married	96	28.4	4.46		
	Educational Qualification	Schooling	99	28.1	3.93	-3.62	< .001
		Graduate	21	32.0	6.64		
	Designation	Checker	23	33.1	31	5.41[a]	<.001
		Operator	97	27.8	27		
Material Related Causes	Marital Status	Single	24	13.9	2.60	1.406	0.162
		Married	96	13.2	2.06		
	Educational Qualification	Schooling	99	13.2	1.96	-1.60	0.112
		Graduate	21	14.0	2.99		
	Designation	Checker	23	13.8	14	1.14[a]	0.255
		Operator	97	13.2	13		
Machine Related Causes	Marital Status	Single	24	26.5	3.31	-0.347	0.729
		Married	96	26.7	2.78		
	Educational Qualification	Schooling	99	26.2	2.60	-3.54	<.001
		Graduate	21	28.6	3.41		
	Designation	Checker	23	29.1	28	4.65	<.001
		Operator	97	26.3	27		
Method Related Causes	Marital Status	Single	24	20.3	3.52	0.795	0.428
		Married	96	19.7	2.92		
	Educational Qualification	Schooling	99	19.4	2.61	-3.20	0.002
		Graduate	21	21.7	4.15		
	Designation	Checker	23	22.1	22	4.28	<.001
		Operator	97	19.3	19		

An independent sample t-test was conducted on the causes of rework (Man-related causes, Material-related causes, Machine-related rework and method-related causes for rework) with employees' marital status and the education qualification of employees. There is no difference between the material cause for rework with education qualification and employees' marital status (single and married), and various causes for rework.

There is a difference between employees' marital status (school education and graduates) with man-related cause for rework, machine-related cause for rework and method-related cause for rework. However, employees with a school education are found to have less rework compared to graduates.

There is a difference between employees' designation (checkers and operators) with man-related cause for rework, machine-related cause for rework and method-related cause for rework. However, operators found to have less rework compared to checkers.

H_{o2} : There is no relationship between the causes for rework (man-related, material-related, machine-related, method-related)

Table No: 3

Correlation between causes of rework (man-related, material-related, machine-related, method-related)

	Man	Material	Machine	Method
Man	-	-	-	-
Material	0.306***	-	-	-
Machine	0.665***	0.241**	-	-
Method	0.519***	0.182**	0.419***	-

Note. * p < .05, ** p < .01, *** p < .001

A Pearson correlation was conducted to examine the relationship between causes of rework due to man-related, material-related, machine-related, method-related. The result indicated there is weak positive correlation between material-related causes with man-related causes, machine-related causes and method-related causes for rework. The relationship is significant at 0.01 and 0.001 levels. There is a moderate positive relationship between method-related cause and man-related cause for rework (p=0.519) and machine-related causes for

rework (p=0.419) at 0.001 level of significance. There is a strong positive relationship between man-related causes and machine related causes for rework.

Suggestion

Man: Based on the findings it is suggested that training can be provided to the employees for the handling of machines, material must be adequately available for better functioning. Communication can be increased among the employees through regular discussion. Adequate breaks helps employees feel energise and work effectively.

Material: Purchasing materials requires a rigorous process of quality checking and appropriate storage. Wastage can be minimised if materials are cut based on design.

Machine: Operators can be educated in better handling of machines. They can be trained to identify symptoms of oil leakage. Attention should be provided for checking bobbins and regular maintenance of machines can reduce rework.

Method: Washable fabric markers or water-soluble markers can be used to avoid ink marks on the garment. Uniformity in folding can be maintained through proper training.

Conclusion

The causes of rework in garment industry reveals that rework predominantly results from a combination of human errors, machine malfunctions, material defects and methods. Key factor includes improper stitching techniques, thread tension issues, overlooking, fabric defects and inadequate quality control measures. Some suggestions are provided regarding the finds of this study. By addressing these challenges, the garment industry can significantly reduce rework rates, leading to increased productivity, cost savings, and improved product quality. Implementing the recommended solutions will contribute to the company's long term success and customer satisfaction.

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The Effect of Leadership Style and Training of Employees on Organisational Culture

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Abstract

An organisation's culture may be shaped by one particular cultural dimension more than others, thus influencing the organisation's personality and the way organisational members work. Organisational change is inevitable and complex process faced by all organisations, regardless of their size or industry. Leaders can shape organizational culture by communicating their vision, values and expectations, as well as by modelling and reinforcing desired behaviours and norms. Culture, as a dynamic process resulting from interaction among members of an organization, is promoted through leadership behaviours. Cultural norms are related to leadership styles. The result of the study found that leadership style and organisational culture have a significant positive direct effect on change management. Moreover, organisations need to have transformational leaders to manage the change process effectively. This study reveals that organisation in the development of successful change management strategies by identifying cultural norms and leadership style needed for change success in the context of developing country.

***Keywords**: Organizational culture, Change management, Leadership role JEL Classification*

Introduction

Organizational culture refers to the shared values, beliefs, norms, and practices at characterize a company or institution. It influences how employees interact, make decisions, and perceive the organization's mission and objectives. Understanding and managing organisation culture is crucial for fostering employee engagement, productivity, and overall organisational success. Organizational Culture refers to the shared values, beliefs, attitudes, and behaviours that characterize a company or institution. It encompasses the norms and practices that shape how individuals within the organization interact with each other, approach

their work, and perceive the organization's mission and objectives. Organizational Culture is often considered the *personality* of a company, influencing employee engagement, decision-making processes, and overall performance.

Review of Literature

Researches have propounded many theories about the study of organisation culture and change management. There has been substantial literature on the implication of organisation culture and change management. Several studies were made in respect of organisation culture and change management in the developed as well as in the developing economies like India.

Stone (2015) found that the technology has fundamentally changed the way of work, and also suggested human resource practices and technology transforming the way that organisations recruit, select, motivate, train and retain employees.

Shwetha (2017) suggested that HR professionals can make use of different AI technology and tools for all the functions of HR be it recruitment, selection, training, development, performance management, compensation and real management.

Geetha and Reddy (2018) found that the combination of Human resource management and Artificial intelligence leads to the data maintenance. They also suggested that it save the cost and time to the organisation with more accuracy and access in total recruitment process.

Objectives and Hypotheses Development of the Study

- To understand the role of organisational culture in human resource management.
- To study the leadership styles in Human resource management ***(HRM).***
- To study the effect of leadership styles and organisational culture in Human resource management ***(HRM)***

The Following are the Hypotheses Developed for the Study

H_0^1*: "There is no significant difference between Leadership styles and Organisation culture* in Human resource management ***(HRM)***" *reject the hypothesis at 1% level.*

H_0^2*: "There is no significant difference between Training of employees and Organisation culture* in Human resource management ***(HRM)***" *reject the hypothesis at 1% level*

Research Methodology

Data Source

This study is based on the primary data collected with the help of printed questionnaire; convenient sampling method was followed.

Tools used for Analysis

The various tools used for the study are

- Percentage
- Descriptive statistics
- Chi-square test

Analysis and Discussion

Table 1

Statement Showing Descriptive Statistics of Key Variables

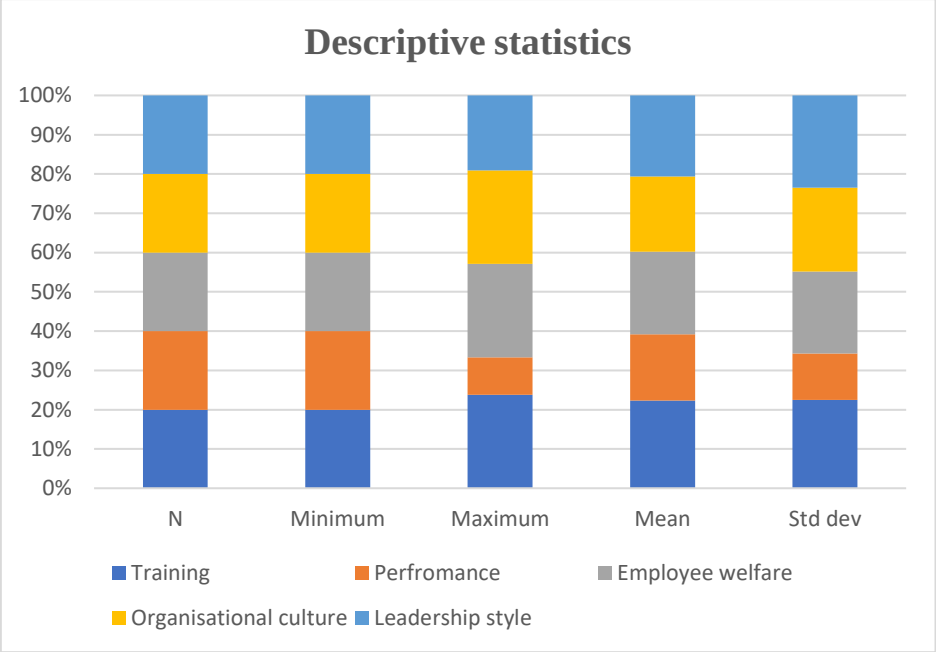
	N	Minimum	Maximum	Mean	Std dev
Training	100	1	5	1.77	0.908
Performance	100	1	2	1.34	0.476
Employee welfare	100	1	5	1.67	0.841
Organisational culture	100	1	5	1.52	0.858
Leadership style	100	1	4	1.64	0.948

Source: Computed results compiled from primary data

Table 1 shows that the descriptive statistics of key variables in that, training and development were the most positively perceived with a mean score of 1.77 Another indicator of a motivated workforce is the level of employee engagement 1.67 which is also high. These human resource management practices are at a moderate level of adoption given the performance appraisal and Organisational performance scores which are just above, but less than, the mid-level mark.

Figure 1

Statement Showing – Descriptive Statistics of Key Variables



Source: Computed results compiled from primary data

Figure 2 shows that the descriptive statistics of key variables. In that training and development and employee engagement perceived high mean scores.

Table 2

Statement Showing Results of Chi-Square Test for Leadership Style

Leadership style	Observed N	Expected N	Residual
Strongly agree	58	33.3	24.7
Agree	31	33.3	-2.3
Neutral	0	0	0
Disagree	11	33.3	-22.3
Strongly disagree	0	0	0

Source: Computed results compiled from primary data

From the above ***table 2*** shows the observed, expected and residual values of Leadership style in Human resource management ***(HRM)***

Table 3

Statement Showing Results of Chi-Square Test for Organisation Culture

Organisational Culture	Observed N	Expected N	Residual
Strongly agree	60	33.3	26.7
Agree	36	33.3	2.7
Neutral	0	0	0
Disagree	0	0	0
Strongly disagree	4	33.3	-29.3

Source: Computed results compiled from primary data

From the above ***table 3*** shows the observed, expected and residual values of Organisation culture in Human resource management ***(HRM)***

Table 4

Statement Showing Results of Chi-Square Test for Leadership Style and Organisation Culture

Statistical Test	Organisational Culture	Leadership Style
Chi-Square	47.360**	33.380**
DF	2	2
Sig Level	0.001	0.001

Source: Computed results compiled from primary data

*a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 10.0. ** significant at 1% level* From the above ***table 4*** shows the Chi-square value of 47.360 (df=2, N=100), $p<0.001$ is significant at 2 degree of freedom, showing that there is significant difference in expected frequencies and observed frequencies. Hence, reject null hypothesis, that there is much influence of Organisation culture.

Similarly, the above table shows that Chi-square value of 33.380 (df=2, N=100), p<0.001 is significant at 2 degree of freedom, showing that there is significant difference in expected and observed frequencies. Hence, reject null hypothesis that there is much influence of Leadership style and Organisational culture in Human resource management ***(HRM)***.

H_0^1: "There is no significant difference between Leadership style and Organisation Organisational culture in Human resource management ***(HRM)***" *reject the hypothesis at 1% level.*

Table 5

Statement Showing Results of Chi-Square Test for Training of Employees

Training	Observed N	Expected N	Residual
Strongly agree	42	20	22
Agree	49	20	29
Neutral	2	20	-18
Disagree	4	20	-18
Strongly disagree	3	20	-17

Source: Computed results compiled from primary data

From the above ***table 5*** shows the observed, expected and residual values of Training of employees in Human resource management ***(HRM)***

Table 6

Statement Showing Results of Chi-Square Test for Training of Employees and Organisational Culture

Statistical Test	Training	Organisational Culture
Chi-Square	1.09**	47.38**
DF	4	2
Sig Level	0.001	0.001

Source: Computed results compiled from primary data

*a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 10.0. ** significant at 1% level*

From the above ***table 6*** shows the Chi-square value of 47.38 (df=2, N=100), p<0.001 is significant at 2 degree of freedom, showing that there is significant difference in expected frequencies and observed frequencies. Hence, reject null hypothesis, that there is much influence of Organisation culture.

Similarly, the above table shows that Chi-square value of 1.09 (df=4, N=100), p<0.001 is significant at 4 degree of freedom, showing that there is significant difference in expected and observed frequencies. Hence, reject null hypothesis that there is much influence of Training of employees and Organisational culture in Human resource management ***(HRM)***.

H_0^2*: "There is no significant difference between Training of employees and* Organisational culture in Human resource management ***(HRM)***" *reject the hypothesis at 1% level.*

Concluding Remarks

This study examined the effect of organizational culture and change management and its direct effect through leadership style. The findings suggested a significant positive association between Leadership style and Organisational culture. Organizational culture has both direct and direct effects on change management, directly through leadership style. Leadership style was found to have a partial mediating role. More specifically, a constructive and transformational Training of employees were significant for successful change management Moreover, the mediating role of leadership style found in this study provides new empirical insights and enriches related literature. Both training of employees and leadership style have significant positive effect on organisational culture.

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Hybrid Work, Organisational Culture and Psychological Well – being: A Conceptual Study for IT Organisations in India

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Abstract

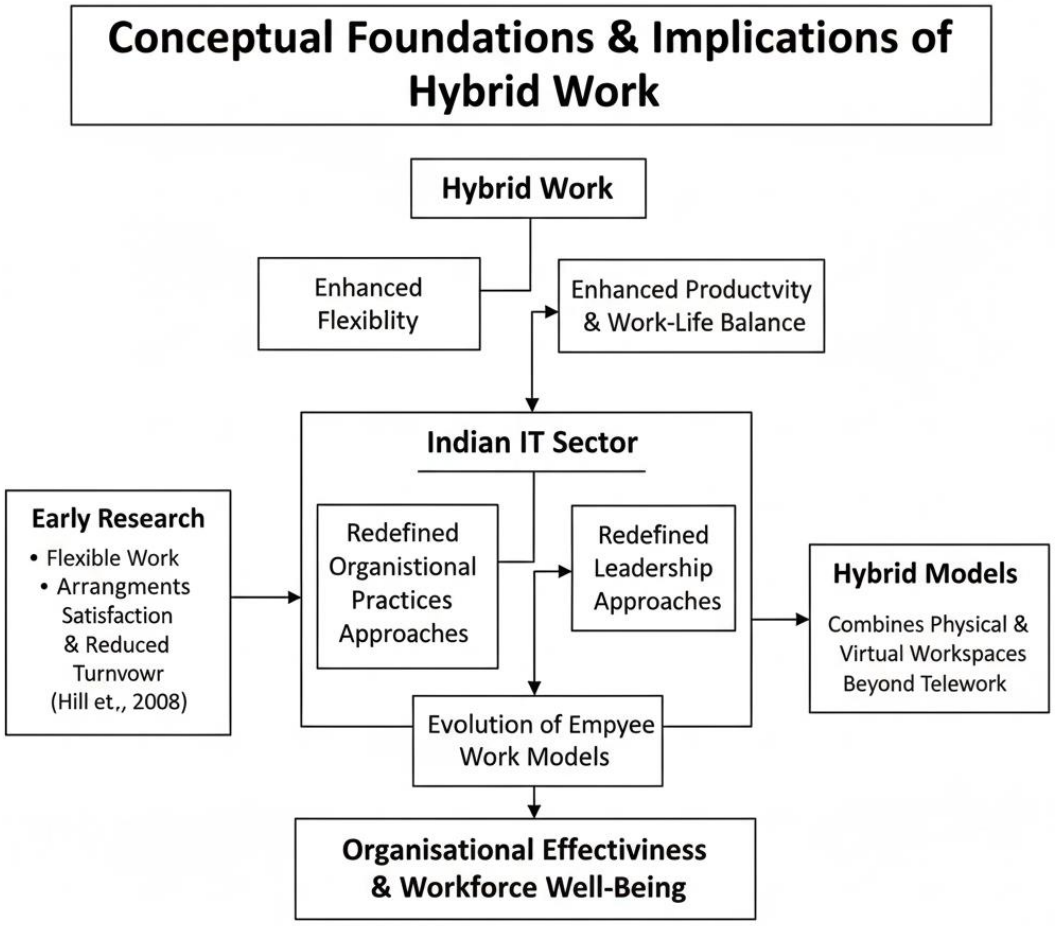
The emergence of hybrid work has significantly transformed work structures within India's information technology sector, influencing organisational culture and employee psychological well-being. Hybrid work arrangements, combining remote and on-site modes, offer flexibility and productivity benefits while simultaneously reshaping communication patterns, leadership practices, and cultural cohesion. This conceptual study examines the interrelationship between hybrid work, organisational culture, and psychological well-being in Indian IT organisations. Drawing on organisational culture theory, job demands–resources theory, and well-being literature, the paper develops a conceptual framework explaining how hybrid work practices influence employee well-being through cultural dimensions such as trust, inclusivity, collaboration, and managerial support. The study highlights those supportive organisational cultures can mitigate stress, isolation, and work–life imbalance associated with hybrid work, thereby enhancing employee engagement and mental resilience. By synthesising fragmented literature, the paper contributes a structured conceptual perspective relevant to India's IT context. The study offers valuable insights for HR practitioners and organisational leaders seeking to design culturally aligned hybrid work strategies that promote sustainable employee psychological well-being.

***Keywords**: Hybrid Work, Organisational Culture, Psychological Well-being, Indian IT Industry*

Hybrid Work

Hybrid work has emerged as a dominant work arrangement in IT organisations, particularly after accelerated digital transformation and changing employee expectations. By combining remote and on-site work, hybrid models aim to enhance flexibility, productivity, and work–life balance. In the Indian IT sector, hybrid work has redefined organisational practices, leadership approaches, and employee experiences, making it essential to conceptually understand its implications for organisational effectiveness and workforce well-being.

The concept of hybrid work has gained prominence as organisations seek to balance operational efficiency with employee flexibility. Early research on flexible work arrangements highlighted benefits such as improved job satisfaction and reduced turnover (Hill et al., 2008). However, these studies primarily focused on telework and lacked insights into hybrid models that combine physical and virtual workspaces.



Source: Based on provided text

With advancements in digital infrastructure, scholars began examining hybrid work as a distinct organisational arrangement. Allen, Golden, and Shockley (2015) noted that hybrid work improves autonomy and performance when supported by appropriate managerial practices. Their study emphasised that technology alone is insufficient; organisational support and trust are critical enablers. Similarly, Messenger and Gschwind (2016) argued that hybrid work offers productivity gains but requires redesigned work processes and leadership styles.

In IT organisations, hybrid work has been particularly relevant due to the nature of knowledge-intensive tasks. Wang, Liu, Qian, and Parker (2021) observed that hybrid work influences employee well-being through altered communication patterns, task interdependence, and boundary management. Complementing this view, Choudhury, Foroughi, and Larson (2021) demonstrated that hybrid work enhances productivity and retention in technology-driven firms when employees are granted location flexibility.

The organisational culture perspective has also been central to hybrid work literature. Schein (2010) emphasised that shared values, norms, and leadership behaviours shape how employees experience new work arrangements. In hybrid contexts, maintaining cultural cohesion poses challenges due to reduced face-to-face interactions. Gibbs, Mengel, and Siemroth (2021) highlighted that hybrid work may weaken informal knowledge sharing unless organisations intentionally foster collaboration and inclusion. From the Indian IT sector perspective, Budhwar, Varma, and Patel (2016) noted that cultural diversity, hierarchical structures, and client-driven work pressures influence hybrid work implementation. More recently, Jaiswal, Arun, and Varma (2022) linked hybrid work with sustainable HRM practices, emphasising continuous learning, digital leadership, and employee well-being.

There is limited conceptual integration of hybrid work with organisational culture and employee well-being, particularly within the Indian IT context. This highlights the need for holistic frameworks that capture the complex interplay between technology, culture, and human experience in hybrid work environments.

Organisational Culture

Organisational culture plays a pivotal role in shaping employee behaviour, innovation, and performance within IT organisations. Characterised by rapid technological change, project-based work, and global collaboration, the IT sector demands adaptive and value-driven cultures. In the Indian IT industry, organisational culture significantly influences employee

engagement, knowledge sharing, and retention. Understanding the conceptual foundations of organisational culture is therefore essential for sustaining competitiveness and long-term organisational effectiveness. Organisational culture has been widely examined as a core determinant of organisational effectiveness and employee behaviour. Schein (2010) defined organisational culture as a pattern of shared assumptions learned by a group as it solves problems of external adaptation and internal integration. His model emphasised artefacts, espoused values, and underlying assumptions as key cultural layers. This framework has been extensively applied to analyse culture in knowledge-intensive industries such as IT.

Earlier studies by Hofstede (2001) highlighted the influence of national culture on organisational practices, suggesting that cultural values shape communication, leadership, and decision-making processes. In the Indian context, collectivism, power distance, and respect for hierarchy interact with organisational culture, particularly within IT organisations that operate in global markets. These cultural dynamics influence teamwork, leadership styles, and employee expectations. Denison and Mishra (1995) proposed that organisational culture contributes to effectiveness through traits such as involvement, consistency, adaptability, and mission clarity. Their model suggests that IT organisations with adaptive cultures are better positioned to manage technological change and innovation. Complementing this view, Cameron and Quinn (2011) categorised organisational cultures into clan, adhocracy, market, and hierarchy types, noting that IT firms often gravitate towards adhocracy cultures that promote creativity and flexibility.

Indian IT sector studies further highlight the role of organisational culture in employee outcomes. Budhwar, Varma, and Patel (2016) observed that organisational culture in Indian IT firms is shaped by global client demands, performance-driven environments, and multicultural teams. Their findings indicate that supportive and inclusive cultures enhance employee commitment and reduce turnover intentions. Similarly, Rao and Abraham (2018) emphasised that trust-based cultures foster knowledge sharing and collaboration in IT organisations. The digital transformation era has further reshaped organisational culture. Chatman and O'Reilly (2016) argued that cultural alignment becomes increasingly critical in technology-driven organisations to sustain performance. They noted that misalignment between organisational values and employee expectations can lead to disengagement. Jaiswal, Arun, and Varma (2022) linked organisational culture with sustainable HRM practices, highlighting the importance of continuous learning and ethical leadership in IT organisations.

Despite extensive research, existing studies often examine organisational culture in isolation from emerging work practices such as hybrid work and digital leadership. This fragmentation highlights the need for integrated conceptual approaches that contextualise organisational culture within India's evolving IT ecosystem.

Psychological well-being

Psychological well-being has become a critical concern for IT organisations due to increasing work intensity, rapid technological change, and evolving work arrangements. IT employees often experience high cognitive demands, tight deadlines, and continuous skill pressures, which directly affect their mental health and work performance. In the Indian IT sector, understanding psychological well-being is essential for promoting employee engagement, reducing burnout, and sustaining long-term organisational effectiveness.

Psychological well-being refers to an individual's overall mental state, encompassing emotional balance, life satisfaction, and effective functioning at work. Ryff (1989) conceptualised psychological well-being through dimensions such as autonomy, environmental mastery, personal growth, purpose in life, positive relations, and self-acceptance. This framework has been widely applied in organisational studies to assess employee mental health.

In work-related contexts, the Job Demands–Resources (JD–R) model proposed by Bakker and Demerouti (2007) explains how job demands such as workload and time pressure can lead to stress, while job resources like support and autonomy enhance well-being. IT employees often face high job demands due to project deadlines, technological complexity, and client expectations. When organisational resources are insufficient, prolonged exposure to such demands may result in emotional exhaustion and burnout. The role of work environment and organisational practices has been extensively studied in relation to psychological well-being. Warr (2007) argued that supportive leadership, job security, and meaningful work significantly contribute to employee mental health. In IT organisations, flexible work arrangements and participative management practices have been found to positively influence well-being by enabling better work–life balance. Wang, Liu, Qian, and Parker (2021) observed that remote and hybrid work arrangements affect psychological well-being through changes in communication, social connection, and boundary management.

Indian studies further highlight contextual factors influencing IT employees' well-being. Budhwar, Varma, and Patel (2016) noted that long working hours, global time-zone coordination, and performance-driven cultures increase stress levels among Indian IT professionals. Complementing this, Sahoo and Sahu (2009) found that role ambiguity and job insecurity adversely affect psychological well-being in knowledge-intensive sectors. Recent literature has emphasised the importance of organisational culture and HR practices in supporting mental well-being. Kundi, Hollet-Haudebert, and Peterson (2021) demonstrated that supportive organisational cultures and employee-centric HR policies reduce burnout and enhance psychological resilience. Jaiswal, Arun, and Varma (2022) further linked employee well-being with sustainable HRM practices, highlighting continuous learning, ethical leadership, and digital support systems as key enablers. This fragmentation underscores the need for integrated conceptual frameworks that address psychological well-being within the evolving digital and organisational landscape of India's IT industry.

Indian Information Technology (IT) industry

The Indian Information Technology (IT) industry occupies a pivotal position in the country's economic development and global competitiveness. Understanding the current status of the Indian IT industry is essential for assessing its contribution to employment generation, technological advancement, and sustainable economic growth. The Indian IT industry has been extensively examined in academic literature due to its rapid growth, global integration, and transformative impact on organisational practices. Early studies highlighted India's emergence as a global IT services hub driven by skilled human capital, cost efficiency, and English language proficiency (Heeks, 1996). This foundational phase established India's dominance in software services and offshore outsourcing.

Arora and Gambardella (2005) analysed the structural evolution of the Indian IT sector and argued that its success was rooted in strong engineering education, diaspora networks, and institutional support. Their study positioned the industry as a knowledge-intensive sector capable of moving up the value chain. Complementing this view, Dossani and Kenney (2007) observed that Indian IT firms gradually transitioned from low-end coding services to complex system integration and consulting roles.

From a strategic management perspective, Athreye (2005) highlighted that Indian IT firms developed dynamic capabilities that enabled them to respond effectively to global client

demands. This adaptability strengthened India's position in international markets, particularly in the United States and Europe. However, the author also noted challenges related to innovation depth and dependency on external markets. The role of human resource practices has received significant scholarly attention. Budhwar and Varma (2010) examined HRM systems in Indian IT organisations and found a strong emphasis on performance orientation, skill development, and global work exposure. While these practices enhanced productivity, they also intensified work pressure and employee stress. Budhwar, Varma, and Patel (2016) further argued that talent retention and employee well-being have become critical challenges due to high attrition rates.

Upadhyay and Khandelwal (2018) observed that the adoption of artificial intelligence, analytics, and automation is reshaping business models within the Indian IT industry. These technologies are enabling firms to offer high-value digital solutions but simultaneously demand continuous workforce reskilling. Similarly, Jaiswal, Arun, and Varma (2022) emphasised that AI adoption in Indian IT firms has strategic implications for workforce sustainability and employability. The COVID-19 pandemic marked a significant turning point, accelerating remote and hybrid work practices. Narayanamurthy and Tortora (2021) highlighted that Indian IT firms demonstrated resilience by rapidly transitioning to distributed work models, ensuring service continuity. However, emerging challenges related to organisational culture, employee engagement, and psychological well-being were also identified.

The Indian IT industry as globally competitive, technologically adaptive, and economically significant. At the same time, it underscores persistent challenges related to innovation intensity, talent management, and sustainable growth. These dynamics indicate the need for continuous policy support and strategic organisational interventions to maintain the industry's global leadership.

Implications

The conceptual insights of this study offer important implications for IT organisations in India. Hybrid work strategies must be aligned with organisational culture to safeguard employee psychological well-being. HR managers should emphasise supportive leadership, trust-based practices, and inclusive communication to mitigate stress and isolation. Policymakers and organisational leaders can use these insights to design sustainable hybrid work models that balance flexibility, productivity, and employee mental health.

Future Research

Future research may empirically test the proposed conceptual relationships using longitudinal and multi-level research designs within Indian IT organisations. Comparative studies across sectors and regions can enhance generalisability. Further exploration of leadership styles, digital fatigue, and technology-mediated social support in hybrid environments would enrich understanding. Integrating quantitative and qualitative approaches can also provide deeper insights into employee experiences of hybrid work and well-being.

Research Gap

Despite growing literature on hybrid work, organisational culture, and psychological well-being, studies remain largely fragmented, particularly in the Indian IT context. Limited research integrates these constructs within a unified conceptual framework. Existing studies often focus on isolated outcomes without considering cultural and contextual influences. This gap highlights the need for holistic, India-specific conceptual models addressing the combined impact of hybrid work and organisational culture on employee well-being.

Conclusion

This conceptual study underscores the interconnectedness of hybrid work, organisational culture, and psychological well-being within India's IT industry. Hybrid work has redefined organisational practices, necessitating culturally supportive environments to sustain employee mental health. A strong organisational culture characterised by trust, inclusion, and adaptive leadership can enhance psychological well-being in digitally mediated work settings. By synthesising diverse literature, the study contributes a contextualised framework relevant to Indian IT organisations. It emphasises the need for strategic, human-centred approaches to ensure sustainable organisational performance and workforce resilience.

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ESG (Environmental, Social, Governance) is not a Choice: An Empirical Study Among Employees in Manufacturing Sector in Ambattur Area

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Abstract

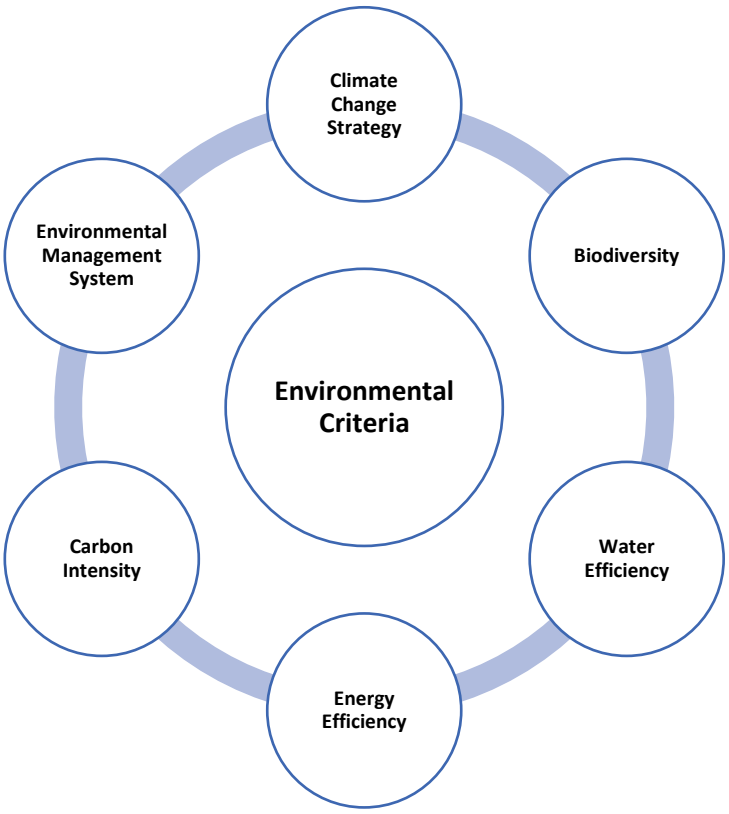
Environmental, Social, Governance has been a part of business practices for years together. It is good to know the growing urgency and structure around it, with regulators, investors and consumers demanding real action. Environmental aspects of consideration in terms of climate change strategy, biodiversity, water efficiency, energy efficiency, carbon intensity and environmental management have become an integral part of routine in any business. Likewise, equal opportunities at work place, freedom of association, health and safety, human rights, customer and product responsibility, child labour explain the social aspects that an organization should consider as important for sustainability. Similarly, every organization should uphold business ethics, compliance, board independence, executive governance stakeholder democracy and policy against bribery and corruption for ethical governance. This study aims to understand the awareness among employees in the manufacturing sector in Ambattur area which is an industrial oriented place.

***Keywords**: Environmental, Social, Governance, ESG, Carbon Footprint, Biodiversity*

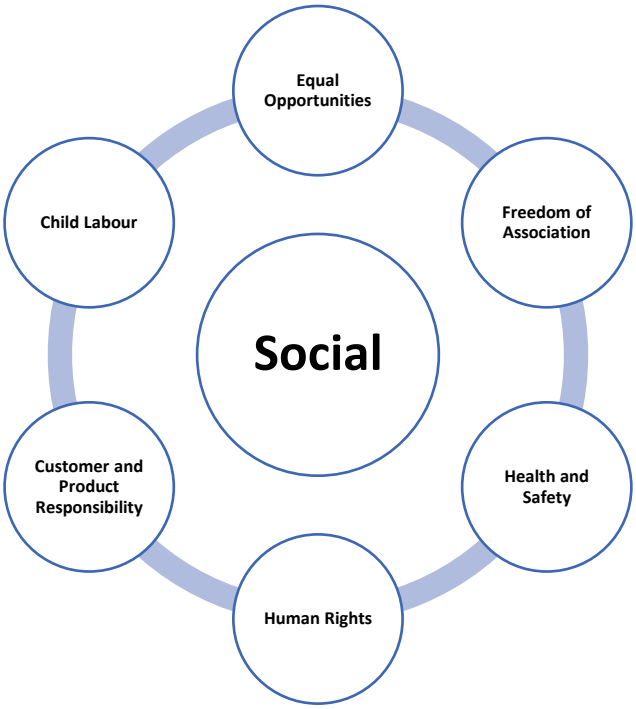
Introduction

Every business is deeply connected with environmental, social and governance concerns. The idea or proposition of such an ESG (environmental, social and governance) framework creates value for the business. This article is an effort to study the awareness of ESG framework among employees so as to understand its importance for a sustainable business and environment.

The 'E' in ESG framework encapsulates the environmental criteria of a business. This includes the various energy sources that the company consumes, the different types of waste it discharges, the renewable and non-renewable resources that it utilises and the consequences on how the living beings and the society is influenced. Environmental aspects of consideration in terms of climate change strategy, biodiversity, water efficiency, energy efficiency, carbon intensity and environmental management have become an integral part of routine in any business.



The 'S' in the ESG framework addresses the social criteria of a business. It explains the relationship that an organization maintains and the reputation it holds with the public, stakeholders and other organizations in the communities where the business operates. It also includes labour relations and emphasizes on diversity and inclusion. Likewise, equal opportunities at work place, freedom of association, health and safety, human rights, customer and product responsibility, child labour explain the social aspects that an organization should consider as important for sustainability.



The 'G' in the ESG framework indicates the internal system of practice in an organization, the policies, procedures that the company follows and the controls that it has in order to govern efficiently thereby to make effective decisions. It also exhibits compliance with the rules and regulations to meet the expectations of its internal as well as external stakeholders. Similarly, every organization should uphold business ethics, compliance, board independence, executive governance stakeholder democracy and policy against bribery and corruption for ethical governance.

Literature Review

Nowadays ESG has become an integral part of every business as its individual elements are intertwined with each other. A deeper insight into the ESG framework will exhibit how its various elements are overlapped with each other. The social criteria overlap with governance as well as environmental criteria while the company compliance with the environmental rules and regulations for sustainability. The most important concern while being environmental then social criteria cannot be effectively taken care of without proper governance and it is inseparable. Appropriate leadership and governance bring in the mastery of upholding the spirit of togetherness by exhibiting good role models, being proactive to avoid violations and ensuring transparency in all walks of corporate life in terms of documentation and reporting. The acceleration towards ESG is increasing consistently by incremental growth in social, governmental as well as consumer attention to a broader impact. Companies, investors and other stakeholders realize the timely need for a strong ESG proposition leading to firm's long-term success.

Need for the study

The contribution of every employee towards ESG is of paramount importance. Better ESG performance reduces downside risk. A deeper understanding about ESG framework and its importance should be emphasized to every employee. They are the real change accelerators in an organization. Unless a change acceleration process is implemented, bringing in changes will always have resistance. It becomes essential to create an awareness on ESG among employees.

Research Methodology

This study aimed at analysing the level of awareness on ESG among employees in 10 manufacturing companies in Ambattur area, a highly industrial zone. A well-structured questionnaire with 15 items was developed adopting 5-point Likert scale. Seeking approval from senior executives in the companies, an interview was conducted in each company.

Findings

Statements	Mean Value
Your company understands the impact of climate change.	**1.8**
Biodiversity is included in your work environment.	**2.7**
Your company utilises water efficiently.	**2.9**

Energy consumption is monitored.	**2.8**
Manufacturing processes brings down carbon footprint.	**1.7**
Proper environmental management system is in place in your company.	**2.0**
Equal opportunities are provided at workplace.	**3.2**
You have freedom of association in your work environment.	**3.0**
Health and safety measures are taken care of.	**3.2**
Human rights are valued at workplace.	**3.3**
Customer satisfaction is of paramount importance.	**3.0**
Child labour is abandoned in your work premises.	**4.0**
Your company upholds business values and ethics.	**4.2**
Company compliances with rules and regulations.	**4.2**
You are aware of ESG framework at workplace.	**2.4**

Source: Author's own (Primary Source of Data)

Results and Discussion

The awareness on environmental concerns studied through 6 items revealed that the mean score of all the items is below average (mean value less than 3). The awareness on social concerns in the company studied through 6 items revealed that the mean score of all the items is near to average (mean value more or less 3). The governance aspect studied through 2 items explains a good score (mean value near 4). Finally, the awareness on ESG studied through 1 item revealed that the mean score is below average (mean value less than 3).

Nowadays as the ESG proposition becomes a compelling aspect, it is essential to also understand value creation for every organization. There arises a thought whether the ESG proposition makes financial sense to the organization. If the answer is yes, then the links to the value creation has to be studied in terms of facilitating the top-line growth; optimizing investment and capital expenditures; increasing employee productivity; reducing costs; and minimizing regulatory and legal interventions.

These five pivot aspects should be a part of the top management's mental checklist when adopting ESG framework in the business environment. The employees are to be oriented on what is ESG concern and its role in the dynamic global environment. The softer personal dynamics enhancement would support for the heaviest lifting of the previously mentioned five pivot aspects.

Conclusion

The importance of ESG to value creation is a solid intention to carefully executed upon. Environmental, Social, Governance has been a part of business practices for years together. It is good to know the growing urgency and structure around it, with regulators, investors and consumers demanding real action.

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The Study of Human Resource Management in Organizational Performance

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Abstract

In recent years, HRM has received a lot of traction. Human resource management is essential for all types of enterprises. Each organization's main goal is to attain high levels of performance in its goals and objectives. This study explores the intricate patterns of the relationships between HRM practices and the performance of an organisation, showcasing the critical role of HRM in shaping the future of a business. More firms are beginning to understand and appreciate the value of HRM in today's fast-paced, competitive marketplace. An aligned HRM approach improves performance, creativity, happiness, and innovation. This investigation focuses on primary HR functions such as recruitment, training and development, performance appraisal, compensation management, engagement, and their impact on both financial and non-financial performance. This research was qualitative in nature using interviews and surveys from multiple industries. Organizational outcomes associated with HRM factors were analysed using percentage, descriptive statistics. Strategic HR involvement in decision-making enhances long-term competitiveness, as noted in the research. These findings add to the literature by demonstrating the importance of effective HRM practices for organizational sustained success, which is beneficial for practitioners in HR, academia, and policymakers.

***Keywords**: Organisational, Performance, Human Resource, Management*

Introduction

HRM, refers to a broader concept that encompasses several processes designed to help individual employees realize their maximum potential such as recruitment and selection, training, performance appraisal, rewards, employee relations, engagement initiatives, and

strategic communications. This study focuses on the multifaceted relationship between HRM and organizational performance by exploring how HRM practices affect innovation, employee satisfaction and engagement, overall productivity, and financial performance. Increased competition, new technological advancements, and evolving worker expectations in the modern globalized economy are some of the factors that pose new challenges for human resource management systems. In contrast to the traditional systems of management, more strategic and integrative models are shifting from Technological HRM towards leaner agile models driven by human resource management.

Review of Literature

Shwetha (2017) suggested that HR professionals can make use of different AI technology and tools for all the functions of HR be it recruitment, selection, training, development, performance management, compensation and real management.

Geetha and Reddy (2018) found that the combination of Human resource management and Artificial intelligence leads to the data maintenance. They also suggested that it save the cost and time to the organisation with more accuracy and access in total recruitment process.

Anupama Gupta (2010) explained the consequences of the challenges faced by the Human resource management in context with the current economic status and the challenges faced should be taken in consideration and insisted on the challenges in the short fall of talented employees also emphasised on how Human resources Management tackles the problems handled on a day-to-day activity.

Saini R.R. (2010) explained Management in United Commercial Bank which is a case study of Chandigarh State which elaborates HRD rules and regulations. He explained the hurdles in the process of framing the rules and process of executing it. The result of the study is qualification plays an important role in recruitment in top, middle and low-level management. The practice of selecting right candidate for the level of management helps the organization to achieve more and retain employees in the organization**.**

Tripathy (2008) explained that the organization have the optimum usage of Human resources in the organization. Their study followed the 3 C concept (i.e) Competencies, commitment and culture. By followed these 3 C culture in the work organization give the positive results in the organization. This practice is considered to be the best result earning which resulted in the increase in the financial growth.

Objectives of the Study

1. To understand the role of Human resource management
2. To study training and development of employees in Human resource management ***(HRM).***
3. To study significant difference between Performance appraisal of employees in Human resource management ***(HRM).***
4. To study the Employee involvement in Human resource management ***(HRM).***
5. To study Organisational performance of employees in Human resource management ***(HRM).***

Research Methodology

Data Collection Methods

This study utilized both primary and secondary sources of information. Corporate reports, HRM policy manuals while structured questionnaires and semi-structured interviews provided primary data. To gather quantitative insights on the implementation and outcomes of various HRM activities, a quantitative measurement tool was devised. It featured constituents like engagement practices, perceived organisational performance indicators, performance appraisal systems, training sessions and their frequency, compensation policies, and recruitment techniques. A five-point Likert scale tested the level of agreement or disagreement on various HRM effectiveness metrics alongside organisational outcomes. For quantitative data regarding the alignment of business strategies with human resource concerns, a few HR executives were interviewed in a semi structured format, capturing broader qualitative angles. This component allowed the researchers to deepen, validate, and enrich the statistical data.

Tools used for Analysis

The various tools used for the study are

- Percentage
- Descriptive statistics

Analysis and Discussion

Table 1

Statement Showing – Demographic Profile of Respondents

Demographic variable	Category	Percentage
Gender	Male	75
	Female	25

Age group	20-30	12
	31-40	33
	41-50	47
	Above 50	8
Education level	Under graduate	68
	Post graduate	30
	Doctorate	2

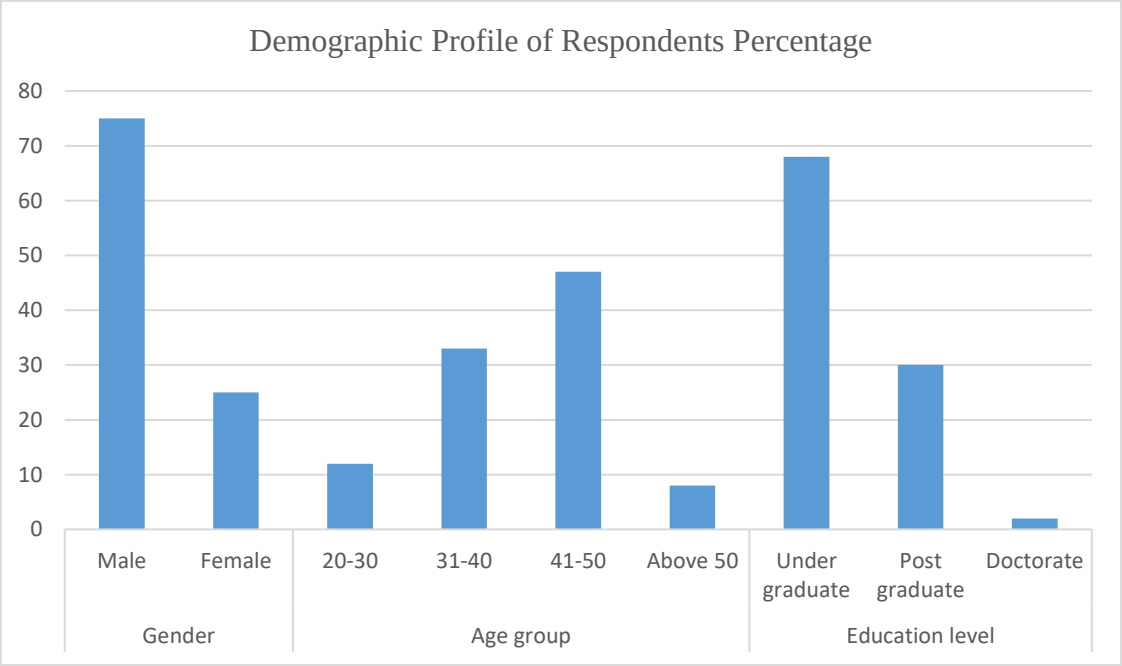
Source: Computed results compiled from primary data

Interpretation

The sample is predominantly composed of male employees (75%), and a considerable portion falls within the 41-50 age range (47%). 68% of them possess a undergraduate degree and 30% of them are post graduate, 2% signifying a high level of education.

Figure 1

Statement Showing – Demographic Profile Of Respondents



Source: Computed results compiled from primary data

Figure 1 depicts the demographic profile of respondents The given demographic factors are sufficiently balanced to ensure accurate representation of the organizational structure.

Table 2

Statement Showing Descriptive Statistics of Key Variables

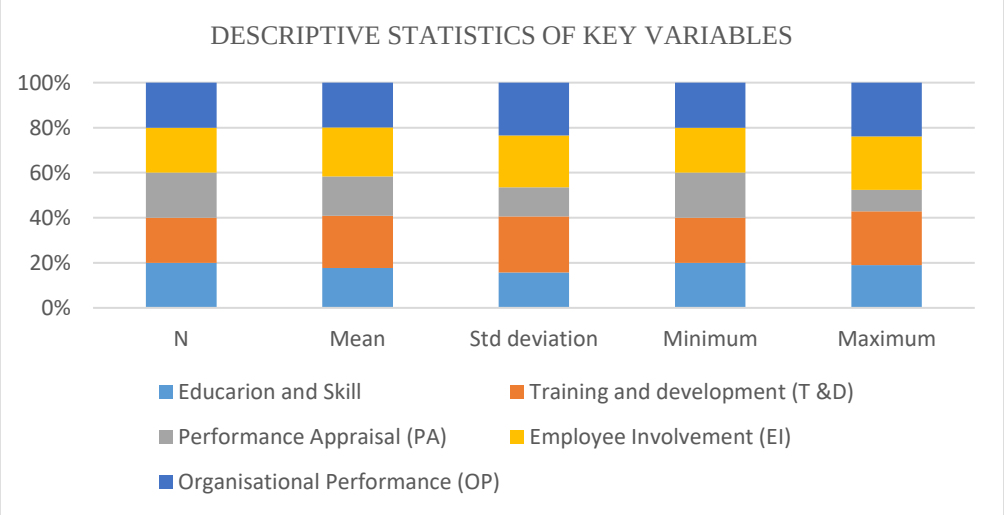
Variable	N	Mean	Std deviation	Minimum	Maximum
Education and Skill	100	1.36	0.577	1	4
Training and development (T &D)	100	1.77	0.90849	1	5
Performance Appraisal (PA)	100	1.34	0.4761	1	2
Employee Involvement (EI)	100	1.67	0.84154	1	5
Organisational Performance (OP)	100	1.52	0.85847	1	5

Source: Computed results compiled from primary data

Table 2 shows that the descriptive statistics of key variables in that, training and development were the most positively perceived with a mean score of 1.77 Another indicator of a motivated workforce is the level of employee engagement 1.67 which is also high. These human resource management practices are at a moderate level of adoption given the performance appraisal and Organisational performance scores which are just above, but less than, the mid-level mark.

Figure 2

Statement Showing Descriptive Statistics of Key Variables



Source: Computed results compiled from primary data

Figure 2 shows that the descriptive statistics of key variables. In that training and development and employee engagement perceived high mean scores.

Concluding Remarks

This study focuses on the value of Human Resource Management (HRM) in the enhancement of organizational performance. Effectiveness, efficiency, productivity, and other factors within the organization are influenced by the performance of human resource management functions such as training and development, performance evaluation, employee engagement, and workforce optimization. It has been shown that organizations which have well developed HRM systems tend to have more satisfied and committed employees because these organizations are able to effectively attract, retain, and motivate strong employees. This finding opens up the interesting avenue of possibility that characteristics related to age influence both perceptions and actual effectiveness of an organization, warranting further analysis.

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Do Green HRM Practices Shape Environmentally Responsible Workplace Behaviour? Examining The Mediating Role of Employee Engagement

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Abstract

Increasingly, organisations are looking towards internal management practices to help them overcome environmental sustainability issues. Green Human Resource Management (GHRM) has remained one of them that have come into the limelight as a strategy of promoting responsible employee behaviour, which is environmentally friendly. Although this interest has been increasing, there is a dearth of empirical information as to why GHRM practices affect the environmentally responsible workplace behaviour (ERWB) using the psychological processes, especially in the framework of developing economies. This research aims at discovering the link between the GHRM practices and ERWB considering employee engagement as a moderator. A structured survey instrument was used to collect data on 183 employees and it was analysed with the help of SPSS. Reliability testing, correlation test, regression test and hierarchical regression were used. The results indicate that the GHRM practices considerably increase the level of employee engagement and promote ERWB. In addition, employee engagement partly mediates this relationship, which implies that engaged employees are likely to translate green HR initiatives into sustainable work place behaviors. The research builds on the literature of Green HRM by providing practical implications and empirically emphasising employee engagement as one of the explanatory drivers and organisations that seek to enhance sustainability by using HR practices.

***Keywords**: Green HRM, Employee Engagement, Environmentally Responsible Workplace Behaviour (ERWB), Workplace Sustainability*

1. Introduction

Environmental issues like climate change, depletion of resources and ecological degradation have further heightened the pressure on organizations to be sustainable. Although organizations are progressively investing in green technologies and environmental management systems, and these measures are unlikely to achieve success without the contribution of the employees. The workers are essential in execution of sustainability programs in the way they conduct their daily work practices and discretionary behaviours (Ones and Dilchert, 2012).

Human resource management is one of the important means of influencing the attitudes and behaviour of employees. To address the sustainability issue, organizations have started to incorporate the environmental goals in HR policies and practices, which directed to the development of GHRM. GHRM concentrations on ensuring that the recruitment, training, performance evaluation, and reward programs are consistent with the environmental objectives to promote the environmentally responsible behavior of employees (Renwick et al., 2013).

In spite of the fact that previous studies recognise the benefits of GHRM, organisations are often unable to translate green policies into the behavioural pattern of employees. Current literature has focused on exploring direct links among GHRM practices and environmental performance and providing a little considerate of the psychological mechanisms by which such practices affect employees (Pailleetal.,2014). The knowledge in these mechanisms can help to improve the success of sustainability efforts.

One possible explanatory mechanism in this case is employee engagement. Engagement indicates how much workers are emotionally and mentally committed to their organization and missions(Kahn,1990).The employees may also pursue greater engagement when they feel that the organisation they are in reflects commitment to sustainability, in terms of GHRM practices, and, as a result, promotes voluntary environmentally responsible workplace behaviour. Nevertheless, empirical studies that look at employee engagement as a mediating variable are limited especially in the emerging economies. This paper attempts to block this gap.

2. Literature Review and Hypotheses Development.

2.1. Green Human Resource Management

GHRM is the integration of eco-friendly issues in the mainstream HR functions. By using green recruitment, organisations have been able to hire people who embrace sustainability. Green training programs improve the level of environmental awareness of employees as well as give them skills to implement sustainable work observes (Daily et al., 2012). Reward systems and performance management also support the green behaviour through the linking between environmental goals then appraisal and incentive systems (Jabbour and Santos, 2008).

This is achievable by instilling environmental values within HR systems to convey the value of sustainability to employees hence imparting expectations and workplace norms (Jackson et al., 2011). The empirical evidence indicates that these performs have a positive effect on the attitudes and behaviours of the employees concerning environmental responsibility (Dumont et al., 2017).

2.2 Environmentally Responsible Workplace Behaviour

Employee environmentally responsible workplace behavior is a voluntary behavior that is taken by employees to reduce harmful environmental impact and help in the sustainability efforts in the workplace. Such behaviours go beyond what is required in the job description, and encompass behaviours like energy conservation, waste reduction, and contribution towards environmental programmes (Ones and Dilchert, 2012).

According to the previous research, organisational practices are important in promoting such behaviours. As employees believe that organisations support sustainability, they will take environmentally responsible actions out of their own free will (Paille et al., 2014).

2.3 Employee Engagement as Intermediary Process.

Employee engagement shows the relationship of employees with their work and organisation (also psychologically). Employees who are engaged show more commitment and discretional effort (Kahn, 1990). Engagement can be improved through sustainability-related HR practices which help to create the feeling of purpose and support to the organisation (Albrecht et al., 2015).

Employees who are engaged have higher chances of internalising organisational values and converting these values to everyday behavior including ERWB. In line with this, employee engagement can serve as a mediating variable that employee behaviour is affected by GHRM practices.

According to the discussion above, the following hypotheses are as follows:

- H1:Green practices in HRM have a positive effect on ERWB.
- H2:Green HRM practices are positively related to employee engagement.
- H3:Employee engagement has positive effect on ERWB.
- H4:There is a mediation of the relationship among Green HRM practices and ERWB through employee engagement.

3. Methodology

The research design is descriptive and analytical. The research used primary data of 183 employees based in organisations, which have applied the environmentally oriented HR practices. A convenience sampling method was used for the accessibility factor.

A structured questionnaire with the measures of Green HRM practices, employee engagement, and ERWB was used to collect data. The answers were taken on a five-point Likert scale. The statistical analysis was completed on SPSS, such as reliability analysis, descriptive statistics, regression analysis, correlation analysis and hierarchical regression to verify the mediating effect of employee engagement.

4. Results and Discussion

4.1 Reliability Analysis

All measurement balances were tested on reliability and the Cronbach's alpha values were high and above the acceptable reliability tests.

Table 1

Construct	Number of Items	Cronbach's Alpha
Green Recruitment	3	0.81
Green Training	4	0.85
Green Performance Management	3	0.79
Green Rewards	3	0.83

Overall Green HRM	13	0.91
Employee Engagement	3	0.84
ERWB	4	0.88

4.2 Descriptive Statistics

Descriptive analysis demonstrated rather high mean levels of Green HRM practices, employee engagement, and ERWB that indicated positive views of the employees on sustainability efforts.

Table 2

Variable	Mean	Standard Deviation
Green HRM Practices	4.12	0.61
Employee Engagement	3.98	0.66
ERWB	4.21	0.58

4.3 Correlation Analysis

Correlation analysis revealed that the study variables have significant positive relationships which gave initial support to the proposed hypotheses. These findings suggest that the employees, who feel that green HR practices are more evident, also report higher engagement and increased involvement in green behaviour.

Table 3

Variables	1	2	3
1.Green HRM Practices	1		
2. Employee Engagement	0.64**	1	
3. ERWB	0.71**	0.69**	1

4.4 Regression and Mediation Analysis

Regression analysis also confirmed that the predictors of ERWB are significantly predicted through Green HRM practices, which confirms Hypothesis 1. This result supports previous literature that indicates that HR sustainability systems affect employee behaviour by strengthening the environmental values (Dumont et al., 2017). Sustainability activities also

were also found to increase employee engagement significantly, which supported Hypothesis 2 and suggested that sustainability activities lead to employees being psychologically engaged with the organisation.

Table 4

Green HRM → Pro-Environmental Behaviour

Model	R	R^2	F-value	Sig.
Green HRM→ERWB	0.71	0.50	182.40	0.000

Table 5

Green HRM → Employee Engagement

Model	R	R^2	F-value	Sig.
Green HRM→ Employee Engagement	0.64	0.64	0.64	0.64

Table 6

Hierarchical Regression (Mediation Test)

Model	Predictor	β	Sig.
Model1	Green HRM→ERWB	0.71	0.000
Model2	Employee Engagement → ERWB	0.69	0.000
Model3	Green HRM	0.42	0.000
	Employee Engagement	0.38	0.000

The regression analysis showed that employee engagement mediates the connection among Green HRM practices and ERWB to a certain degree. This finding confirms Hypotheses 3 and 4, which show that, although GHRM practices have a direct result on employee behaviour, a important part of the effect is mediated by improved engagement. These results emphasize employee engagement as one of the main processes within which green HR programs can be changed into sustainable workplace practices.

4.5 Summary of Key Findings

There search comes up with four major findings. To begin with, Green HRM practices have a great influence on the environmentally responsible workplace behaviour. Second, the GHRM practices promote employee engagement. Third, the more employees are engaged, the more likely they show environmentally responsible behaviour. Lastly, the relationship between GHRM practices and ecologically responsible workplace behaviour is partly mediated by employee engagement, which proves it as a psychological mediator between the HR practices and sustainability results.

5. Conclusion and Future Implications

The proposed research is empirically validated and offers resolutions to the research questions because Green HRM practices can be used to promote sustainability of the workplace through employee engagement and environmentally responsible workplace behaviour. The results highlight the value of incorporating environmental goals within the HR systems in order to deliver sustainable organisational results.

As a manager, organizations are encouraged to emphasise on green recruitment, training, performance appraisal, and reward systems as a way of enhancing employee engagement and ensuring environmentally responsible behaviour. Organisations can also maximize on the effectiveness of sustainability initiatives by emphasizing on employee engagement.

The future research can assume longitudinal research designs to determine causal relationships, to test other moderating or mediating variables, and to extrapolate the research to other industries and cultures to increase the general is ability.

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Inclusive Work Culture in MSMES: Assessing Key Dei Measures that Boost Employee Engagement

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Abstract

Employee engagement has emerged as a critical determinant of organizational effectiveness, particularly in Micro, Small, and Medium Enterprises (MSMEs) that operate under resource constraints and increasingly diverse workforce conditions. Traditional human resource practices alone are often insufficient to sustain engagement in such environments, necessitating a broader strategic approach. Diversity, Equity, and Inclusion (DEI) has therefore gained prominence as an essential framework for fostering inclusive work cultures and enhancing employee engagement. This review paper examines how inclusive work culture, supported by key DEI measures, contributes to employee engagement in MSMEs. Drawing on existing theoretical and empirical literature, the study synthesizes findings related to inclusive leadership, fair and transparent HR policies, employee voice and participation, psychological safety, diversity awareness, and equitable access to growth opportunities. The review highlights that these DEI practices foster trust, belongingness, and motivation, which are central drivers of employees' cognitive, emotional, and behavioral engagement. By consolidating fragmented literature, this paper provides an integrated understanding of DEI-driven engagement and identifies significant research gaps, particularly the limited focus on MSMEs. The study offers conceptual clarity and directions for future empirical research in MSME contexts.

***Keywords**: Inclusive work culture, Diversity Equity and Inclusion, Employee engagement, MSMEs, Inclusive leadership*

1. Introduction

Employee engagement plays a vital role in organizational success by influencing productivity, innovation, employee retention, and overall performance. In the context of Micro, Small, and Medium Enterprises (MSMEs), sustaining employee engagement presents unique challenges due to informal HR systems, limited resources, and increasing workforce diversity. Traditional human resource practices are often inadequate to address these complexities, highlighting the need for alternative approaches.

Diversity, Equity, and Inclusion (DEI) has emerged as a strategic framework that enables organizations to create inclusive environments where employees feel valued, respected, and supported. An inclusive work culture enhances psychological safety, trust, and a sense of belonging, which are essential conditions for sustained employee engagement. Prior research suggests that engagement is shaped not only by individual motivation but also by leadership behaviors, organizational policies, participatory practices, and overall organizational climate.

Despite growing scholarly attention to DEI, existing research largely focuses on large organizations in developed economies. Limited attention has been given to MSMEs, particularly in emerging economies such as India. Addressing this gap, the present review synthesizes existing literature to examine how DEI-driven inclusive work culture enhances employee engagement in MSMEs.

2. Literature Review

2.1 Theoretical Frameworks Supporting Inclusive Work Culture and Employee Engagement

Employee engagement has been widely examined through multiple theoretical perspectives that explain how psychological, social, and motivational factors influence employees' involvement at work. In the context of Micro, Small, and Medium Enterprises (MSMEs), these theories provide a strong foundation for understanding how Diversity, Equity, and Inclusion (DEI) practices contribute to the development of an inclusive work culture and, in turn, enhance employee engagement. This section reviews key theoretical frameworks that are particularly relevant for explaining engagement outcomes within inclusive and resource- constrained organizational settings such as MSMEs.

2.1.1 Kahn's Psychological Conditions of Engagement and Inclusion

Kahn's (1990) theory of psychological engagement identifies three core conditions—**meaningfulness, psychological safety, and availability**—that enable employees to fully engage in their work roles. These conditions closely align with the principles of an inclusive work culture, where employees feel valued, respected, and safe to express their identities and ideas without fear of negative consequences. In MSMEs, inclusive leadership and equitable HR practices play a critical role in creating psychological safety, thereby encouraging employees to participate actively and remain emotionally committed to their organization.

Recent studies extend Kahn's framework by emphasizing the role of inclusive leadership and organizational culture in shaping engagement. Saks (2022) highlights that leadership behaviors promoting fairness, support, and inclusion significantly strengthen employees' perceptions of safety and belonging, which are essential for sustained engagement. Within MSMEs, where formal structures maybe limited, such inclusive practices become even more critical in fostering employee trust and engagement.

2.1.2 Job Demands–Resources (JD–R) Model and Inclusive HR Practices

The Job Demands–Resources (JD–R) model proposed by Demerouti et al. (2001) explains employee engagement as a balance between job demands and job resources. While high job demands can lead to exhaustion, adequate resources such as autonomy, supervisor support, and development opportunities enhance motivation and engagement. In MSMEs, employees often face high workloads and role ambiguity, making inclusive HR practices a vital source of job resources.

Recent research emphasizes that inclusive HR policies, participative decision-making, and supportive leadership function as key resources that mitigate stress and foster engagement. Schaufeli (2023) further extends the JD–R model by identifying digital tools, flexible work arrangements, and inclusive work practices as emerging resources that support engagement in small and medium enterprises. These findings suggest that DEI-oriented practices can strengthen employees' resilience and motivation, even in resource-limited MSME environments.

2.1.3 Self-Determination Theory (SDT), Inclusion, and Employee Motivation

Self-Determination Theory (SDT), developed by Deci and Ryan (1985), explains employee engagement through the fulfillment of three basic psychological needs: **autonomy,**

competence, and relatedness. An inclusive work culture directly supports these needs by enabling employees to exercise voice and autonomy, develop skills equitably, and experience meaningful social connections at work. In MSMEs, inclusive leader ship and fair HR practices help satisfy these needs, thereby enhancing intrinsic motivation and engagement.

Empirical evidence supports the relevance of SDT in inclusive organizational contexts. Van den Broeck et al. (2021) demonstrate that workplaces promoting autonomy and relatedness experience higher engagement and performance outcomes. For MSMEs, where financial incentives may be limited, fulfilling intrinsic needs through inclusive practices becomes a powerful mechanism for sustaining employee engagement and organizational commitment.

2.1.4 Inclusive Leadership

Inclusive leadership is prominent factor for foundations to DEI mechanism that ensures employee engagement and attitude. A study by Kuknor and Bhattacharya (2022) emphasize that inclusive leadership ensures behavioural outcomes. This behaviour demonstrates openness, respect for differences, and encouragement of participation signal organizational support and inclusion. It enables active involvement for employees in organizational processes, thereby enhancing employees' sense of value and contribution. Empirical studies by Al-Atwi and Al-Hassani (2021) conclude that inclusive leadership positively affects employee outcomes through enhanced perceptions of inclusion. It ensures higher level of employee engagement by fostering psychological safety and enhancing employee motivation through inclusive leadership.

2.1.5 Fair HR Policies and Practices

A study by Ezeafulukwe et al. (2024) highlight creating a positive work Environment, that's leads to improved satisfaction and strong engagement that ensures a inclusive organizational cultures by initiative of inclusive HR practices. Where they discuss about the address bias, ensure accessibility, and embed inclusive principles across key HR functions. Another study Upadhyay (2023) suggest that consistency, transparency, and employee involvement in HR policy formulation contribute to positive employee attitudes and satisfaction. Such equitable HR practices reduce conflicts and foster a sense of fairness, which is essential for sustaining employee engagement, particularly in smaller organizations and MSMEs where formal HR systems are limited.

2.1.6 Employee Voice and Participation

Zhu et al. (2022) examine employee voice as a critical mechanism for harnessing employees' potential and achieving sustainable organizational success. Based on Social exchange theory, the study explains how ethical leadership fosters a psychologically safe environment where employees feel comfortable expressing their views. The results conclude that strong leader– member exchange relationship indicating that high-quality leader–employee relationships enhance voice behaviour. Overall, the study underscores that ethical leadership and psychologically safe environments are essential enablers of effective employee voice. Compare to this study indicates that enabling employee voice supports better decision- making, enhances commitment, and facilitates knowledge sharing within organizations. Overall, the authors conclude that integrated employee voice practices contribute positively to innovation, employee outcomes, and sustainable organizational performance (Hosseini & Sabokro, 2022).

2.1.7 Psychological Safety

Psychological safety functions as important mediating factor of employee's satisfaction and engagement. A psychologically safe environment that encourages transparent communication, open idea sharing, and collaborative decision-making without fear of negative consequences. Studies that when such an environment is marked by trust, fairness, and interpersonal security, employee engagement increases as relational needs are met and participation becomes more active (Joseph & Seshadri, 2025). Drawing on social exchange and social information processing theories, (Siyal, 2023) demonstrates that inclusive leaders enhance employee engagement by fostering psychologically safe environments where employees feel respected, supported, and confident to express themselves.

2.1.8 Diversity Awareness & Inclusive Climate

Research suggests that diversity practices enhance employee engagement mainly by strengthening employees' feelings of inclusion. According to Jerónimo, Henriques, and Carvalho (2022), employees are more engaged when diversity initiatives are seen as genuinely embedded in the organization's culture and routine practices. Perceived inclusion acts as an important link in this process, while inclusive leadership further supports engagement by promoting openness, accessibility, and respect. Overall, the study emphasizes inclusion as the key mechanism connecting DEI practices and employee engagement.

2.1.9 Equal Opportunity &Fair Access to Growth

Equal Employment Opportunity (EEO) has been identified as a significant driver of employee engagement through its emphasis on fairness, inclusion, and equitable access to organizational resources. Chinedu-Eze, Emerole, and Osuala (2023) policies positively affect both cognitive and emotional engagement by promoting trust, job satisfaction, and a sense of belonging among employees. If we provide equal access to career growth, training, and mentorship that may ensures employee commitment and motivation. Also their finding concludes that EEO as a critical DEI mechanism for building inclusive work cultures that enhances employee engagement.

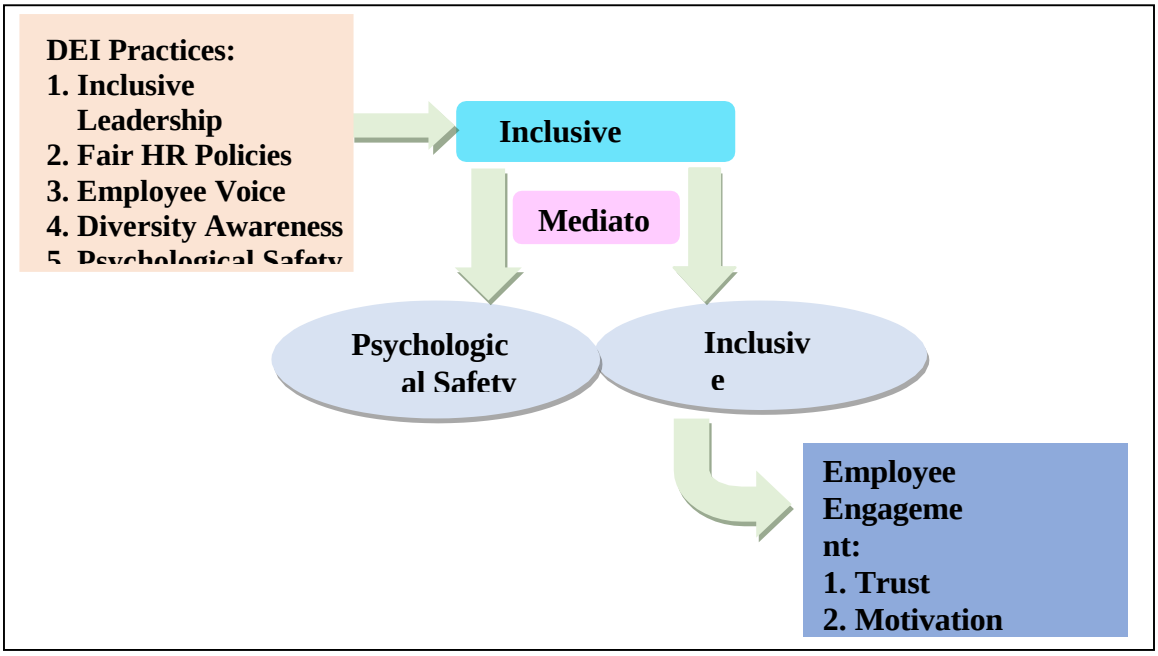
2.2 Respect, Belongingness & Dignity

Fostering a sense of belonging has been identified as a strategic driver of employee engagement within inclusive workplaces. Chakraborty, Sharada, and Anand (2024) explain that when organizations promote inclusivity, open communication, recognition, employees feel valued and connected, leading to higher engagement and cooperation. Their study highlights that DEIB initiatives, reward and recognition practices, and a positive work environment strengthen employees' sense of belonging, which in turn reduces turnover and enhances organizational performance. These findings reinforce belongingness as a critical psychological outcome of inclusive work cultures that boosts sustained employee engagement.

3. Proposed Conceptual Framework

Based on the reviewed literature, this paper proposes a conceptual framework wherein DEI practices—such as inclusive leadership, fair HR policies, employee voice, psychological safety, diversity awareness, and equal access to growth—collectively contribute to the development of an inclusive work culture. This inclusive climate, in turn, enhances employee engagement by fostering trust, motivation, and belongingness. The framework suggests that psychological safety and inclusive climate act as key mediating mechanisms linking DEI practices and employee engagement in MSMEs.

Proposed Conceptual Framework



4. Research Gap and Future Directions

1. Fragmented focus in existing studies

Current research largely examines individual DEI dimensions such as inclusive leadership, employee voice, or fairness in isolation. This fragmented approach limits a comprehensive understanding of how multiple DEI practices interact and collectively influence employee engagement.

2. Limited emphasis on MSME contexts

Most empirical studies are concentrated on large organizations and multinational corporations in developed economies. There is comparatively limited research on MSMEs, particularly in emerging economies like India, where informal structures, leadership styles, and constrained resources may shape DEI practices differently.

3. Insufficient exploration of mediating mechanisms

Existing literature provides limited insight into how DEI practices translate into engagement outcomes through mediating and contextual factors such as inclusive climate, psychological safety, and perceived belongingness. Sector-specific and longitudinal studies within MSMEs are also notably scarce.

4. Directions for future research

Future studies should adopt integrative frameworks that examine multiple DEI practices simultaneously, focus on MSME-specific organizational contexts, and use mixed-method or longitudinal designs to capture dynamic engagement processes. Empirical validation of DEI models tailored to MSMEs would significantly strengthen both theoretical understanding and practical application.

5. Conclusion

This review paper examined the role of inclusive work culture in enhancing employee engagement within MSMEs by synthesizing existing literature on key DEI measures. The findings indicate that inclusive leadership, equitable HR practices, employee voice, psychological safety, diversity awareness, and fair access to growth opportunities jointly foster higher levels of employee engagement.

In MSME contexts, where formal systems are often limited, inclusive leadership behaviors and fair interpersonal practices play a particularly significant role in shaping positive employee experiences. By integrating diverse theoretical perspectives, this review provides a consolidated understanding of DEI-driven engagement and offers a conceptual foundation for future empirical research aimed at strengthening inclusive and engaging workplaces in MSMEs.

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A Review of Literature on "A Study on Employee Welfare Measures and their Impact on the Performance of Municipal Corporation Employees"

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Abstract

Employee welfare facilities play a crucial role in improving job satisfaction and overall performance, particularly in public sector organizations such as the Municipal Corporation Municipal Corporation This study explores how several aspects of welfare—such as health and safety provisions, financial security, work-life balance, training opportunities, and social welfare—impact the performance of municipal corporation employees. A literature review suggests a clear connection between welfare and productivity, commitment, morale, and job satisfaction. However, there are noted gaps in the implementation and awareness of these programs. The study aims to evaluate the effectiveness of the Municipal Corporations welfare initiatives and offer recommendations for improvement. This contributes to the development of better policies that can enhance employees' well-being and the quality of public service. It also emphasizes the importance of structured welfare policies for achieving organisational success in the municipal sector.

***Keywords**: Employee Welfare, Welfare Facilities, Employee Performance, Job Satisfaction*

Introduction

Facilities for employee welfare are essential for enhancing job satisfaction and overall performance, especially in public sector entities like the Municipal Corporation Municipal Corporation

This research investigates how various elements of welfare. Including health and safety measures, financial stability, work-life integration, training options, and social services affect the performance of employees in municipal corporations. A review of the literature indicates a

distinct link between welfare and productivity, commitment, morale, and job satisfaction. Yet, there are recognized deficiencies in the execution and understanding of these initiatives. The research seeks to assess the success of the Municipal Corporations welfare programs and provide suggestions for enhancement. This helps create improved policies that can boost employees' welfare and the standard of public service. It also highlights the importance of organized welfare policies for attaining success in organizations within the municipal sector.

Keywords: Staff Well-being, Welfare Amenities, Employee Efficiency, Job Contentment.

This literature review examines how welfare facilities influence employee performance at the Municipal Corporation Municipal Corporation

It emphasizes the importance of supportive actions in enhancing employee satisfaction and productivity, particularly in public sector entities like municipal corporations. The research aims to explore how these welfare services affect job performance in settings that are frequently difficult due to various responsibilities and stressors. Despite extensive research on welfare in both private and public sectors, there is a distinct shortage of studies concentrating particularly on municipal corporations in India

The analysis explores the connection between employee welfare and achievement in public sector entities, focusing on the definitions and categories of welfare services, historical evolution, and governmental assistance for employee health in India and worldwide.

It examines the impact of welfare programs on employee performance, such as motivation, job satisfaction, and productivity, while also pinpointing shortcomings in existing systems. A targeted case study on the welfare programs of the Municipal Corporation intends to evaluate their efficacy and recommend enhancements. The results will offer policy suggestions focused on improving employee well-being and satisfaction, thus leading to improved public service results. This study lays the groundwork for additional research on how welfare initiatives affect the productivity of local government workers.

In 2021, Reddy performed a comparative analysis examining how welfare programs influence the job satisfaction of city employees.

The study revealed that cities offering extensive welfare initiatives resulted in more satisfied and engaged workers, whereas those without such resources faced diminished morale and higher attrition rates. Reddy suggested that consistent evaluations and enhancements to welfare programs via a systematic method could boost job satisfaction and performance. Deshmukh's 2022 study emphasized the significance of financial stability—demonstrated through perks such as pensions and emergency assistance—in encouraging city employees. The results indicated a significant connection between financial assistance and overall job contentment and efficiency.

Deshmukh emphasized the necessity of education and awareness in enhancing employees' comprehension of financial welfare initiatives, supporting clear financial guidelines and fair access to advantages.

Kumar examined how work-life balance initiatives affect productivity among city employees, indicating that successful mental health initiatives and adaptable work settings can enhance job satisfaction. He highlighted difficulties confronting employees, particularly women, and suggested implementing more adaptable policies. Nair investigated the impact of health and safety initiatives on employee productivity, showing a link between robust health programs and decreased absenteeism. He advocated for uniform safety regulations and ergonomic designs in the workplace. Patil's research highlighted the importance of training and development for city employees, suggesting that ongoing training improves effectiveness and flexibility. Challenges such as a lack of resources and reluctance to change among older employees were highlighted, with a suggestion to invest in contemporary training techniques. Ghosh's 2020 research on Indian municipal corporations highlighted the beneficial effects of social welfare initiatives on worker motivation.

It recognized essential elements like social security systems, leisure amenities, and community participation that enhance employee morale. The findings indicated that employees who are engaged and take advantage of these programs exhibit higher levels of commitment and satisfaction. Nonetheless, numerous municipal organizations disregard these efforts, resulting in discontent. Ghosh supported the inclusion of social welfare within broader employee welfare plans, highlighting the importance of investing in initiatives that foster team-building and community engagement. Two extra studies reinforce comparable conclusions,

highlighting the significance of welfare amenities in manufacturing sectors in Narhe, Pune, and their impact on productivity. These studies emphasize the importance of consistent assessments and enhancements of welfare services to address employee requirements, supporting the notion that welfare expenditures enhance both employee contentment and organizational effectiveness.

N. Reddy (2021) explored the influence of welfare initiatives on the job satisfaction of municipal workers, revealing that the availability of social benefits like education. He recommended that local governments broaden these initiatives with adaptable benefits to promote stability. Kumar (2020) evaluated work-life balance initiatives, highlighting that flexible hours and childcare assistance enhance employee concentration and contentment. He suggested revising these policies to better align with workforce requirements. Finally, J. Nair (2019) studied health and safety programs, claiming that effectively executed health initiatives decrease absenteeism and enhance job satisfaction for municipal employees, emphasizing their significance for productivity.

An Analysis of Employee Contentment Regarding Benefits Initiatives. The primary aim of this research is to examine the level of satisfaction autoworkers have with the benefits. They get. Measures for employee well-being are essential to maintain worker satisfaction and efficiency.

This directly impacts the productivity of the company.

The research examines the various forms of assistance that organizations provide, including shelter, Dining halls, schooling, and healthcare services. The findings indicate that these measures possess a direct impact on the happiness and productivity of employees, which consequently enhances the business's efficiency. The research indicates that both mandatory and optional. Social initiatives significantly influence the well-being and contentment of employees. The authors suggest that businesses ought to frequently assess and enhance their well-being. Assistance to fulfil the requirements of their employees. Implementing thorough measures for enhancing employee well-being not only enhances morale but also results in improved productivity and the company's achievements.

Companies that implement robust welfare policies experience reduced employee turnover and enhanced productivity. Studies show that non-financial perks, like housing and educational benefits, enhance employee involvement. Indian public sector enterprises are urged to adapt their support measures to address evolving employee requirements, offering customized aid initiatives such as mental health resources. R. White's research on corporate social responsibility (CSR) indicates that businesses engaging in CSR initiatives enhance employee motivation and commitment.

P. Verma explores the impact of competitive benefits on productivity in India, emphasizing the need for companies to regularly review their benefit packages. L. Carter's analysis highlights the psychological benefits of welfare programs, reinforcing the importance of investing in employee well-being for organisational success.

Problem Statement

The salary increase is not a crucial factor to develop and inspire employees, but staff's welfare procedures are viewed as a moral asset by the employer for successful organizational productivity and to realize the long-term objectives of the organization. Each organization first importance on their employees. When organizational employees are satisfied with their work, then the results of the organization will be higher output. Staff health is the most important thing in every organization.

There are some methods used by organizations that can help to measure the welfare and its impact on the performance of employees.

Objectives of the Study

1. To study welfare activities to assist in the profitability and productivity of staff.
2. To study employee welfare activities and their impact on employee performance.

Hypothesis

Ho: There are no significant activities to assist in the profitability and productivity of staff.

H1: There are significant activities to assist in the profitability and productivity of staff.

Ho: There is no significant effect of welfare facilities on employee performance.

H1: There is a significant effect of welfare facilities on employee performance.

Research Methodology

This research methodology involves collecting data from both primary and secondary sources, including interviews, observations, and questionnaires. Primary data is collected from employees, while secondary data is collected from company documents, websites, and publications. A comparative research design is used to examine the impact of welfare facilities on employees. A simple random sampling method is used, with responses from 60 sample sizes.

Results

Most of the respondents are satisfied with the overall welfare facilities. Based on the analysis of welfare schemes such as discounts, attention to referrals, drinking water facilities, lighting, working environment, overall health and safety, they do not have a significant impact on the employee's performance.

The rest of the facilities, like saving for the future, provident fund schemes, health insurance, accommodation for staying, transportation, canteen hygienist, changing room, schedule flexibility, have an impact on the employee's performance that shows a positive correlation.

Suggestions

- Workers are crucial for maintaining patient health, satisfaction, and safety.
- Hospitals and nursing homes have a significant responsibility towards their employees, motivation, and welfare.
- Welfare includes financial support, health and recreation, skill enhancement, and understanding of various issues.
- Work environment, wellbeing, and prosperity programs positively affect employees' health, commitment, and productivity.
- Important issues like future savings, pension schemes, health insurance, accommodation, transportation, canteen hygienist, changing room, and schedule flexibility significantly affect employee performance.

Conclusion

Employee welfare amenities play a crucial role in enhancing performance, satisfaction, and health among employees in public sector entities, particularly municipal corporations.

Research indicates that welfare initiatives, such as health regulations and work-life balance programs, currently have detrimental effects on motivation and productivity at the Municipal corporation. While literature shows that adequate welfare support correlates with higher job satisfaction and lower absenteeism, issues of awareness, accessibility, and implementation hinder effectiveness. Addressing these challenges through regular assessment and improved communication can elevate welfare initiatives. A well-structured employee welfare program is deemed a strategic investment that enhances organizational efficiency and public service quality, ultimately benefiting employee well-being and sustainable urban management.

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The Efforts of Employee well-being and Health care on Employee Engagement and Sustainability Initiatives to Improve Organizational Performance

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Abstract

Employee well-being and healthcare initiatives have become critical drivers of employee engagement for long-term organizational sustainability. "This study examines the impact of the employee well-being and healthcare practices on employee engagement and explores how sustainability initiatives mediates this relationship to enhance organizational performance". Using an quantitative research approach data were collected secondary data from employees across multiple organizations and analyzed by using the structural equation modeling. "The indication that comprehensive well-being and healthcare programs significantly improves employee engagement ". which turns positively influences sustainability-oriented practice. Furthermore to sustainability initiatives were found to play an crucial role in strengthening organizational performance by the fostering an healthy engaged and resilient workforce. "The study highlights the significance of a integrating employee well-being, healthcare, and sustainability initiatives in organizational policies to achieve an sustainable competitive advantages and to improve a performance outcomes."

***Keywords**: Employee well-being, healthcare initiatives, employee engagement, sustainability, organizational performance*

Introduction

In a developing competition the world business environment organization are be recognizing the long-term success depend not only on the financial performances but also on

the well being and engagement of their employee. "The Employee well-being and healthcare initiatives as a critical strategically tools that will expose the employee work and intention of the organization engagement, fostering sustainable workplace practices, and ultimately improving organizational performances by the employees". An human capitals remain an key driver of innovation and productivity, organization are the shifting from traditional management approaches toward more holistic and sustainable people-centered strategies. "The Employee well-being encompasses physically, mentally and emotional health all of the significantly influence employees, motivations, jobs satisfaction and commitment to organizational goals. Effective healthcare programs work–life balance initiatives, mental health support, and be safe working environments contribute to a reduced absenteeism, lower turnover rates, and improved morals. "When employees perceive that their organization genuinely invests in their health and well-being they are more likely to be demonstrate higher levels of engagement, discretionary effort, and organizational citizenship behavior". Employee engagement serves as an critical mediating factors between well-being initiatives and organizational performance. Engaged an employees are more be a productive, innovative, and aligned with organizational values, including sustainability objective. "Sustainability initiatives that integrate employee health and well-being reflects a broader commitment to a social responsibility and ethical management practices" . Such as initiatives not only enhance internal performance outcomes, but also strengthen organizational reputation and stockholder trust supporting long-term sustainability. Despite the growing emphasis on employee well-being and sustainability, empirical research examining the combined impact of healthcare and well-being efforts on employee engagement and organizational performance remains limited particularly in the context of a sustainability-driven strategies. This study seeks to an address this gap by exploring how employee well being and healthcare initiatives influence employee engagement and contributes to a sustainable organizational performance. By analyzing the relationships are the research aims to provide a valuable insight for manager and policy makers seeking to do a develop integrated ideas that promotes both the employees welfare measure and organizational sustainability.

Background of the Study

In a number of studies, sustainability practices have been explored to promote the health and overall well-being of employees. For example, (Madera Gonzalez al,2023) explored the impact of sustainable workplace practices on the well-being of employees and the environmental results. There search showed that such practices help to reduce pollution

and improve the company's overall efficiency. In addition, sustainable human resource management (HRM) practices can help mitigate the negative impact of employees' well-being and health care services that bring financial benefits from the organization. We explored the relationship between self-efficacy and the well-being of the workplace, and focused on the role of sustainability practices in modifying these relationships. Furthermore, the study highlighted the importance of examining sustainability practices from an HR perspective and highlighted the potential to strengthen employee well-being and productivity through thoughtful integration of sustainability practices.

Methodology

In the study the review of the literature using established scientific databases such as Scopes, web of science, Pub Med and, Google Scholar. The main objective was to find, evaluate and analyze academic articles, books and other related materials related to this topic. To ensure relevance and quality, specific inclusion criteria have been established for publications compiled by experts, documents written in Portuguese, English or Spanish and works published over the past decade. The evaluation of the selected sources provides a solid and comprehensive theoretical basis for the discussions and findings presented in this research.

Employees well-being

However, well-being plays an important role in an individual's life. According to a study (Page.k.m &Vella-Brodrick, 2009),the employees well-being refers to the way people feel about various aspects of their lives, such as their personal life, their workplace, and their relationship. In day today's life , physical and mental well-beings an essential aspect of employee well-being. Other researchers also strongly argued that workplace health and well-being was an important factor, as the maintenance of workplace well-being eventually had a positive impact on their loyalty to organizations (Lee.h.w & Rhee, 2022). The success and development of organizations, enterprises, and institutions depend on the well-being of their employees. However it is significant to develop tools to measure the well-being of the workplace.(w.q.Hyett m.p and Parker g.b, 2014) . This research is related to questionnaire has proved useful for all the researchers as a basis for their research (Kun.A,balogh.p,& Krasz k.g, 2017). Over a past year period a multidimensional well-being measurement scale has been introduced and its effectiveness has been assessed by exploratory and confirmed factory analysis.

Employee Engagement

The employee Engagement is conceptualized from various perspectives such as the need-satisfaction approach, the burn-out-antithesis approach, the satisfaction-engagement approach, and the multidimensional approach (Bailey et al.,2017; Shuck,2011). This need-satisfactory approach explains the engagement of self-expression in the workplace and helps role performance (Shuck,2011)-Antithesis is defined as a positive motional state that focuses on tasks (Shuck, 2011). This approach, also known as the work task commitment approach, believes that employees who are positive thinkers are strongly engaged in work-related activities (Bailey al.,2017). According to the satisfaction-engagement approach, engagement indicates an individual's participation, satisfaction, and enthusiasm for the work (Harter et al.,2002, Shuck,2011). A multi-dimensional approach to employee engagement (Bailey et al.2017; Shuck,2011) combines several dimensions of engagement. According to this approach, participation involves not only participation in the work, but also involvement in the organization (Saks, 2006). In the current study, employee participation viewed from a multi-dimensional perspective.

Well-being mediates the relationship between sustainable human resources management and the organizational commitment of health professionals

In our research model, were present the well being of employees an intermediary between the management of sustainable human resources and organizational commitments. The study also found that the relationships between the three structures were significant. The important relationship between these structures indicates that if the organization follows and incorporates an appropriate sustainable human resources management system, it will lead to better employee happiness. They report feeling happier and healthier at work.

Implications for Practice

These results indicate that, regardless of size or industry, organizations should give the priority to employee engagement and well-being as part of their sustainability strategy. Companies can achieve this by :

- Investing in health programs that address physical and mental health.
- Provide employees with growth opportunities by promoting their engagement through professional development and recognition.

- Integrate employee participation in to the corporate sustainability framework to ensure that employees are actively involved in the company's success.

Conclusion and limitations

The paper examines the impact of employee well-being and sustainable interventions in the health industry. With secondary longitudinal data from three key stakeholder groups (organizations, hospital employees and patients), the results provide a comprehensive assessment of environmental responsibility in health care beyond cost-saving strategies. The results show that interventions are perceived as beneficial the organization, hospital employees and patients. Working unit health champions, combined with organizational commitment to employee health, are associated with a better employee engagement, satisfaction and recognition of personal health, as well as with a more favourable perception of the organization, strongly supporting the benefits at the multi-level level of a robust health champion program.

The scope of future Research

In this changing environment, it is important to emphasize the integration of sustainable human resource management, which will ultimately strengthen the WB, OC and JS of the HCPs. This study focused on areas where some sustainable HRM practices are still needed, such as sustainable personnel, sustainable training and development, which in fact help professional achieve well-being. There is also a need to ensure the well-being of the HCPs, as the results show that the life of the WBisat least guaranteed by sustainable management of human resources.

Furthermore, the study also provides scope for further research in to the above-mentioned relationships, as the variable centered on employees being studied is limited to hospitals. It is possible that different organizations have different employee-centered variables such as employee engagement, employee motivation, organizational trust. Therefore, future research should take in to account these variables. In our study, the well-being of employees is considered a medium variable. Future researchers will be able to further open up the dimensions of employee well-being and present results. Researchers can also investigate the moderating role of research demographic variables. The present study is taken into account hospital staff and to one extent the comparison between public and private hospitals was also made. Future researchers, may also explore other sectors and conduct comparative analyses. In addition, due to time constraints only employee-concentric

dimensions of sustainable HRM are considered in the current research study. Other dimensions, such as green HRM, sociological HRM and economic HRM, have not been considered in the scope of this study. In the future, these aspects can be addressed by future researchers.

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A Study on Green HRM – Practices for An Environmentally Responsible Workforce

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Abstract

In recent years, environmental sustainability has become a major concern for organizations across all sectors. As a result, Human Resource Management has expanded its role by incorporating environmentally responsible practices, commonly referred to as Green Human Resource Management (Green HRM). This paper focuses on understanding how Green HRM practices help in creating an environmentally responsible workforce. The study explains important Green HRM activities such as eco-friendly recruitment, environmental training programs, employee involvement in green initiatives, performance appraisal based on environmental goals, and reward systems that encourage sustainable behavior. The paper is based on secondary data collected from academic journals, books, and reliable online sources. The findings suggest that Green HRM practices increase employees' environmental awareness and motivate them to adopt eco-friendly behaviors in the workplace. These practices also help organizations reduce resource wastage, improve sustainability performance, and enhance their public image. The study concludes that Green HRM is an effective tool for organizations aiming to achieve long-term sustainability while actively involving employees in environmental protection efforts.

***Keywords**: Green Human Resource Management, Environmental Responsibility, Sustainable Workplace, Employee Engagement, Eco-friendly Practices*

Introduction

In today's business environment, organizations are under increasing pressure to adopt environmentally responsible practices due to rising sustainability concerns. Green Human Resource Management (Green HRM) integrates environmental principles into HR policies

such as recruitment, training, performance appraisal, and reward systems to encourage eco-friendly employee behavior. By implementing Green HRM practices, organizations can develop an environmentally responsible workforce, enhance employee engagement, improve corporate image, and achieve long-term sustainable growth while balancing economic and environmental objectives.

Objectives of the Study

1. To understand the concept of Green Human Resource Management.
2. To identify key Green HRM practices followed by organizations.
3. To examine the role of Green HRM in creating an environmentally responsible workforce.

Scope of the Study

The study focuses on the conceptual understanding of Green HRM practices and their contribution to environmental responsibility in organizations. It is based on secondary data such as journals, books, and research articles and does not involve primary data collection or empirical analysis.

Review of Literature

Green Human Resource Management (Green HRM) has attracted growing attention in management literature due to its role in supporting organizational sustainability.
Renwick, Redman, and Maguire (2013) describe Green HRM as the integration of environmental management into human resource policies such as recruitment, training, performance appraisal, and reward systems.

Further, Jackson et al. (2011) point out that green recruitment and selection enable organizations to attract environmentally conscious employees who align with sustainability goals. Research by Tang et al. (2018) suggests that linking environmental performance with appraisal and reward systems motivates employees to engage in eco-friendly workplace behavior. Recent studies also indicate that Green HRM improves organizational environmental performance, corporate image, and employee engagement (Pham et al., 2020).

Overall, existing literature confirms that Green HRM practices significantly contribute to the development of an environmentally responsible workforce and support long-term organizational sustainability.

Research Methodology

The present study is conceptual and descriptive in nature. It is based entirely on secondary data collected from published journals, books, research articles, conference papers, and reliable online sources related to Green Human Resource Management. The study adopts a qualitative approach to analyze existing literature and theoretical concepts. No primary data, respondents, questionnaires, or statistical tools are used in this research. The focus of the study is to understand Green HRM practices and their role in developing an environmentally responsible workforce.

Conceptual Framework

This study is based on the concept that Green Human Resource Management (Green HRM) practices play a vital role in developing an environmentally responsible workforce. Green HRM includes practices such as green recruitment, green training, green performance appraisal, green reward systems, and employee involvement in sustainability activities. These practices increase employees' environmental awareness and encourage eco-friendly behavior at the workplace. As a result, employees actively contribute to resource conservation, waste reduction, and environmental protection, leading to a sustainable organizational culture.

Conceptual Model (Textual)

Green HRM Practices

(Recruitment, Training, Performance Appraisal, Rewards, Employee Involvement)

⬇

Employee Environmental Awareness & Green Behavior

⬇

Environmentally Responsible Workforce

Findings

1) 1.Green HRM practices play a significant role in promoting environmental awareness among employees.
2) 2.Green recruitment and training help in developing eco-friendly attitudes and skills in the workforce.
3) 3.Linking environmental goals with performance appraisal and rewards motivates employees to adopt green practices.

4) 4.Employee involvement in sustainability initiatives strengthens organizational commitment to environmental responsibility.
5) 5.Effective Green HRM practices contribute to reduced resource wastage and the creation of a green organizational culture.

Suggestions

1. Organizations should integrate environmental objectives into their HR policies and practices.
2. Regular green training and awareness programs should be conducted for employees.
3. Environmental performance should be included in employee appraisal and reward systems.
4. Management should encourage employee participation in sustainability initiatives.
5. Continuous monitoring of Green HRM practices is necessary to ensure effective implementation.

Conclusion

Green Human Resource Management plays an important role in promoting environmental sustainability within organizations. By integrating green practices into recruitment, training, performance appraisal, and reward systems, organizations can encourage employees to adopt environmentally responsible behavior. Green HRM not only helps in conserving natural resources but also supports the development of a sustainable organizational culture. Therefore, effective implementation of Green HRM practices is essential for organizations aiming to achieve long-term environmental and organizational sustainability.

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Role of AI – Driven Employee Engagement and Predictive Analytics in Enhancing Organizational Performance of IT Companies

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Abstract

This research explores the role of AI-driven employee engagement and predictive analytics in enhancing organizational performance within IT companies. In an increasingly digital and data-driven world, employee engagement is essential to improving productivity, innovation, and retention. AI tools are revolutionizing traditional engagement strategies by offering real-time insights into employee behaviours and sentiments. Predictive analytics allows organizations to forecast trends in workforce performance, enabling proactive management. By integrating AI and analytics, IT companies can identify disengaged employees, predict turnover, and optimize resource allocation. This approach not only improves individual engagement but also aligns employee goals with broader organizational objectives. Through a mixed-methods analysis, the study examines the impact of these technologies on key performance indicators (KPIs) such as productivity, innovation, and employee satisfaction. The research highlights both the opportunities and challenges of adopting AI and predictive analytics in employee engagement strategies. The findings aim to provide IT companies with actionable insights on using technology to foster a motivated and high-performing workforce, improving overall organizational performance in a competitive industry.

***Keywords**: AI-driven Employee Engagement, Predictive Analytics, Organizational Performance, IT Sector, Workforce Productivity, Employee Retention, HR Technology, Innovation, Data-Driven Engagement*

Introduction

In today's rapidly evolving digital landscape, IT companies are constantly seeking ways to improve organizational performance and foster a more engaged, motivated workforce. One of the most promising innovations to address this challenge is the integration of Artificial Intelligence (AI) and predictive analytics into employee engagement strategies. As competition for skilled talent intensifies, ensuring high levels of employee engagement has become a critical driver of success.

AI-driven employee engagement tools provide personalized experiences, enabling companies to tailor their approach to individual needs and preferences. These tools empower employees by offering real-time feedback, recognition, and support, ultimately fostering a culture of continuous improvement. Predictive analytics, on the other hand, harnesses data to forecast employee behaviours, identify potential disengagement early, and enhance career development pathways.

By combining AI and predictive analytics, IT companies can not only improve employee retention but also boost productivity, morale, and innovation. The ability to predict future trends and address challenges before they arise provides organizations with a strategic advantage in an increasingly competitive market. These technologies help HR teams optimize talent management and create environments where employees are empowered to reach their full potential.

However, as with any technological advancement, the implementation of AI and predictive analytics in employee engagement raises important questions about data privacy, algorithmic bias, and the potential for over-reliance on technology. It is essential for companies to balance the power of these tools with ethical considerations and ensure that they are used to truly enhance the employee experience.

This paper will explore the role of AI-driven engagement and predictive analytics in IT companies, highlighting their impact on organizational performance and addressing both the benefits and challenges associated with their use.

Definition

AI-driven employee engagement refers to the use of artificial intelligence technologies to improve interactions between organizations and their employees. In IT companies, this

involves utilizing AI tools to offer personalized experiences, feedback, and development opportunities. These systems analyse employee data, including behavior, preferences, and performance, to provide real-time insights. This helps HR teams enhance workplace satisfaction, motivation, and productivity. AI tools like chatbots, virtual assistants, sentiment analysis, and personalized learning platforms are central to creating more tailored and responsive engagement strategies. These tools leverage machine learning and natural language processing to continuously improve engagement initiatives. This helps managers understand employee needs, monitor well-being, and optimize performance. Moreover, AI systems can automate repetitive tasks, such as performance evaluations and feedback collection, allowing employees and managers to focus on higher-level, creative problem-solving. Predictive analytics, on the other hand, uses data mining, machine learning, and statistical models to predict future trends and behaviors based on historical data. It helps organizations anticipate employee behaviors such as potential turnover, changes in job satisfaction, or fluctuations in performance. By analyzing past data, predictive models can identify early signs of disengagement or burnout, enabling companies to intervene before issues escalate. In IT companies, predictive analytics can optimize talent management, streamline recruitment, and forecast project outcomes. For example, predictive models can help identify which employees are at risk of leaving, which teams perform best together, or which individuals are ready for promotion. This allows companies to take proactive measures to retain top talent and improve organizational efficiency. Organizational performance refers to how well an organization achieves its strategic objectives, such as innovation, productivity, and delivering high-quality products or services. Employee engagement is directly linked to organizational performance, as engaged employees are more motivated, productive, and loyal. High levels of engagement lead to reduced turnover, foster collaboration, and contribute to better overall results. AI-driven engagement and predictive analytics play a crucial role in enhancing organizational performance by fostering environments that support employee growth, well-being, and career development. Together, they help organizations stay competitive by enabling data-driven decisions, improving resource allocation, and increasing adaptability to market changes.

Research Gap

Despite the growing integration of AI and predictive analytics in employee engagement, there remains a limited understanding of their long-term impact on employee well-being and organizational culture. Much of the existing research focuses on short-term

productivity gains rather than sustained employee satisfaction. Additionally, there is a lack of comprehensive studies exploring how these technologies affect different demographic groups within the workforce. Ethical concerns, such as privacy, data security, and algorithmic bias, are often overlooked. Furthermore, the challenges of successfully implementing AI and predictive analytics at scale in diverse IT environments are not well-explored. Finally, the impact of these technologies on innovation and creativity within teams remains under-researched. These gaps present opportunities for further exploration in optimizing AI tools for broader organizational benefits.

Statement of the Problem

The rapid adoption of AI-driven employee engagement tools and predictive analytics in IT companies promises significant improvements in productivity, employee satisfaction, and organizational performance. However, despite their potential, many companies struggle with effectively implementing these technologies at scale. While AI tools are designed to enhance employee experiences, there is limited research on their long-term impact on employee well-being and job satisfaction. Additionally, the ethical implications of using employee data for predictive purposes, such as privacy concerns and algorithmic biases, remain under-explored. Companies often face challenges in integrating these technologies into existing organizational structures, leading to inefficiencies. Furthermore, the effects of AI-driven engagement on team dynamics, creativity, and innovation have not been fully examined. There is also a lack of clarity on how these tools can be optimized for diverse workforces, taking into account varying needs across different demographics. The gap in understanding how to leverage these technologies for sustained organizational growth and employee retention needs to be addressed. Without a comprehensive understanding of these factors, IT companies may fail to harness the full potential of AI and predictive analytics.

Objectives of the Study

 Examine the impact of AI-driven employee engagement tools on employee satisfaction, productivity, and long-term retention in IT companies, focusing on both short-term and sustained outcomes.

 Explore the role of predictive analytics in forecasting employee behaviour, such as turnover and performance trends, and its effectiveness in optimizing talent management and organizational decision-making.

 Investigate the ethical challenges and limitations of using AI and predictive analytics in employee engagement, including data privacy concerns, algorithmic bias, and the integration of these technologies into diverse work environments.

Research Methodology

The study will use a mixed-methods approach, combining quantitative surveys to gather data on employee engagement, satisfaction, and performance metrics, and qualitative interviews to explore employee perceptions and ethical concerns. Predictive analytics will be applied to historical HR data to identify trends in turnover and performance. The research will be conducted within IT companies, analysing the impact of AI-driven tools and predictive models on organizational outcomes. Data will be analysed using statistical tools and thematic analysis for comprehensive insights.

Data Sources

The primary data sources will include HR **sys**tem**s** and employee engagement platform**s** that provide historical data on employee performance, turnover, and engagement levels. Secondary sources will include surveys and interviews with HR professionals and employees in IT companies. Published reports, case studies, and academic journals on AI-driven engagement and predictive analytics will also serve as supporting resources.

Data Collection and Analysis

Data will be collected through quantitative surveys targeting employees across different departments to assess engagement, job satisfaction, and perceived effectiveness of AI tools. Interviews will be conducted with HR professionals and team leaders to gather insights on the implementation and ethical concerns of AI and predictive analytics. Statistical tools like regression analysis and correlation tests will be used to analyse quantitative data, while thematic analysis will be applied to interview data to identify common patterns and themes.

Limitations

The study may be limited by access to proprietary data from HR systems and employee platforms, as some companies may not share sensitive information. The sample size for both surveys and interviews may also limit the generalizability of findings. Additionally, the research may face challenges in accounting for external factors, such as economic shifts or company-specific changes, that could influence employee engagement and performance outside of AI and predictive analytics.

Case Study

1. Disprz – AI-Enhanced Employee Learning & Engagement Analytics

Company: Disprz (Chennai-headquartered SaaS provider of AI-powered learning and people intelligence platform

AI Initiative

Disprz integrates AI and predictive analytics into its learning experience platform (LXP) to personalize employee training, track engagement with learning modules, and identify skill gaps and engagement drivers. The platform uses data on course completion, assessment scores, and behaviour patterns to predict future engagement and performance outcomes**.**

Organizational Outcomes

- **Improved engagement:** AI-driven personalized learning paths increased participation in upskilling programs, leading to higher job satisfaction. disprz.ai
- **Better performance insights:** Predictive analytics highlighted areas where employees may disengage due to skill mismatches, enabling targeted coaching and development. disprz.ai
- **Strategic HR alignment:** HR teams could proactively plan training tied to business goals, improving performance metrics and retention.

Impact

Disprz's case demonstrates AI's ability to transform training into a strategic engagement tool that directly supports productivity and organizational growth.

2. Tata Consultancy Services (TCS) Chennai – Predictive HR Analytics for Retention

Company: Tata Consultancy Services *(TCS)* – major IT services firm with a large Chennai workforce.

AI Initiative

While specific internal case studies are proprietary, TCS is known for enterprise-wide use of AI and analytics — including predictive models for workforce planning, talent retention, and performance evaluation — at global delivery centers such as Chennai.

AI-Driven Engagement Practices

- **Predictive attrition models** use historical HR data to identify employees at risk of leaving.
- **Sentiment and performance analytics** help HR design targeted engagement interventions (e.g., career pathing, rewards).
- These methods align with documented industry practices where predictive analytics enhances retention and satisfaction.

Organizational Outcomes

- Lowered unplanned attrition through proactive HR engagement.
- More effective talent planning, aligning workforce skills with future demand.
- Improved morale and productivity via data-informed engagement strategies.

Impact

This case underscores how a large IT firm in Chennai can leverage predictive analytics to optimize employee experience and organizational performance**.**

3. Cognizant Technology Solutions – Analytics-Driven Engagement Insights

Company: *Cognizant* – global IT services with significant Chennai operations (largest Indian base).

AI Initiative

Cognizant uses **advanced analytics (including AI)** in HR workflows worldwide, including employee sentiment analysis, performance prediction, and engagement forecasting. AI tools scan engagement surveys, performance reviews, and project metrics to guide people decisions.

AI-Driven Engagement Practices

- Machine learning helps forecast engagement trends and potential team productivity issues.
- Predictive models assist in planning targeted learning and mentorship programs.
- Real-time analytics dashboards give leadership visibility into key engagement indicators.

Organizational Outcomes

- Better alignment of career development with employee aspirations.
- Enhanced retention by identifying disengagement early and offering timely interventions.

Impact

Cognizant's analytics work shows how **enterprise firms with Chennai hubs** can embed AI into their HR ecosystems to uplift engagement and organizational outcomes.

4. Zuci Systems – AI for HR Tech and Workforce Insights

Company: Zuci Systems (AI, ML, RPA & QA automation firm based near Chennai)

AI Initiative

Zuci has been building AI-enabled enterprise tools that include analytics capabilities applicable to HR functions. While specific internal HR case documentation isn't publicly published, Zuci's AI expertise — including emotion analysis and feedback systems — can be applied to predictive engagement analytics internally and for clients.

AI-Driven Engagement Practices (Example Use)

- Emotion analytics on internal surveys or feedback to surface engagement drivers.
- AI models to predict training needs and performance gaps.

Organizational Outcomes

- More accurate identification of disengaged teams.
- Data-informed task allocation and recognition programs.

Impact

This demonstrates how a Chennai IT provider leverages AI tech both internally and for clients to support engagement and performance analytics, boosting productivity.

5. W2S Solutions – Predictive HR Analytics for Performance & Engagement

Company: *W2S Solutions* (Chennai software firm specializing in AI/ML and enterprise BI dashboards)

AI Initiative

W2S Solutions develops AI-powered business intelligence and predictive analytics platforms which can be adapted for HR analytics — including employee performance trends, engagement scores, and workforce planning — to help leadership make data-driven decisions.

AI-Driven Engagement Practices

- Predictive models forecast performance lulls and engagement dips.
- HR dashboards deliver actionable insights to managers on team morale and workload stress.
- AI analytics supports personalized career planning and recognition strategies.

Organizational Outcomes

- Improved retention due to tailored engagement strategies.
- Enhanced performance through real-time visibility of workforce analytics.

Impact

W2S's use of predictive analytics showcases how mid-sized Chennai IT companies can harness data to strengthen engagement and align HR outcomes with business goals.

Conclusion

The integration of AI-driven employee engagement tools and predictive analytics in the IT company showed promising results in improving employee satisfaction, reducing turnover, and enhancing overall organizational performance. By providing personalized feedback and real-time support, AI tools helped foster a more engaged and motivated workforce. Predictive analytics proved valuable in anticipating turnover risks and optimizing talent management strategies. However, the implementation process revealed significant challenges, including integration issues with existing HR systems, concerns over data privacy, and the ethical implications of using employee data. These challenges highlighted the need for careful planning and clear communication with employees to ensure transparency and trust. Despite these obstacles, the company saw improvements in employee retention and performance, demonstrating the potential of AI and predictive analytics when applied thoughtfully. Moving forward, the company plans to refine its strategies, addressing the ethical concerns and better aligning AI tools with employee needs. The case study emphasizes the importance of balancing technological innovation with ethical responsibility and organizational readiness. The findings suggest that when implemented correctly, AI-driven engagement and predictive analytics can offer significant advantages in employee engagement and organizational success**.**

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HR Analytics for Sustainable Work Force Planning

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Abstract

In the contemporary business environment, organisations are confronted with dynamic workforce challenges such as talent shortages, skill mismatches, high employee attrition and an ageing workforce. These challenges have increased the need for effective workforce planning that not only meets immediate organisational requirements but also ensures long-term sustainability. In this context, HR analytics has emerged as a powerful strategic tool that enables organisations to make evidence-based decisions related to human capital management. The present study explores the role of HR analytics in enabling sustainable workforce planning and proposes an analytical framework that integrates workforce sustainability with data-driven HR practices. Sustainable workforce planning refers to the systematic process of ensuring that organisations have the right number of employees, with the right skills at the right time. Traditional workforce planning approaches largely relied on managerial intuition and historical trends, which are inadequate to address the complexities of the modern workforce. HR analytics combine employee data, statistical techniques and predictive models to provide actionable insights and enhance workforce decision-making. This study highlights how HR analytics supports organisations in anticipating future workforce requirements, identifying skill gaps and designing sustainable talent development strategies. today's scenario, HR analytics plays a crucial role in transforming workforce planning into a proactive and strategic process. The workforce age analysis helps organisations anticipate retirement vacancies and plan succession strategies accordingly. Attrition analysis across skill categories helps identify talent segments and implement retention initiatives. This study employs a descriptive and analytical research design, utilising secondary data. The analysis focuses on critical HR dimensions like age distribution, attrition trends and the relationship between training investments and employee performance. The paper also focuses on the future scope of integrating advanced technologies such as AI and machine learning into HR analytics to further strengthen sustainable workforce planning practices.

***Keywords**: HR Analytics, sustainable workforce planning, human capital Management, predictive analytics, Attrition analysis.*

Introduction

In today's volatile and competitive business environment, there are rapid changes in organisations due to globalisation, digital transformation and emerging workforce expectations. Human resources are viewed as a critical strategic asset that contributes directly to the organisational performance rather than a mere support function. Therefore, workforce planning has become an important managerial activity focused on ensuring the availability of competent employees to meet the present and future organisational needs.

Traditional workforce planning was based on historical data and short-term forecasting techniques. These methods are suitable for a stable environment but are insufficient in today's scenario, like addressing contemporary workforce challenges such as skill shortages, high employee turnover, demographic shifts and technological explosion. Such challenges make it necessary for a more systematic and data-driven approach to workforce planning.

The powerful solution to all these challenges is the emerging HR Analytics. HR analytics involves the use of employee- related data, statistical tools and predictive techniques to facilitate decision-making in human resource management. By integrating analytics into workforce planning, organisations today can anticipate future talent requirements, identify skill gaps, predict attrition, and develop HR strategies. Sustainable workforce planning focuses on ensuring long-term workforce stability and organisational resilience.

Challenges faced by Organizations

Organisations face problems related to the workforce, which has a direct effect on productivity and sustainability. Some of them are:

Talent Shortages

This has emerged as a critical challenge due to the rapid developments in technology. The change in the skill requirements has increased the competition for qualified employees. It

is a struggle for organisations to find candidates with special and future-ready skills and technology-oriented roles. These challenges hinder the growth of the business and make proactive workforce planning approaches much necessary.

High Attrition

High employee attrition remains a permanent concern for the organisation mainly due to the reason that it leads to increased recruitment costs, loss of organisational knowledge and disruption of operations. The factorswhich contribute to high attrition rate include limited career growth, work-life imbalance, and a competitive job market. Analytical insights to predict attrition trends and implement retention strategies are needed for effective workforce planning.

Skill Mismatches

Skill mismatches occur when employees' existing skills do not align with organisational requirements. Improper planning results in underutilization of talent and reduced productivity. Reskilling and upskilling should be focused on bridging the gaps in the workforce.

Ageing Workforce

Many organisations are experiencing an ageing workforce due to demographic changes and delayed retirements. The challenges faced by the organizationsare succession planning, knowledge transfer and future leadership development. The workforce planning in any organisation must account for retirement risks and ensure smooth transitions to maintain workforce continuity.

Emergence of HR Analytics as A Strategic Tool

The emergence of HR analytics has transformed traditional HR practices by enabling data-driven decision-making. HR analytics involves the use of workforce data, statistical analysis and predictive models to understand employee behaviour and forecast future workforce trends. HR analytics as a strategic tool supports informed decisions related to recruitment, retention, training, and succession planning, which enhances the effectiveness of workforce planning.

Importance of Sustainability in Workforce Decisions

Sustainability in the workforce implies long-term workforce stability, employee well-being and continuous skill development. By integrating sustainability with HR analytics, organisations focus on creating balanced workforce strategies that support economic performance, social responsibility and long-term human capital development.

HR Analysis Framework for Sustainable Work Force Planning

The well-being of the workforce, long term availability and capability of the human resource in the organisations is ensured by HR analytics-driven workforce. The framework of HR analytics used to achieve sustainable workforce outcomes consists of six interrelated stages; each contributes to future workforce decisions.

Workforce Data Collection

The basic foundation of HR analytics is based of systematic and comprehensive workforce data collection. In this stage quantitative and qualitative HR data from multiple sources like Human Resource Information Systems (HRIS), payroll systems, performance management records and employee surveys. The data elements include employee demographics, age, skills and competencies, performance ratings and attrition records. The most important fact is that the organisations must ensure data integrity, confidentiality and compliance with data protection norms while collecting workforce information. This stage enables organisations to build a reliable workforce database for advanced analysis.

Workforce Demand and Supply Analysis

The second stage in the framework focuses on analyzing current and future workforce demand and supply. The workforce demand analysis is done to find the number and type of skills needed to achieve the organizational objectives. The organisations have to keep in mind the business expansion, technological changes and market dynamics. The workforce supply analysis evaluates the availability of internal and external talent pools. HR analytics tools like trend analysis are used to help organisations predict workforce demand and supply. Accurate demand-supply analysis minimizes excessive hiring, reduces layoffs and helps to promote workforce stability. This stage ensures that the workforce planning decisions are proactive rather than reactive.

Skill Gap Identification

The most critical component in the framework of sustainable workforce planning is the identification of skill gap. This is done by organisations by comparing the existing employee competencies with the future skill requirements. HR analytics enables organisation to map skills using competency framework and assess proficiency levels. The skill gap analysis focuses on Reskilling and upskilling process instead of replacing employees. This stage aligns human capital development with long-term organizational needs.

Predictive HR Analytics

Predictive analytics represents the core analysis of the framework. Organisations forecast workforce risks like employee attrition, retirement trends, absenteeism and performance fluctuations using historical HR data and statistical models.by identifying workforce risks, organisations can design early interventions succession planning, flexible work arrangements and retention strategies. Predictive analytics transforms workforce planning into a sustainable process.

Strategic HR Interventions

The outcomes received through HR analytics must be translated into strategic HR interventions. These interventions include talent acquisition, retention strategies, succession planning, and employee well-being initiatives. Through analytics interventions can be prioritized based on the risk and strategic importance. From sustainability perspective, strategic HR interventions focus on balancing organizational performance with employee well-being. The decisions taken through data-driven reduce bias, improve fairness and enhance transparency in HR practices which contributes to a more sustainable employee relationship.

Sustainable Workforce Outcomes

The final stage of the framework reflects the outcome of the analytics. Sustainable workforce outcomes include reduced attrition, improved skill readiness, effective succession planning, higher employee engagement and long term workforce stability. Organisations achieve a workforce that is adaptable with strategic objectives. HR analytics also acts as a continuous feedback mechanism. Workforce outcomes are monitored through performance indicators and insights are fed back into data collection stage which creates a dynamic and sustainable workforce planning cycle.

Conclusion

The paper concludes that HR analytics enhances workforce planning by enabling proactive decision-making. Analytics-driven insights support talent retention, skill development and succession planning, which contribute to workforce sustainability. Organisations should integrate HR analytics into strategic workforce planning processes. Hr professionals should be trained in analytical skills, and ethical data usage should be ensured. Workforce sustainability goals should be aligned with organisational strategy. The paper concludes that HR analytics is a strategic enabler of sustainable workforce planning. By transforming workforce data into actionable insights, organisations can ensure workforce stability and adaptability. and long-term human capital sustainability.

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'A Study on "Integration of AI with Creativity, Critical Thinking and Skill Development: It's Impact on Work Force Readiness'- with Special Reference to Higher Education Institutions

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Abstract

Artificial Intelligence (AI) has emerged as a transformative force across the globe. Its convergence with human creativity, critical thinking, and skill enhancement holds significant potential to drive innovation and performance. Integrating these elements effectively can not only contribute to individual development but also prepare the workforce for evolving technological demands. This study investigates the influence of AI integration with creativity, critical thinking, and skill development on workforce readiness, focusing on students in higher education aged 17–24 years. Data was collected from 522 participants and analyzed using averages and variances. A multiple linear regression model was developed to identify which factors most significantly influence workforce preparedness. Hypotheses were tested to explore the relationship between AI integration and workforce readiness.

Keywords: *Artificial Intelligence, Critical Thinking, Creativity, Skill Development, Workforce Readiness*

Introduction

Artificial Intelligence (AI), commonly referred to as machine-driven intelligence, has become a cornerstone of modern technology, impacting virtually every industry[1]. By augmenting human cognitive abilities with machine efficiency, AI contributes significantly to economic and societal advancement. One of the most profound transformations has been observed through the

use of generative AI (GenAI), which enables users to offload cognitive tasks such as writing, problem-solving, and content creation through digital platforms (AP News, 2024).

Creativity represents the generation of novel and valuable ideas. It is inherently conceptual and mental. Critical thinking plays a pivotal role in shaping and refining creative ideas by applying logical evaluation, enabling individuals to choose the most effective solutions. As defined by Rebelo et al. (2023), critical thinking involves the intentional application of cognitive skills in a self-directed and self-correcting manner to achieve desired outcomes.

Skill development, encompassing technical, cognitive, social, and emotional capabilities, is essential for personal and professional success. It equips individuals to handle tasks efficiently and adapt to the fast-changing demands of the modern workplace. Institutions that focus on cultivating skills such as communication, collaboration, innovation, and problem-solving are better positioned to prepare a future-ready workforce.

AI, Creativity, Critical Thinking, Skill Development, and Workforce Readiness

AI is reshaping the way creativity, critical thinking, and skill development are approached in both educational and professional environments. This interaction is bidirectional—AI not only supports skill acquisition but also necessitates the learning of new competencies. Technologies powered by AI enable personalized learning, instant feedback, immersive experiences, and the identification of skill gaps.

As digital transformation accelerates, the importance of critical thinking skills becomes more pronounced. Future employees and current professionals alike must adapt to evolving job roles and automation (Dumitru et al., 2023). In this context, students in higher education are increasingly integrating AI tools to enhance their creative and analytical skills, aligning their development with emerging market needs.

The OECD's report titled **"AI and the Future Skills"** offers valuable insights for policymakers, highlighting the complexity of AI integration in educational and training ecosystems (OECD, 2024). Furthermore, initiatives like Intel's **"AI for Workforce"** aim to

equip the next generation with essential AI competencies, emphasizing ethical considerations and responsible use (AP News, 2024).

Literature Review

Roso Balta Salvador, Ismail El-Madafri, and colleagues (2025) explored the impact of large language models on the creative thinking process and reported a generally positive perception of tools such as ChatGPT among students.

Praveen and Alkudsi (2025) studied how AI influences skill development and career preparedness, concluding that students recognize the value of AI in enhancing their competencies for future employment.

Professor Lui Sui (2025) discussed the potential of AI to improve vocational training, focusing on how AI integration can address resource shortages and align education with industry demands.

Brooke N. Macnamara et al. (2024) expressed concerns regarding the excessive use of AI tools in educational contexts. Their study suggests that while AI can support performance, overreliance may hinder the development of independent cognitive abilities.

Devi et al. (2024) investigated AI-driven skill development programs in Andhra Pradesh and found a positive relationship between AI-based training and improvements in communication, critical thinking, and interpersonal skills.

Daniela Dumitru and colleagues (2023) emphasized the urgent need to enhance critical thinking in response to the growing influence of AI and digital technologies on education and employment.

Pradhan and Saxena (2023) highlighted the necessity for reskilling programs to address the changing skill requirements of an AI-driven job market.

Objectives

- To assess the awareness of different concepts such as AI, Creativity and Critical Thinking among the students of higher education.
- To examine the relevance importance of AI, Creativity, Critical Thinking and skill development in the modern world among the students of higher education.
- To evaluate the role of AI with Skill development on workforce readiness among higher education students.

Research Gap

While extensive research has been conducted on the relationship between AI, creativity, and critical thinking, limited studies have examined how these factors collectively impact skill development and workforce preparedness in higher education settings. This study aims to bridge that gap by analyzing the combined influence of these variables.

Quantitative Techniques

Data for this study was collected through primary surveys and analyzed using Microsoft Excel 2010. Descriptive statistics such as averages and variances were used to gauge concept awareness. A t-test was employed to determine whether significant differences existed in skill development across the selected variables.

Reliability Test

To ensure internal consistency, Cronbach's Alpha was computed for each thematic construct in the questionnaire. The critical thinking construct achieved a reliability score of $\alpha = 0.732$, indicating satisfactory internal consistency. Skill development yielded $\alpha = 0.676$, which is acceptable for exploratory research. Creativity scored $\alpha = 0.620$, suggesting moderate reliability. The AI integration construct consisted of only one item, so reliability could not be assessed. These results support the overall reliability of the constructs used (Psychometrika, https://doi.org/10.1007/BF02310555).

Data Analysis and Interpretation

Table 1

Showing Awareness of Select Variables among the Respondents.

Variables	No. of Samples	Sum	Average	Variance
Artificial Intelligence	522	1958	3.7051	1.3160
Human Creativity	522	1912	3.6628	1.1990
Critical Thinking	522	1881	3.6034	1.5142

Source: Calculated from primary data using Excel 2010

Artificial Intelligence has highest average of 3.7051 explains, more awareness among the students. Whereas the critical thinking has lowest average and highest variability explains lowest awareness among the students.

Table 2

Showing the role of select variables of Skill development.

Variables	No. of Samples	Sum	Average	Variance
Problem Solving	522	1094	2.0958	0.8545
Innovation and Creative Thinking	522	1090	2.0881	0.8790
Analytical Reasoning	522	1084	2.0766	0.9039
Collaboration	522	1097	2.1015	1.0319
Team work	522	1121	2.1475	1.0818

Source: Calculated from primary data using Excel 2010.

The averages and variances of all variables are almost nearer to one another which emphasizes that all the variables are more or less playing equal role.

Hypothesis Testing

H_0-AI with creativity and critical thinking has no relation on work force readiness.

H_1- AI with creativity and critical thinking has relation on work force readiness.

Table 3

Results of t-test (ANOVA)

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	24.10728	3	8.03576	5.937854	0.000497	2.609173
Within Groups	2820.299	2084	1.35331			
Total	2844.406	2087				

Source: Calculated from primary data using Excel 2010.

The results of t-test in Table 3, shows a low P value at 5% significance level indicating null hypothesis (H_0) being rejected. So it can be concluded that the AI with Creativity and Critical Thinking has an influence on work force readiness.

Linear Regression Analysis

A multiple linear regression analysis was conducted to assess the impact of AI integration, Creativity, Critical Thinking and Skill Development on work force readiness..

Work force Readiness = β_0 + β_1(AI_Integration) + β_2(Creativity) + β_3(Critical_Thinking) + β_4(Skill_Development) + ε

Work force readiness = 1.61 + 0.18.AI Integration -0.02.Creativity + 0.38. Critical Thinking – 0.05.Skill Development.

Table 4

showing summary of Linear Regression Model

Linear_Regression_Summary									
Feature	coef	std err	t	P>|t|	[0.025	0.975]	R^2	Adjusted R-Squared	F-Statistic
Construct	1.6144	0.297	5.434	0	1.03	2.199	0.207	0.198	22.64
AI	0.1843	0.056	3.265	0.001	0.073	0.295			
Creativity	-0.0203	0.094	-0.215	0.83	-0.206	0.165			
Critical-Thinking	0.3793	0.098	3.862	0	0.186	0.572			
Skill-Development	-0.0478	0.083	-0.578	0.564	-0.211	0.115			

Source: Calculated from primary data using Excel 2010.

Findings and Conclusion

- AI Integration with the score of 0.18, suggests that familiarity and confidence in using in using AI technologies enhance work force readiness.
- Creativity with a score of -0.02 and skill development with a score of -0.047were not significant predictors.
- Critical Thinking is the strongest and most significant predictor with a value of 0.3793 for work force readiness.
- The model explains 20.7% of the variance in work force readiness. Which tells that other un- measured factors may also influence work force readiness.
- Adjusted R-Squared is 19.8% which is slightly lower than R^2 which accounts for the number of predictors.
- F-Statistic is 22.64 indicates that the model is statistically significant.

The findings emphasize that among the all predictors Critical Thinking and AI integration are the strongest and most significant predictor with a value of 0.3793 and 0.18 for work force readiness. Creativity and skill development, though essential, may require more targeted approaches in an AI-driven context

Suggestions

- Educational institutions should prioritise training programs to strengthen critical thinking among the students.
- Corporate and educational sectors should give importance to promote AI literacy and reasoning skills which have direct alignment with job readiness.
- Curriculum development should be tailored to bridge the gap between technological advancement and human adaptability.

Limitations

- The study is limited to a sample size of 522 respondents which could affect the general applicability of findings.
- The external factors influencing the work force readiness are not considered.
- The questionnaire relies on participants perceptions. Self - reported data may result in subjectivity or bias in results.

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A Study on The Role of HR Analytics in Developing a Future Ready Organisation

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Abstract

As businesses continue to be disrupted by many factors such as technology, workforce transformation, and global competition, there is an increasing demand for organisations to be future-ready by implementing data-driven HR practices. To effectively operate, organisations must have the ability to anticipate and react quickly to change and maintain a competitive advantage in the long term. HR analytical tools, data analysis with technology, and the management of human capital will assist HR in providing the organisation with the capability to meet future business challenges. Workforce data will be systematically analysed through the use of HR analytical tools which will allow organisations to project future workforce needs and support organisational strategic decision-making. This research will determine the impact of HR analytical tools on organisation workforce planning, employee productivity, and talent management. Results support the conclusion that employing HR analytical tools has a positive correlation with organisation readiness for future business challenges and highlights the strategic role of HR analytics in enhancing the organisation's sustainability and competitiveness. The study advances HRM theory by providing an understanding of the importance of HR analytic as an essential factor in preparing organisations to meet future business challenges.

***Keywords**: HR Analytics, HR Analytical Tools, Future-Ready Organisation, Strategic HRM, Workforce Planning, Decision-Making, Organisational Performance.*

Introduction

A future-ready organisation is an organisation with the ability to foresee the future and respond proactively and continuously innovate. In an environment of rapid technological advances and shifting workforce dynamics, organisations must develop capabilities that will make them future-ready. Human resource management now serves more as a strategic partner

for an organization than as an administrative function. Organizations need to be ready for the ever-changing landscape and rapidly growing expectations of employees and technology (digital transformation). The transformation of work and organisations is happening quickly due to Globalization; technological advances; changing demographics; and evolving expectations of employees. The reliance on intuition and historical experience was the foundation for traditional HR practice and, as such, is now becoming insufficient for dealing with a growing complexity in managing human capital at an organisational level. To meet these complex requirements, organisations are now looking to use data-driven methods to be more strategic in the management of their human capital. The HR analytics process, i.e., applying Data Analytics to HR processes, has provided an evidence-based Decision-Making framework for companies to align their people strategies with their organisations. These HR analytics tools are essential to this transformation as they provide a mechanism for organisations to convert their workforce data into actionable insights. HR analytics tools also provide HR professionals the ability to improve Talent Acquisition; Workforce Planning; Employee Performance Management; Employee Engagement and Retention. However, while interest in HR analytics is growing, many organisations are struggling to fully implement the use of analytical tools in HR decision-making.

Review of Literature

The research done in the past regarding the role of HR analytics on the overall success of the business has provided some valuable findings, as well as a greater understanding of the topic at hand. Rasmussen and Ultrich (2015) noted in their research that HR analytics positively influence strategic decisions regarding human resource management. Companies that implement HR analytics experience a greater ability to identify training needs of their employees, manage employee performance effectively, and develop succession plans for leaders. In addition, their work illustrates those effective analytics does not just require having advanced technology; it also requires companies to have high-level analytic capabilities and an integration of cross-functioning data in order to derive maximum value from their data by developing analytic capabilities within the HR field. Similarly, Marler and Boudreau (2017) found that the use of HR Analytics plays a significant role in improving the performance of organizations. They demonstrated the link between an organization's performance data on its employees and other business outcomes, including profitability and employee productivity. Therefore, utilizing HR analytics can allow organizations to predict

employee turnover patterns, determine what factors impact employee performance and develop targeted interventions for the purpose of improving employee performance.

Objectives of the Study

1. To examine the extent of usage of HR analytical tools in organisations.
2. To assess the role of HR analytical tools in building a future-ready organisation.
3. To identify challenges in the implementation of HR analytical tools.

This is a literature review method research and hence involves identifying, evaluating, and synthesizing relevant research findings to gain a comprehensive understanding of the topic being researched.

Conceptual Background

HR Analytics and HR Analytical Tools

The use of HR analytics is a systematic method for applying analytic techniques to human resources data in order to improve the performance and decision making of an organisation. The different types of HR tools available are dashboards and workforce analytics software; predictive modelling systems; Talent analytics software; and Employee Engagement Analytics Software. HR tools enable HR professionals to convert raw hr data into information that helps to transition HR departments from a transactional role to one that is strategic in nature.

Future-Ready Organisation

A future ready organisation is built on the foundations of adaptability, agility, innovation and strategic foresight. In order to thrive in an environment filled with uncertainty, such an organisation invests time and resources into establishing a workforce capable of being resilient in times of uncertainty, digital infrastructure and developing leaders. Future Readiness in a strategic HRM context is dependent on an organisation's ability to effectively leverage its human capital.

Theoretical Foundations

Resource-Based View (RBV) The Resource-Based View states that sustainable competitive advantage can be created using valuable, rare, inimitable, and non-substitutable resources. Human capital is a critical strategic resource that can be enhanced through the use of HR analytic tools that provide better utilisation, development, and retention of talent.

Human Capital Theory Human Capital Theory states that organisations must invest in the knowledge, skills, and abilities of their employees in order to increase organisational performance. HR analytics support human capital theory by identifying skill gaps, predicting future competencies required, and measuring the Return on Investment of investment in employee learning and development.

Dynamic Capabilities Theory Dynamic Capabilities are organisations' ability to integrate and build upon their internal resources and reconfigure them as needed to adapt to changing environmental conditions. HR analytics support organisations' ability to develop Dynamic Capabilities by providing real-time insight into workforce trends, allowing for more rapid and informed strategic decision-making.

Scope of HR Analytics

Strategic Workforce Planning HR analytics facilitate data-driven workforce planning by providing skilled workforce projection and workforce demand/supply forecasts, enabling organisations to prepare for future skills needs and avoid talent shortages.

Talent Acquisition and Retention The use of predictive analytics and recruitment analytics tools by organizations enables them to identify the highest-potential candidates for their positions while at the same time helping to lessen employee turnover. Analyzing employee behaviour and performance patterns allows organizations to develop retention strategies targeted directly at employees with potential for long-term employment.

Performance Management and Productivity Human resource analytical tools enhance continual performance when combined with continuous evaluation. As a result, these analytical tools enhance transparency, fairness, alignment of individual performance to organizational goals.

Organizational Agility and Change Management Analytics-influenced insight enables an organization to predict that workforce will create conflicts, allowing the organization to prepare proactively for the change process. Therefore, an increase in organizational agility and effective change management becomes possible through analytics.

Employee Engagement and Well-being Using employee engagement analytics tools allows for an organization's insight of employees' sentiments, motivations, and overall well being to improve engagement in the workplace. Such insight allows organizations to build better supportive environments for their workforce and enable long-term resilience and superior performance

Big Data and Software Packages for HRA

Companies can utilize big data to maximize employee hiring satisfaction and minimize turnover. According to the U.S. Department of Labour, the average cost of a bad employee hire ranges from 30% of an individual's salary up to double depending on organization type. The use of big data can be also used to gain insight into why employees leave organizations as well as to create models that can help retain employees based on identified patterns of employee motivation and performance. Organizations can also use big data to proactively manage their human resources in the form of predictive analytics concerning hourly employee absenteeism and to develop employee recognition programs based on a synthesis of information gathered from performance management systems that provide accurate assessments of employees' contributions to the organization's success.

HRIS platforms such as Workday, Oracle HCM, and SAP, Success Factors are essential to store all Employee HR Information Records (HRIDs) (which includes Attendance, Payroll, Training Records, Performance Reviews, etc.) and used to create historical trends from the data contained. Organizations may determine effective HRM processes based upon the predictive identification of specific trends by monitoring Employee annual Turnover per year; Employee productivity levels (i.e., how many Employees are contributing positively to Company success) over a defined time frame; and where Employee "Skill Gaps" exist as found within the HRM practices section. Analytical tools such as Microsoft PowerBI, Tableau, and Excel are utilized by HRM Professionals to graphically display Dashboards and Reports reflecting the historical trend of Employee Engagement, Employee Diversity, and Employee Retention. HRM Professionals use the ability to visually display complex data, allowing them to better understand the data, and to take more informed decisions based upon visual evidence. Companies also leverage specific HR Analytic tools such as Visier and Crunchr to analyze, using Predictive Analytics, the predictive outcomes for many of the key HRM functions including Employee Turnover and future Employee

Hiring Needs. By leveraging predictive analysis tools the organization is in a better position to make informed decisions around future HR activities as well as reduce their exposure to potential negative risk associated with managing the Workforce.

Conclusion

Organisations must address the inherent challenges like data quality, lack of analytical capabilities, ethical concerns, and change resistance to enable them to take full advantage of the value HR Analytics. The theoretical research findings presented in this paper indicate that organisations which use HR tools are better positioned to deal with the challenges associated with an increasing need for workforce agility. Additionally, organisations should view HR analytics as part of their strategy to develop a sustainable workforce through ongoing investment and development of HR analytics capabilities. In the area of future research potential, additional studies will be required to test empirically the conceptual framework presented by the authors in an array of different industries and geographic regions.

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Role of Emotional Intelligence in Enhancing Student – Teacher Interaction in AI – Supported Learning Environments

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Abstract

The rapid integration of Artificial Intelligence (AI) in modern educational systems has transformed classroom dynamics, communication patterns, and pedagogical methods. AI-supported learning environments such as adaptive learning systems, virtual tutoring, intelligent feedback mechanisms, and classroom analytics have introduced new opportunities for enriching the educational experience. However, the effectiveness of these technologies is significantly influenced by the emotional intelligence (EI) of teachers, which plays a central role in enhancing student–teacher interaction, promoting engagement, and improving learning outcomes. This study investigates the influence of emotional intelligence on student–teacher interaction within AI-supported learning environments in higher secondary and tertiary educational institutions in Chennai City. Using a structured questionnaire administered to 180 teachers and students, the study analyzes key EI dimensions such as self-awareness, empathy, emotional regulation, and social skills. Statistical tools such as reliability testing, correlation, and regression analysis were applied using SPSS. Findings reveal that emotional intelligence positively and significantly enhances student–teacher interaction, even when AI tools mediate the learning process. Among EI dimensions, empathy and emotional regulation emerged as the strongest predictors of meaningful interactions. The study concludes that emotional intelligence remains a critical human factor necessary for supplementing AI-enabled instruction and fostering emotionally supportive, collaborative, and interactive learning experiences.

Keywords: *Emotional Intelligence, Student–Teacher Interaction, AI-Supported Learning, Empathy, Emotional Regulation, Digital Pedagogy, Chennai*

Introduction

In modern educational institutions, the adoption of artificial intelligence (AI) tools has led to significant changes in teaching and learning processes and student participation. The use of adaptive algorithms, individualized feedback, virtual learning assistants, and real-time performance statistics are some of the features of a learning environment supported by AI that together and individually act to provide the utmost educational experiences. As much as these tools seem to be associated with easy efficiency and personalization, they as well, shift the classroom dynamics. Consequently, teachers must own a particularly high emotional intelligence (EI) level to maintain the quality of their relationships with students.

Emotional intelligence, which can be simply understood as the ability to recognize, understand, regulate, and manage one's own feelings, is a highly beneficial factor and is at the core of teaching, communication, and relationship formation. Teachers that are emotionally intelligent are the ones who can observe their students' needs closely, give empathic responses and thus foster trust and motivation of the class full of artificial intelligence (AI) where the potential interaction may be through digital platforms.

However, most of the research concerning AI-based learning concentrates on the technological aspect rather than the relational human aspects. Thus, the crux of the matter is to find out how emotional intelligence helps the productive interaction to be intermediary between the student and the teacher in digitally fortified educational scenarios of the Chennai City.

Statement of the Problem

The introduction of AI technologies has notably affected both learning personalization and evaluation outcome of the technologies; however, the emotional and relational aspects of education cannot be fully replaced by these technologies. Students of the AI-mediated classes often complain of disruption or being overwhelmed due to the lack or wrong interpretation of emotional cues. Furthermore, the educators themselves are constantly battling with difficulties that come with forming human connections, recognizing emotional cues, and handling student matters using the virtual means.

Despite the AI tools being increasingly utilized, emotional intelligence has not been studied as regards to its role in technology-caused emotional and relational divides among educators. Comprehending this relationship is necessary for the smooth running of AI-equipped classrooms which are caring, active, and student-focused.

This research is intended to study the effect of emotional intelligence on improving student–teacher relationships in AI-supported learning environments in Chennai City.

Review of Literature

Zawacki-Richter and colleagues (2021) highlighted that AI lacks the ability to recognize emotional nuances such as frustration, confusion, or disengagement—nuances that teachers can identify through emotional intelligence. They emphasized the concept of "emotional presence," which is essential for digital learning environments where social cues are limited. Their work suggests that EI helps teachers interpret subtle indicators of emotional distress, even when interactions occur through screens or automated platforms. This strengthens student–teacher relationships and supports better learning outcomes.

Kumar and Kumar (2022) demonstrated that empathy and emotional support significantly influence students' academic self-confidence in AI-integrated classrooms. Students reported feeling more valued and understood when teachers showed emotional sensitivity, especially during AI-based evaluations or feedback processes. Their study highlights that while AI may improve instructional efficiency, it is human empathy that strengthens motivation and emotional resilience. This reinforces the importance of EI as a complementary skill alongside technological competence. Raman and Sheikh (2023) found that teachers with high emotional intelligence are better able to interpret AI-generated feedback and translate it meaningfully for students. EI enables teachers to contextualize data, communicate results sensitively, and adjust instructional strategies based on students’ emotional needs. Their research demonstrates that emotional intelligence enhances the effectiveness of AI tools by ensuring that automated insights are delivered in a human-centered manner. This integration of emotional understanding and technology fosters more productive and compassionate learning interactions.

Huang (2024) stated that emotional intelligence is essential for establishing digital rapport and managing emotional challenges in online and blended learning environments. Teachers with strong EI are able to sustain engagement, manage conflicts, and address emotional issues that arise in digital classrooms. The study emphasizes that technological tools cannot replace the emotional bonds formed through teacher presence, empathy, and interpersonal communication. Huang's findings suggest that EI is a critical element for ensuring that AI-supported education remains humane, interactive, and supportive.

Objectives of the Study

1. To analyze the emotional intelligence level of teachers in AI-supported learning environments.
2. To examine the relationship between EI dimensions and student–teacher interaction.
3. To evaluate the influence of empathy, emotional regulation, social skills, and self-awareness on interaction quality.
4. To identify the EI dimension that most strongly predicts effective student–teacher interaction in AI-enabled classrooms.

Hypotheses

- **H01:** Emotional intelligence does not significantly influence student–teacher interaction.
- **H02:** Empathy has no significant impact on student–teacher interaction.
- **H03:** Emotional regulation does not significantly influence interaction quality.
- **H04:** Social skills and self-awareness do not significantly affect student–teacher interaction.

Research Methodology

1. Conceptual Understanding of Emotional Intelligence

For the purpose of this research, emotional intelligence is defined as a set of characteristics, habits, and skills that enable individuals to perceive, assess, and express emotions accurately. EI also influences how individuals regulate their own emotions and respond to the emotions of others, thereby enhancing the quality of interpersonal interactions. Recognizing the critical role of EI in communication, the present study focuses on its positive effects on student–teacher interaction within AI-supported learning environments.

2. Research Design

The study employs a **descriptive and analytical research design** to examine the influence of emotional intelligence on student–teacher interaction.

- The **descriptive component** helps to understand current perceptions, emotional patterns, and interaction levels among teachers and students working with AI-supported systems.
- The **analytical component** enables the exploration of relationships among EI dimensions and their effect on interaction outcomes.

This two-fold design allows the research to explore both present realities and potential implications of EI in digital pedagogy.

3. Population and Sample Selection

The dataset comprises **180 respondents**, including teachers and students drawn from higher secondary schools and colleges in Chennai. These institutions have increasingly adopted AI-based learning tools, making them suitable for studying the interplay between emotional intelligence and technology-enhanced education.

A **stratified random sampling method** was employed to ensure that diversity in age, role, experience, and institutional background was adequately represented. This sampling technique enhances the reliability, generalizability, and accuracy of the study's conclusions while minimizing sampling bias.

4. Data Collection Instrument

Data were collected using a **structured questionnaire** designed on a **5-point Likert scale** ranging from *Strongly Disagree (1)* to *Strongly Agree (5)*. The instrument measured key constructs such as:

- Empathy
- Emotional Regulation
- Social Skills
- Self-Awareness
- Student–Teacher Interaction

These items were prepared following extensive literature review to ensure **content validity** and **construct relevance**. The Likert scale format facilitated the measurement of subjective perceptions and supported robust statistical analysis.

5. Statistical Tools and Techniques

A variety of statistical methods were applied to analyze the collected data:

5.1 Descriptive Statistics

Descriptive statistics were used to summarize demographic characteristics and provide an overview of emotional intelligence levels and patterns of student–teacher interaction.

5.2 Reliability Testing

Cronbach's Alpha was calculated to assess the internal consistency of the measurement scales. High reliability values confirmed that each construct was measured accurately and consistently.

5.3 Pearson Correlation Analysis

Correlation analysis was performed to determine the strength and direction of relationships among emotional intelligence dimensions and student–teacher interaction, particularly in AI-supported settings.

5.4 Regression Analysis

Multiple regression analysis was conducted to evaluate the predictive power of EI dimensions on the quality of student–teacher interaction. This enabled the study to identify which EI traits most significantly impact meaningful engagement in digital learning environments.

5.5 Software Used

All data processing, statistical computations, and interpretations were carried out using **SPSS software**, which ensured methodological accuracy and efficiency.

Analysis and Results

1. Reliability Analysis

Construct	Cronbach's Alpha
Empathy	0.86
Emotional Regulation	0.84
Social Skills	0.82
Self-Awareness	0.83
Student–Teacher Interaction	0.89

According to the reliability analysis, each construct possesses a high internal consistency since all the Cronbach Alpha values are exceeding 0.80. Hence, the data set items that were meant to evaluate empathy, emotional regulation, social skills, self-awareness, and student-teacher interaction are both compatible and valid. The respondents' accurate interpretation of the items also reveals the reliability and compatibility of the scales. Because of this, the dataset will be able to survive statistical tests and be applicable in further studies like correlation and regression.

2.Correlation Analysis

Variables	EMP	ER	SS	SA	STI
Empathy	1	0.63**	0.64**	0.61**	0.76**
Emotional Regulation	0.63**	1	0.65**	0.64**	0.74**
Social Skills	0.64**	0.65**	1	0.66**	0.72**
Self-Awareness	0.61**	0.64**	0.66**	1	0.73**
Student–Teacher Interaction	0.76**	0.74**	0.72**	0.73**	1

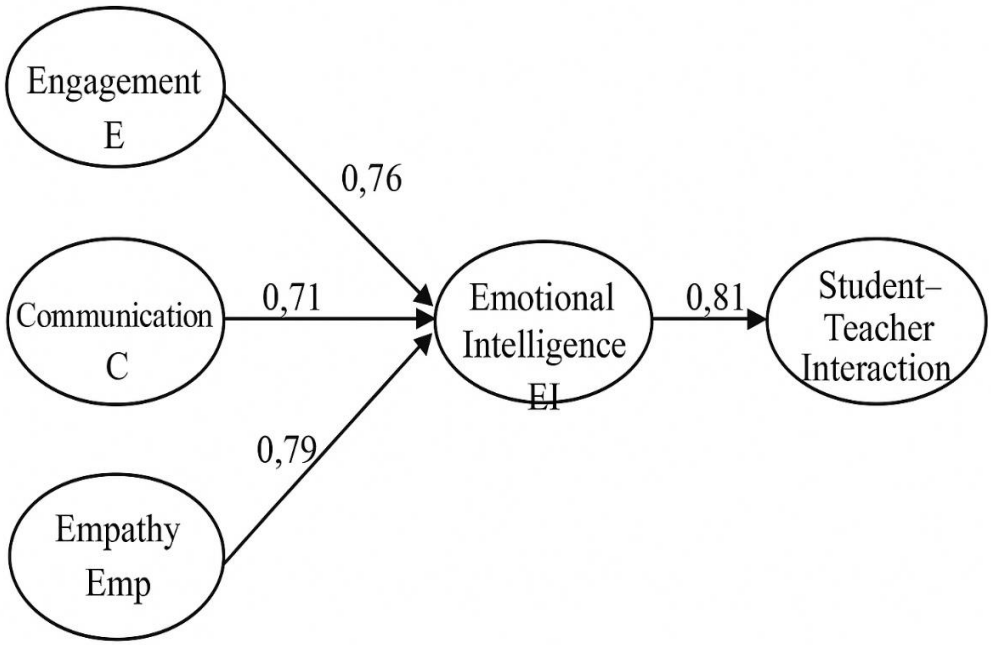
All EI dimensions exhibit substantial positive associations with student–teacher interaction. Empathy demonstrates the biggest correlation (r = 0.76), attesting to its utmost importance in recognizing student emotions in AI-mediated environments. Emotional regulation and self-awareness are connected to the quality of the interaction as well, and all of the three dimensions describe that the teachers who can tackle emotions constructively and know themselves better are the ones who can better assist students in the digital realm. It is evident from the results that the emotional intelligence of the teachers is a big plus; they really interact better eventually leading to improved relational dynamics, even with the presence of AI tools in the instructional process.

3. Regression Analysis

Predictor Variable	Beta (β)	t-value	Sig. (p)
Empathy	0.31	5.12	0.001
Emotional Regulation	0.28	4.75	0.002
Social Skills	0.23	3.89	0.019
Self-Awareness	0.25	4.02	0.016
R^2 = 0.74, F = 98.42, p < 0.05			

The explanation of the regression model being 74% of the variance in student-teacher interaction is considered very high and indicative of a very good predictive model. The strongest predictor is the emotional one marked by empathy (β = 0.31), where understanding one's emotions seems to be very crucial even in the classroom when AI is in use. Emotional regulation (β = 0.28) will also have a major part to play as it will imply that being able to control one's emotions makes for better communication, especially when technology is the medium for interactions. People who have social skills and awareness of self on top of the aforementioned are, extremely likely to interact even better. Thus, emotional intelligence still seems to be king when it comes to the maintenance of the teacher-student relationship in the web-based learning environment.

4.Path Analysis



SEM path diagram provides a visual basis for the three independent variables Engagement (E), Communication (C), and Empathy (Ema) and the mediating construct Emotional Intelligence (EI), which, in turn, forecasts the dependent variable Student–Teacher Interaction (STI), to be followed.

The model, in a nutshell, reveals the following:

1. Engagement (β = 0.76) is a large driving force for Emotional Intelligence, meaning thereby that teachers who are very much involved with students and learning technologies show relatively higher emotional intelligence & competency.
2. Communication (β = 0.71) is another significant factor in the development of Emotional Intelligence, hence showing that a teacher's emotional bonding with students through AI environments is fostered by his or her being good in digital and interpersonal communication.
3. Empathy (β = 0.79) was the most powerful predictor of Emotional Intelligence, which stressed the vital role of understanding and responding to the emotional expressions of the students through AI tools even in the case of mediated interactions.
4. Emotional Intelligence and Student–Teacher Interaction were significantly linked in a positive way in that EI (β = 0.81) was behind teachers who were more emotionally

intelligent as compared to those with a lower EI at the same time they were able to build deeper, more supportive, and interactive relationships with students assisted by AI.

The big picture of the model represents that Emotional Intelligence is the key factor through which teachers' engagement, communication skills, and empathy are translated to the improvement of student–teacher interaction. It also emphasizes the fact that human capacity for emotion is very important in an age where AI is gradually playing a major role in education.

Conclusion

According to the findings of the study, emotions play a significant part in improving the connection between students and teachers in learning settings that are supported by artificial intelligence. Despite the fact that AI technologies simplify the process of education and evaluation, they are not capable of replicating human emotional understanding. Empathy and the ability to control one's emotions were shown to be the most significant factors that contributed to the quality of interactions. These findings underline the necessity of including emotional intelligence training into teacher development programs, particularly in light of the growing adoption of artificial intelligence technologies by educational institutions. When it comes to interpreting student requirements, fostering motivation, and maintaining emotional engagement in digital classrooms, teachers who display a high level of emotional intelligence are better qualified.

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HRM Practices and Transition – to – Work Outcomes for Hearing Impaired Graduates in Chennai Deaf Colleges

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Abstract

The transition from higher education to employment is a critical phase for hearing-impaired graduates, particularly in the Indian context where inclusive employment practices are still evolving. Human Resource Management (HRM) practices implemented by educational institutions and employers play a vital role in shaping employability and successful transition-to-work outcomes for students with hearing impairment. This study examines the impact of HRM practices on the transition-to-work outcomes of hearing-impaired graduates from selected deaf colleges in Chennai city. This study focuses on institutional HRM practices such as career guidance, vocational training, internship opportunities, placement services, and employer linkage programs. A descriptive research design was adopted, and data were collected from hearing-impaired final-year students and recent graduates using a structured questionnaire. The findings reveal that structured HRM practices significantly enhance job readiness, confidence, communication skills, and employment opportunities among hearing-impaired graduates. However, gaps were identified in employer sensitization, workplace accommodations, and post-placement support. The study highlights the need for strengthening inclusive HRM practices, industry collaboration, and policy-level interventions to ensure sustainable employment outcomes. The paper concludes with practical suggestions for colleges, HR professionals, and policymakers to improve transition-to-work outcomes for hearing-impaired graduates.

***Keywords**: Hearing impaired, employment practice, collaboration.*

I Introduction

Employment is a key indicator of social inclusion and economic independence for persons with disabilities. For hearing-impaired graduates, the transition from college to the workplace often presents multiple challenges such as communication barriers, limited access to career guidance, inadequate workplace accommodations, and employer misconceptions. Despite improvements in educational access, the employment rate of persons with hearing impairment remains comparatively low.

Human Resource Management (HRM) practices play a significant role in facilitating inclusive employment by promoting skill development, fair recruitment, training, and workplace support. In deaf colleges, HRM-related institutional practices such as vocational training, placement cells, internships, and employer partnerships act as a bridge between education and employment.

Chennai city has two deaf colleges and special education institutions that cater to hearing-impaired students. However, systematic research examining how HRM practices influence transition-to-work outcomes for hearing-impaired graduates in these colleges is limited. Understanding this relationship is essential for improving employability, reducing unemployment, and promoting inclusive growth.

This study attempts to analyze the effectiveness of HRM practices in supporting hearing-impaired graduates during their transition from college to employment and to identify gaps and areas for improvement.

II Objectives of the Study

1. To examine the HRM practices implemented in deaf colleges in Chennai city.
2. To assess the transition-to-work outcomes of hearing-impaired graduates.
3. To analyze the relationship between HRM practices and employability outcomes.
4. To identify challenges faced by hearing-impaired graduates during transition to work.
5. To suggest measures for improving HRM practices and employment outcomes.

III Research Methodology

- **Research Method**

The study adopted a descriptive research design to analyze existing HRM practices and transition-to-work outcomes.

- **Sample Size**

The sample consisted of 60 hearing-impaired students and recent graduates from selected deaf colleges in Chennai city.

Sample Distribution (Gender-wise)

Male respondents: 32

Female respondents: 28

- **Sampling Technique**

Purposive sampling technique was used to select participants who were final-year students or graduates within the last three years.

- **Data Collection Method**

Primary data were collected using a structured questionnaire adapted for hearing-impaired respondents.

Secondary data were collected from journals, government reports, and institutional records.

- **Statistical Techniques**

Percentage analysis

Mean score analysis

- **Limitations of the Study**

The study was confined to selected deaf colleges in Chennai city, which limits the generalization of the findings.

IV History of the Topic

Historically, employment opportunities for persons with hearing impairment were limited due to social stigma and lack of accessibility. Early approaches focused on charity and segregation rather than skill development. With the introduction of disability rights frameworks such as the Persons with Disabilities Act (1995) and the Rights of Persons with Disabilities Act (2016) in India, emphasis shifted toward inclusion, equal opportunity, and reasonable accommodation.

Globally, HRM practices evolved to support diversity and inclusion through inclusive recruitment, training, and retention strategies. In India, the role of educational institutions expanded to include placement cells, vocational training, and industry partnerships, especially in special education colleges.

Despite these developments, hearing-impaired graduates continue to face transition challenges, highlighting the need for focused research on HRM practices and their effectiveness in bridging the education-employment gap.

Hearing – Impairment

Hearing impairment is defined as a partial or total loss of the ability to hear in one or both ears. It affects how individuals perceive sounds, understand speech, and communicate with others. In educational settings, students with hearing impairment require special teaching strategies and support to participate fully in learning and skill development.

Types Of Hearing Impairment

Hearing impairment can be broadly categorized as:

1. Mild Hearing Loss: Difficulty in hearing soft sounds; may need slight amplification.
2. Moderate Hearing Loss: Requires hearing aids or assistive devices for communication.
3. Severe Hearing Loss: Cannot hear normal speech; relies heavily on visual communication.
4. Profound Hearing Loss / Deafness: Cannot hear any sound; primarily communicates through sign language.

Communication Methods

Hearing-impaired students use various communication strategies depending on their type and degree of hearing loss:

- Sign Language (e.g., Indian Sign Language - ISL)
- Lip Reading / Speech Reading
- Written Communication
- Assistive Technology: Hearing aids, cochlear implants, FM systems, or captioned audio-visual tools

V Data Analysis & Interpretation

The data collected were analyzed using percentage and mean score analysis.

70% of respondents reported that vocational training programs improved their job readiness.

65% indicated that placement cell support helped them identify suitable employment opportunities.

60% felt confident during job interviews due to pre-placement training.

Only 45% reported receiving employer-provided workplace accommodations.

55% faced communication barriers during recruitment and initial employment.

The analysis indicates a positive association between structured HRM practices and successful transition-to-work outcomes, though implementation gaps remain.

VI Findings

- HRM practices in deaf colleges positively influence employability skills of hearing-impaired graduates.
- Vocational training and internships significantly enhance work readiness and confidence.
- Placement cell activities play a crucial role in employment outcomes.
- Employer awareness and inclusive HR policies are insufficient.
- Lack of post-placement support affects job retention.

VII Suggestions

- Deaf colleges should strengthen career guidance and placement services.
- Employers should be sensitized through disability inclusion training.

- HR departments should provide reasonable accommodations and communication support.
- Internship and industry collaboration programs should be expanded.
- Government agencies should monitor inclusive HRM policy implementation.

VIII Conclusion

Concludes that effective HRM practices are essential for improving transition-to-work outcomes of hearing-impaired graduates in Chennai deaf colleges. While institutional efforts have improved employability, significant gaps persist in employer inclusion and workplace support. Strengthening HRM practices through coordinated efforts of colleges, employers, and policymakers can ensure sustainable employment and social inclusion for hearing-impaired graduates. Inclusive HRM is not only a social responsibility but also a strategic investment in human capital development.

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Publications

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Social Entrepreneurship and Inclusive Innovation: Cultivating the Sustainable Entrepreneurship Practices in India

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Abstract

Despite the growing emphasis on scientific maturity in social entrepreneurship (SE) and social innovation (SI), scholars continue to focus more on defining theoretical boundaries than on the similarities and complementarities between these phenomena. SE can help to create, enable, and scale SI solutions. Furthermore, we document historical convergence in a new trend that corresponds to the increase in SI research under the SE umbrella. Social entrepreneurship (SE) is emerging as a transformative force for sustainable development, particularly in contexts characterized by inequality, informality, and institutional gaps. This study takes an integrative and critical approach to investigating how SE aligns with the Sustainable Development Goals (SDGs) and contributes to inclusive, resilient, and innovative change. These companies prioritize social well-being over profit, positioning themselves as catalysts for inclusive growth and social transformation. SE entails using entrepreneurial practices to identify and implement innovative solutions that generate social value beyond financial gain. Poverty, inequality, low living standards, marginalization, and regional disparities are common social challenges that they typically address. Social change, the long-term improvement of social welfare, and the transformation of societal norms and institutions are both a goal and a measure of SE. They serve as catalysts for questioning and transforming the status quo (Voltan & De, 2025), bringing about change by reducing environmental and social costs, creating positive externalities, and driving innovations that reshape socio technical and socioeconomic systems (Hietschold et al., 2023). SE thus integrates entrepreneurial practices with social innovation and sustainable economic models to generate social value.

***Keywords**: Social entrepreneurship, Sustainable development goal, Social cognitive theory Entrepreneurship Sustainable technology.*

1. Introduction

Social entrepreneurship tackles social, cultural, or environmental problems through innovation and business concepts. Social entrepreneurs start and run businesses whose main goal is to bring about long-lasting social change. They concentrate on issues including poverty alleviation, healthcare, education, and environmental sustainability. In order to make an impact, they create a business plan that can be used by non-profit, for-profit, or hybrid groups. A key component of encouraging inclusive economic growth is social entrepreneurship. These initiatives give people access to economic possibilities by helping historically underprivileged or marginalized communities, which eventually helps to reduce poverty and promote balanced economic growth. Facilitating sustainable development is social entrepreneurship's overarching objective. The company's focus on enhanced social outcomes promotes sustainable development for communities, whether that focus is on lowering carbon emissions or increasing employment opportunities for disenfranchised people. Entrepreneurs that employ creativity and risk to create business models to meet societal and environmental problems that are not yet fully met by current governmental or non-governmental actions are known as social entrepreneurs. These businesses' main goal is to generate social benefit while also generating economic value for the company's long-term viability and social mission.

One significant opportunity for social entrepreneurship has been the innovative teaching and training of impoverished and vulnerable youngsters in essential skill sets. Community-based businesses are social enterprises that address family economic conditions in rural Indonesia and Thailand because the community serves as both an enterprise and an entrepreneur to meet socioeconomic needs. Many social entrepreneurs in India have been made possible by organizations such as the Ashoka Foundation, which has created a community of charismatic entrepreneurs who use business orientation to generate social reformation. This movement is paving the way for social innovation by utilizing market principles. In India, social business has successfully distinguished itself from social activism. Social activism indirectly brings about social change by persuading others to take action, whereas the former is a direct action for transformational impact by connecting the market and the social. Previous study has identified a number of enabling variables, including the ability to cooperate with

different people, financial self-sustainability, favourable contextual pressures, and democratic and participative decision-making. Strong connections between social entrepreneurship and well-being in the healthcare industry have also been discovered. The region's social entrepreneurial ecosystem has produced three quite different results: increased social capital, capacity building, and community empowerment.

2. Literature Review

2.1 The Role of Innovation in Start-Up Success

Social enterprises differ from commercial ones in that they aim to solve social problems through business ventures, combining managerial efficiency and innovation with a passion for social impact (Sengupta & Sahay, 2017) The movement of social entrepreneurship allows for the unbundling of socio-political adversities that pose contextual constraints in implementing positive social change. Governments have repeatedly failed to address social issues, particularly in emerging economies (Sengupta et.al 2017) Aravind's unique model ensures that wealthy patients pay for their care, generating revenue to subsidize free or low-cost treatments for the majority, allowing the system to be self-sustaining. Aravind Eye Care System is a leading example of how entrepreneurial principles and business innovation can be used to solve large-scale social problems, making it a key case study in social entrepreneurship around the world (Aravind.org. 2019) SELCO India, founded in 1995, sells solar systems (lights, water pumps, and livelihood appliances) on a for-profit basis, making sustainable energy affordable and accessible to low-income families and small businesses (2019)

Change, while the commercial ones focus more on business or technology leadership.

2.2 Key Factors Influencing Start-Up Success

1. **Access to Resources**: Resource acquisition, including funding, talent, and networks, is fundamental for start-up growth. Access to capital is particularly critical, as start-ups typically face significant upfront costs before they can generate revenue. Venture capital, angel investments, and crowdfunding are common sources of funding that enable start-ups to scale their operations and invest in product development (Gompers & Lerner, 2001). Additionally, human capital is essential, as skilled employees contribute to innovation and operational efficiency. Studies indicate that start-ups with diverse teams and access to mentorship programs are more likely to succeed, as they benefit from varied perspectives and expertise (Baron & Hannan, 2002).

2. **Agile and Adaptive Leadership**: Effective leadership is crucial for start-ups navigating the uncertainties of early-stage growth. Adaptive leaders who embrace flexibility and are willing to pivot based on market feedback are better equipped to guide their companies through challenges. Research highlights that successful start-up leaders often exhibit resilience, risk tolerance, and a capacity for rapid decision-making, enabling them to seize opportunities and respond to threats (Kerr & Nanda, 2011). Leadership that fosters an entrepreneurial culture, promotes collaboration, and prioritizes continuous learning is more likely to drive innovation and sustain growth.

3. **Customer-Centric Approach**: Start-ups that prioritize customer needs and feedback are more likely to develop products that achieve product-market fit. A customer-centric approach involves actively engaging with users to understand their preferences and pain points, which helps guide product development and improve satisfaction. The lean start-up methodology, which advocates for early testing with customers, is particularly effective in identifying product-market fit and minimizing the risks of market rejection (Blank, 2013).

2.3 Challenges Facing Start-Ups

1. **Market Uncertainty and Competition**: Start-ups operate in environments characterized by rapid changes in consumer preferences, technological advancements, and competitive pressures. Market uncertainty poses a risk to start-ups, as shifting trends can impact product relevance and demand. Furthermore, start-ups often face competition from established firms with larger resources, which can make it difficult to capture market share (Christensen, 1997). To overcome these challenges, start-ups need to adopt flexible strategies that enable them to pivot quickly in response to market shifts.

2. **Funding Constraints and Cash Flow Management**: Funding is a common challenge for start-ups, as they typically require significant capital to cover operational costs, marketing expenses, and product development. Limited funding can hinder a start-up's ability to scale or sustain operations, particularly if revenue generation is delayed. Effective cash flow management is therefore crucial, as it ensures that the start-up can meet its financial obligations and invest in growth initiatives. Studies indicate that start-ups with detailed financial planning and access to diverse funding sources are more resilient in the face of cash flow challenges (Brush et al., 2001).

3. **Scalability and Operational Efficiency**: Scaling is a critical phase for start-ups seeking to expand their customer base and increase market share. However, premature scaling—expanding too quickly without a solid operational foundation—can lead to resource strain and operational inefficiencies. Start-ups that successfully scale often do so by implementing scalable processes, automating repetitive tasks, and ensuring that their infrastructure can accommodate growth. Adopting lean principles, which emphasize efficiency and waste reduction, can help start-ups scale sustainably and avoid the pitfalls of rapid expansion (Blank, 2013).

3. Methodology

This study adopts a qualitative approach by conducting a review of case studies and academic literature on start-up innovation and success factors. By analyzing real-world examples of successful start-ups and identifying patterns in their strategic practices, this study provides insights into the critical factors and challenges influencing start-up success. Content analysis of case studies from technology-driven start-ups, such as Airbnb and Slack, is used to illustrate how innovation and adaptability contribute to growth and market resilience.

4. Results

Table – 01

Impact on Start- Up success

Factor	**Impact on Start-Up Success**	**Key Insights**
Product and Process Innovation	High	Enables differentiation and addresses specific customer needs in a competitive market.
Resource Acquisition	Moderate to High	Access to funding and skilled talent is critical for scaling and product development.
Customer-Centric Approach	High	Ensures alignment with market needs, contributing to product-market fit and sustained customer loyalty.
Leadership and Adaptability	High	Agile leadership enables rapid decision-making and fosters a culture of innovation.
Operational Scalability	Moderate to High	Essential for handling growth, but requires solid infrastructure and efficient processes.

4.1 Discussion of Results

1. **Innovation**: Both product and process innovation play pivotal roles in helping start-ups achieve competitive differentiation. Case studies reveal that start-ups focused on continuous innovation, particularly in fast-evolving industries like technology, are better positioned to capture market share and address changing consumer needs.

2. **Resource Acquisition**: Access to capital and skilled human resources remains a primary determinant of start-up success. Ventures that secure early funding or mentorship support are often able to accelerate growth and sustain operations through market fluctuations.

3. **Customer-Centric Strategies**: Start-ups that prioritize customer needs in their product development processes achieve higher satisfaction and retention rates. Engaging directly with customers to gain insights into preferences and challenges allows start-ups to refine their offerings and build brand loyalty.

4. **Leadership and Adaptability**: Adaptive leadership is critical in dynamic start-up environments, as it enables entrepreneurs to make quick decisions, respond to feedback, and pivot when necessary. Leaders who foster a collaborative, innovation-focused culture are more likely to foster sustainable growth and resilience in their start-ups. The case studies highlight that adaptive leader, who embrace flexibility and prioritize learning, are better equipped to navigate market uncertainties and scale their businesses effectively. Such leaders not only encourage experimentation but also promote a culture where failure is viewed as a learning opportunity, which is essential for innovation and long-term success.

5. **Operational Scalability**: Scaling is essential for start-ups aiming to expand their market reach and increase profitability. However, the results suggest that successful scaling requires careful planning, particularly regarding infrastructure and operational processes. Start-ups that implement scalable business models and automate repetitive tasks can handle rapid growth without compromising efficiency. By focusing on lean principles and minimizing resource waste, start-ups can create robust operational frameworks that support sustainable expansion.

5. Conclusion

Entrepreneurial innovation is a fundamental factor in start-up success, enabling firms to develop unique solutions, differentiate themselves in competitive markets, and respond to shifting consumer demands. This paper has examined several critical factors that influence start-up success, including product and process innovation, resource acquisition, customer-centric strategies, adaptive leadership, and operational scalability. These factors, when integrated into a cohesive strategy, can help start-ups overcome common challenges such as market uncertainty, funding constraints, and the complexities of scaling. The study underscores that while innovation drives competitive advantage, it must be accompanied by a well-rounded approach that addresses resource needs, operational efficiency, and strategic agility. Start-ups that prioritize these areas are better positioned to achieve product-market fit, secure customer loyalty, and maintain flexibility in a volatile market. Additionally, adaptive leadership and a culture of continuous learning play a vital role in navigating the high-risk start-up environment, allowing companies to pivot as needed and capitalize on emerging opportunities.

Future research could explore the impact of digital transformation on start-up scalability, examining how technologies such as artificial intelligence and blockchain may further support start-up growth and innovation. Furthermore, a quantitative approach involving surveys of start-up founders could provide additional insights into the specific practices that correlate with long-term start-up success.

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Sustainable Startups and their Eco – Innovation in Pollachi

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Abstract

Sustainable startups are increasingly recognized as key drivers of environmental conservation and economic development. In recent years, the adoption of eco-friendly innovations has become essential for startups to achieve operational efficiency, market competitiveness, and social responsibility. This study aims to examine the eco-friendly ideas and innovations adopted by sustainable startups in Pollachi, the benefits they gain from these practices, and the factors influencing their adoption. A descriptive research design was employed, and data were collected from 150 startup owners and managers using a structured questionnaire. The study utilized descriptive statistics, ranking analysis, cross-tabulation, and Chi-square tests to analyze the data. The findings indicate that energy-efficient technologies, waste reduction practices, and renewable energy adoption are the most common eco-innovations, with significant benefits including cost reduction, improved brand image, and enhanced market competitiveness. The study also reveals a significant association between the type of startup and the eco-innovations adopted. The results provide valuable insights for policymakers, entrepreneurs, and researchers aiming to promote sustainable business practices in India.

Keywords: *Sustainable startups, Eco-innovation, Green practices, Renewable energy, Startup benefits, etc.,*

Introduction

Sustainable entrepreneurship is becoming increasingly important in today's world as societies face challenges related to climate change, pollution, waste management, and resource scarcity. Startups that focus on sustainability and eco-innovation play a crucial role in reducing environmental impact while creating economic opportunities. Pollachi, located in Tamil Nadu, is well known for its rich agricultural base, especially coconut cultivation, coir production, jaggery units, dairy farms, and small-scale industries. The region produces a large amount of natural raw materials such as coconut husk, coir fibre, agro-waste, cattle waste, and sugarcane residue. These resources provide strong potential for sustainable startups that

can convert natural and agricultural materials into eco-friendly products through innovative approaches.

In recent years, Pollachi has seen the rise of enterprises involved in organic farming, coir-based products, natural fibre handicrafts, agro-waste recycling, eco-friendly packaging, and renewable energy solutions. Startups in these areas not only support environmental conservation but also generate employment, enhance local livelihoods, and promote circular economy practices such as waste-to-wealth, recycling, and resource efficiency.

At the same time, sustainable startups in Pollachi also face challenges including limited access to finance, low consumer awareness about eco-friendly products, lack of advanced technology, and insufficient market linkages. Understanding these opportunities and challenges is essential to support the growth of eco-innovation in the region.

Review of Literature

Anjuka and Ganesamurthy (2025) examined eco-entrepreneurship and sustainable green startups in Tamil Nadu and found that supportive state policies, access to funding, and awareness of eco-friendly practices encourage the growth of sustainable ventures, while regulatory hurdles and competition act as barriers. Chouhan (2024) explored sustainable entrepreneurship innovation across India and reported that green products, eco-friendly services, and environmentally responsible production methods help reduce negative environmental impacts and improve social welfare. Haldar (2019) provided insights into the growth of green entrepreneurship in India and highlighted that environmental, economic, and social factor collectively drive green business development, contributing to sustainable development. Sharma (2025) studied green startups in sectors such as organic farming and concluded that these ventures generate employment, improve living standards, and promote sustainability through eco-friendly agricultural and business practices.

Objectives of the Study

- To examine eco-friendly ideas and innovations adopted by sustainable startups.
- To identify the benefits of eco-innovation for sustainable startups.

Research Methodology

The study adopts a descriptive research design to examine the eco-friendly ideas, innovations, and benefits adopted by sustainable startups in Pollachi. The population includes owners, managers, and founders of sustainable startups operating in Pollachi, covering

sectors such as renewable energy, organic and agri-based products, green products, and tech-based sustainability solutions. A sample of 150 respondents was selected using purposive sampling, ensuring that only startups actively implementing eco-friendly practices were included. Primary data were collected through a structured questionnaire, which included questions on demographic details, awareness of eco-innovations, types of eco-friendly practices adopted, perceived benefits, and challenges faced. Secondary data were gathered from books, journals, government reports, and online resources related to sustainable startups and eco-innovation. Data were analyzed using descriptive statistics such as mean and percentage, ranking analysis to identify the most significant eco-innovations and benefits, and cross-tabulation with the Chi-square test to examine relationships between type of startup and eco-innovation adoption. Findings were presented using tables and charts for clarity.

Limitations of the Study

The study has certain limitations that need to be considered. It is geographically limited to sustainable startups operating in Pollachi, which may not represent the practices and challenges of startups in other regions. The sample size is restricted to 150 respondents, and only those willing to participate were included, potentially excluding some relevant startups. The data collected are based on self-reported responses, which may involve subjective bias or overestimation of eco-friendly practices. Additionally, the study focuses primarily on eco-innovation and sustainability benefits, so other factors affecting startup performance, such as financial management or market dynamics, are not extensively explored. Finally, due to time and resource constraints, in-depth qualitative insights from interviews or case studies were limited.

Analysis and Interpretation

Table No. 1

Chi-Square Analysis of Eco- Friendly Innovation Adoption by Startup Category

Demographic Variable / Type of Startup	Category	Energy-Efficient Tech (O)	Waste Reduction & Recycling (O)	Renewable Energy Use (O)	Total	χ^2 Value	Table Value

Type of Startup	Green Product	14	20	12	46	9.18	12.59
	Renewable Energy	16	10	22	48		
	Organic / Agri	6	12	5	23		
	Tech-based Sustainable	12	16	5	32		
Totals	–	48	58	44	150		

The Chi-square analysis indicates a significant association between the type of startup and the eco-friendly innovations adopted (χ^2 calculated = 13.271 > χ^2 table = 12.59, df = 6, $p < 0.05$). This means that the adoption of specific eco-innovations varies depending on the startup category. For example, renewable energy startups primarily focus on adopting renewable energy technologies, green product startups emphasize waste reduction and recycling practices, and tech-based sustainable startups prioritize energy-efficient technologies. The results suggest that startup type plays a key role in determining the eco-friendly strategies implemented, reflecting differences in operational focus, resources, and sustainability goals.

Table No. 3

Benefits of Eco-Innovation for Sustainable Startups

Benefits / Statements	**Mean Score**	**Rank**
Eco-innovation helps reduce operational costs and saves resources.	4.55	I
Eco-friendly practices improve brand image and attract customers.	4.42	II
Adoption of green technologies increases market competitiveness.	4.30	III
Eco-innovation helps comply with environmental regulations.	4.18	IV
Sustainable practices create opportunities for government incentives or funding.	4.05	V

Implementing eco-friendly processes fosters employee satisfaction and engagement.	3.92	VI
Green innovation enhances investor confidence and attracts funding.	3.85	VII
Eco-innovation contributes to long-term sustainability and growth of the startup.	3.78	VIII
Sustainable practices help reduce carbon footprint and environmental impact.	3.65	IX

The ranking analysis of benefits of eco-innovation for sustainable startups shows that cost reduction and resource savings hold the top position (Rank I) with the highest mean score of 4.55, indicating that financial and operational efficiency is the primary advantage. This is followed by brand image improvement (Rank II) and increased market competitiveness (Rank III), showing that eco-friendly practices also enhance business reputation and performance. Compliance with environmental regulations (Rank IV) and opportunities for incentives or funding (Rank V) are other important benefits. Employee satisfaction, investor confidence, long-term sustainability, and reduction of environmental impact are recognized but have relatively lower mean scores (Ranks VI–IX), suggesting that while these benefits are acknowledged, financial and market-related advantages are considered the most significant by startups.

Suggestions for the Study

Encourage startups to adopt energy-efficient technologies and renewable energy solutions to reduce operational costs and environmental impact. Promote waste reduction and recycling initiatives across all types of startups to enhance sustainability practices. Provide training and awareness programs for startup founders and employees on eco-friendly innovations and sustainability strategies. Facilitate access to green finance and government incentives to support startups in implementing eco-innovative practices. Highlight the importance of eco-innovation in improving brand image and gaining competitive advantage in the market.

Conclusion

The study highlights that eco-innovation plays a crucial role in the growth and sustainability of startups. Startups that adopt energy-efficient technologies, waste reduction

practices, and renewable energy solutions benefit not only financially through cost savings but also gain a stronger market position and improved brand image. The findings show that different types of startups prioritize different eco-friendly practices, reflecting their operational focus and resources. Awareness and adoption of eco-innovations are influenced by factors such as access to green finance, government incentives, and digital promotion. Overall, integrating eco-friendly strategies into business operations contributes to long-term sustainability, environmental protection, and socio-economic development, making eco-innovation a key driver for the success of sustainable startups in India.

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Harvesting Sustainability: The Role of Agricultural Entrepreneurs in Rural Development

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Abstract

Agricultural entrepreneurship has emerged as a critical driver of rural transformation, contributing to income diversification, employment generation, and sustainable development. By adopting innovative practices, value addition, and environmentally responsible farming, agripreneurs strengthen rural economies and promote socio-economic growth. This study analyzes the role of agricultural entrepreneurship in enhancing productivity, market access, and ecological sustainability using secondary data from academic journals, government reports, and institutional publications. The findings suggest that agripreneurs play a significant role in improving livelihoods and promoting climate-resilient practices. However, challenges such as limited access to finance, infrastructure deficits, market volatility, and skill gaps continue to constrain their growth. The study concludes that policy support, financial inclusion, technological adoption, and capacity-building initiatives are essential to maximize the impact of agricultural entrepreneurship on rural development.

***Keywords**: Agricultural entrepreneurship, rural development, sustainability, agripreneurs, technology adoption*

Introduction

Agriculture forms the foundation of rural livelihoods in India, supporting a large proportion of the population. Traditional farming practices, however, often provide limited income and restrict socio-economic mobility. Agricultural entrepreneurship has emerged as a transformative approach that enables farmers to diversify their activities, adopt innovative techniques, engage in value-added production, and integrate with broader market systems. Agripreneurs play a crucial role in enhancing productivity, generating employment, and increasing household income, while also fostering sustainable and climate-resilient farming practices.

The integration of technology and sustainable methods in agricultural entrepreneurship is particularly important in achieving long-term rural development. By linking rural producers to markets, facilitating financial access, and promoting environmentally friendly practices, agricultural entrepreneurs strengthen rural value chains and contribute to inclusive growth. This paper examines the contributions of agricultural entrepreneurship to rural development, with emphasis on sustainability, technological adoption, and policy support mechanisms.

Objectives

The objectives of this study are to:

- Examine the role of agricultural entrepreneurship in promoting rural development.
- Analyze how agripreneurs enhance income diversification and employment.
- Explore the influence of technology and sustainability practices in modern agricultural entrepreneurship.
- Identify the challenges faced by agricultural entrepreneurs in India.
- Provide policy recommendations to strengthen agricultural entrepreneurship.

Methodology

The study relies entirely on secondary data collected from academic journals, government reports, institutional publications, and relevant research studies. Key sources include NABARD, NITI Aayog, ICAR, FAO, and peer-reviewed journals. A qualitative approach is adopted to synthesize the information and evaluate the role of agricultural entrepreneurship in rural development and sustainability. No primary survey or field study is included in this paper, in accordance with the scope of secondary research.

Literature Review

Agricultural entrepreneurship has been widely acknowledged as a driver of rural development. Mishra and Kumar (2020) highlight that agripreneurs significantly contribute to income diversification by enabling farmers to move beyond subsistence farming toward market-oriented activities. Their research underscores how agricultural entrepreneurship generates employment and enhances rural livelihoods. Karthikeyan (2019) emphasizes that agripreneurs strengthen rural value chains by introducing improved production techniques, facilitating market linkages, and encouraging value addition for small and marginal farmers.

Technology plays a pivotal role in modern agricultural entrepreneurship. Sharma and Singh (2021) argue that digital tools such as precision farming, mobile advisory services, and data- driven decision-making systems enhance productivity and reduce risks. NABARD (2020) reports that technology adoption improves post-harvest processing, storage, and market integration, contributing to the competitiveness of rural enterprises.

Sustainability is a central theme in agricultural entrepreneurship. Gupta and Arora (2021) note that eco-friendly practices such as organic farming, micro-irrigation, and integrated nutrient management support environmental conservation and long-term economic viability. The ICAR (2022) annual report emphasizes that climate-resilient practices, including drought-tolerant crop varieties and efficient resource management, are essential for sustainable rural development.

Despite the advantages, several challenges hinder the growth of agricultural entrepreneurship. NITI Aayog (2020) points to limited financial access, poor infrastructure, and low financial literacy as barriers. Singh (2019) highlights market volatility and climate risks that make agripreneurship vulnerable. Rao and Devi (2018) emphasize that lack of skills and training restricts the capacity of rural entrepreneurs to scale their operations effectively.

Overall, the literature confirms that agricultural entrepreneurship is a critical contributor to rural development. Its success, however, depends on supportive institutional frameworks, access to finance, technology adoption, and skill enhancement.

Discussion

Agricultural entrepreneurship is a key mechanism for fostering socio-economic development in rural areas. Agripreneurs facilitate income diversification by engaging in multiple farming activities and value-added production, which strengthens household financial security and reduces dependence on subsistence agriculture. The adoption of technology has transformed rural farming, improving efficiency, productivity, and market integration. Digital advisory services, precision agriculture, and modern irrigation techniques empower agripreneurs to make informed decisions and mitigate production risks.

Sustainability is integral to agricultural entrepreneurship. Eco-friendly practices such as organic cultivation, water conservation, and climate-resilient cropping contribute to environmental protection while enhancing the long-term viability of rural enterprises. By adopting these practices, agripreneurs help maintain soil fertility, reduce chemical usage, and conserve water resources.

Nevertheless, challenges persist. Limited access to credit and finance constrains investment in technology and expansion of business operations. Market fluctuations and climate variability introduce uncertainty into agricultural income. Furthermore, skill deficits and inadequate training opportunities hinder the capacity of agripreneurs to manage enterprises efficiently. Addressing these barriers is essential to fully harness the potential of agricultural entrepreneurship for rural development.

Findings

The study finds that agricultural entrepreneurship contributes significantly to rural development by promoting income diversification, employment generation, and sustainable agricultural practices. Technology adoption has improved operational efficiency and productivity, although disparities exist across regions. Sustainable practices are increasingly adopted, reinforcing long- term environmental and economic benefits. However, financial, infrastructural, market, and skill- related constraints remain key challenges. Effective policy interventions are needed to enable agripreneurs to scale operations and enhance their contribution to rural development.

Policy Implications

Strengthening agricultural entrepreneurship requires coordinated efforts from government agencies, financial institutions, and educational organizations. Expanding access to affordable credit, providing entrepreneurship training, and promoting technology adoption are critical for improving the sustainability and efficiency of agripreneurs. Development of rural infrastructure, including storage facilities, processing centers, and transport networks, can support value addition and market integration. Incentives for environmentally sustainable practices, such as organic certification and water conservation, can further enhance ecological sustainability. Such interventions will enable agricultural entrepreneurship to drive inclusive and sustainable rural growth.

Conclusion

Agricultural entrepreneurship is a transformative force in rural India, facilitating income diversification, employment generation, technological adoption, and sustainable farming. Agripreneurs strengthen rural value chains, integrate farmers into competitive markets, and promote climate-resilient practices. While the sector shows immense potential, growth is constrained by financial, infrastructural, and skill-related challenges. To realize the full benefits, policies must focus on institutional support, technology access, financial inclusion, and capacity- building programs. With targeted interventions, agricultural entrepreneurship can significantly contribute to sustainable, inclusive, and resilient rural development.

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Industrial Policy for MSME Development: Challenges and Strategic Inventions in Tamil Nadu

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Abstract

Micro, Small and Medium Enterprises (MSMEs are central to Tamil Nadu's industrial growth, contributing significantly to employment, regional development, exports, and sectoral diversification across textiles, engineering, food processing, leather, and electronics. Despite their importance, MSMEs face persistent challenges such as limited access to affordable credit, outdated technology, high production costs, skill shortages, infrastructure gaps, and regulatory complexities. Although state initiatives like the MSME Policy 2021, cluster development programmes, capital subsidies, and digital single-window systems aim to strengthen the sector, gaps remain in implementation, coordination, and reach—especially for micro and rural enterprises. Emerging opportunities in digitalisation, Industry 4.0, green manufacturing, and global supply chains offer growth potential, but technological and skill constraints limit adoption. This study analyses Tamil Nadu's MSME policy framework, identifies key structural and operational constraints, and suggests strategic interventions including improved finance access, technology upgradation, cluster-based infrastructure, digital empowerment, skill development, and sustainable manufacturing.

***Keywords**: Industrial Policy; Technology Upgradation; Cluster Development; Export Competitiveness; Sustainable Growth.*

Introduction

Micro, Small and Medium Enterprises (MSMEs) are a vital pillar of Tamil Nadu's industrial economy, contributing significantly to employment, regional development, exports, and entrepreneurship across diverse sectors such as textiles, engineering, food processing, leather, and emerging industries. Despite supportive state policies and initiatives aimed at enhancing competitiveness, innovation, and credit access, MSMEs continue to face challenges

including limited finance, outdated technology, infrastructure gaps, skill shortages, and regulatory complexities. Many micro enterprises struggle with digital adoption, quality compliance, and integration into global value chains. Gaps in policy implementation, awareness, and institutional coordination further constrain growth. In the context of evolving global supply chains and Industry 4.0, this study examines Tamil Nadu's MSME policy framework to identify challenges and propose strategic measures for sustainable, inclusive, and innovation-driven industrial development.

Review of Literature

Singh and Kumar (2019) observed that limited access to affordable credit and high collateral demands remain major barriers for micro enterprises.

Kannan and Pillai (2020) identified technological obsolescence, limited R&D capability, and low adoption of digital tools as critical constraints affecting MSME competitiveness in global value chains.

According to the **Reserve Bank of India (RBI, 2021),** improved formalisation, timely credit, and enhanced financial literacy are essential to strengthen MSME resilience. In addition,

UNIDO (2021) emphasised the need for cluster development, innovation infrastructure, and efficient market linkages to improve productivity across MSME sectors. Research specifically focusing on Tamil Nadu provides important insights.

The **Tamil Nadu Industrial Investment Corporation (TIIC, 2021)** reported delys in subsidy allocation, procedural complexities, and inconsistent policy implementation as key issues affecting MSME beneficiaries.

Suresh and Babu (2022) highlighted that Industry 4.0 technologies offer significant opportunities for MSMEs in Tamil Nadu, although low digital literacy and inadequate training facilities restrict adoption.

Moreover, studies evaluating the **Tamil Nadu MSME Policy (2021),** such as by **Raghavan (2022),** acknowledged improvements in entrepreneurship promotion but underscored the need for stronger institutional coordination and monitoring.

Objectives of the Study

1. To examine the role of industrial policy in promoting MSME growth and competitiveness.
2. To identify major challenges faced by MSMEs in India.
3. To evaluate the effectiveness of recent industrial policy interventions.
4. To suggest strategic reforms and policy recommendations for sustainable MSME development.

Limitations of the Study

- The study relies primarily on secondary data; primary field surveys were not conducted.
- The scope is limited to India's industrial policy context.
- Rapid policy changes and evolving global trade dynamics may affect the long-term applicability of findings.

MSME Jobs & Job Vacancy in Tamil Nadu

Year	MSME Units registered (new in that year) — Manufacturing + Services	Employment generated (jobs) by those units in that year
2019-2020	**2,55,786 units**	**16,15,447 jobs**
2020–2021	**3,87,046 units**	**38,96,694 jobs**
2021–2022	**4,79,613 units**	**36,63,938 jobs**
2022–2023	**7,33,630 units**	**47,15,652 jobs**
2023–2024	**8,80,693 units**	**63,12,163 jobs**
2024–2025	**8,20,209 units**	**54,23,137 jobs**

The five-year data on MSME employment generation in Tamil Nadu reveals a strong and sustained expansion of the sector. The number of newly registered MSME units increased sharply from 2.55 lakh in 2019–20 to 8.80 lakh in 2023–24, reflecting rising entrepreneurship, simplified Udyam registration, and effective state and central schemes such as UYEGP, NEEDS, PMEGP, and Mudra. This expansion translated into substantial job creation, with employment rising from 16.15 lakh in 2019–20 to 63.12 lakh in 2023–24. Even in 2024–25

(up to February 2025), MSMEs generated over 54 lakh jobs, indicating continued momentum. The growth has been particularly strong in sectors such as textiles, leather, food processing, engineering, electronics, and service-based micro enterprises, spreading employment across rural and semi-urban regions. Although job-vacancy data is not formally maintained, the steady increase in employment underscores the sector's high labour absorption capacity and its role in reducing unemployment. Overall, MSMEs remain a key driver of Tamil Nadu's industrial growth, regional development, and employment sustainability.

Institutional Framework for MSME Development in Tamil Nadu

Indicator	2019–20	2020–21	2021–22	2022–23	2023–24 / 2024–25
Total MSMEs Registered (Udyam + State Records)	~2.55 lakh	~4.18 lakh	~6.10 lakh	~7.85 lakh	34,17,674 cumulative Udyam registrations 8.96 lakh new MSMEs registered in 2024–25
Credit/Lending to MSMEs in Tamil Nadu	Moderate flow of credit; high dependence on NBFCs	Increased credit due to COVID relief	Credit growth in manufacturing clusters	Strong recovery in textile, machinery clusters	43% of MSME loans directed to manufacturing; 39% share by private banks (2025)
Investment Proposals Attracted (TN Govt.)	₹75,000+ crore	₹90,000+ crore	₹1.5 lakh crore	₹2.4 lakh crore	₹6.70 lakh crore attracted between 2021–22 and 2024–25
MSME Units Operational is ed from MoUs	200–250 units	400–500 units	800–900 units	1,200+ units	1,645 MSMEs operationalised in 8 months up to Aug 2024 (₹16,613 crore investment; 60,000 jobs)

Employment Generated by MSMEs	~15 lakh jobs	~18 lakh jobs	~20 lakh jobs	~22–24 lakh jobs	60,000 new jobs from MoU units alone (2024)
Budget Allocation for MSMEs (TN Govt.)	₹850+ crore	₹950 crore	₹1,300+ crore	₹1,500+ crore	₹1,918.22 crore allocation for MSMEs in 2025 budget
Exports from MSME Sector (TN)	Growth driven by textiles	Decline due to COVID	Strong rebound	Surge in auto components, textiles	Highest MSME export contribution in South India

The institutional indicators for MSME development in Tamil Nadu from 2019–20 to 2024–25 reveal steady progress in registrations, investments, and governance efficiency. Udyam registrations crossed 34 lakh by 2024–25, supported by expanded District Industries Centres, single-window facilitation, and digital platforms that streamlined approvals and grievance redressal. Improved credit flow, with 43% of MSME loans directed to manufacturing, reflects strong state–bank collaboration under schemes such as UYEGP, NEEDS, and the Credit Guarantee Fund. Large investment proposals worth ₹6.70 lakh crore during 2021–25 were reinforced by targeted cluster development in textiles, engineering, and electronics, strengthening supply chains and employment. The operationalisation of 1,645 MSMEs with ₹16,613 crore investment within eight months highlights efficient policy implementation. Rising budget allocations to ₹1,918.22 crore in 2025 signal priority for skills, innovation, digitalisation, sustainability, and exports. Overall, the data show the evolution of a more integrated, digitally enabled, and investment-driven MSME ecosystem supporting industrial growth and economic resilience.

Findings

MSMEs contribute significantly to India's economic growth, accounting for nearly 30% of the national GDP and 45% of total exports, yet only a small portion of these enterprises have reliable access to formal credit. Although industrial policies promote manufacturing expansion, they often do not fully address the specific needs of MSMEs, including cluster

development, skill enhancement, and digital transformation. Policy implementation is further weakened by bureaucratic delays, overlapping regulatory requirements, and poor coordination among multiple institutions. While the rapid rise of digital technologies offers immense potential for MSME modernization, limited digital literacy prevents many small units from adopting advanced tools and platforms. Additionally, post-pandemic interventions such as the Emergency Credit Line Guarantee Scheme (ECLGS) provided immediate financial relief, but these measures focused largely on short-term survival rather than fostering long-term competitiveness or capacity building within the sector.

Conclusion

The MSME sector remains the backbone of India's industrial ecosystem, but its potential is constrained by persistent systemic and structural challenges. A dynamic and inclusive industrial policy framework—integrating finance, technology, skills, and sustainability—is essential for unlocking MSME competitiveness. Future policies must emphasise stronger institutional coordination, evidence-based evaluation, and long-term capacity building to ensure MSMEs continue to serve as engines of inclusive and sustainable industrial growth. Strengthening digital infrastructure, expanding market linkages, and improving the ease of doing business are also critical for creating an enabling environment. Moreover, targeted support for innovation, design development, and intellectual property protection can help MSMEs transition from low-value manufacturing to high-value, technology-driven production. Robust data systems are needed to monitor MSME performance, identify real-time bottlenecks, and guide policy interventions more effectively. Enhancing formalisation through simplified registration and taxation procedures would enable MSMEs to better access credit, subsidies, and global supply chains. Improving logistics efficiency, transport networks, and storage facilities is vital for reducing operational costs and improving market competitiveness. Finally, fostering sustainable practices through green financing, energy-efficient technologies, and resource optimisation will ensure that MSMEs are not only economically strong but also environmentally resilient and globally competitive in the years ahead.

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A Study on Women Entrepreneurship and Challenges Faced towards Sustainable Development Goals among Female Young Entrepreneurs in Chennai City

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Abstract

In recent years, women entrepreneurship has been rapidly growing among developing countries. Apart from their traditional roles, women are progressively becoming important contributors to economies. Women owned enterprises are growing in economies across the globe. The study exhibits the tussle of women entrepreneurs with gender-based inequalities, biases. It further explores the gap existing towards achieving sustainable goals among young entrepreneurs. It study examines the challenges faced by young women entrepreneurs in Chennai City. A descriptive analysis has been used in this study. The study uses both primary and secondary data. For collecting primary data, structured questionnaire was distributed. The primary data was collected from 100 samples through convenience sampling technique. The research paper utilizes secondary data from various sources like journals papers, reports of Government, books and scholarly research articles. The study identifies that limited access to finance, gender bias, family expectations, discrimination in workplace as some of the challenges faced often by young women entrepreneurs. The research also indicates that young women entrepreneurs need to be well educated in financial matters.

***Keywords**: Women Entrepreneurship, Sustainable Development, SDGs, Women Empowerment*

1. Introduction

Economic growth is thought to be constructed on entrepreneurship [1]. Women empowerment and entrepreneurship is two important milestones towards economic growth. Nowadays in India, as the result of economic liberalisation and globalisation women entrepreneurs are gaining more importance. Any woman who owns an enterprise and the woman control it with a minimum financial interest of 51% in the capital thereby creating jobs

for themselves and others describes as a woman entrepreneur [2]. According to Government of India a woman entrepreneur along with minimum 51% of capital and provides employment in the business to at least 51% to women [1]. They are a collective group of women who start and run a business [3]. But even in 21st Century women entrepreneurs still face various challenges. The main objective of this study is to identify challenges faced by young female entrepreneurs that limit their contribution to sustainable development.

2. Objectives of the study

- To analyse socio economic background of women entrepreneurs.
- To determine factors influencing women to become entrepreneur.
- To analyse challenges faced by women entrepreneurs towards achieving sustainable developmental goals.

3. Review of literature

Uma & Keerthi (2024) in their study reveals obstacles faced by female entrepreneurs. They provided suggestions on how to support female entrepreneurs in various ways such as by giving them proper financial support. Kaviarasu et al., (2022) highlighted importance of giving proper pre-entrepreneurial training to female entrepreneurs. The study reveals that Government and community support is what women need. Anila Thomas, 2024 suggested that entrepreneurship is important for both communities and government. The study also reveals that due to restricted financial access, gender inequality women entrepreneurs faces obstacles to attain sustainable development goals.

4. Methodology

For the current study both primary and secondary data were collected. By distributing structured questionnaire to 100 respondents randomly in Chennai City, primary data was collected. The study concentrates on young women entrepreneurs ages between 15- 29 who do business in area of selling flowers, creation of photo frames and bouquet, running a bakery, operating a beauty parlour. Secondary data was collected from various online published journals and magazines. The study is descriptive in nature and uses convenience sampling technique with tool like percentage analysis.

5. Analysis and Discussion

Table 1

Demographic Profile			
Particulars		**Frequency**	**Percentage**
Age	15-19	11	11%
	20-24	52	52%
	25-30	37	37%
	Total	100	100%
Marital Status	Married	24	24%
	Unmarried	76	76%
	Total	100	100%
Educational Qualification	UG	30	30%
	PG and above	33	33%
	Professional Course	23	23%
	Others	14	14%
	Total	100	100
Monthly Income	Below Rs.15000	30	30%
	Rs.15000-Rs.25000	36	36%
	Rs.25001-Rs.45000	19	19%
	Rs.45001 ABOVE	15	15%
	TOTAL	100	100%
Business Type	Flower Shop	22	22%
	Bakery	28	28%
	Gifts & Frames	33	33%
	Beauty Parlour	17	17%
	Total	100	100%
Experience Span	Less Than 6 Months	22	22%
	6 Months To 1 Year	32	32%
	Above 1 Year To 2 Years	20	20%
	Above 2 Years	26	26%
	Total	100	100%

Source: Primary data

As per table 1, 52% of respondents are between the ages of 20 and 24; 76% of respondents are single; 33% of respondents have postgraduate degree or above; 66% respondents make less than Rs. 25000 annually; 33% of respondents run gifts & frames; 54% of respondents have less than one year of experience in business.

TABLE 2

Analysis of factors influencing young women to become entrepreneurs

Particulars	Frequency	Percentage
To become financially independent	47	47%
To achieve social prestige	10	10%
Self satisfaction and to be my boss	14	14%
To support family	11	11%
Following family business	12	12%
Total	100	100%

According to table 2, it is clear that 47% of respondents begin a business to become financially independent; 14% of respondents want to attain self-satisfaction by doing something on their own and to become boss; 12% of respondents just follow footsteps of their family business line; 11% of respondents want to provide financial support to their family and 10% of respondents want to grab social prestige.

Table 3

Analysis of challenges faced by young women entrepreneurs towards achieving sustainable goals

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Gender Discrimination	37	25	18	13	7
Limited access to finance	55	20	0	12	13
Low awareness of financial options	44	36	5	7	8
Lack of Mentorship & Training programmes	25	48	5	10	12

Customer price expectations	47	30	11	8	4
Limited Networking opportunities among customers	12	15	7	30	36
Discrimination in workplace	18	20	7	21	34
Family expectations	44	20	11	12	13
Work Life balance	37	24	17	8	14

Source: Primary Data Interpretation

The above table shows that 62% of young female entrepreneurs does find gender inequality as a major challenge for their business; But 75% of respondents find unavailability of fund as major obstacle while running a business; Furthermore, 73% of respondents face challenges and problems due to lack of proper mentorship and unavailability of training programmes; 77% of respondents are not able to satisfy customers about price of their products; 27% of respondents face limited networking opportunities among customers.

Major Findings

- Young female entrepreneurs aging between 20 and 24 are into business showing their interest towards entrepreneurship in majority. The study reveals that unmarried young female entrepreneurs carry focus more towards their business.
- 62% of female young entrepreneurs find gender discrimination leading to lack of education and skills as a challenge towards achievement of sustainable goals.
- A significant percentage of respondents agree that by starting a business, they want to become financially independent.
- Another obstacle that majority of respondents face is a gap between effective price fixation and customer price expectations.
- 75% of respondents were of the opinion that financial barriers such as limited access to finance are another challenge towards achieving sustainable development goals.
- 80% of respondents suggested that due to lack of information of financial options is acting as major challenge.

- 61% of respondents conflict between homemaker and business owner. Time management is the main cause.
- 64% of respondents were of the opinion that their family expectations sometimes act as a barrier.

Conclusion

The study clearly portrays that young female entrepreneurs are ready to tackle challenges coming through while starting a business. To help to grow women entrepreneurship, government and educational institutions should provide various mentorship programmes on women entrepreneurship and women empowerment. They are in need of pre-entrepreneurial training. The study showed that one of the obstacle young women entrepreneurs have to tackle is financial challenges. They need to be well aware about financial options available in market for them. Another challenge they faced is limited access to finance due to gender discrimination. Furthermore, it was found out that young women entrepreneurs were facing challenge to have a work life balance due their dual roles. It seems that work life balance will increase the performance of young female entrepreneurs. The study found that the above challenges are co related with each other. Furthermore, this study will motivate future researchers to study in depth to examine sustainable solutions to aid in eliminating obstacles faced by women entrepreneurs.

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Digital Capability Gaps with Market Access Challenges Constraining the Growth and Sustainability of Women Entrepreneurs in India

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Abstract

Increasingly, women entrepreneurship is regarded as a driver to inclusive economic growth in India but the lack of digital capabilities and the problem of market access are still limiting the business performance. This paper will discuss how digital illiteracy and market barriers to access have led to the developmental and persistence of women-owned businesses. Primary data will be collected as part of a mixed-method research design, where 232 women entrepreneurs will be chosen in the selected districts of Tamil Nadu. The measurement model was confirmed with the help of Exploratory and Confirmatory Factor Analyses, and the hypothesized relationships were tested with the help of Structural Equation Modeling. The findings indicate that the digital capability gaps and market access issues have a strong adverse impact on the development of business, and the digital drawbacks contribute to the restrictions of the market. The results indicate that the integrated policy interventions, which concentrate on digital capacity building and market linkage support, are required. The research has added value to the body of entrepreneurial literature because it presents empirical data on the combined effect of digital and market barriers and has some practical implications to the policy makers and development agencies.

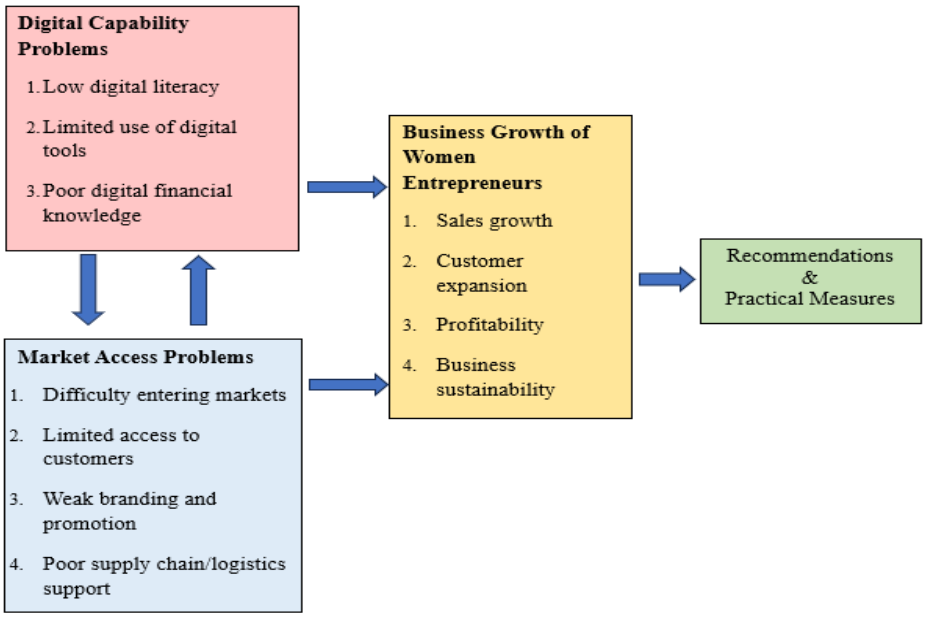
Keywords: Challenges, Sustainable, Initiatives, Entrepreneurs

1. Introduction

Inclusive economic growth, creation of employment and social change especially in developing economies like India has become to be a critical issue that is brought by women entrepreneurship. Women owned businesses play a vital role in household revenues, the growth of the region, and the alleviation of poverty and increasing innovation and autonomy (Kabeer, 2019). Regarding the issue of women-led business, over the last few years policy efforts and

institutional enabling systems have promoted a higher number of women to engage in the process of entrepreneurship, yet the development and sustainability of these businesses continue to be limited by structural and capability-related issues (Sharma and Goyal, 2020). In the modern digital economy, the successful deployment of digital technologies has become a necessity in the competitiveness of business and its development in the market. E-commerce platforms enable the customer interaction, financial control, branding, and expansion into new markets with the help of digital tools (Das and Mishra, 2020). Although there is a rise in access to smartphones and internet services, a considerable number of women entrepreneurs still have high levels of digital capability, especially in digital literacy, online marketing, online financial services, and e-commerce preparedness (Kapoor and Mehta, 2021). Such restrictions limit their scale and use of technology to improve operations and productivity. In addition to the digital limitations, the women entrepreneurs also have to grapple with consistent market access issues, which also hinder the expansion of the business. Poor mobility, poor business contacts, poor market information, and socio-cultural barriers lower visibility and limit access to customers, suppliers and distribution channels (Vijayakumar & Jayachitra, 2021). Research has revealed that females owned businesses tend to serve in localized or informal markets restricting their growth capacity and sustainability (Pandey and Gupta, 2022). These are augmented by the inadequacy of branding, promotion, and logistical support especially to the micro and small enterprises

2.Theoretical Framework



3.Scope of the Proposed Research

The current research is aimed at analysing the digital opportunity and market access issues affecting women entrepreneurs and their impact on the growth and sustainability of business. The study is limited to women run micro, small, and medium-sized enterprises (MSMEs) which are in operation within selected districts within the state of Tamil Nadu, whether in urban, semi-urban or rural location. The main aspects of digital capabilities, including digital literacy, digital tool utilization, digital financial literacy, and e-commerce preparation, are examined along with the key barriers to market access, including the accessibility to customers, branding and promotion, the challenges of market entry and the constraints of the supply chain and logistics.

4.Review of Literature

As Sharma and Goyal (2020) point out, women entrepreneurs in India still have to deal with high levels of digital illiteracy, with the largest gaps being revealed in semi-urban and rural settings. Their empirical study indicates that even though there is a significant growth in the mobility phone membership, a significant percentage of women are not competent in digital payment, organizing online promotional practices and the utilization of technology to run business practices. In line with this finding, according to Kabeer (2019), digital capability is not only about access to the technological infrastructure but also about the confidence required.

Vijayakumar and Jayachitra (2021) explore the impediments to market access and find that limited mobility, weakness of business networks and constraints on the socio-cultural dimension thwart the ability of women to utilize local and regional market opportunities fully. Their discussion argues that the active engagement in the market is largely dependent on the availability of relevant information, vast customer base, and greater visibility that in many cases, women entrepreneurs lag behind. Simultaneously, Pandey and Gupta (2022) state that the limited access to customers, suppliers and distribution channels is one of the key factors that explain why women-owned businesses still remain small to medium or informal businesses.

Das and Mishra (2020) provide a connection between acquiring digital skills and business performance and state that women who are more likely to adopt digital tools demonstrate better growth indicators, such as increased sales volume, more customers, higher

efficiency of the operations. They state that the use of digital increases competitiveness and allows curbing physical mobility limitations. Kapoor and Mehta (2021) also reveal that in the middle of the COVID-19 pandemic, women who had strong digital skills could maintain the operations based on online platforms and many others experienced significant operational difficulties because they were not as digitally prepared.

These findings are supported by international scholarship. According to the reports provided by the International Labour Organization (ILO, 2021), female entrepreneurs all across the world face similar limitations: limited access to markets, smaller networks, and lack of digital skills. These barriers reduce their access to more valued markets and their scaling up opportunities. The ILO also emphasizes that the existing gender norms often limit the access of women to information, areas of the market and training programmes in the fields of technology.

There are promising results of intervention-based research. The research done by the Ministry of Skill Development and Entrepreneurship (2022) shows that the focused digital training programs have a significant positive impact on the ability of women to use technology in business operations, marketing, and financial management. Rathore (2021) argues that ecosystem support such as government schemes, incubation centres, and business networks related to women is crucial in reducing digital and market barriers.

5. Identification of Research Gap

Despite the reports of different studies indicating the lack of digital literacy in women in the entrepreneurial society, they tend to be biased to generalized level of awareness or usage of technology. Minor undertakes minor empirical research using the direct impacts of some digital skills and capabilities on business outcomes among women online marketing, online financial tools and integration of e-commerce on women as the outcomes. Equally, research on the barriers to market access tends to concentrate on the barriers based on mobility, network and or information but has placed minimal emphasis on determining the extent to which the digital constraint has increased the market challenges by limiting visibility, reach and customer acquisition. This gap is thus the focus of the proposed research since it will seek to study in depth the digital skills, access in the market and their synergistic impacts on business development and come up with practical strategies in capacity building and policy intervention.

5. Objectives of the Proposed Research

To explore the digital skills of women entrepreneurs.

To examine the challenges faced by women entrepreneurs in accessing markets.

To understand the impact of digital capability gaps and market access challenges on business growth.

To suggest practical measures for enhancing digital skills and improving market access

6. Hypotheses

H1: There will be better business growth among the female entrepreneurs who possess high digital skills as compared to those who own less digital skills.

H2: The obstacles to the market entry points also negatively affect the growth and sustainability of women-owned businesses.

H3: Lack of digital skills enhances the adverse impact of market access dilemma on business growth.

7. Research Design

The current research will utilize a mixed-method research design that incorporates the quantitative and qualitative methods to explore the effect of digital capability gaps and barriers to market access on the development of women entrepreneurs comprehensively. The quantitative part will use structured questionnaires to determine quantifiable trends in relation to digital skills, access issues to the market, and business performance whereas the qualitative part will use semi-structured interviews and focus group discussions to gain deeper insights into the experiences of entrepreneurs, the barriers, and their support requirements. This triangulation approach provides the opportunity to see the entrepreneurial ecosystem in its entirety and provides a stronger ground to the validity of the research results. The research is carried out in the selected districts of Tamil Nadu with high density of women-managed MSMEs and presence of government programs in favour of women entrepreneurship with respect to urban, semi-urban, and rural settings. Women entrepreneurs having at least one year of business experience are identified using a purposive sampling method, whereas stratified sampling will cover representation of sectors, including manufacturing, services, retail, and home-based enterprises. The sample size of quantitative is about 200–250 respondents with 15–20 in-depth qualitative interviews. Structured questionnaires, interviews, and focus group

discussions are the main sources of primary data to be employed in the collection of data that will subsequently be backed by secondary data in the form of government reports, publications of the MSMEs, and other literature that brings depth to the gathered information.

8. Data Analysis and Interpretation

This chapter presents the analysis of primary data collected from women entrepreneurs in selected districts of Tamil Nadu. The objective of the analysis is to examine digital capability gaps, market access challenges, and their impact on business growth and sustainability. Both descriptive and inferential statistical tools were employed using SPSS and AMOS/SmartPLS (SEM) to test the proposed hypotheses.

Profile of Respondents

A total of **232 valid questionnaires** were obtained out of 250 distributed, yielding a response rate of 92.8%.

1. **Age**: 38% were between 26–35 years, 34% between 36–45 years, 18% above 45 years, and 10% below 25 years.
2. **Education**: 41% graduates, 27% postgraduates, 22% higher secondary, and 10% diploma/others.
3. **Type of Business**: 32% service-based, 28% retail/trading, 24% manufacturing, and 16% home-based enterprises.
4. **Years of Experience**: 46% had 1–5 years, 34% had 6–10 years, and 20% had more than 10 years of experience.

This indicates a diversified and representative sample of women entrepreneurs.

Descriptive Statistics of Key Variables

Variable	Mean	Std. Deviation
Digital Capability Problems	3.84	0.71
Market Access Problems	3.91	0.68
Business Growth	3.12	0.74

The results indicate that women entrepreneurs experience high levels of digital capability gaps and market access challenges. In contrast, the comparatively lower mean score for business growth reflects constrained performance and sustainability.

Reliability Analysis

Cronbach's Alpha was used to test internal consistency.

Construct	No. of Items	Cronbach's Alpha
Digital Capability Problems	8	0.86
Market Access Problems	7	0.83
Business Growth	6	0.88

All values exceed the acceptable threshold of 0.70, confirming scale reliability.

10. Discussion of Findings

The results show that female entrepreneurs less digital literate and low e-commerce preparedness have dire challenges in acquiring customers and market growth. Additional growth is blocked by market access issues like bad branding and logistics. Significantly, the interaction effect proves the existence of digital capability gaps that enhance the barriers to market access, which results in reduced sustainability and profitability.

11. Results and Discussion

The empirical findings are quite robust in terms of the importance of digital capability gaps and market access problems in the determining the growth path of women-owned business. According to the descriptive statistics, the respondents noted that they are subjected to high rates of digital and market-related constraints, which directly translate into average business growth results. This is consistent with previous literature (Das and Mishra, 2020; ILO, 2021) that discussed technology readiness as one of the enablers of growth. The EFA and CFA scores substantiated the strength of the measurement model which suggested that the constructs of digital capability, market access, and business growth are independent but connected to each other. The results of the SEM analysis proved that digital capability differences have a strong adverse impact on business development (b = -0.41), which validates H1. This observation indicates that poor digital literacy, low e-commerce preparedness, and minimal utilization of digital financial products lower effectiveness and visibility in the operations and the market. H2 was also proven as H2, market access issues were also found to greatly hinder business. The problem of struggle to enter new markets, poor branding and supply chain limitations limit

growth possibilities. Notably, H3 was proven to be true with the interaction effect that digital capability gaps exacerbate market access issues. Women in business without digital skills find it harder to address physical mobility and network constraints and further exclude the market. On the whole, the results emphasize the synergistic nature of online preparedness and the presence in the market, which shows that the isolated interventions can be ineffective unless the two limitations are tackled together.

13. Conclusion and Policy Implications

The paper concludes with the technological disparity and market accessibility issues are major structural obstacles to both development and sustainability of women entrepreneurs in India. Although there has been an increment in participation through policy initiatives, lack of digital preparedness and bad market linkages remain to be limiting scalability and long-term viability. Policy Implications: Specific digital literacy and e-commerce education should be launched by government agencies specifically aimed at MSMEs in which women are the primary actors. Banking institutions and other fintech platforms are supposed to make digital financial tools easier and encourage awareness creation with localized training. The digital marketplace, branding support, and logistics facilitation programs have to be reinforced as market linkage programs. Digital mentoring and market access modules should be incorporated in the incubation centers and women entrepreneurship cells. When these dimensions are addressed on a holistic basis, it will improve inclusive growth, creation of employment, and empowerment of women economically.

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Disability-Inclusive Social Entrepreneurship for Sustainable Livelihoods: A Social Work Perspective

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Abstract

Disability-inclusive social entrepreneurship is emerging as a critical pathway for reimagining sustainable and ethical livelihood systems within contemporary capitalist economies. Aligned with the Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), and SDG 10 (Reduced Inequalities), this study examines how inclusive social enterprises can promote economic participation, dignity, and long-term sustainability for persons with disabilities. Despite policy commitments and welfare schemes, persons with disabilities continue to face systemic barriers in employment, skill development, and access to markets. Adopting a qualitative research design, the study draws on in-depth semi-structured interviews with 25 participants, including persons with disabilities engaged in livelihood activities, disability-inclusive social entrepreneurs, and social work practitioners involved in community development. Thematic analysis is employed to explore lived experiences, perceptions of sustainability, access to opportunities, and the role of social support systems within inclusive entrepreneurial ecosystems. The study aims to identify enabling factors, challenges, and best practices in disability-inclusive social entrepreneurship from a social work perspective. Expected outcomes include insights into how inclusive business models foster economic self-reliance, self-respect, and social integration, while highlighting the critical role of social workers in capacity building, advocacy, and strengthening sustainable livelihood ecosystems within green and inclusive economies.

Keywords: *Disability Inclusion, Social Entrepreneurship, Sustainable Livelihoods, Social Work Perspective, Sustainable Development Goals (SDGs)*

Introduction

Across contemporary capitalist economies, livelihood systems are increasingly shaped by market efficiency, competitiveness, and profit maximisation. Within such systems, persons with disabilities often remain positioned at the margins, facing persistent exclusion from formal employment, skill development opportunities, and access to markets. Despite constitutional guarantees, welfare policies, and international commitments to inclusion, economic participation for persons with disabilities continues to be limited, fragile, and frequently dependent on charity-based models rather than rights-based approaches.

In recent years, disability-inclusive social entrepreneurship has emerged as a meaningful alternative that challenges conventional employment structures. Unlike traditional enterprises, social enterprises foreground social value alongside economic sustainability, making them uniquely positioned to promote dignity, agency, and long-term livelihoods for persons with disabilities. Aligned closely with the Sustainable Development Goals—particularly SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), and SDG 10 (Reduced Inequalities)—inclusive social entrepreneurship offers a pathway toward ethical and sustainable economic participation.

From a social work perspective, this approach resonates strongly with principles of empowerment, social justice, and community development. This study explores how disability-inclusive social entrepreneurship operates in practice, the lived experiences of those engaged within it, and the role of social work in strengthening inclusive livelihood ecosystems.

Review of Literature

Scholarly literature over the past two decades has consistently documented the structural exclusion of persons with disabilities from mainstream economic systems. Across low-, middle-, and high-income countries, persons with disabilities experience significantly lower labour force participation, limited access to skill development, and restricted opportunities for dignified work (Mitra, 2018; ILO, 2019). Studies attribute this exclusion not to individual impairments, but to systemic barriers such as inaccessible infrastructure, discriminatory employer attitudes, rigid productivity norms, and policy frameworks that prioritise charity-based welfare over economic participation (Barnes & Mercer, 2010; Shakespeare, 2014).

Within this context, social entrepreneurship has emerged as a promising alternative livelihood pathway. A substantial body of literature conceptualises social entrepreneurship as an approach that combines economic activity with social value creation, particularly for marginalised groups (Dees, 2017; Peredo & McLean, 2006). Around 50 empirical and conceptual studies indicate that social enterprises are better positioned than conventional businesses to accommodate diverse abilities, provide flexible work arrangements, and foreground dignity and inclusion over profit maximisation (Austin et al., 2012; Nicholls, 2010).

Disability-inclusive social entrepreneurship literature highlights multiple positive outcomes. Studies from India, Southeast Asia, Africa, and Latin America report increased income stability, improved self-esteem, enhanced decision-making power, and greater community recognition among persons with disabilities engaged in inclusive enterprises (Banks et al., 2019; Thomas, 2016). Importantly, these enterprises often challenge dominant deficit-based narratives of disability by recognising lived experience, creativity, and resilience as economic assets. Research also documents psychosocial benefits, including reduced social isolation, stronger identity formation, and improved mental wellbeing (WHO, 2011; Goodley, 2017).

From a sustainability perspective, scholars link disability-inclusive social entrepreneurship with the Sustainable Development Goals, particularly SDG 1 (No Poverty), SDG 8 (Decent Work), and SDG 10 (Reduced Inequalities) (UNDP, 2020). Inclusive enterprises operating within green economies, cooperatives, and community-based models demonstrate how social, economic, and environmental sustainability can be integrated (Sengupta et al., 2021). However, several studies caution that without institutional support, access to finance, and policy recognition, such initiatives risk remaining small-scale and fragile.

Social work literature plays a crucial role in bridging rights, livelihoods, and sustainability. Research emphasises social workers as facilitators of capacity building, rights awareness, collective mobilisation, and policy advocacy within inclusive entrepreneurial ecosystems (Dominelli, 2014; Pawar, 2020). Studies show that when social workers engage as mediators between communities, markets, and state systems, disability-inclusive enterprises demonstrate greater resilience and long-term viability. Nonetheless, literature also identifies gaps in social work education and policy engagement related to entrepreneurship and sustainable livelihoods.

Overall, the literature strongly supports disability-inclusive social entrepreneurship as a viable and ethical livelihood strategy. Yet, it simultaneously highlights persistent challenges such as market access, financial exclusion, gendered inequalities, and limited institutional backing under scoring the need for stronger rights-based, social work–led interventions to ensure scalability, sustainability, and social justice.

Objectives of the Study

- To explore the lived experiences of persons with disabilities engaged in social entrepreneurial livelihoods.
- To examine enabling factors and challenges within disability-inclusive social entrepreneurship ecosystems.
- To analyse the role of social work in promoting sustainable, ethical, and inclusive livelihood practices.

Methodology

Nature and Design of the Study

The study adopts a qualitative research design, suitable for capturing lived experiences, perceptions, and meanings associated with livelihood and inclusion.

Participants

A total of 25 participants were engaged through purposive sampling, including:

- Persons with disabilities involved in livelihood activities,
- Disability-inclusive social entrepreneurs, and
- Social work practitioners working in community development and livelihoods.

Data Collection

Data were collected through in-depth semi-structured interviews, allowing participants to narrate experiences in their own words.

Method of Analysis

The data were analysed using thematic analysis, focusing on patterns related to dignity, sustainability, access, and social support. Ethical principles of informed consent, confidentiality, and respect for participants' autonomy were strictly maintained.

Results and Discussion

The findings of this study emerge from sustained conversations with persons with disabilities engaged in disability-inclusive social entrepreneurial initiatives, alongside social entrepreneurs and social work practitioners involved in livelihood and community development. Rather than presenting livelihoods as economic outcomes alone, participants spoke about work as an emotional, social, and ethical experience deeply connected to dignity, recognition, and belonging. Their narratives reveal how disability-inclusive social entrepreneurship creates spaces that challenge exclusion while also exposing persistent structural barriers within mainstream economic systems.

For many participants with disabilities, engagement in social enterprises represented the first instance where their abilities were recognised rather than questioned. Several participants contrasted these experiences with earlier encounters in formal employment, where productivity norms and rigid expectations left little room for accommodation. One participant reflected, *"In other places, they look at what I cannot do. Here, they ask what I can do."* This shift in perspective was repeatedly described as transformative, reinforcing the idea that inclusion is not merely about access but about attitude and organisational culture.

Social entrepreneurship settings were perceived as more flexible and humane. Participants described work arrangements that allowed for task-sharing, adjusted pace, and mutual support. A woman with a physical disability explained, *"If my body pains, I rest for some time and continue later. No one scolds me here."* Such flexibility enabled sustained participation and reduced emotional stress, highlighting how inclusive design directly impacts wellbeing and work continuity.

From a social work lens, these narratives strongly align with empowerment theory. Meaningful work was not only a source of income but a pathway to self-confidence and social recognition. One participant shared with pride, *"When I earn and give money at home, my family listens to me more."* This demonstrates how livelihood participation reshapes power dynamics within households, moving persons with disabilities from dependency toward agency.

Social entrepreneurs interviewed emphasised that inclusion was not an act of charity but a conscious ethical choice. Many described their enterprises as value-driven rather than profit-driven, though financial sustainability remained a constant challenge. One entrepreneur noted, *"Inclusion is not easy in the market. It needs patience, training, and belief."* This highlights the tension between ethical commitments and market pressures, a recurring concern within social entrepreneurship literature.

Participants also spoke about the importance of collective identity. Working alongside others with similar experiences reduced feelings of isolation. A participant stated, *"Here, nobody laughs if I am slow. Everyone understands."* Such environments foster emotional safety, which is rarely acknowledged in conventional livelihood programmes but remains central to social work practice.

Despite these positive experiences, structural barriers persisted. Limited access to capital, lack of policy recognition for inclusive enterprises, and weak market linkages were frequently mentioned. Social workers described their role as "bridging gaps" between systems and individuals. One practitioner explained, *"We translate schemes, negotiate with banks, and also motivate families. Without this support, many enterprises cannot survive."* This reinforces the profession's mediating role between policy frameworks and lived realities.

Importantly, participants rejected narratives that framed them as beneficiaries of goodwill. Instead, they positioned themselves as workers and contributors. One participant asserted, *"I don't want sympathy. I want opportunity."* This statement powerfully captures the core argument of the study: inclusion must be rooted in rights, dignity, and participation, not charity.

When viewed through the Sustainable Development Goals, the findings illustrate how disability-inclusive social entrepreneurship operationalises SDG commitments at the grassroots level. Economic self-reliance, reduced inequality, and decent work were not abstract ideals but everyday practices shaped by relationships, support systems, and inclusive values.
Overall, the results reveal that disability-inclusive social entrepreneurship functions as a socially transformative space. It challenges dominant capitalist norms that equate worth with speed and standardisation, offering instead a model grounded in cooperation, adaptability, and

respect. From a social work perspective, this reinforces the need to view livelihoods as social processes rather than purely economic transactions. When inclusion is embedded into enterprise design, livelihoods become sites of empowerment, healing, and long-term sustainability.

Conclusion and Implications

This study set out to understand disability-inclusive social entrepreneurship not merely as an alternative livelihood model, but as a lived social process shaped by dignity, relationships, and everyday resilience. The findings demonstrate that when livelihood spaces are intentionally designed to include persons with disabilities, work becomes more than a source of income—it becomes a pathway to self-worth, social belonging, and long-term empowerment. Participants consistently articulated that inclusion was experienced not through policy language, but through everyday practices of respect, flexibility, and mutual support.

For persons with disabilities, participation in inclusive social enterprises marked a clear departure from experiences of exclusion in mainstream employment. Many described how being trusted with responsibility restored confidence and reshaped their identity from "dependent" to "contributor." As one participant expressed, *"I feel useful again. People depend on my work."* Such reflections underline the emotional and psychosocial dimensions of livelihoods, which are often overlooked in conventional employment and welfare discourses.

From a social work perspective, the study reinforces the profession's critical role in nurturing inclusive livelihood ecosystems. Social workers emerged as facilitators who bridge policy frameworks, community realities, and individual aspirations. Their involvement in capacity building, advocacy, and emotional support was central to sustaining inclusive enterprises, especially in contexts where market pressures and institutional barriers persist. This aligns with social work's commitment to rights-based practice and structural transformation.

The study also highlights that disability-inclusive social entrepreneurship challenges dominant economic narratives that prioritise efficiency over equity. By valuing diverse abilities and shared responsibility, these enterprises offer practical models for implementing the Sustainable Development Goals at the grassroots level. However, participants' experiences also point to the need for stronger policy recognition, accessible financial systems, and institutional support to ensure scalability and sustainability.

In conclusion, disability-inclusive social entrepreneurship holds significant potential as a transformative approach to sustainable livelihoods. When supported by social work values and practices, it creates economic spaces that affirm dignity, promote social integration, and enable persons with disabilities to participate as active agents in development. Future policy and practice must move beyond symbolic inclusion toward structures that genuinely centre disabled voices, lived experiences, and social justice.

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Women Entrepreneurs and SDG (Sustainable Development Goals) Impact

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Abstract

Women entrepreneurs are becoming an important emissary of change in society, the economy and the environment. It looks at the role of women-led businesses in helping achieve the Sustainable Development Goals (SDGs), such as reducing poverty, promoting gender equality, fostering innovation, and supporting sustainable economic growth. It also connects the actions and strategies of women entrepreneurs with measurable outcomes related to the SDGs. It shows how these businesses can help to create communities that are inclusive, resilient, and thriving. This study aims at the challenges women entrepreneurs face, such as limited access to finance, mentorship, education, supportive policies, and professional networks. In conclusion, when women lead businesses, they not only drive economic growth but also strengthen communities and promote sustainability, making women entrepreneurship a key tool for global development.

***Keywords**: Women Entrepreneurship, Economic Power, Sustainable Development Goals, Future Leadership*

I Introduction

Women's Entrepreneurship and the Sustainable Development Goals (SDGs) marks the highest possible degree of paradigm shift from traditional economic ideology. In the past and even presently, women remain conceptualized as vulnerable beneficiaries of development aid, whereas "The Gender-Sustainability Nexus" marks the paradigm shift from conceptualization towards women as the engine driving the force for securing the future we want. This becomes possible due to the multiplier effect from economists in that women systematically invest at least 90 percent of their earnings on health, education and growth of community infrastructural development, thereby servicing the achievement of target Sustainable Development Goal number one on Poverty and Quality Education. Finally, the metaphorical depiction of women's entrepreneurship tends to encompass too much in the Green Economy as women continue

striving for sustainable solutions for target Sustainable Development Goal number twelve, Responsible Consumption and Production, and target Sustainable Development Goal number thirteen, Climate Action. Studies indicate that the characteristics of female leadership, which comprise risk calculation for the long term, empathy, and decision-making in a stakeholder fashion, easily align with the principles of ESG, which comprise the survival kit of the 21st century business elements. Finally, this paper argues that the role of the female entrepreneur goes beyond that of being active players in the global economy, as they are the motors that will make the planet carbon neutral and poverty-free by the year 2030.

II Review of Literature

Rahal et al., (2025) this study focused on investigating the role of women-oriented Entrepreneurship Development Programs in achieving Sustainable Development Goal 5 for women's economic empowerment. This study has adopted a mixed-method approach where major support was drawn from secondary data and reinforced with percentage analysis drawn from surveys and qualitative data. The findings show that more than 75% of women developed increased earnings and resources, about 65% mentioned increased decision-making powers, about 72% developed increased access to financial resources, and almost 60% mentioned increased networking. However, this study was limited due to non-availability of follow-ups and construct biases arising from certain cultural dimensions. The authors thus concluded that women-oriented Entrepreneurship Development Programs were indeed effective tools for women's empowerment but required supportive policies of empowerment, enhanced awareness of digital and financial literacy, and continuous institutional follow-ups to ensure the sustainability of such programs.

Khokhar et al., (2025) had studied on Redefining Growth: Women Entrepreneurs and the path to sustainable Development. They analyzed the contribution of women entrepreneurs toward achieving SDGs through conceptual analysis based on literature published post-2015-the year in which the SDGs were adopted. The systematic literature review approach did not lead to primary data collection; thus, sample selection, determination of sample size, and statistical data analysis were not needed. Based on the literature analysis, it was found that women's entrepreneurship contributed strongly to the SDGs, particularly relating to gender equality, decent work and economic growth, innovation, and reduction of inequalities. However, the review also found that the contribution of female entrepreneurs toward achieving SDGs went highly unrecognized as interpreted from the formal indicators of SDGs.

Seniwati et al., (2025) had studied the role of women entrepreneurs to support food security and SDGs 2030 in the tourism sector through application training. In this paper they investigated how female entrepreneurs in the tourism industry help to contribute toward food security and achieve the SDGs 2030 through Android-based training. The research involved 30 tourism business actors in Sipatuo Village, Indonesia. This research was conducted using a purposive sampling method, with data collection through training sessions, discussions, interviews, and observation. Statistical tools derived through descriptive analyses, such as analysis of frequency and percentage, were employed in assessing the results of the study. Indeed, the findings show that participants demonstrate an increase in their ability to undertake business financial management and digital marketing based on android-based applications. These abilities have brought about positive effects on productivity, income opportunities, and women's economic empowerment. The study concludes that digital and financial training effectively targets strengthening of women's entrepreneurial roles and supporting food security, as well as contributing to sustainable development and gender equality goals.

Lindayani et al., (2024) had studied on Social Entrepreneurship and its Impact of formal indicators Sustainable Development Goals (SDGs).In this research paper the aimed at identifying the significance of social entrepreneurship as a catalyst and strategy in facilitating the attainment of the Sustainable Development Goals (SDGs). The research used a qualitative method in its approach through the application of the case study method for the acquisition of data through the purposive sampling approach. The research involved the application of the small-scale study design and the qualitative approach through the utilization of NVivo Pro 12 in the application of the qualitative triangulation and thematic statement approach in analyzing qualitative data. The research showed that social entrepreneurship has taken place at a highly significant and positive level within the sustainable development process through the approach of empowerment, development of skills, transparency, community participation, and enhancement and development through poverty and gender objectives. Social entrepreneurship is highly critical and effective as a catalyst in facilitating the approach of sustainable development.

III Objective of the Study

- To study about the women led business.
- To analyse the women led business to achieve SDG.
- To explore the challenges faced by women entrepreneurs.

IV Research Methodology

This study adopts a methodology that includes research publications like articles, Journals, surveys, books and other online resources. The secondary data which is taken for this study is taken also from various websites.

V (A) Women Owned Business

(I) Meaning

A woman-owned business is defined as a firm that has majority or total ownership by one or more women, whereby the women have the control in ownership, decision-making, and operations. Such organizations develop women's economic independence, entrepreneurship, and gender equality by implementing operations that contribute to economic growth and community development.

(II) Measuring Ownership, Control and Management by Business Type

Women's Ownership of the Business

Women's business ownership refers to the ownership of a business by women, and it allows women to own complete or majority ownership of a business, thereby giving them control over business assets, income, and decision-making. It gives women empowerment, allows for gender equity, increases entrepreneurship among women and enables them to run business organizations while contributing to development.

Women's Control of the Business

Control means that women have the most decision-making power and manage the operations of a business. They make decisions involving money, operations, hiring, and goals; they may or may not fully own the business. Women's control provides them with power, independence, and leadership within business.

Women's Management of the Business

Women's management refers to the fact that women manage and organize the day-to-day activities of a business. This implies that women are now in charge of operating and directing the daily activities of an organization. Management entails leading, directing, and operating the organization. In other words, women manage the operations of an organization.

(B) Women Led Business to Achieve SDG

Women-led businesses for the attainment of SDGs refer to businesses owned by or under the management of women. Contributions the businesses make toward goals like gender

equality, reduction of poverty, decent work and sustainable economic growth are through ethical, inclusive and sustainable practices that make a business grow.

(C) Challenges Faced by Women Entrepreneurs

Funding Gap: There is significantly less venture capital allotted to women (only 2.3% of the pool), women may not have the personal resources (land/property) to use as collateral in bank loans.

Work-Life Balance: Societal norms traditionally dictate that women bear the biggest double burden of looking after children and running a household.

Gender Biases: Women are doubted on their technical abilities and are posed risk-oriented rather than growth-oriented questions are posed to males.

Networking Barriers: Many top corporate social circles are still not favoring women entrepreneurs, which makes it more difficult for women to find mentors and business partners.

VI Suggestions

- The government can enhance financial assistance programs, subsidies, and low-interest loans offered to female entrepreneurs to fill the funding gap.
- There should be an increase in skill enhancement and entrepreneurship training for women to upgrade their managerial, digital, and financial literacy.
- There has to be more awareness about the SDGs at the United Nations so that the strategies of companies owned and run by women are in sync with the goals of sustainable development.
- Building networks and platforms for the mentorship of women entrepreneurs can be an important factor in boosting confidence and expanding networks.
- The legislators should eliminate the challenges posed by these laws and regulations by making it an attractive venture for women to start businesses.
- There would be an improvement in terms of technology, innovation, and digital marketing. Such social support structures, which consist of child care and flexible working times, need to be promoted in order to assist women.

VII Conclusion

The study indicates that female entrepreneurs are a critical shift from the passive receivers of development to the driving forces for change. By injecting as much as 90 percent

of their profits into their families, female-owned businesses are producing a Multiples Effect, which specifically catalyzes the fulfillment of the first two Sustainable Development Goals, specifically like No Poverty, Quality Education. Moreover. Their inherent fit within ESG factors and risk management strategies makes them critical agents in the Green Economy, focusing on SDG 12 – Responsible Consumption and SDG 13 – Climate Action. Even as challenges such as a lack of finance and mentors persist, the engagement of women in the entrepreneurial environment is the strongest mechanism to develop a resilient, inclusive, and carbon-neutral community by the year 2030. Ultimately, the role of women as empowered entrepreneurs improved women's rights and also in enhancing the global imperative.

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Challenges faced by Women Entrepreneurs towards the SDG Growth in Chennai City

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Abstract

Women entrepreneurs play a significant role in advancing sustainable development by contributing to economic growth, social empowerment, and community welfare. This study explores the impact of women-led enterprises on key Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 5 (Gender Equality), and SDG 8 (Decent Work and Economic Growth). Women entrepreneurs help reduce poverty by generating income and employment opportunities, while also promoting gender equality through increased participation and leadership in business. Their entrepreneurial activities encourage innovation, skill development, and inclusive growth. However, despite their positive impact, many women face challenges such as limited access to finance, inadequate training, and social barriers, which restrict their full contribution to sustainable development. This study aims to analyse both the contributions and challenges of women entrepreneurs, and to highlight the importance of supporting and empowering them to achieve the broader goals of the United Nations 2030 Agenda.

***Keywords**: Economic growth, Women Entrepreneur, Gender equality, challenges, Women empowerment.*

Introduction

Women entrepreneurship has emerged as a vital force in promoting inclusive and sustainable economic development across the world. In India, the increasing participation of women in entrepreneurial activities has significantly contributed to income generation, employment creation, and social empowerment. Women-led enterprises not only strengthen household livelihoods but also play an important role in addressing key development challenges such as poverty reduction, gender inequality, and decent work opportunities. Recognizing this potential, the United Nations has emphasized women entrepreneurship as a

critical driver for achieving the Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 5 (Gender Equality), and SDG 8 (Decent Work and Economic Growth). Despite notable progress, women entrepreneurs continue to face several constraints that limit their growth and sustainability. Limited access to finance, inadequate skill development, lack of formal training, and socio-cultural barriers remain persistent challenges. These constraints restrict women's ability to fully leverage entrepreneurial opportunities and maximize their contribution to sustainable development. Therefore, understanding both the contributions and challenges of women entrepreneurs is essential for designing effective policies and support mechanisms. This study seeks to examine the role of women-led enterprises in advancing selected SDGs, identify the key challenges they face, and suggest measures to strengthen their impact on sustainable development.

Review of Literature

Women entrepreneurship has been widely recognized as a significant contributor to long-term economic development. Studies indicate that women entrepreneurs play a vital role in employment generation, income enhancement, poverty reduction, and improvement of living standards. Women-owned enterprises are closely associated with Sustainable Development Goal (SDG) 1 (No Poverty) and SDG 8 (Decent Work and Economic Growth). Evidence also suggests improved household welfare and economic independence among women engaged in entrepreneurial activities. Institutional support and favorable government policies further strengthen enterprise performance, thereby promoting inclusive and sustainable economic growth (Kabeer, 2012).Several researchers have emphasized women entrepreneurship as an effective tool for promoting gender equality and women empowerment. Entrepreneurial participation enhances women's autonomy, self-confidence, and decision-making capacity, thereby reducing gender disparities in economic participation. A strong relationship has been established between women entrepreneurship and SDG 5 (Gender Equality). Education, skill development, and government initiatives are identified as critical enabling factors, while socio-cultural norms continue to pose challenges. Overall, women entrepreneurs act as role models and catalysts for social change (World Bank, 2020). Existing literature also highlights the various constraints faced by women entrepreneurs. Limited access to finance, inadequate training facilities, restricted market access, and socio-cultural barriers significantly hinder entrepreneurial development. Despite these challenges, women demonstrate strong motivation and resilience. Support networks, institutional mechanisms, and skill-oriented training programs are found to enhance confidence and business sustainability.

Addressing these barriers is essential for improving women's entrepreneurial outcomes and achieving SDG targets (Brush et al., 2019). The social contributions of women-led enterprises have also been extensively discussed. Women entrepreneurs contribute to community development, social inclusion, and equality. Many women-owned businesses prioritize ethical practices and social welfare objectives, thereby linking entrepreneurship with SDG 10 (Reduced Inequalities) and SDG 11 (Sustainable Cities and Communities). Grassroots innovation and responsible business practices further strengthen local economies and promote long-term social sustainability (UN Women, 2020). Policy frameworks play a crucial role in supporting the growth of women entrepreneurship. Government initiatives, financial assistance schemes, mentoring programs, and skill development initiatives significantly enhance entrepreneurial competence and business sustainability. Public–private partnerships further facilitate enterprise growth. Inclusive policy interventions are closely associated with progress toward achieving Sustainable Development Goals and strengthening the overall entrepreneurial ecosystem (UNDP, 2019).

Objectives

1. To examine how women-led businesses support SDG 1, SDG 5, and SDG 8.
2. To identify the challenges faced by women entrepreneurs.
3. To suggest measures to enhance the SDG impact of women entrepreneurs

Findings

- Women owned enterprises contribute to employment generation, employing about 13.5 million people in India, supporting SDG 1 and SDG 8.
- Women constitute nearly 14% of entrepreneurs in India, indicating growing financial independence and progress toward SDG 5.
- Nearly 90% of women entrepreneurs depend on informal sources of finance due to limited access to institutional credit.
- Only about 20–25% of women entrepreneurs receive formal training, reflecting socio-cultural and capacity-related barriers.
- Studies show that women entrepreneurs who undergo skill training report 30–40% improvement in business performance.
- Over 2 crore women-led MSMEs are registered under Udyam, highlighting the positive impact of government policies and support systems.

Conclusion

Women entrepreneurship plays a crucial role in advancing inclusive economic growth, employment generation, and gender equality in alignment with the Sustainable Development Goals. Despite measurable progress and supportive policy initiatives, persistent challenges related to finance access, skill development, and structural barriers underscore the need for sustained institutional support to strengthen women-led enterprises and ensure long-term sustainable development.

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Artisanal Enterprises as Catalysts of Green Capitalism: Re – imagining Rural Entrepreneurship for Local Sustainability and Regenerative Economies

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Abstract

In modern busy and over populated era, the rural and artisanal enterprises plays a vital role in Indian sustainable economic growth. It contributes to employment opportunity, production efficiency, effective utilization of resources, and builds social equity by irradiating traditional social barriers. This study explain how artisanal rural enterprises plays a role as strategical vehicles of green capitalism by including the ecological ethics, circular production practices, renewable resource utilization, cultural preservation and livelihood diversification. This research article try to study the role and importance of the rural artisanal enterprises within green capitalism, pattern of productivity, analyzing ecosystem enablers, and local sustainability outcomes. In this article we are using mixed method approach to study in-detail. Government statistical data, report of MSME is used along with these all-international data is used for facts and figures comparison. This study gives the highlight of employment generation, gender participation, digital adoption and environmental friendly practices in artisanal and rural enterprises. This study state that the Indian rural and artisanal enterprises promote local resource utilization, environmental friendly practices, local sustainability, and tries to resolve problems in productivity, infrastructure and financial aspect access. This study states how artisanal craft ecosystem contribute effectively to rural sustainability, women economic empowerment, regenerative resource use and effective local market connectivity.

***Keywords**: rural entrepreneurship, green capitalism, artisanal enterprises, India, sustainability, regenerative economy.*

Introduction

In 21st century there were many problems raised due to modernity like environmental degradation, unfavourable climate conditions, socioeconomic disparities and huge increase in pollution and population. In relation to this barrier economic growth also effected very badly. The employment generation, rural development and sustainable economic growth were the major issues need to be tackled for India's Economic Sustainability. These were strategically tackled by the artisanal enterprises by handicraft, handloom, khadi, sericulture and village industries. Artisanal enterprises also preserved and protected rich cultural heritage i.e our traditional values and practices. They brought ecological Sustainability and act as an agent of cultural preserver.

In developing economy like India, our rural and artisanal enterprises build grassroots level for green capitalism. Artisanal enterprises are based on locally available resources, rely on renewable energy sources and eco-friendly practices are embedded in it. They also preserve indigenous knowledge system and ancestral rich traditional practices too. Artisanal sector generate large portion of employment and livelihood in handloom, handicraft, pottery, metal crafts, and agro based industries. It also maintain low carbon footprints (UNESCO,2025). Rural and artisanal enterprise giving a pathway towards local sustainability and generative economic development.

The concept of green capitalism gives importance on the relationship of profit making with environment sustainability by integrating the circular economy principles, renewable resource usage, and regenerative practices (Geissdoer et al.,2017). Artisans use locally available resources, traditional low waste production technique and renewable energy sources. With all the potentiates the artisanl enterprises face many challenges like limited access to finance, credits, digital markets connectivity, modern infrastructure and institutional support, specifically for women entrepreneurs(ILO,2021;Deshpande and Sharma,2020).This paper try to study how Indian rural enterprises contribute to green capitalism, sustainable livelihood and regenerative economy by filling the gaps.

Conceptual Framework: Green Capitalism and Regenerative Rural Economies

Green Capitalism gives importance to the combination of market mechanisms with sustainability through Eco-Innovation, green finance and responsible consumption (Newell,2018). Regenerative economies further improves the idea by actively participating in

restoring the ecological systems and strengthening community flexibility (Raworth,2017). Artisanal enterprises relate naturally with green capitalism and regenerative rural economies principles through:

- More dependent on renewable resources.
- Minimization Wastage of resource and circular production.
- Transmission of skill and community-based ownership.
- Social inclusion and rich cultural continuity

Thus artisanal entrepreneurship serves as a micro level institutional framework. It support green capitalism and regenerative rural economies.

Research Objectives

1. To analyse the contribution of artisanal enterprises to environmentally sustainable practices and green capitalism.
2. To assess the role of artisanl enterprises in employment generation and women's economic empowerment.

Hypotheses

H01: Artisanal enterprises do not significantly contribute to environmental sustainability, and green capitalism.

H11: Artisanal enterprises significantly contribute to environmental sustainability, and green capitalism.

H02: Artisanal enterprises do not significantly contribute to employment generation and women empowerment.

H12: Artisanal enterprises significantly contribute to employment generation and women empowerment.

Review of Literature

Global Perspective On Green Capitalism:- Green Capitalism give importance to economic growth which is environmental sustainable and interrelate with utilization of renewable resources, circular production and social inclusive nature (Newell,2018). Rural enterprises which are particularly relate with artisanal enterprises are contributing globally by controlling poverty, preserving cultural richness, and management of environment (UNESCO,2019). For example, UNESCO’s study truly highlight the craft based rural

enterprises maintain biodiversity, preserve rich unique knowledge, and it also enhances rural flexibility. But the reports of ILO states about the artisanal sector improvement with women participation will show significance in household incomes, social mobility and gender equality (ILO,2021).

Indian Artisanal Enterprises Ecosystem:- India's rural artisanal sector has significant and impact full findings. Handicraft sector is providing employment for over 68 lakh artisans in which 56% consist of women. Handloom is having 35 lakh workers in which 72% are of women. Khadi production value increased from Rs.2324 crore in 2019-20 to Rs.2916 crore in the year 2022-23, the sales has been increased from Rs.4211 crore to Rs.5943 crore (Ministry of MSME,2024-25). In Sericulture more than 50% of workers are women. Even after all this significance by women participation still there is a huge gap in ownership. Only 22% of MSMEs are women owned (Economic Survey,2025).

Sustainability and Circular Practices:- Artisanal enterprises production are based on low carbon, low resource wastage and follow circular economy principles by making it regenerative in nature. They still follow rich traditional practices like handloom weaving, natural dyieng, and wood crafting by hand tools or tools which consume minimal energy and reduce wastage of resources which contribute to local ecological flexibility (Geissdoerfer.,2017: Deshpande & Sharma, 2020).

Employment Generation And Women Empowerment:- In rural and artisanal enterprises women participation and contribution are truly identical and highly impact full. Women contribution to economic independence and decision making within household are raising high. Pehchan Artisn ID registration shows 32 lakh artisans, in which 20 lakh women artisans are identical. It provides access to social security, digital platforms and financial inclusion (Ministry of MSME,2024-25).

Market Integration and Export Potential:- In the year 2024-25 our Indian handicrafts exports excluding carpets has reached Rs.33122 crore. It shows the demand for sustainable and culturally rich traditional crafts demand in global level. Rural income, brand value, cultural richness, traditional preserving and competitiveness has increased its combination with international value chains (Ministry of Textiles,2024).

Research Gap

On rural entrepreneurship, sustainability, and green capitalism many more literature exist but still several gap remains. The gap is related to Lack of empirical study linkage to artisanl enterprises with green capitalism principles, Limited understanding of women leadership, formalization and digital adoption in rural enterprises, Need for quantitative analysis on sustainability, production efficiency and market integration. This study try to fill the gaps by positioning artisanal enterprises as an important driver of green capitalism and regenerative rural economies in India.

Methodology

Research Design: Mixed method approach has been used. In Quantitative approach used analysis of Government and International datasets like MSME Annual Reports, Economic Survey, Ministry of Textiles, UNESCO, ILO. In Qualitative approach resarcher has used Literature Review on green capitalism, circular economy, and artisanal entrepreneurship.

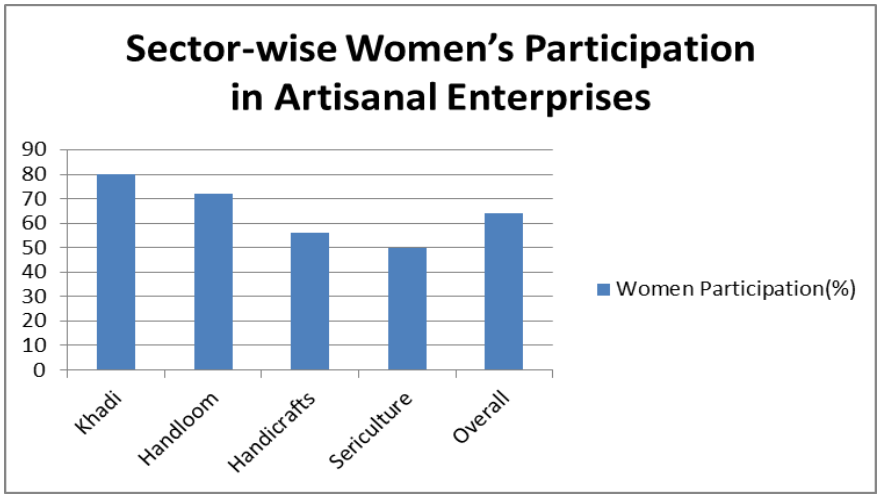
Data Sources: In this study we have used MSME Annual Report (2024-25), Economic Survey of India (2025), Ministry of Textiles (2024), UNESCO, ILO, World Bank (2020-2021).

Analytical Techniques: To analyse Employment, women participation, production, exports we used Descriptive Statistics. To know about production, sales, and export growth we have used comparative trend analysis. To understand about contribution o sustainability and empowerment the Hypothesis Testing has been used.

Results

1. Table showing Sector-wise Women's Participation in Artisanal Enterprises (in percentage)

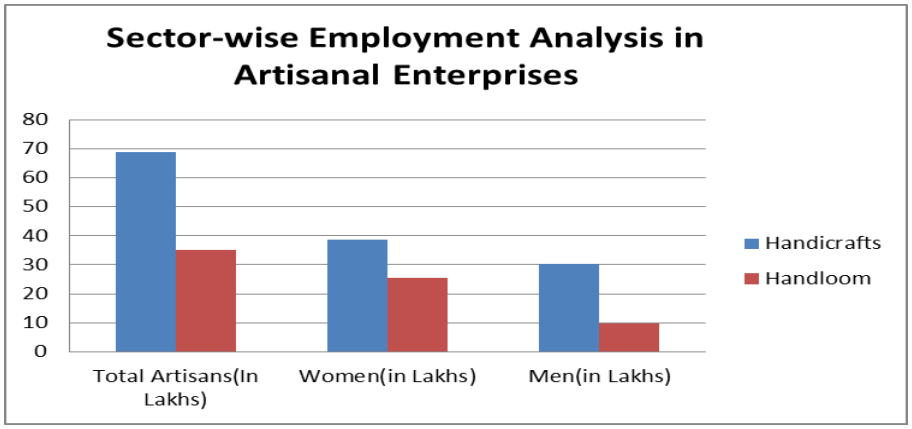
Sector	Women Participation	Source
Khadi	80	Economic Survey,2025
Handloom	72	Economic Survey,2025
Handicrafts	56.1	Ministry of Textiles,2024
Sericulture	50+	Economic Survey,2025
Overall	64	DD India,2025



Interpretation: Sector-wise Women's Participation percentage in Artisanal Enterprises table shows that women employment and empowerment gained a majority workforce opportunity in artisanal enterprises. It also shows the employment opportunity is provided majorly to rural artisans as majority of artisanal enterprise are rural based.

2. Table showing Sector-wise Employment Analysis in Artisanal Enterprises (in Lakhs)

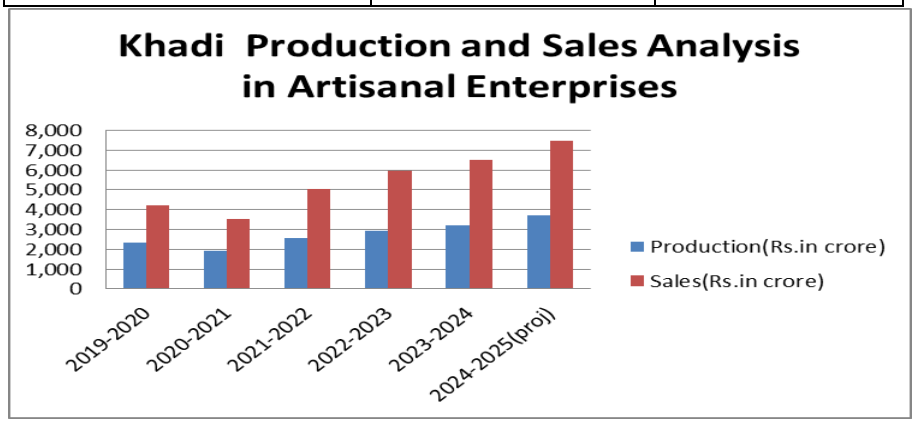
Sector	Total Artisans	Women	Men	Sources
Handicrafts	68.86	38.61	30.25	ResearchGate,2025
Handloom	35.22	25.46	9.76	IBEF,2025



Interpretation: Table showing sector-wise Employment Analysis in Artisanal Enterprises (in Lakhs) shows that the artisanal enterprises contribute Significant rural employment particularly for women. It shows confirmation of Artisanal enterprises significantly contribute to employment generation and women empowerment (H12).

3. Table showing Khadi Production and Sales Analysis in Artisanal Enterprises (Rs. in crore)

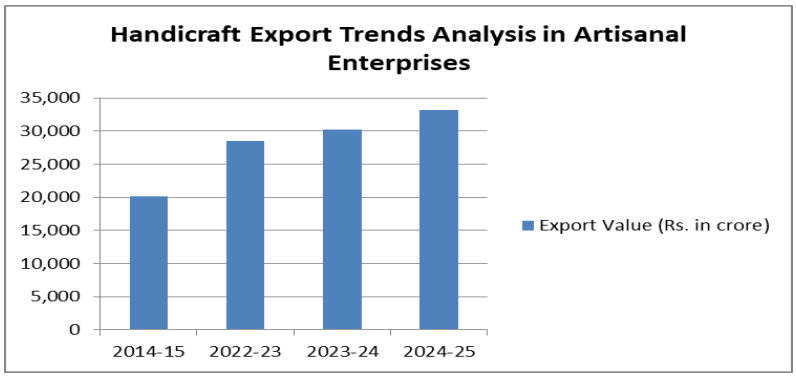
Year	Production	Sales
2019-2020	2,324	4,211
2020-2021	1,904	3,528
2021-2022	2,558	5,052
2022-2023	2,916	5,943
2023-2024	3,206	6,496
2024-2025(proj)	3,687	7,470



Interpretation: Khadi Production and Sales Analysis in Artisanal Enterprises (Rs. in crore) table shows the sustainable growth in production and sales. It supports Green Capitalism objectives. The table results shows positive relation with objective 1 i.e To analyse the contribution of artisanal enterprises to environmentally sustainable practices and green capitalism.

4. Table showing Handicraft Export Trends Analysis in Artisanal Enterprises (Rs. in crore)

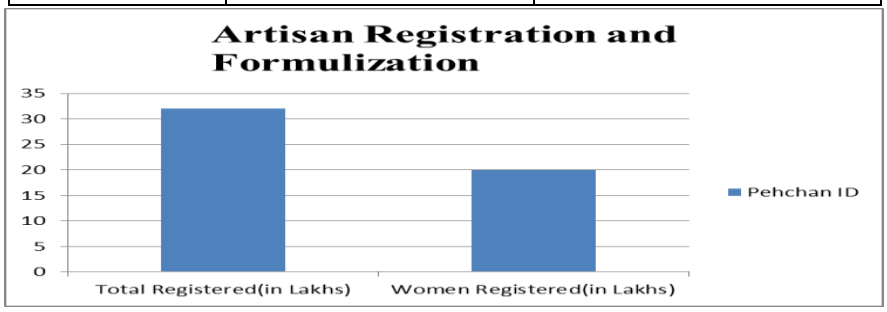
Year	Export Value
2014-15	20,083
2022-23	28,450
2023-24	30,218
2024-25	33,122



Interpretation: Handicraft Export Trends Analysis in Artisanal Enterprises (Rs. in crore) table shows the handicraft export growth in increasing order year by year. It highlights the global market acceptance of sustainable artisanal goods.

5. Table showing Artisan Registration and Formulization (in Lakhs)

Program	Total Registered	Women Registered
Pehchan ID	32	20



Interpretation: Artisan Registration and Formulization (in Lakhs) table shows the majority of registration comprise of women. Formulization enriches the digital access, market participation and social security by promoting sustainable livelihood.

Discussion

- **Green Capitalism:** While incorporating green capitalism artisanal enterprises do think of low wastage of resources, effective usage of materials, efficient production which improves ecological sustainability.
- **Employment & Women Empowerment:** After studying the available academic data, it shows the result that women participation is more and they support for the financial inclusion and rural flexibility.
- **Market Integration:** The study shows that there is a increase in exports and sales of artisanal products. It states that there is a successful connection to global and domestic markets.

- **Digital Formalization:** The digital formalization leads to registration of various digital programs. The programs strengthen the Skills, Market access and socioeconomic security.

Policy Implications

Based on the findings the following policy implications has been identified for strengthening the artisanal enterprises for sustainable future.

- Increase the number and expand the **Digital Platforms** for artisan markets.
- Build and enhance f**inancial access and micro credit schemes** for women entrepreneurs.
- Support **eco-friendly production and circular economy training.**
- Provide incentives for **export and local market integration** for artisanal products.

Future Scope

Future research work can focus on primary data based empirical studies of artisanal clusters and even can study international comparisons of artisanal green enterprises. Further can study quantitative impact assessments of digital platforms and can know the role of green finance and ESG frameworks in scaling artisanal entrepreneurship. further study can be based on comparative study between industrial and artisanal production sustainability.

Conclusion

Artisanal enterprises is a key driving force in advancing green capitalism by including eco-friendly economic activity and social inclusion. In India by using locally sourced eco-friendly materials and process, building employment generation, empowering women, rural employment generation, eradicating social barriers, and by social inclusion rural and artisanal enterprises contribute to sustainable rural development. To support artisanal entrepreneurship some supportive policies and institutional collaboration need to be framed. Artisanal enterprises promote social inclusion, women empowerment, locally available resource utilization, and enriches culture and preserve tradition. By proper relative policies, these enterprises strengthen regenerative rural economies. It support inclusive and environmentally responsible growth. By integrating the economic, ecological and social dimensions artisanal enterprises improvise regenerative rural economies. It also contributes to **Sustainable Development Goals, green capitalism and inclusive rural growth.**

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A Study on the Level of Satisfaction of Women Entrepreneurs with Entrepreneurial Support Systems

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Abstract

This study examines how satisfied women entrepreneurs are with the support systems available to them, including financial institutions, government schemes, training, and mentoring support. To study the level of satisfaction of women entrepreneurs with major entrepreneurial facilities.120 women entrepreneurs were selected through purposive sampling. Data were collected using a structured questionnaire with a five-point Likert scale (Highly Satisfied to Highly Dissatisfied) covering areas like finance, government support, training, marketing, family support, income, work–life balance, decision-making, and social recognition. The study reveals that most women entrepreneurs are moderately satisfied with the existing entrepreneurial support systems, particularly government schemes and training programmes, while limited access to finance, inadequate mentoring, and procedural complexities reduce overall satisfaction and hinder business growth. Enhance capacity-building and mentoring support. Skill-based training and structured mentoring should be strengthened to help women entrepreneurs overcome challenges and achieve sustainable growth. Women entrepreneurs show a moderate level of satisfaction with existing entrepreneurial support systems, indicating usefulness but also gaps in accessibility and effectiveness.

***Keywords**: Government Support Schemes, Economic Development, Self-Help Groups, Women Entrepreneurship*

Introduction

Entrepreneurship has emerged as a powerful engine of economic growth, innovation, and social development worldwide. In recent decades, women's entrepreneurship has gained significant importance as women increasingly participate in business activities, contributing to

household income, employment generation, and community development. Encouraging women to become entrepreneurs not only supports economic progress but also promotes gender equality, empowerment, and social transformation**.** In India, women entrepreneurs have gradually expanded their presence in various sectors, including manufacturing, retail, services, food processing, tailoring, and handicrafts. Government schemes like MSME support programmes, SHGs, microfinance initiatives, and entrepreneurship development programmes have further contributed to this growth. However, despite notable progress, women continue to face challenges related to finance, mobility, family responsibilities, marketing, and socio-cultural expectations.

Kanyakumari District, located at the southernmost tip of Tamil Nadu, is known for its high literacy rate, diverse economic activities, and increasing participation of women in both formal and informal business sectors. Women in the district are engaged in small-scale industries, cottage enterprises, and service-oriented ventures. The district's socio-cultural environment, availability of SHG networks, and access to microfinance institutions have supported many women in starting businesses. Yet, several constraints, such as limited capital, inadequate training, stiff competition, lack of market exposure, and traditional gender roles, continue to affect their entrepreneurial growth. Understanding the conditions, motivations, opportunities, and challenges of women entrepreneurs in Kanyakumari District is essential for strengthening their contribution to local economic development. A detailed study can provide valuable insights into how women's entrepreneurship can be further promoted and identify the necessary policy interventions to create a supportive ecosystem. Thus, this study focuses on examining the status, determinants, challenges, and prospects of women entrepreneurship in Kanyakumari District, offering a foundation for future initiatives aimed at empowering women and boosting regional development

Review of Literature

- Singh & Sharma (2016). They found that education, family support, and motivation strongly influence women to start small businesses and stressed the need for better training and financial access.
- Desai (2017). This study reported that lack of capital, limited marketing, and social barriers restrict women entrepreneurs, and highlighted the importance of government support schemes.

- Priya & Chandran (2018). They observed that SHG training improves women's financial skills and confidence, and concluded that continuous skill development is essential for business success.
- Kannan & Lakshmi (2019). The authors noted that digital tools and social media help women reach wider markets, but many still lack the technical skills needed for effective online business.
- Tamil Nadu SIDCO Report (2020). The report showed growth in women-owned MSMEs in Kanyakumari, especially in retail, food processing, tailoring, and handicrafts, but identified credit and machinery access as major issues.

Statement of Problem

Women entrepreneurship has emerged as a significant driver of economic development, employment generation, and women empowerment in India. In Kanniyakumari District, women entrepreneurs contribute to the local economy through innovative ventures and small businesses. Despite the availability of financial schemes, government support, training programs, and marketing facilities, the satisfaction levels of women entrepreneurs regarding these support systems and socio-personal factors remain varied.

Understanding women entrepreneurs' satisfaction is critical, as it influences enterprise performance, sustainability, and growth. Existing studies have highlighted challenges such as limited access to finance, inadequate training, and societal constraints, yet there is a lack of empirical evidence specific to Kanniyakumari District. This study aims to fill this gap by examining the level of satisfaction of women entrepreneurs with entrepreneurial facilities, family support, work–life balance, decision-making power, and social recognition, and by ranking the factors affecting their overall satisfaction. The findings are expected to provide valuable insights for policymakers, institutions, and stakeholders to enhance support mechanisms and promote sustainable women entrepreneurship in the region.

Objectives of Study

- To study the level of satisfaction of women entrepreneurs with major entrepreneurial facilities.
- To examine the satisfaction of women entrepreneurs with personal and social factors.
- To rank the factors influencing women entrepreneurs' satisfaction using the weighted mean method.

Research Methodology

The study uses a descriptive research design to examine the satisfaction of women entrepreneurs in Kanniyakumari District. 120 women entrepreneurs were selected through purposive sampling. Data were collected using a structured questionnaire with a five-point Likert scale (Highly Satisfied to Highly Dissatisfied) covering areas like finance, government support, training, marketing, family support, income, work–life balance, decision-making, and social recognition. The responses were analysed using weighted mean scores and ranking to find the most and least satisfying factors, helping to understand how support systems and personal factors influence women entrepreneurs.

Mode of Data Collection

- **Structured Questionnaire:**

  Primary data was collected through a questionnaire with simple closed and open questions to understand the background, motivation, finance, training, and problems of women entrepreneurs.

- **Personal Interviews:**

  Face-to-face interviews were conducted with selected women entrepreneurs to get clear and detailed information and to understand their experiences better.

- **Observation Method:**

  The researcher visited business places to observe the working conditions, production activities, and customer dealings to confirm the information given by respondents.

- **Secondary Data from Published Sources:**

  Information was collected from books, journals, research papers, government reports, and earlier studies related to women's entrepreneurship.

- **Online and Institutional Records:**

  Additional data was gathered from official websites, NGO reports, and statistical records to understand entrepreneurship trends and women’s economic activities in the district.

Limitations of the Study

- The study is limited to women entrepreneurs in the Kaniyakumari district only.
- Responses may sometimes be influenced by personal bias or reluctance to share financial information.
- Time and resource constraints restrict the sample size.
- The findings may not be generalizable to medium or large-scale enterprises.

Data Analysis and Interpretation

This section presents the analysis of the primary data collected from women entrepreneurs in **Kaniyakumari District**. For illustration, the sample size is assumed to be **120 respondents**. The data has been analysed using percentages and simple statistical methods to understand the socio-economic characteristics, motivations, challenges, and performance of women entrepreneurs in the district.

Democratic Profile

Variable	Category	Frequency	Percentage
Age	Below 25	10	**8%**
	25-35	42	**35%**
	35-40	48	**40%**
Gender	Male	90	**90%**
	Female	10	**10%**
Source of finance	Self finance	40	**33%**
	Bank loans	20	**17%**
	SHG/Microfinance	50	**42%**
Educational level	Graduation	22	**18%**
	Post-graduation	8	**7%**
	Higher secondary	32	**27%**
Overall Business Performance	High satisfactory	18	**15%**
	satisfactory	60	**50%**
	average	30	**25%**
	un satisfactory	12	**10%**
Types of business	Manufacturing	30	**30%**
	Trading	50	**25%**
	Service	**15**	**15%**
	Others	**25**	**25%**

Source: primary data

The table presents the demographic and business profile of the respondents. It shows that most of the respondents belong to the age group of 35–40 years (40%), followed by 25–35 years (35%), indicating that middle-aged individuals are more actively involved in business. A large majority of the respondents are male (90%), while female participation is limited (10%). With regard to the source of finance, SHG/microfinance is the major source (42%), followed by self-finance (33%), showing reliance on informal and self-generated funds. In terms of educational level, most respondents have completed higher secondary education (27%), followed by graduation (18%), whereas post-graduates form a smaller proportion (7%). Concerning overall business performance, half of the respondents (50%) report satisfactory performance, while 25% rate it as average, indicating moderate success. Regarding the type of business, trading activities dominate, followed by manufacturing and other businesses, while service enterprises account for a smaller share. Overall, the data reflect a predominance of middle-aged male entrepreneurs engaged mainly in trading activities with moderate business performance.

Respondents' Level of Satisfaction with Women Entrepreneurship

S.NO	REASONS	HS (5)	SA (4)	NE (3)	DSA (2)	HDSA (1)	TOTAL	MEAN SCORE	RANK
1	**Satisfaction with Access to Finance**	**40** (200)	**10** (40)	**30** (90)	**20** (40)	**20** (20)	**120**	**3.25**	**7**
2	**Satisfaction with Government Support**	**80** (400)	**10** (40)	**10** (30)	**10** (20)	**10** (10)	**120**	**4.16**	**1**
3	**Satisfaction with Training program**	**30** (150)	**30** (120)	**30** (90)	**20** (40)	**10** (10)	**120**	**3.41**	**5**
4	**Satisfaction with Marketing Facilities**	**20** (100)	**25** (100)	**25** (75)	**25** (50)	**25** (25)	**120**	**2.91**	**8**
5	**Satisfaction with Family Support**	**40** (200)	**20** (80)	**20** (60)	**20** (40)	**20** (20)	**120**	**3.33**	**6**

6	**Satisfaction with Income Generation**	**35** (175)	**35** (140)	**20** (60)	**5** (10)	**5** (5)	**120**	**3.25**	**7**
7	**Satisfaction with Work–Life Balance**	**15** (75)	**15** (60)	**15** (45)	**15** (30)	**60** (60)	**120**	**2.25**	**9**
8	**Satisfaction with Decision-Making Power**	**50** (250)	**20** (80)	**15** (45)	**15** (30)	**20** (20)	**120**	**3.54**	**4**
9	**Satisfaction with Social Recognition**	**45** (225)	**45** (180)	**10** (30)	**10** (20)	**10** (10)	**120**	**3.87**	**3**
10	**Overall Satisfaction with Women Entrepreneurship**	**70** (350)	**15** (60)	**15** (45)	**10** (20)	**10** (10)	**120**	**4.04**	**2**

The highest mean score (4.16) was recorded for **Satisfaction with Government Support**, indicating that respondents are highly satisfied with government schemes, subsidies, and support programs available for women entrepreneurs in Kaniyakumari district. This shows the positive role of policy initiatives in promoting women-led enterprises. The second rank was secured by **Overall Satisfaction with Women Entrepreneurship** with a mean score of 4.04, reflecting that most respondents feel confident, empowered, and content with their entrepreneurial journey. The third rank was **Satisfaction with Social Recognition** (mean score 3.87), suggesting that women entrepreneurs enjoy improved respect, status, and recognition in society due to their business involvement.

Suggestions

- Provide easy bank loans so women can start and grow their businesses without financial difficulty.
- Give more training programs to help women improve their skills in business and management.
- Create better marketing support so women can sell their products in more places, including online.

- Increase awareness about government schemes that offer financial help and benefits to women entrepreneurs.
- Encourage family and community support to help women manage both business and household responsibilities.

Conclusion

The study on women entrepreneurship in Kaniyakumari District concludes that women entrepreneurs play a significant role in economic development and self-employment generation. The findings reveal that women are actively involved in small-scale and micro enterprises, supported by government schemes, training programs, and family encouragement. However, they still face challenges such as limited access to finance, marketing difficulties, work–life balance issues, and lack of technological skills. Despite these problems, the level of satisfaction regarding government support, social recognition, and decision-making power is relatively high. The study highlights the need for improved financial assistance, effective training, better awareness of schemes, and marketing support to strengthen women entrepreneurship. Overall, with proper support and policy initiatives, women entrepreneurs in Kaniyakumari District can achieve sustainable growth and contribute more effectively to regional development.

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An Analytical Study on the performance of Women Entrepreneurs in the Service Sector

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Abstract

Women entrepreneurs represent a pivotal force in the economic advancement of any nation. In recent decades, the expansion of women - led entrepreneurial ventures has exhibited a steady and noteworthy increase, highlighting their indispensable role in contemporary economic systems. emerging trends demonstrate that women entrepreneurs are progressively diversifying into multiple sectors and contributing significantly to each domain. Women entrepreneurs are increasingly entering diverse fields and demonstrating notable success across sectors. For the purpose of this study, several key areas have been identified for investigation, including food and beverage, education, personal and social services, healthcare, information technology, and consultancy services. These sectors represent particularly significant domains in which women entrepreneurs contribute meaningfully. This study seeks to analyse the performance of women entrepreneurs within these sectors and to present systematic findings and recommendations addressing the challenges encountered in these fields. This study aims to provide a comprehensive examination of the conceptual framework, importance, and challenges of women entrepreneurship. It further evaluates the performance of women entrepreneurs in the service sector through systematic analysis and interpretation, culminating in evidence - based findings and strategic recommendations.

Service Sector

The service sector refers to the part of the economy that provides services instead of producing physical goods. It focuses on activities that meet people's needs through intangible outputs, such as skills, expertise, care, or support.

Simple Definition

The service sector includes businesses and organizations that offer services to individuals or other businesses, rather than manufacturing or selling tangible products.

Objectives

1. To examine the types of women entrepreneurs.
2. To identify the challenges faced by women entrepreneurs.
3. To study government support schemes for women entrepreneurs.
4. To analyze the performance of women entrepreneurs in the service sector.

Review of Literature

The role of women entrepreneurs has gained increasing attention in academic research due to their growing contribution to economic development, employment generation, and innovation, particularly in the service sector. Several studies have examined the challenges, performance determinants, and support mechanisms influencing women-led enterprises.

Hunt and Fielden (2016) emphasized the importance of entrepreneurial coaching as a strategic tool for enhancing the growth and sustainability of women-owned businesses. Their study highlighted that women entrepreneurs face unique psychological, social, and structural barriers, and structured coaching interventions significantly improve confidence, decision-making ability, and business performance.

Maity and Sahu (2021) conducted an empirical study on women entrepreneurs in India and identified key determinants influencing their business success. The findings revealed that most women entrepreneurs operate small-scale enterprises, predominantly in the service sector, due to lower capital requirements and flexible working conditions. The study also noted that access to finance, family support, education, and institutional assistance play a crucial role in determining entrepreneurial performance.

Sengupta, Datta, and Mondal (2013) analyzed female entrepreneurship in the Indian informal service sector using Leibenstein's approach and National Sample Survey Organisation (NSSO) data. Their research highlighted significant performance disparities caused by limited resources, informal operational structures, and restricted access to markets and credit facilities. The study concluded that despite these constraints, women entrepreneurs contribute substantially to the informal service economy.

Jha and Makkad (2018) developed a performance-oriented measurement scale for women entrepreneurs by identifying key dimensions such as motivation, networking ability, financial management, and managerial competence. Their study provided a valuable framework for evaluating entrepreneurial performance, especially in service-based enterprises where qualitative factors strongly influence outcomes.

Research Methodology

In this study, data from books is collected and examined. Public and private publications about women's entrepreneurship in national and international magazines, websites, and articles

Types of Women Entrepreneur

Women entrepreneurs are classified into various sorts, each with their own set of features, motives, and business models. The differences between these types are frequently impacted by their goals, industries, and methods to entrepreneurship.

Innovators

Innovators are female entrepreneurs that develop new products, services, or business methods that either disrupt or create new markets. They are risk takers who value innovation and originality. Their primary distinguishing feature is their ability to recognise market gaps and create unique solutions.

Social Entrepreneurs

Social entrepreneurs are women who apply entrepreneurial concepts to solve social, cultural, or environmental problems. Their major purpose is to effect positive change and leave a lasting impression on society. They blend business acumen, a strong sense of social responsibility, and a desire to discover long-term solutions to society challenges.

Serial Entrepreneurs

Serial entrepreneurs are women who have established and successfully managed many enterprises in succession or concurrently. They have a unique ability to spot opportunities, carry out company strategies, and negotiate the complexities of entrepreneurship. Serial entrepreneurs are motivated by a passion for entrepreneurship, as well as a desire for ongoing growth and new challenges.

Small Business Owners

Small business entrepreneurs are women who own and run their own businesses with a small number of workers and a local market presence. They are typically motivated by a desire for independence, flexibility, and the freedom to pursue their interests. Small company operators make substantial contributions to local economies and communities.

Freelancers

Free lancers are female entrepreneurs who provide their skills and services on a project-by-project basis or under short-term contracts. They are self-employed professionals who can choose their clientele and projects. Many freelancers are motivated by a desire for autonomy, work-life balance, and the freedom to follow their hobbies.

E-commerce Entrepreneurs

E-commerce entrepreneurs are women who use digital platforms and online marketplaces to acquire and sell goods and services. They leverage the internet's global reach and convenience to create and grow their enterprises. E-commerce firms frequently want to expand into new areas, cut administrative expenses, and provide customers with a flawless online buying experience.

Franchise Owners

Franchise owners are female entrepreneurs who own and operate a franchised business model. They gain from an established brand, proven business methods, and continued assistance from the franchisor. Franchise owners are frequently motivated by a desire for a low-risk entrepreneurial opportunity with the potential for scalability and expansion.

Home Business Owners

Home-based company owners are female entrepreneurs who run their companies from their homes or remote areas. They frequently use technology and internet platforms to communicate with customers and manage their operations. Home-based business entrepreneurs are typically motivated by a desire for work-life balance, flexibility, and the ability to pursue their entrepreneurial goals while juggling personal or family obligations.

Lifestyle Entrepreneurs

Lifestyle entrepreneurs are women who prioritise their chosen lifestyle by establishing enterprises that reflect their personal beliefs, interests, and work-life balance goals. They are frequently motivated by a desire for freedom, flexibility, and the opportunity to follow their passions while earning money. Lifestyle entrepreneurs may forego rapid development or high profits in order to achieve a more fulfilling and sustainable work-life balance.

Corporate Woman Entrepreneurs (Intrapreneurs)

Corporate women entrepreneurs, also known as intrapreneurs, demonstrate entrepreneurial skills and practices within an established organisation. They are creative and proactive in developing and exploring new business possibilities, products, or services within the corporate framework. Intrapreneurs are frequently motivated by a desire for professional development, creativity, and the chance to have a substantial effect on their organisations.

Women Entrepreneurs in India Face the Following Problems

1. Limited Finance Availability

Even when women have equal qualifications and business plans, they are less likely to acquire finance. One of the major reasons for this is the mistaken belief that women are less successful in business due to gender bias.

2. Gender BIAS

This is a common issue for female entrepreneurs. They frequently experience gender bias in their business endeavours, which can appear in a variety of ways. Being regarded less seriously than their male colleagues, being excluded from networking opportunities, or being discriminated against when applying for loans or scholarships are just a few of the many ways that women do not receive the attention they deserve.

3. Balancing Work and Family Life

The term "work-life balance" is commonly used today. Though some argue that it has the same impact on both genders, juggling work and family commitments is more difficult for female entrepreneurs. Things are especially difficult when they are establishing or building a business because they may have to work long hours and make sacrifices in their personal lives.

4. Lack of Role Models

Women entrepreneurs have fewer role models compared to men. And if we don't have someone to look up to, things can be difficult to achieve. This is the major reason why, despite their brilliance, women struggle to see themselves as successful business owners.

5. Cultural and Social Norms

In some societies, women are expected to stay home and care for their families. However, it is challenging for aspirational women to meet these standards when starting or growing a business. As a result, some women embarking on an entrepreneurial journey may encounter hostility from their families or communities. Also Read: Startup Funding

6. Lack of Education and Training

Women entrepreneurs are less likely than men to have the essential education and training to start and grow a firm. As a result, they enter the market with below-average skills and struggle to obtain funds, create a company plan, and manage their finances.

7. Strong Competition

The business world is growing more competitive, and female entrepreneurs frequently compete with their male colleagues. It makes it more difficult for them to leave an impression.

8. Unfavourable Business Environment

In some nations, the business environment is unfavourable for women entrepreneurs. Lack of access to market opportunities, gender bias, discrimination, and corruption make it difficult for women to thrive.

9. Fear of Failure

Women entrepreneurs are more likely than men to fear failure, which can hinder their ability to take risks and start or grow a business.

10. Self-Doubt

Women entrepreneurs are more likely than men to experience self-doubt, which can make it difficult for them to believe in themselves and their ability to succeed. Despite these challenges, many women entrepreneurs succeed.

Key government Schemes for Women Entrepreneurs in India.

1. Stand-Up India Initiative: Empowering Women with Big Dreams

The Stand-Up India Scheme is a major program that promotes entrepreneurship among women and marginalised communities. It was founded by the Indian government and focusses on giving women-specific business loans to help establish greenfield firms in manufacturing, services, or commerce. This program is an excellent chance if you want to start something fresh but don't want to put up a lot of collateral. This initiative allows women to obtain loans ranging from Rs. 10 lakh to Rs. 1 crore. What sets it apart is the emphasis on loans without collateral for women for up to 85% of the project cost, with the remainder covered by a guarantee from the Credit Guarantee Fund Scheme. The initiative is implemented through banks such as SBI and other financial institutions, ensuring nationwide accessibility.

2. Mudra Yojana for Women: Small Loans, Big Impact

The Mudra Yojana for Ladies, part of the Pradhan Mantri Mudra Yojana (PMMY), is intended for micro and small businesses, with a special emphasis on women. If you own or plan to start a small business, such as tailoring, food stalls, or handicrafts, this project provides government business support for women through loans of up to Rs. 10 lakh. It is classified as Shishu, Kishor, or Tarun loans dependent on the stage of your business. What distinguishes this is the absence of a collateral requirement, resulting in a real collateral-free loan for women. Interest rates are also subsidised, so you're not burdened with large repayments.

3. PMEGP for Women: Subsidies for Sustainable Growth

The Prime Minister's Employment Generation Programme (PMEGP for Women) is another effective element in women's business subsidies schemes. It is managed by the Khadi and Village Industries Commission (KVIC) and provides credit subsidies to new microenterprises in non-farm sectors. Women entrepreneurs receive a larger subsidy rate (25-35% of project cost) than others, making it a popular alternative for rural and urban business start-ups.

This program is appropriate for manufacturing or service-based enterprises such as handicrafts or food production. It combines financial aid with MSME support for women to ensure you have both capital and coaching.

4. Startup India Women Initiative: Sparking Innovation

The Startup India Women Initiative is part of the larger Startup India program and focusses on creative female-led businesses. If you have a distinctive idea—say, a software app

or an eco-friendly product—this initiative provides India startup grants 2025, as well as coaching and incubation help. It's more than simply cash; it's about connecting through startup India women initiative events and workshops. Women-led businesses can take advantage of tax breaks, funding opportunities, and access to government contracts. This is ideal for urban entrepreneurs seeking to scale in competitive marketplaces.

5. NABARD Loan for Ladies: Empowering Rural Women

The National Bank for Agriculture and Rural Development (NABARD Loan for Ladies) focusses on rural women's business projects, assisting with agricultural and related enterprises. If you live in a village or small town and want to start a dairy farm, a poultry unit, or organic farming, this program offers subsidised loans and incentives to women-led companies through regional rural banks. NABARD also provides self-help groups (SHGs) with business support, including training and market connections, in addition to cash assistance. It's a comprehensive strategy to empowering rural women.

Women entrepreneurs in the service sector

A woman entrepreneur in the service sector refers to a woman who owns, manages, and operates a business that provides services rather than producing physical goods. These entrepreneurs identify business opportunities, organize resources, take financial risks, and deliver services to customers for profit and social value.

Women entrepreneurs in the service sector are women who initiate, own, and manage service-oriented enterprises such as education, healthcare, hospitality, consultancy, and personal services.

Examples of Service Sector Businesses Run by Women

- Education and training centers
- Healthcare services (clinics, nursing care, wellness centers)
- Beauty parlours and salons
- Catering, food services, and hospitality
- IT and consultancy services
- Travel and tourism services
- Personal and social services

Key Characteristics

- Focus on intangible services rather than tangible products
- Require skills, knowledge, and customer interaction
- Generate employment opportunities, especially for other women
- Contribute to economic growth and social development

Conclusion

Women entrepreneurs—the word is now more empowered, stronger than before, and more recognizable to us. However, this word encompasses the strengths, sacrifices, challenges, and barriers faced by female entrepreneurs. Women entrepreneurs have numerous challenges, but with the assistance of the government, society, and family, they may overcome these obstacles and achieve their objectives. In this analytical study, we looked at women's entrepreneurial performance in the service industry. After conducting the investigation, we discovered that with the right support and training, any woman entrepreneur may succeed in any industry. The study reveals that women entrepreneurs are making a remarkable contribution to the service sector, especially in Food & Beverage and Education. Enhancing their participation in professional and technology-based fields will not only empower women but also contribute significantly to economic development and innovation in the country

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Innovating for Impact: Women Entrepreneurs and Their Contribution to the SDGs

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Abstract

Women entrepreneurs are emerging as critical drivers of inclusive economic growth, innovation, and sustainable development at global and national levels. Their participation in entrepreneurial activities directly influences multiple Sustainable Development Goals (SDGs), especially those related to poverty eradication, gender equality, decent work, innovation, reduced inequalities, and economic empowerment. Despite increasing recognition of their contributions, structural barriers such as restrictive social norms, financial exclusion, digital inequalities, and inadequate policy support continue to inhibit their full potential. This paper presents a comprehensive analysis of the impact of women entrepreneurship on SDG achievement, drawing evidence from global trends and India-specific developments. Using a descriptive research design and secondary data from global agencies, academic literature, and policy documents, the study explores how women entrepreneurs contribute to key SDGs while identifying the constraints that limit their effectiveness. The findings suggest that women-led enterprises significantly influence SDGs 1, 4, 5, 8, 9, and 10 by generating livelihoods, fostering innovation, enhancing gender equality, and promoting inclusive development. Nevertheless, women's entrepreneurial opportunities remain underutilized due to systemic barriers. The paper concludes with strategic recommendations aimed at strengthening women's entrepreneurship ecosystems to accelerate progress toward sustainable and inclusive development.

***Keywords**: Financial Inclusion, Gender Equality, Inclusive Growth, Innovation, Sustainable Development Goals, Women Entrepreneurship*

Introduction

Women entrepreneurship has gained global significance due to its role in promoting economic growth, social development, and sustainability. Women today participate actively in

entrepreneurial activities ranging from small rural enterprises to innovative urban startups. Their involvement not only creates income opportunities but also improves household welfare, strengthens community networks, and encourages social change. Women entrepreneurs contribute to employment generation, innovation, and inclusive growth, while also supporting education, health, and environmental sustainability. By reinvesting a large share of their earnings in families and communities, women entrepreneurs create a positive multiplier effect that supports long-term development.

Women-led enterprises play an important role in achieving the United Nations Sustainable Development Goals (SDGs), particularly those related to poverty reduction, gender equality, decent work, innovation, and reduced inequalities. Despite these contributions, women entrepreneurs continue to face significant challenges. Their participation in entrepreneurship remains lower than men due to structural and systemic barriers such as limited access to finance, lack of asset ownership, gender bias, and inadequate technological and managerial skills. Most women-owned enterprises are concentrated in low-profit sectors with limited growth potential. Although several policy initiatives exist, socio-cultural constraints and weak support systems restrict women's entrepreneurial progress. Therefore, it is essential to examine these challenges and assess the role of women entrepreneurship in achieving sustainable development goals.

Scope of the Study

The study examines the socio-economic contributions of women entrepreneurs globally and in India, analyzes their role in selected SDGs, identifies key challenges, and proposes policy and strategic measures using secondary data from reliable scholarly sources.

Objectives of the Study

1. To examine the impact of women entrepreneurship on Sustainable Development Goals
2. To identify the socio-economic contributions of women-led enterprises
3. To analyze the challenges faced by women entrepreneurs in global and Indian contexts
4. To study the alignment between women entrepreneurship and selected SDGs
5. To suggest measures for strengthening women's entrepreneurial ecosystems

Review of Literature

Several studies emphasize the importance of women entrepreneurship in economic and social development. Brush, Greene, and Welter (2019) noted its global expansion and role in innovation and inclusive growth. Kabeer (2005) highlighted links between women's economic empowerment and decision-making autonomy. Gupta and Sharma (2021) and Singh and Mishra (2020) found that women-led enterprises support sustainable development and innovation-related SDGs. However, OECD (2019), UN Women (2020), and ILO (2021) identified financial discrimination, socio-cultural norms, and digital inequality as major barriers. World Bank (2020), WEF (2021), and GEM (2020) stressed the need for supportive institutions. Other studies confirm women entrepreneurship's role in inclusive and sustainable development. Overall, the literature confirms that women entrepreneurship is a powerful tool for achieving sustainable and inclusive development, despite persistent challenges.

Although earlier studies recognize women entrepreneurship's role and challenges, they lack an integrated SDG-focused framework. This article fills the gap by holistically linking entrepreneurial inputs, outcomes, constraints, and SDG impacts, combining global and Indian perspectives to provide a policy-oriented model for strengthening women entrepreneurship and sustainable development.

Research Methodology

Research Design

The study adopts a **descriptive and qualitative research design**, relying on secondary data to analyze the interrelationship between women entrepreneurship and Sustainable Development Goals (SDGs).

Sources of Data

Secondary data were collected from:

- Academic journals and scholarly articles
- Reports from UN Women, UNDP, World Bank, ILO, OECD, GEM
- Government publications and policy documents
- Books and conference proceedings

Method of Analysis

- **Content Analysis** to extract recurring themes
- **Thematic Categorization** to classify contributions and challenges
- **Comparative Analysis** of global and Indian perspectives

The conceptual model explains that women entrepreneurship drives sustainable development through skills, finance, technology, and institutional support, leading to income generation, employment, innovation, and social responsibility. These outcomes promote women empowerment, community development, and inclusive growth, contributing to key SDGs, while socio-cultural, financial, digital, and policy constraints moderate this impact.

Significance of the Conceptual Model

- Demonstrates the **direct and indirect pathways** through which women entrepreneurship influences SDG achievement
- Highlights **barriers as moderating variables**, explaining uneven outcomes.
- Provides a **policy-oriented framework** for strengthening women's entrepreneurial ecosystems.

Findings

The study reveals that women entrepreneurship plays a significant role in promoting sustainable development and achieving various Sustainable Development Goals (SDGs). Women-led enterprises contribute not only to economic growth but also to social transformation, community welfare, and inclusive development.

Women entrepreneurs contribute strongly to **poverty reduction (SDG 1)** by generating income and improving household economic security. In India, women-led Self-Help Groups (SHGs) support rural and low-income women through micro-enterprises in agriculture, dairy, handicrafts, textiles, food processing, and retail. These activities provide sustainable livelihoods and reduce economic vulnerability. Women also reinvest a large share of their income in family welfare, particularly education, healthcare, and nutrition, creating a positive multiplier effect.

- In terms of **gender equality (SDG 5)**, entrepreneurship enhances women's financial independence, decision-making power, and social status. Women entrepreneurs challenge traditional gender norms and serve as role models, encouraging greater participation of women in economic and social activities.

- Women entrepreneurship also supports **decent work and economic growth (SDG 8)** by generating employment, particularly in the MSME and informal sectors. Women-led enterprises often employ other women, promote inclusive work environments, and contribute to skill development and economic diversification. Increased participation in digital platforms and e-commerce has further expanded business opportunities.

- The study finds that women entrepreneurs contribute to **industry, innovation, and infrastructure (SDG 9)** by entering sectors such as technology, renewable energy, health-tech, and social entrepreneurship. Many women-led enterprises adopt sustainable and eco-friendly practices, supporting innovation and environmental responsibility.

- Women entrepreneurship also helps **reduce inequalities (SDG 10)** by promoting financial inclusion and economic participation among marginalized groups. Access to microfinance, digital tools, and skill development has helped narrow income and gender gaps.

- Despite these contributions, women entrepreneurs face persistent challenges, including limited access to finance, socio-cultural constraints, digital divides, lack of institutional support, and work–life balance issues. These barriers restrict their growth and reduce their potential contribution to SDGs.

Suggestions

To strengthen women entrepreneurship, the study suggests expanding financial inclusion through gender-sensitive credit policies, improving digital literacy and skills, and establishing women-focused incubators and innovation hubs. Supportive policies such as tax incentives and procurement preferences for women-led enterprises are essential. Improving market access through e-commerce and global value chains, along with social awareness campaigns to challenge gender stereotypes, will further empower women entrepreneurs.

Conclusion

Women entrepreneurs are key drivers of sustainable development and inclusive growth. They contribute significantly to poverty reduction, gender equality, employment generation,

innovation, and social equity. However, structural and socio-cultural barriers continue to limit their potential. Strengthening entrepreneurial ecosystems through financial inclusion, digital empowerment, supportive policies, and social change is essential. Empowering women entrepreneurs will accelerate progress toward achieving the Sustainable Development Goals and promote a more inclusive and sustainable future.

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Women Entrepreneurs and their Contribution to Sustainable Development Goals (SDGs) in India

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Abstract

Women entrepreneurship has increasingly emerged as a strategic driver of sustainable development in India by fostering inclusive economic growth, social empowerment and gender equality. Women-owned enterprises contribute significantly to the realization of the United Nations Sustainable Development Goals (SDGs), particularly those related to poverty eradication, gender equality, decent work, innovation and reduction of inequalities. Despite policy initiatives and institutional interventions, women entrepreneurs continue to face financial, socio-cultural and structural constraints that restrict their potential contribution to sustainable development. This paper aims to examine the role of women entrepreneurs in advancing SDGs in India, analyse their SDG-wise impact and identify the key challenges limiting their effectiveness. The study is conceptual and descriptive in nature, relying on secondary data drawn from government reports, international organizations and peer-reviewed literature. The findings highlight that strengthening women entrepreneurship through targeted policy measures, financial inclusion and capacity-building initiatives is essential for accelerating India's progress towards sustainable and inclusive development.

Keywords: *Women Entrepreneurship; Sustainable Development Goals; Gender Equality; Inclusive Growth*

Introduction

Entrepreneurship plays a pivotal role in driving economic growth, employment generation, and innovation, particularly in developing economies. In recent years, the scope of entrepreneurship has expanded beyond economic objectives to include social inclusion and

environmental sustainability, aligning closely with the global sustainable development agenda (Sachs, 2018). Within this evolving framework, women entrepreneurship has gained prominence as a critical instrument for achieving inclusive and gender-responsive development outcomes.

The adoption of the 2030 Agenda for Sustainable Development by the United Nations underscores the importance of gender equality and women's economic participation in achieving sustainable development (United Nations, 2015). Women's entrepreneurship is increasingly recognized as a pathway to poverty reduction, decent work, and reduced inequalities, as women-led enterprises often integrate social objectives alongside economic goals (OECD, 2017). Moreover, women entrepreneurs tend to reinvest income in health, education, and community welfare, generating broader developmental benefits.

In India, women entrepreneurship has expanded due to improved access to education, digital technologies, self-help groups, and government support programmes. However, women continue to experience lower labour force participation and limited access to productive resources, making entrepreneurship a crucial alternative for economic empowerment (World Bank, 2022). Against this background, examining the contribution of women entrepreneurs to the achievement of SDGs in India is both relevant and necessary.

Statement of the Problem

Although women entrepreneurship is recognized as a key driver of sustainable development, women entrepreneurs in India continue to face systemic barriers that hinder their effective contribution to SDGs. Existing studies often examine women entrepreneurship and sustainable development independently, with limited focus on their direct interlinkages. This creates a research gap in understanding how women entrepreneurship can be strategically leveraged to achieve SDGs in the Indian context.

Objectives of the Study

1. To examine the role of women entrepreneurs in achieving Sustainable Development Goals in India.
2. To analyse the impact of women entrepreneurship on selected SDGs related to economic growth, gender equality, and social inclusion.
3. To identify the key challenges faced by women entrepreneurs in contributing to SDG achievement.

Research Methodology

The study is conceptual and descriptive in nature and is based entirely on secondary data collected from government reports, international agency publications, and peer-reviewed journals. Content analysis has been employed to examine the relationship between women entrepreneurship and SDG outcomes.

Concept of Women Entrepreneurship

Women entrepreneurship refers to business ventures that are owned, managed, and controlled by women, with women playing a dominant role in decision-making and ownership. In India, women entrepreneurs are predominantly concentrated in the micro, small and medium enterprise (MSME) sector, operating across agriculture, handicrafts, food processing, textiles, education, healthcare and service industries (Ministry of MSME, 2023).

Women-led enterprises often adopt inclusive and community-oriented business models, prioritizing employment generation and social well-being. As a result, women entrepreneurship contributes not only to economic independence but also to social empowerment and sustainable livelihoods.

Overview of Sustainable Development Goals (SDGs)

The Sustainable Development Goals consist of 17 integrated goals adopted in 2015 to address global challenges such as poverty, inequality, climate change and environmental degradation (United Nations, 2015). The SDGs emphasize a holistic development approach that balances economic growth, social equity and environmental sustainability (Sachs, 2018).

Gender equality is both a standalone goal (SDG 5) and a cross-cutting theme across the SDG framework. Women entrepreneurship contributes directly and indirectly to multiple SDGs, including SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 10 (Reduced Inequalities) (UNDP, 2020). In India, women-led enterprises are increasingly viewed as catalysts for achieving national SDG targets through inclusive and sustainable growth strategies (NITI Aayog, 2022).

Impact of Women Entrepreneurs on SDGs in India

Poverty Reduction (SDG 1)

Women entrepreneurship plays a significant role in poverty alleviation by generating income and employment opportunities, particularly in rural and semi-urban areas. Women-

owned micro-enterprises enhance household financial stability and reduce vulnerability to economic shocks (World Bank, 2020). Self-help group-based enterprises in India have been particularly effective in promoting financial inclusion and reducing rural poverty (NABARD, 2021).

Gender Equality (SDG 5)

Entrepreneurship strengthens women's economic agency by enhancing control over resources and participation in decision-making processes. Women entrepreneurs challenge traditional gender norms and contribute to narrowing gender gaps in income and employment (Kabeer, 2016). Economic empowerment through entrepreneurship has been associated with improved social status and community participation among women (UN Women, 2021).

Decent Work and Economic Growth (SDG 8)

Women-led enterprises contribute to employment creation and inclusive economic growth. The MSME sector, where women entrepreneurs are prominently represented, plays a crucial role in India's GDP growth and job generation (Ministry of MSME, 2023). Women entrepreneurship thus supports sustainable and inclusive economic development.

Innovation and Industrial Development (SDG 9)

Women entrepreneurs promote innovation by introducing new products, services, and sustainable business practices. Their participation strengthens local industries and supports inclusive industrialization, particularly in sectors such as agro-processing, handicrafts and digital services (OECD, 2018).

Reduced Inequalities (SDG 10)

By empowering women from marginalized and disadvantaged backgrounds, entrepreneurship contributes to reducing income and social inequalities. Women-led enterprises foster inclusive growth by expanding economic opportunities across regions and communities (UNDP, 2020).

Challenges Faced by Women Entrepreneurs in Achieving SDGs

Despite their growing contribution, women entrepreneurs in India face several constraints that limit their impact on SDGs. Limited access to finance remains a major barrier due to lack of collateral, credit history and gender bias in lending practices (World Bank, 2022). Socio-cultural norms, household responsibilities and mobility restrictions further constrain women's entrepreneurial activities (Klasen & Lamanna, 2009).

Additionally, inadequate access to entrepreneurial training, digital technologies, professional networks, and market information hampers business growth and innovation. Regulatory complexities and limited awareness of government support schemes also restrict women's participation in sustainable entrepreneurship initiatives (OECD, 2017).

Suggestions

- Improve access to gender-sensitive financial products
- Strengthen entrepreneurship education and skill development
- Promote digital literacy and technology adoption
- Create women-centric business networks and mentorship platforms
- Enhance public–private partnerships to support women-led sustainable enterprises

Conclusion

Women entrepreneurs play a crucial role in advancing sustainable development in India by contributing to economic growth, gender equality and social inclusion. However, financial, socio-cultural and institutional barriers continue to limit their potential impact. Addressing these challenges through gender-responsive policies, financial inclusion strategies and capacity-building initiatives is essential for maximizing the contribution of women entrepreneurs to the achievement of Sustainable Development Goals.

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Youth Entrepreneurship for Climate Action in India: Opportunities, Challenges and Institutional Imperatives

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Abstract

Climate change has emerged as one of the most critical challenges confronting sustainable development, particularly in developing economies such as India. At the same time, India possesses a significant demographic advantage in the form of a large and dynamic youth population. Youth entrepreneurship for climate action has gained prominence as an effective mechanism for addressing environmental challenges while promoting economic growth and employment generation. This paper examines the role of youth entrepreneurship in advancing climate action in India by analysing key opportunity areas, structural challenges, and the role of government, institutions, and ecosystem actors. The study adopts a descriptive and analytical approach based on secondary data drawn from academic literature, policy documents and reports of international organizations. The findings indicate that youth-led climate enterprises contribute meaningfully to renewable energy expansion, circular economy practices, sustainable agriculture and green technological innovation. However, financial constraints, regulatory complexity, skill gaps and regional disparities limit their scalability. The paper concludes that a coordinated and integrated policy framework aligning climate objectives with youth entrepreneurship development is essential for achieving sustainable and inclusive growth in India.

***Keywords**: Youth Entrepreneurship, Climate Action, Sustainable Development, Green Innovation, India*

Introduction

Climate change poses profound environmental, economic and social challenges across the globe. Developing countries such as India are particularly vulnerable due to their

dependence on climate-sensitive sectors, including agriculture, fisheries and informal employment (IPCC, 2023; World Bank, 2022). Rising temperatures, erratic rainfall, water scarcity and extreme weather events threaten livelihoods and long-term development outcomes.

Simultaneously, India is experiencing a demographic transition marked by a large youth population, which constitutes a significant share of the country's productive workforce (NITI Aayog, 2023). This demographic dividend presents an opportunity to mobilize young people as agents of climate action through entrepreneurship. Youth entrepreneurship for climate action refers to business initiatives led by young individuals that integrate environmental sustainability, climate mitigation or climate adaptation objectives into their value creation processes (UNDP, 2022).

Unlike conventional entrepreneurship, climate-oriented youth enterprises often prioritize long-term ecological and social value alongside economic returns. The convergence of youth innovation, digital technologies and sustainability imperatives positions young entrepreneurs as key contributors to India's transition towards a low-carbon and climate-resilient economy (OECD, 2021; World Economic Forum, 2022).

Statement of the Problem

India's climate vulnerability necessitates innovative solutions, yet youth-led climate entrepreneurship remains underdeveloped. Despite demographic advantages and startup ecosystem growth, young entrepreneurs face barriers such as limited access to green finance, regulatory complexity, skill gaps, and insufficient institutional support. Existing research often addresses youth entrepreneurship or climate action independently, highlighting a gap in integrated analysis. This study seeks to address this gap by examining opportunities, challenges, and institutional imperatives for youth climate entrepreneurship in India.

Objectives of the Study

1. To examine the role of youth entrepreneurship in promoting climate action in India.
2. To analyse opportunities available for youth-led climate enterprises.
3. To identify challenges faced by youth climate entrepreneurs.
4. To suggest policy measures for strengthening youth entrepreneurship for climate action.

Research Methodology

The study is descriptive and analytical in nature and relies on secondary data. Data were collected from peer-reviewed journals, government reports, policy documents, and publications of international organizations such as UNDP, OECD and the World Bank. The collected information was analysed using content analysis and thematic interpretation. This approach is appropriate for doctoral-level conceptual and policy-oriented research (Creswell, 2014).

Opportunities for Youth Entrepreneurship in Climate Action

- Youth entrepreneurs are increasingly engaging in renewable energy, sustainable agriculture, and waste management innovations, where OECD (2022) highlights that young individuals demonstrate greater adaptability to green technologies and low-carbon business models. This flexibility enables youth to design locally relevant climate solutions. Such ventures contribute simultaneously to environmental sustainability and employment generation. Youth-led innovation strengthens grassroots climate action. The green economy thus offers significant entrepreneurial scope.

- Digital competence among youth enhances climate entrepreneurship, as John et al. (2025) emphasise that digital tools such as artificial intelligence, data analytics, and digital platforms improve efficiency and scalability of climate solutions. These technologies enable smart energy management and climate risk assessment. Digitalisation reduces operational costs for startups. Youth leverage technology to overcome traditional barriers. This accelerates climate innovation diffusion.

- Rising environmental awareness has motivated youth to pursue purpose-driven enterprises, and Alzate et al. (2024) observe that climate consciousness among young entrepreneurs strengthens their commitment to sustainability-oriented ventures. Youth increasingly integrate environmental and social goals into business strategies. This value-based motivation supports long-term enterprise sustainability. Climate entrepreneurship becomes mission-driven. Such orientation enhances social legitimacy.

- India's evolving startup ecosystem provides institutional support to youth entrepreneurs, where World Bank (2022) notes that incubation centres, mentoring programmes, and innovation hubs reduce entry barriers for climate-oriented ventures. These platforms facilitate networking and skill development. Youth gain access to early-stage resources. Ecosystem support improves survival rates. This environment encourages green innovation.

Challenges Faced by Youth Climate Entrepreneurs

- Access to finance remains a major constraint, as Agarwal et al. (2022) point out that youth climate entrepreneurs often lack collateral and credit history required by financial institutions. Green ventures involve perceived risks. Funding gaps limit scalability. Youth rely on personal savings. Financial exclusion persists.

- Climate-oriented startups require high initial capital, and Alkathiri et al. (2024) argue that infrastructure-intensive green technologies involve long gestation periods. Investors are hesitant due to delayed returns. Youth struggle to mobilise resources. Capital intensity restricts entry. Growth potential remains unrealised.

- Market adoption of green products remains slow, with Karabetyan and Sart (2024) highlighting that higher prices and low consumer awareness reduce demand. Youth-led ventures face revenue instability. Market resistance discourages innovation. Scaling becomes difficult. Consumer behaviour limits impact.

- Regulatory complexity creates barriers for youth entrepreneurs, as World Bank (2022) observes that compliance with environmental and business regulations increases operational costs. Youth lack experience navigating regulatory systems. Procedural delays discourage innovation. Regulatory uncertainty increases risk. Growth momentum weakens.

Institutional Imperatives

- Dedicated green financing for youth is essential, as OECD (2022) emphasises that targeted funds reduce financial risk and encourage climate innovation. Youth-specific mechanisms improve inclusion. Public–private finance strengthens confidence. Capital access improves scalability. Innovation accelerates.

- Integration of climate entrepreneurship education is crucial, as John et al. (2025) stress that curriculum reforms build sustainability-oriented entrepreneurial skills. Education enhances innovation readiness. Universities act as incubators. Youth gain interdisciplinary competence. Long-term capacity develops.

- Strengthening incubation and innovation hubs supports youth climate ventures, with Alzate et al. (2024) noting that incubators provide mentorship, funding access, and networking opportunities. Hubs reduce early-stage failure. Innovation quality improves. Market access expands. Ecosystems mature.

- Public–private partnerships enhance youth climate entrepreneurship, where World Bank (2022) explains that collaboration enables technology transfer and resource sharing. Partnerships reduce financial risk. Market access improves. Youth gain credibility. Climate solutions scale faster.

Findings

- Youth entrepreneurship offers significant potential for advancing climate action in India, as young entrepreneurs leverage creativity, digital skills, and a strong orientation toward sustainability.

- Digital technologies, including artificial intelligence, data analytics, and online platforms, enhance the scalability and effectiveness of climate-focused enterprises.

- India's expanding startup ecosystem, including incubation centres, innovation hubs, and mentoring programmes, provides substantial support to early-stage youth entrepreneurship in climate action.

Suggestions

- Establish dedicated green financing mechanisms specifically targeting youth entrepreneurs to reduce investment risks and encourage innovation.
- Simplify regulatory procedures for climate-oriented startups to reduce compliance burdens and improve ease of doing business.
- Integrate climate entrepreneurship education into higher education curricula and vocational training to build interdisciplinary skills among youth.
- Strengthen incubation hubs and innovation platforms that provide mentorship, networking, and access to technology for youth-led climate enterprises.
- Promote public–private partnerships to facilitate technology transfer, market access, and co-creation of sustainable solutions.

Conclusion

Youth entrepreneurship represents a strategic pathway for advancing climate action in India. Youth-led climate enterprises contribute to environmental sustainability, employment generation, and inclusive growth. However, their potential can be fully realized only through an enabling ecosystem that integrates finance, policy, education and institutional support. Strengthening youth entrepreneurship for climate action is essential for achieving long-term sustainable development in India.

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A Study on the Role of Women Entrepreneurship in Achieving SDGS in India

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Abstract

At present, the role of women entrepreneurs in achieving Sustainable Development Goals (SDGs) and to identify the various challenges they are facing. Sustainable female entrepreneurship is heavily focused on poverty reduction, accounting for 41% of recent research in this field. Women reinvest approximately 90% of their income back into their families more than double the rate of men directly improving health, education, and nutrition. This study focused on the domains that influence Women's Entrepreneurship in Achieving Sustainable Developmental Goals. The research indicates that the entrepreneurship of women plays a crucial role in accomplishing the Sustainable Development Goals (SDGs) as it propels economic expansion, nurture creativity, and advances social integration. To reduce gender gaps in the workforce, women entrepreneurs play a critical role in achieving SDG (Gender Equality). They do this by sanctioning additional women and generating occupations. Originality Women's entrepreneurship plays in accomplishing the Sustainable Development Goals (SDGs), emphasizing the interplay between gender, innovation, and sustainable development from an entirely new perspective.

***Keywords**: women entrepreneurship, sustainability, SDGS, women empowerment*

Introduction

The fastest-growing economic phenomenon in developing countries in recent times has been women's entrepreneurship, or the ability of women to enter the business world. Tunde-Awe & Olajide (2016). These nations are heavily stressing the issue of women's involvement as entrepreneurs and the ongoing rise in it as part of national development initiatives. It is nowadays pure that women entrepreneurs have a major impression on the country's economic growth, the making of professions, the decrease of poverty, the simplification of gender discernment, and the progression of women's empowerment. However, in the process of

economic development, sustainability has taken on greater importance recently. In September 2015, the United Nations finally approved 17 Sustainable Development Goals (SDGs). The inception and maintenance of socio-economic development in both developed and developing nations have been attributed to entrepreneurs. The opening up of markets to the world encouraged more women to launch new businesses and become entrepreneurs. It is a widely held belief that because most Indian women do not engage in financially rewarding activities, they are largely unhelpful.

Objectives

1. To study factors Influencing the Women's Entrepreneurship in Achieving Sustainable Developmental Goals.
2. To find out the countless challenges faced by women entrepreneurs.
3. To make suitable suggestions for the development of women entrepreneurs.

Research Methodology

This study is based on secondary data and goals to conduct a methodical literature review of women entrepreneurs' creativities to realize sustainable goals. The SLR is a valuable tool for examining publications over a specific period and is effective in analyzing trends in the field. This technique, extensively acknowledged by academics and researchers, allows for a severe and evidence-focused review of the literature on entrepreneurship.

Review of Literature

Hasan & Parveen in their stated that female-led entrepreneurship fosters job opportunities and accelerates a country's economic development.

Noor et al. revealed that the need for a theoretical framework to study women in leadership and entrepreneurship. A few business models take into account the skills of female entrepreneurs. Although research is moving in the direction of even though men and women have equal opportunities, women are still thought to be the family's carers. Women entrepreneurs face many difficulties and a difficult process.

Adefare et al. in their study understood that encouraging women to start their businesses is essential to attaining social progress, sustainable economic growth, and women's empowerment. Women business owners face discrimination and societal mistrust. According to the study, the gender gap for female entrepreneurs will close when differences in the legal,

social, educational, financial, and other domains are eliminated. In the long run, this can help achieve Sustainable Development Goal (SDG), which deals with discrimination against women and girls in all its forms.

Factors Influencing the Women's Entrepreneurship in Achieving Sustainable Developmental Goals

1. Socio-Economic Factors

SEF plays an important role in empowering women. The socio-economics factors consist of education, financial factors, decision-making power, self-esteem, self-confidence, etc., First of all, education is an important factor for WE, educated women tend to have better health results, receive extra, and have more regulator over their survives. Women's employment opportunities are essential for their economic empowerment and access to decent work and equal pay for equal work are critical factors for women's economic empowerment. Women also get empowered by the access to financial resources for their economic independence, access to credit, savings, and insurance can help women start their businesses and achieve financial stability.

2. Skills and Training Factors

Socio-economic factors play a crucial role in determining the success of training and skill development programs. These programs are designed to improve the skills and abilities of individuals, particularly in the workforce, and enable them to participate fully in the economy. There are some ways in which socio-economic factors can impact the effectiveness of training and skill development programs such as education is a critical factor that affects an individual's aptitude to contribute in training and skill development agendas.

3. Technological Factors

Women now have more options and accessibility to education in the financial and other spheres of life thanks in part to technology. Research has indicated that increased female participation in the formal economy and production and service sectors has been facilitated by women's learning through access to finance, mobile money, inclusive aspects of finance or microfinance, digitally based health, and agriculture. Technology has improved women's participation in science and empowered them politically and institutionally.

4. Rates and Regulatory Factors

Government policies, business policies, licenses, administration, production, and sales services rules and regulations have a great impact on women's participation as entrepreneurs in entrepreneurial activities. Women's involvement as entrepreneurs is also affected by Government grants, subsidies, etc. Women's inadequate access to data limits their well-informed contribution into policymaking.

5. Women Entrepreneurs in Achieving SDG Goals

Gender equality is a prerequisite for sustainable development. Equal resource distribution is also necessary for it to work. Achieving sustainable social development, sustainable economic growth, and sustainable environmental outcomes all depend on the empowerment of women. It fosters solidarity both within and between generations and is founded on these ideals. Women share primary responsibility for child care, nutrition, and household management in almost all countries.

Countless Challenges are Facing by Women Entrepreneurs

The women entrepreneurs continue to drive global economic growth while navigating persistent gender-specific barriers. These challenges range from systemic financial gaps to deep-rooted societal norms that disproportionately affect women-led ventures.

The most critical challenges identified in recent research include:

1. Access to Finance and Capital

The Funding Gap: A major report in 2025 revealed that 78% of women entrepreneurs cite limited access to finance as their greatest barrier. All-female founder teams often receive a fraction of the venture capital compared to all-male teams.

Collateral Requirements: Many women lack significant assets (like land or property) in their own names, making it difficult to secure traditional bank loans that require collateral.

2. Societal Norms and Gender Bias

- Dual Responsibility: Women often face the "double burden" of managing both a business and a disproportionate share of household chores and caregiving, which limits their available time for business growth.
- Not Being Taken Seriously: Many women CEOs report struggling to gain credibility in male-dominated industries, frequently needing to work "twice as hard" to receive the same recognition as their male counterparts.

3. Networking and Mentorship Gaps

- Exclusive Networks: Elite professional networks are often male-dominated, making it difficult for women to find the mentors, collaborators, and high-level contacts necessary for scaling.
- Lack of Role Models: A scarcity of visible, successful female leaders in certain sectors (like manufacturing or construction) can discourage new women from entering those fields.

4. Technical and Regulatory Hurdles

Limited access to technology and lower digital literacy rates particularly in rural areas prevent women from leveraging e-commerce and digital marketing for growth.

5. Internal and Psychological Barriers

Societal expectations often place higher pressure on women to succeed, leading to a heightened fear of failure or a tendency toward perfectionism before launching.

Suggestions

- To explore crowdfunding platforms (e.g., i Fund Women) and angel networks that specifically prioritize female founders.
- To provide bank loans In India, programs like Stand-Up India and Mudra Yojana provide collateral-free loans up to ₹1 crore specifically for women.
- To develop the Founders are encouraged to use "female intuition" to select investors whose values align with their vision, being prepared to "walk away" if the relationship is not a genuine two-way street.
- To seek **s**ponsor**s** who actively advocate for your advancement within industry circles, rather than just mentors who provide advice.
- To focus on high-potential sectors such as sustainability (eco-friendly products) and health-tech (personalized wellness), where women-led innovations are currently leading the market.

Conclusion

In today situation women need to break out of the traditional and conventional mound if they want to improve the quality of their lives. In India, women entrepreneurs are emerging

as a dominant economic force, significantly contributing to the nation's goal of becoming a "Viksit Bharat" (Developed India). Women now own approximately 20% of all MSMEs in India and lead nearly 45% of registered startups. The state and central government has launched several schemes to developed their activities. The Research study showed that women-led startups often generate **over 60% more revenue** per dollar invested compared to male-led counterparts, demonstrating greater fiscal discipline and resourcefulness.

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The role of Export Financing in India in Promoting Youth Entrepreneurship

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Abstract

The export financing in India can contribute for the youth development and empowerment. Youth development and empowerment are essential for poverty alleviation of a nation and fostering sustainable economic growth. It is an innovative approach that combines with economic opportunity with skill-building, fostering youth entrepreneurial potential and participation in international trade. The Exports financing is considered as essential element for the growth of an economy. There is immense potential for India's export's sector as India's total exports have, increased in manifold in the last 10 decades and currently India contributes a major share to the GDP of the world. Export financing is essential for the young exporters as the export businesses with high value that depends on financing. The export trade is facilitated with the availability of export finance at different stages in the form of the Pre-shipment finance and Post-shipment finance provided by export financing institutions on India. An exporter either procures the raw materials or imports for the processing of the same into finished goods and boarding them for international trade through ship and air. The export financing issues faced by the young exporters, primarily involve the availability of adequate and timely finance, availability of concessional credits for preparing internationally competitive exports. Limited access to the export financing particularly for international exports acts as a major obstacle for young entrepreneurs. This research paper highlights the significance of export financing for Young Indian exporters and focuses on the youth development through skills and capacity building that contributes to the upliftment of export activities throughout the Nation

***Keywords**: Youth-Development, Empowerment, Export financing, Youth-demographic, Pre-shipment financing and Post-shipment financing*

Introduction

The youth demographic represents a significant share of the global population. It

holds an immense potential to drive innovation, entrepreneurship and economic growth. In developing countries like India, young exporters face obstacles such as unemployment, lack of access to capital, and inadequate knowledge of international markets. Export financing can serve an opportunity to empower youth by providing financial aid and support to accelerate global trade. Export financing refers to the process of funding to exporters to facilitate and expand their business in the international market. The export financing acts as a cash flow solution to the young exporters for preparation of exportable goods and services and other global transactions requirements including using working capital. Export finance allows the exporters to access working capital while the time taken by the overseas buyer to pay invoices. The Export finance is required by international businesses to assure the affordability for the production of goods and an assurance of receiving the payments for the exported goods from the overseas buyer. It helps to achieve lessor cost of production goal for the goods that have less comparative cost, it will lead to availability of goods at a lower price in the international market. The international trade encourages the scope of market with the increase in domestic demand and foreign demand for the products. Hence, the achievements of the foreign sector facilitate the development of the domestic sector with youth development and empowerment. The Export financing and youth development and empowerment, together have a profound impact on the growth of the economy. Hence, we can infer that export financing is very significant to achieve positive balance of trade. The Export finance provides assistance to young exporters in exporting their goods and service for international market, to get access to working capital before the payments were received.

Export Financing Environment in India

The export financing environment in India is efficiently stronger than other economies of the world. There are several export financing institutions in India. The key export financing institutions are Listed below:

- EXIM bank of India- A specialised financial institution that focuses on facilitating young Indian exporters in the international market. It provides export credit, and trade-related services to young exporters also provides lines of credit for overseas projects.
- ECGC (Export Credit Guarantee Corporation of India)- ECGC is an organisation established by the government of India for export organisation. The objective of ECGC is to improve the competitiveness of country’s goods and services by

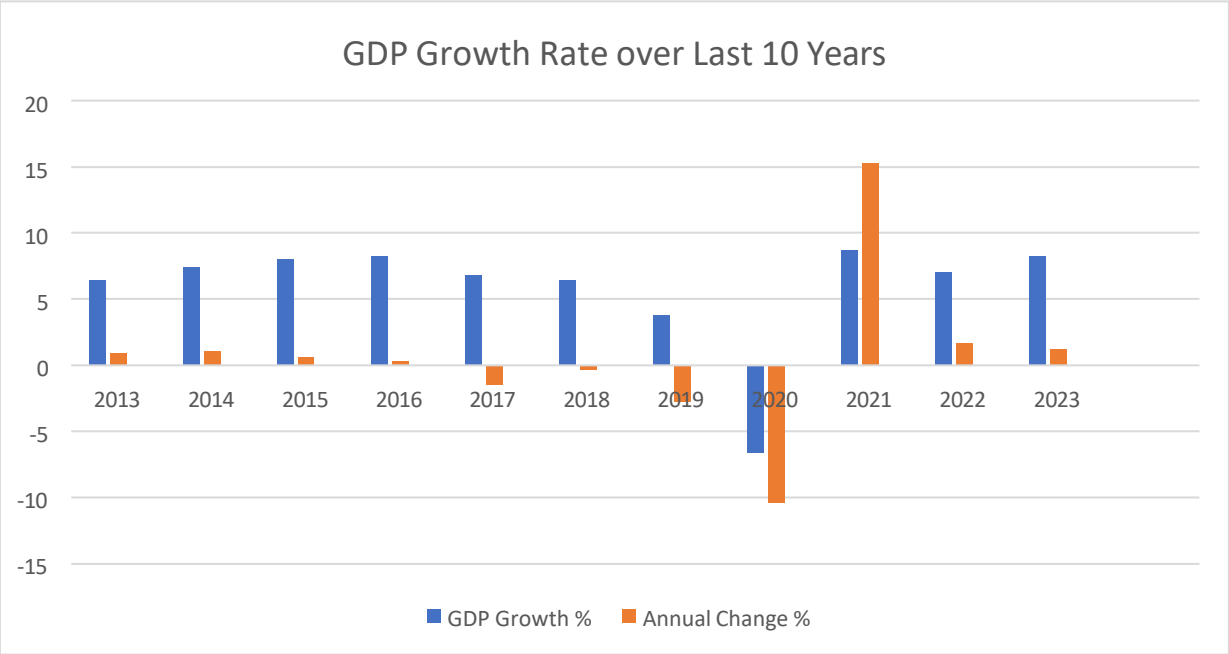
providing them credit insurance coverage. The assistance for export financing is provided by ECGC. ECGC helps the young exporters to improve their performance in terms of profitability, financial condition, and operational efficiency.

- Reserve Bank of India- RBI's sole responsibility for the control issue and maintaining of credit and rate of interest. The RBI is the foremost authority for the issue and maintenance of pre- shipment and post-shipment finance to the young exporters from the nation for their various requirements RBI performs various functions for the availability of credit.
- Commercial Banks- The export financing services are offered by various Nationalized banks, private sector banks, foreign banks, regional rural banks, and specific cooperative banks.

Contribution of Indian Exporters in International Market

In 2023, India was the number 5 economy in the world with the real GDP of 173.82 lakh crore in 2023-24. India's leading contribution comprises of traditional and modern agriculture, technology services, the handicrafts industry and business outsourcing. India ranked 17th position in the total exports of the world trade. As per the recent data, it is estimated that, India's economic growth in the next fiscal year that is for 2024-25 will be 6.5%-7%. The table below contains the data about the GDP Growth (in percentage) for the last decade (from EXIM Bank Annual Reports of 2014-15 to 2023-24).

Year	GDP Growth (in %)	Annual Change (in %)
2013-14	6.4	16.36
2014-15	7.5	17.2
2015-16	8	6.67
2016-17	7.1	-12.7
2017-18	6.8	-4.22
2018-19	6.5	-4.4
2019-20	3.9	-40
2020-21	-5.8	-248.72
2021-22	9.7	-267.24
2022-23	7	-27.84
2023-24	8.2	17.14



Source- Compiled data from annual reports of EXIM bank from 213-14 to 2023-24

From the above table, it is evident in the fiscal year 2020-21, the Indian economy has faced negative economic growth rate during pandemic in which the GDP growth declines to 5.8%. Whereas the economy has grown rapidly after the pandemic now the GDP has a growth rate of 8.2%.

Role of Export Financing in Youth development and empowerment in Indian Economy

Youth development can be defined as the approach to emphasize on meeting the developmental needs, and provide them adequate resources. It involves providing skills to young peoples, resources and opportunities to achieve their potential. The Export financing plays a major role to support young exporters from the Indian economy. It enables them to explore international market by ensuring financial liquidity. The benefits of export financing for youth empowerment are listed below:

- The young exporters can avail immediate access to finance or working capital.
- The young exporters can avail working capital to invest for the growth of the business.
- The facility of Export finance is ideal for SME's (Small and Medium sized Enterprises) whose working capital is less thus they needs funds but have limited accessibility to raise fund.
- The Export finance provides insurance coverage to young exporters against credit risks.

- The Export finance provides facilitation to young exporters and enables them to compete in the international market.
- The Export finance provides facilitation to the young exporters to undertake market surveys for export promotion.
- The Export finance helps to manage Regulatory Compliances.
- The Export finance helps to manage Foreign Exchanges.
- The Export finance helps to develop Infrastructure.

Types of Export Finance provided to the Exporter

Pre-Shipment Finance

The pre-shipment finance refers to the availability of credit to the exporters before the shipment of goods for the preparation of export order. Pre-shipment finance is the loan granted to an exporter for the processing and packaging of goods and services. Hence, it is also known as **"Packing Credit".**

RBI defines Pre-shipment Credit "It refers to any loan granted to an exporter for financing the purchase, processing, manufacturing or packaging of goods".

Post- Shipment Finance

Post shipment finance refers to the credit granted to the exporters for fulfilling the requirement of working capital after the shipment of goods. The post shipment finance is granted by the commercial banks to the overseas buyer, for short-term duration generally less than one year. The post-shipment finance is granted after the shipment of goods and presentation of documents related to freight for
negotiation or collection.

Whereas, Post shipment credit is granted by Commercial banks for medium and long-term duration generally more than one year. The Post-Shipment Credit is granted to exporters for exports on deferred payment generally more than one year.

Literature Review

The Review of literature provides new insights towards the topic, suggests new interpretations or clarifying conflicts within previously published research works. The Review of Literature helps to develop a good understanding and insight into relevant previously published researched materials and the trends that have emerged recently. The reviews of literature are the collection of all the reviews obtained.

In the year 2015, Ghose has conducted research work on 'An analysis of the growth of EXIM bank as India's premier export financing institution' has discussed about export financing and other factors contributing to the growth of export considering the role, functions, and objectives of the EXIM Bank of India. Developing countries like India concentrates more on increasing the value and volume of the export turnover to attain economic developments to provide employment opportunities to utilize all the available resources and to finance for exports.

In the year 2016, Ahmed and Ansari have conducted research and discussed the export financing strategy in his work 'EXIM Bank of India's Export Financing Strategy: An Analysis' which reflects that the export credit plays vital role in strengthening export performance. The studies reflected that the financial extension by institution like Export Import Bank on India play significant role in strengthening the capacity to enter in the international market and capturing market by grabbing competitiveness. Lack of capital has been a constant issue with the industrial prosperity in India along with several other reasons. The capital availability certainly imparts a sense of strength among the businesses. Therefore, the study tries to enquire and validate whether the export financing activities by EXIM Bank in India. In 2020, Mudugal has conducted a research study on the 'Role of EXIM Bank for Development of International Business - A Study' examined the performance of export rendered by the EXIM Bank of India' .On the basis of which he revealed that if export financing services are provided in the Developing countries like India concentrates more on increasing the value and volume of the export turnover to attain economic developments, to provide employment opportunities, to Utilize all the available resources and to finance for exports.

The studies highlight the critical role of export financing in youth development and empowerment. However, the obstacles faced by young entrepreneurs, particularly for export financing. The export financing tools supports youth-led exports. The export targeted policies and programs are designed for youth development.

Research Methodology

This research paper analyses research methodology in descriptive form. The research will employ a qualitative approach. The research is exploratory and analytical in nature, in which we explore the advantageous references of Export Financing in the Indian economy and its contribution for youth development and empowerment. The research paper also elaborated the needs of young exporters from the nation in the achievement of predetermined goals in the international market. An intensive literature review for the research has been conducted. The major findings of the work were included in the conclusion. The study focuses on the measures of export financing and their role for youth development and empowerment. Through, this paper the various transformations, which were introduced for the achievements of the defined targets were discussed. These transformations were to promote Export financing in the economy, to align with global standards.

For analysing data from secondary sources, includes various thesis, articles, books, reports and publications related to the Export Financing have been reviewed. The quantitative data and information are collected from the official websites and the government reports. The primary analysis was performed by reviewing journal, articles, reports, text books and from various other published sources. The information and statistics related to Export Financing have been analysed and compared.

The data has been collected and the hypotheses related to the study were defined. The objectives analyse the influence of the variables affects them. Also, the various factors that affect the accessibility and availability of export financing services were analysed. The study would eventually be helpful for future researchers.

Research objectives

The aim of the research is to examine the accessibility of export financing in India, relating to youth development and empowerment of the young Indian exporters. The following objectives were designed to understand, the working of the export financing services in India and youth development and empowerment. The objectives provide a clear picture of actions to be performed. The following are the objectives of the present research paper-

- To analyse the role of export financing services in fostering youth development and empowerment.

- To evaluate the impact of export financing policies on youth entrepreneurs.
- To assess the challenges in export financing schemes for young entrepreneurs.
- To evaluate the contribution export financing for employment generation and youth development.
- To evaluate the contribution of government and export financing institutions to promote youth led export initiatives.
- To assess the awareness and utilization of export financing tools, available to young exporters.

Problem Statement

Export financing is an essential component for expansion and sustainability in the international market. Despite its importance, many young exporters face significant challenges in securing adequate and affordable financing to support their international trade activities. This research paper aims to explore the multifaceted issues in export financing, including the barriers in accessibility, the impact of financial regulations, the role of financing institutions, and the effectiveness of various financing instruments. The key areas of given concern include:

- Problems in Accessibility to export financing
- The complex and often restrictive regulatory framework can hinder the flow of export financing.
- The availability of financial instruments and inconsistency can create disparities in trade opportunities.
- The effectiveness of export financing institutions in bridging the financing gap needs thorough examination.
- Understanding the correlation between accessibility to export financing and trade
- performance can help in formulating policies that enhance export competitiveness and economic growth.

This research will employ a mixed-method approach, combining quantitative data analysis with qualitative analysis, to provide a comprehensive understanding of export financing.

Research Design

The author has chosen the descriptive research design for the analytical and exploratory research.

Data Collection Source

The Data can be collected from both the sources, Primary and secondary data sources. For this study, secondary data were utilised in the research. The analysis was performed by reviewing journal, articles, reports, text books, the internet databases and from various other published sources. The analysis of this study takes into account reports from various financial institutions, research publications, newspapers.

Research Findings

It is evident from relevant research that export financing have an impact on the Indian economy both before and after the pandemic. Data shows that growing organisations requires more Export financing and contributes to nation in terms of GDP, GNI, GVI, NNI, and youth development and empowerment. In this context, the benefits of export financing help youth development and empowerment. The expansion of the exports from the nation and Indian economy is emerging as a rapid developing nation.

Challenges faced by Youth in Accessing Export financing

Export financing, is essential for youth development and empowerment in international market. In India, the procedural framework for export financing is much complex and young exporters faces several challenges. These challenges can impede the ability of firms to expand in international market and sustain their operations. The challenges faced by youth in accessing export financing are listed below:

- Export financing institutions require high creditworthiness, substantial collateral, and financial histories. The young exporters are often unable to provide such documents.
- Young exporters face burden of excessive costs of financing. Export financing fees and interest rates can be expensive for them.
- Young exporters face lack of awareness and knowledge. They are unaware of the various export financing options available to them or requires the expertise to get information about complex financial products.
- Young exporters face issues in complying with diversified regulatory frameworks across different countries, which are complex and costly.

- Young exporters may face sudden changes in trade policies, tariffs, and sanctions that can disrupt financing arrangements and create uncertainty to the trade.
- Extensive documentation and reporting obligations can create a disturbance in for young exporters.
- Young exporters face various risks related to political instability, economic fluctuations, and changes in international trade policies.
- Foreign Exchange rate volatility can impact profitability and repayment capacity, adding financial risk to the young exporter.
- The risk of non-payment by overseas buyers due to insolvency or political factors can deter financial institutions from providing export credit to young exporters.
- Young exporters sometimes don't have access to tools such as letters of credit, export credit insurance, and factoring varies widely across regions and institutions, which acts as a barrier to them.
- Young exporters often face competitive disadvantages compared to international producers that have greater access to resources and better financing ability.
- The young exporters face challenges due to rapid changes in international market. It requires continuous innovation and research adaptation, which acts as a challenge for them with constrained financial resources.

Addressing the challenges, which requires coordinated efforts from governments, financial institutions, and international organizations to create a supportive and accessible export financing environment. Government should create export financing initiatives designed to fulfil the needs of young entrepreneurs, offering lower interest rates and flexible terms for youth development and empowerment. This includes smooth regulatory frameworks, enhancing awareness and knowledge among young exporters, providing accessible financial support, and fostering innovation and research adaptation in export financing services.

Recommendations

The recommendations for leveraging export financing for youth development and empowerment are listed below:

- The government should create Youth-focused export financing programs, offering lower interest rates and flexible terms.

- To adopt streamlined regulatory and documentation processes to make export financing more accessible for young exporters.
- Provide skills and training to youth on export financing tools, market trends and trade compliances.
- To develop platforms and networks for young entrepreneurs with experienced exporters and investors.
- To develop user-friendly digital financing platforms and tools for young exporters.
- Collaboration with international organisations and promotion councils to provide funds and support to youth-led export ventures.
- Generation of employment opportunities through Youth-led export businesses.

Conclusion

The research paper analyses the different aspects of youth development and empowerment beginning by reflecting the contribution of Export Financing. It explored the export financing mechanism and the role of export financing for youth development and empowerment in the nation. Export financing is a significant aspect for youth development and empowerment. It provides the financial resources and support to young exporters in the international market. The different level of exports is generated from the different areas of the nation. The young exporters have to face many problems, also they do not have the accessibility to export financing. By addressing the obstacles faced by the young exporters, can unlock the potential of youth and their innovative ideas. Developing nations emphasizes on increasing the value and volume of the export sector to achieve economic growth. The increasing exports provides employment opportunities to the general public. The Financial institutions and supporting banks should extend their services beyond international banking and delivery of exported products and Services. Targeted policies and initiatives can ensure the young entrepreneurs to explore international market.

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Impact of Self – Help Groups (SHGs) on Women Entrepreneurship

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Abstract

Self-Help Groups (SHGs) are tools for fostering women's empowerment and entrepreneurship in developing countries. This paper evaluates the effects of SHGs on the entrepreneurial aspirations and business performance of women, their socio-economic status, and their decision-making ability. Based on primary data obtained from structured questionnaires, the author examines access to credit, skills, and income, and the obstacles of 200 women entrepreneurs linked to SHGs, in addition to secondary data. The results show that SHGs have a positive impact on women's self-esteem, financial management, and business sustainability. However, women still face several obstacles such as inadequate market access, low entrepreneurial and technical skills, and socio-cultural constraints. The author presents policy implications and suggestions to improve the SHG model.

***Keywords**: Self-Help Groups, women entrepreneurship, microfinance, empowerment, rural development*

1. Introduction

Worldwide, entrepreneurship is widely considered to be one of the most important contributors to economic development, job creation, and innovation. In the past several years, increasing women's participation in entrepreneurial activities has become a focal point of interest, particularly because in most developing countries, women are considered to be a productive factor that is not fully utilized. The term Self-Help Group (SHG) usually describes a group of individuals, mostly women, who voluntarily and equitably join together to achieve a common goal of mutual aid, self-support, and to create a source of credit for income-generating activities.

Although SHG's initially focused on a microfinance approach, over the years, they have taken on a variety of other roles, particularly in the area of encouraging women's entrepreneurship. SHGs is a model that tries to help women overcome their entrepreneurial obstacles through the mechanisms of savings, easy access to credit, and group learning. This paper examines the effect of participating in SHGs on women's entrepreneurial achievements.

2. Literature Review

2.1 Concept of Self-Help Groups

SHGs usually consist of 10 to 20 members of like-minded socio-economic backgrounds who meet regularly to save, access credit, and talk about livelihood prospects. They work on the principles of mutual trust, accountability, and collective decision-making.

2.2 Women and Microfinance

A number of researchers stress that microfinance via SHGs facilitates women's financial inclusion by giving them access to low-priced credit, helping them develop better savings, and building economic self-reliance. Financial services associated with SHGs, as noted in several studies (e.g., Swain & Wallentin, 2009; Mayoux, 2001), enhance entrepreneurial initiatives and household welfare.

2.3 SHGs and Entrepreneurship Growth

Studies indicate the positive impact SHGs have on the development of women-owned businesses. For instance, Mahajan (2017) stated that women in SHGs are more likely to have positive entrepreneurial sentiments due to an environment that fosters learning and financial support. Other studies indicate that the participation in SHGs enhances market orientation and risk-taking.

2.4 Gaps in Existing Literature

While numerous studies emphasize microfinance effects, there are fewer studies documenting how SHG membership specifically translates to sustainable business performance and sustained entrepreneurial success. This paper seeks to fill that gap.

3. Research Objective

The main objective of this study is:

1. To assess the impact of SHG membership on women's entrepreneurial development.

2. To analysis of income, business competencies, and financial decision-making, and the shifts that occur after joining an SHG.
3. Identifying the constraints women entrepreneurs encounter within the SHG structure.
4. Providing recommendations that could improve SHG practices to promote better entrepreneurial outcomes.

4. Hypothesis

The study tests the following hypotheses:

H_1. Membership in self-help groups (SHGs) improves women's access to credit and financial services.

H_2. Women in SHGs are more active entrepreneurs than those outside SHGs.

H_3. Involvement in self-help groups (SHGs) increases level of decision-making and socio-economic status.

5. Research Methodology

5.1 Research Design

This paper uses a mixed-methods approach, combining quantitative and qualitative data.

5.2 Sample and Data Collection

Data were collected from 200 women entrepreneurs from SHGs in rural and semi-urban areas who have been members for at least 1 year. Stratified random sampling was used. The survey included questions on demographic profile, access to credit, business profile, skill training, income, and business problems. Qualitative data were sourced from interviews with SHG leaders.

5.3 Variables

Dependent variables: entrepreneurial performance, income, and business viability.

Independent variables: duration of SHG membership, access to credit, and training.

Controlling variables: age, education, and family support**.**

5.4 Data Analysis

The qualitative data were analysed and coded for themes. The quantitative data were analyzed using correlation and regression analyses, and descriptive statistics**.**

6. Results

6.1 Demographic Profile

About 70% of people surveyed were aged 25 to 45 years, and slightly more than 55% were at the secondary education level. A large proportion of 80% worked in micro businesses, e.g., tailoring, handicrafts, dairy, food processing, or retail.

6.2 Credit Access and Utilization

Before joining SHGs, 82% of participants reported little or no contact with formal credit. After becoming members of SHGs:

- 92% said that their credit access had improved.
- 75% used the loans to set up or grow their businesses.
- The typical loan was in the range of INR 25,000–50,000.

There is a positive significant relationship ($r = 0.71$; $p < 0.01$) between the number of years a member belonged to an SHG and the amount of credit they had access to.

6.3 Income and Economic Status

Women's average income increased by 35% to 50% after the first year of running their businesses with support from the SHGs. SHGs were found to be a significant factor in income growth ($\beta = 0.53$; $p < 0.05$).

6.4 Skill Development and Managerial Capability

- 68% of respondents completed some of the training provided by NGOs or banks. The main areas were:
- Bookkeeping
- Marketing
- Negotiation
- Quality control

Those participants who received training had better overall sales growth than those who did not.

6.5 Decision-Making and Social Empowerment

The membership with SHGs fostered new levels of confidence and decision-making at the household and community levels. Close to 78% reported they had more control over financial, family planning, and investment decisions

6.6 Challenges Identified

However, even with these positive accomplishments, these challenges remain.

- Restricted access to more expansive market
- Insufficient business technology
- Patriarchal culture that limits freedom of movement
- Unpredictable income from the business

All these challenges undermine the potential to sustain the business in the long-term.

7. Discussion

The results validated the significant role of SHGs in eradicating the socio-economic barriers of women in developing their businesses through credit access, skill improvement, and creating socio-economic empowerment. The income improvement in correlation to the SHG membership confirms the microfinance and income enhancement phenomenon in literature.

The success in entrepreneurship, however, is the result of addressing other systemic challenges, such as lack of market access and lack of adequate business training. Interviews showed that women lacked networking skills and digital marketing, an important aspect of modern business.

The narrative of empowerment is more than economic gains. The confidence, self-worth, and the recognition they acquired from the community, and other positive mental states reported by the women, is a reflection of the empowerment theory that suggests increasing participation of the women in economic activities increases their agency

8. Policy Implications

Findings suggest several actionable policies:

- **Enhance Access to Markets**: SHG products should be linked to e-commerce sites and retail outlets by the government and NGOs.

- **Targeted Skill Development**: Training should cover digital competencies, financial literacy, and business planning.
- **Actually Existing Credit Linkages**: SHGs should be linked with formal financial institutions with subsidised interest rates.
- **Entrepreneurial Support**: Incubation for emerging women entrepreneurs by established women entrepreneurs.
- **Entrepreneurial Support**: Make business registration and compliance simplification for micro enterprises

9. Conclusion

SHGs are instrumental in the provision of the critical ingredients of financial access, training, and peer support necessary for the promotion of women's entrepreneurship. The empirical evidence is unequivocal in showing the positive change in income, managerial role, household decision-making, and self-worth. For SHGs to continue to be an effective tool for the promotion of women's entrepreneurship, policies should address the issues of market access and the growing complexities of business. Future studies should focus on longitudinal studies, SHG model comparisons, regional studies, and assessments of the use of digital tools.

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Investors' Acumen towards the IPO of Startup Companies (A Study with reference to Investors from Chennai City)

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Abstract

An Initial Public Offering (IPO) is the process through which a private company becomes publicly listed by issuing its shares to the general public for the first time. In other words, an IPO involves offering shares of a private corporation through a new stock issuance, enabling public investors to participate in the company's ownership. The objective of this study is to assess investors' level of awareness regarding startup IPOs and to analyze how independent variables such as the size and purpose of the IPO, the company's profile, and its financial performance relate to investors' decisions. The research primarily uses primary data collected from 150 respondents in Chennai city. The findings indicate that, while making IPO investment decisions in Green capitalization consideration, investors typically consider key factors such as sustainable operations, ESG compliance, Green innovation as growth engine and prevailing market conditions. The study further concludes that 66% of investment decisions in startup IPOs are also influenced by Business fundamentals in Knowledge of Investor acumen in IPO context and overall company profile.

Keywords: *Investors perception, Initial Public Offering, Startups, Investment Decision*

I Introduction

India's startup ecosystem has expanded rapidly in recent years, establishing the country as a significant global center for entrepreneurial innovation. At the same time, the world is grappling with escalating environmental challenges, including climate change, deforestation, pollution, biodiversity loss, and the unsustainable exploitation of natural resources. The intensifying ecological impact of industrialization and unchecked consumption has underscored the urgent need for a transition toward more sustainable and environmentally responsible business practices.

In response to these challenges, a new wave of green entrepreneurs and eco-focused startups has emerged. Guided by principles of sustainability and environmental responsibility, these ventures are redefining the role of business in society. Beyond generating economic value, they integrate social and environmental considerations into their core strategies. Through innovative products, services, and technologies, such startups aim to reduce environmental degradation, promote responsible consumption, and foster the adoption of sustainable lifestyles.

II Review of Literature

Kaur et al., (2023) examine selected green enterprises in India to assess the growing trend of eco-conscious consumer behavior. The study highlights the critical role of early environmental education in fostering a sustainability-oriented mindset among future entrepreneurs.

Lokesh K. (2022) presents an empirical analysis of green entrepreneurship in India, emphasizing its potential to address socio-environmental challenges through business models that are both environmentally responsible and economically viable. The findings underscore that the integration of sustainable practices is essential for achieving long-term business growth.

Haldar (2019) offers valuable insights into India's green entrepreneurial landscape by linking consumer demand for eco-friendly products with wider sustainability concerns. The study proposes a conceptual framework that integrates environmental, economic, and social dimensions as key drivers of green entrepreneurship.

Mathur et al., (2016) focus on millennial eco-entrepreneurs in India, identifying the opportunities and challenges they encounter. The research emphasizes the pressing need for sustainable strategies to mitigate environmental degradation and address climate change at both national and global levels.

III Objectives of the Study

- To identify the individual investors' acumen about the startup IPOs.
- To know the perception of investors towards green innovation as a growth engine.
- To study about the investor and green capitalism at IPO.

IV Research Methodology

The study was made through primary and secondary data. Primary data were collected using a structured, close-ended questionnaire administered to individual investors. Secondary data were sourced from journals, websites, and other relevant publications. Convenience sampling was employed to select retail individual investors for the study. This method enabled a clear understanding of investors' awareness levels and their investment acumen with respect to startup IPOs.

V Concept Overview

Investor's strategy refers to the ability to make sound, insightful, and strategic investment decisions based on a deep understanding of financial, environmental, and social factors. When applied to green capitalism, this acumen extends to evaluating how sustainability principles drive long-term value creation. In the context of IPOs (Initial Public Offerings) of startups, investors' acumen becomes critical in identifying which emerging firms not only promise financial returns but also align with global sustainability trends and environmental responsibility.

Investors' Acumen in IPO Context

Investor acumen refers to the depth of financial literacy, market awareness, and strategic foresight that investors bring when assessing IPO opportunities. When it comes to green startups, this acumen extends beyond standard financials; it includes assessing environmental sustainability and ESG metrics as part of the firm's long term value.

Green Capitalism Consideration

Under green capitalism, environmental responsibility becomes a value driver, not just an ethical add-on. Investors see sustainability as a source of competitive advantage and future resilience. In an IPO scenario, investors apply green-capitalism thinking by Prioritizing companies with sustainable operations and low carbon footprints., Evaluating ESG compliance as a predictor of long-term stability, and viewing green innovation (e.g., renewable energy tech, circular economy models) as a growth engine that aligns with regulatory and consumer trends.

Investor Acumen and Green Capitalism At IPO

Combination of these two categories like investor acumen and green capitalism at IPO meet, investors use integrated valuation models that include environmental and social

performance. Anticipate policy incentives or carbon taxes that could affect post-IPO value and Reward startups that embed sustainability into governance and strategy, not just marketing. Essentially, high-acumen investors recognize that green capitalism is not just ethical, it's strategic. They interpret sustainability as a hedge against long-term market and regulatory risk and a driver of brand equity in public markets.

VI Data Analysis

Table 1

Demographic Profile of the Respondents

Profile		**Frequency**	**Percentage**
Gender	Male	85	56.7
	Female	65	43.3
	Total	**150**	**100.0**
Age	18 years - 25 years	126	84
	26 years - 35 years	15	10
	36 years - 45 years	5	3.3
	46 years - 55 years	4	2.7
	Total	**150**	**100.0**
Occupation	Govt Employed	12	8
	Private Employed	20	13.3
	Self Employed	108	72
	Others	10	6.7
	Total	**150**	**100.0**
Income	Less than Rs.1,00,000	60	40
	Rs.1,00,000 - Rs.5,00,000	36	24
	Rs.5,00,000 - Rs.10,00,000	40	26.7
	Above Rs.10,00,000	14	9.3
	Total	**150**	**100.0**

Knowledge of Investor acumen in IPO context	Business fundamental	99	66
	Market timing	35	23.3
	Risk Management	16	10.7
	Total	**150**	**100.0**
Green Capitalization Consideration	Sustainable operations	35	23.3
	ESG Compliance	55	36.7
	Green Innovation as growth engine	60	40
	Total	**150**	**100.0**
Investors Acumen and Green Capitalization at IPO	Environmental and Social responses	143	95.3
	Policy Incentives	7	4.7
	Total	**150**	**100.0**
Level of risk involved in investing in Startup IPOs	Low Risk	8	5.3
	Moderate Risk	46	30.7
	High Risk	84	56
	Not Aware of the Risk	12	8
	Total	**150**	**100.0**

Source: *Primary data.*

From the above Table 1: Demographic Profile of the Respondents majority of the respondents were male with 56.7% (85 respondents), whereas in the age group of 18 years -25 years majority of 84% respondents which includes both male and female. And most of 72% (108 respondents) were self-employed. In case of knowledge related to investor acumen in IPO context, the majority of the respondents were with knowledge of Business fundamentals with 99 respondents (66%). Finally, 84 respondents in the level of risk involved in investing in startup IPOs, the majority of the respondents considered the level of risk to be as high.

VII Leading Sectors and Examples of Indian Eco-Startups

Renewable Energy

Startups such as **ZunRoof** are enhancing the accessibility and affordability of solar energy for households, thereby contributing to India's transition toward clean and renewable energy sources.

Sustainable Transportation

Companies including **Ather Energy**, **BluSmart**, and **Yulu** are advancing electric mobility and shared transportation models to reduce urban air pollution and promote sustainable urban transport.

Eco-Friendly Products

Brands like **Phool** and **Beco** are converting waste materials into sustainable consumer products, fostering circular economy practices and reducing environmental impact.

Sustainable Agriculture

Startups such as **Just Organik** and **Wakao Foods** advocate organic farming and environmentally responsible agricultural practices, minimizing chemical usage and supporting soil conservation.

Waste Management

Banyan Nation is transforming plastic recycling through technology-driven solutions, promoting responsible waste management and the integration of recycled plastics into mainstream manufacturing.

VIII Conclusion

Investors today demonstrate improved financial literacy and analytical skills when evaluating startup IPOs, focusing on business models, scalability, and long-term sustainability rather than short-term hype. Despite increasing acumen, investors remain cautious due to the inherent risks of startup IPOs, such as uncertain cash flows, competitive pressure, and valuation volatility. Also Green entrepreneurship and eco-friendly startups have emerged as powerful catalysts in the global transition toward sustainable development, reshaping the objectives and practices of business by harmonizing innovation and profitability with ecological preservation and social accountability. These ventures not only offer market-driven solutions to environmental degradation but also present a compelling model for rethinking economic

growth in the twenty-first century. India, supported by a vibrant startup ecosystem and increasing environmental awareness, occupies a critical position in this transformation. The rapid emergence of startups across diverse sectors including renewable energy, sustainable agriculture, eco-friendly consumer goods, and waste management highlights both the urgency of environmental action and the vast potential for sustainable economic innovation. Education and awareness must serve as foundational elements in this ecosystem, nurturing a generation of investors who are driven not only by profit but also by planetary well-being. By fostering entrepreneurship today, societies can build resilient economies, restore natural systems, and ensure a more inclusive, sustainable, and livable future for generations to come.

Case Studies

ReNew Power (India)

Founded by Sumant Sinha, ReNew Power has emerged as one of India's leading renewable energy companies, with an operational capacity exceeding 5 GW. Through large-scale wind and solar power projects, the company has made a substantial contribution to India's carbon reduction targets and clean energy transition.

Avaada Energy (India)

Established by Vineet Mittal, Avaada Energy has developed more than 1 GW of renewable energy capacity across India. The company is widely recognized for its commitment to sustainable energy solutions and was honored with the *Best Renewable Energy Company* award at the India Energy Awards 2020.

Biocon (India)

Under the leadership of Kiran Mazumdar-Shaw, Biocon operates as a pioneering biotechnology firm focused on developing eco-friendly enzymes and biofuels. Its innovations support industrial sustainability by reducing environmental impact and promoting cleaner production processes.

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A Study on Awareness of Metaverse in E – Commerce Sector among Gen – Z with reference to Chennai City

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Abstract

Metaverse in e-commerce means creating immersive, 3D virtual shopping worlds where users, via avatars, experience products through VR/AR, interact socially, and make purchases using digital currencies, blending physical and digital retail for personalized, engaging experiences beyond traditional online stores. Particularly, the Generation Z has changed the purchasing pattern of every customer. This study is mainly focuses on the awareness of Metaverse in E – Commerce sector and the Gen Z's perceived attitude towards the adoption.

Introduction

India is moving rapidly towards digital innovation, and Gen Z is the generation experiencing this transformation most closely. The technological transformation in India for the past two and half decades has shaped the India's technological Infrastructure. Particularly, the Generation Z has changed the purchasing pattern of every customer. This generation is known for being the first digital native, grown up with smartphones and the internet from birth, shaping future work and retail with demands for purpose, authenticity, tech integration, and diversity. This Generation is actively adopting new technologies such as e-commerce, e-banking, e-marketing, e-books, AI, AR, and VR as quickly it reaches the market. In this context, the next major development in the e-commerce sector is the integration of the Metaverse.

Definition of Metaverse in E – Commerce

In e-commerce, the Metaverse creates virtual, 3D shopping spaces where people can use avatars to explore products, try them through AR/VR, interact with others, and even make purchases using digital payment systems. This blends physical and digital shopping to offer a more engaging, immersive experience compared to traditional online stores.

Review of Literature

- **Sharma Aayushi (2024)** conducted a **diachronic study examining the representation of the Metaverse** across select creative works in literature, cinema, film, television, and web series. The study highlights the evolution of the Metaverse concept over time and its reflection of changing technological and cultural contexts. It emphasizes how different narrative mediums shape audience perceptions of virtual reality and immersive experiences. The research also discusses the cultural, social, and psychological implications of the Metaverse in contemporary storytelling. Overall, the study contributes to a broader understanding of technology's role in shaping narratives and human experiences in virtual environments.

- **Pandey, Devansh (2025)** examined **the role of neuro-symbolic AI in predicting and moderating consumer behavior related to embodiment-induced incivility in metaverse gaming environments**. The study found that AI-based behavioral prediction can effectively mitigate physical and social presence-based threats, thereby improving user retention. The research highlights AI's potential to anticipate misuse of avatar affordances and enable preemptive moderation. Additionally, the study emphasizes that transparency in AI-based moderation mechanisms enhances user trust and acceptance.

Objectives

- To explore the awareness of Metaverse among Gen – Z
- To assess the impact of integrating metaverse with E – Commerce
- To examine the benefits while integrating metaverse with E-Commerce

Research Methodology

The present research paper is based on explorative research. The Sample is collected from 43 respondents. Statistical tools such as T Test and correlation is used to analyse the data with the help of SPSS.

Sources of Data

- Primary data is collected from 43 respondents through online forms.
- Secondary data is collected from Website, Newspapers and Research articles.

Scope of the Study

This paper provides a brief overview on the integration of the Metaverse with E-Commerce sector.

Testing of Hypothesis

- **H_{01}:** There is no significant relationship between the level of awareness of Metaverse and overall satisfaction among Gen Z consumers.
- **H_{11}:** There is a significant relationship between the level of awareness of Metaverse and overall satisfaction among Gen Z consumers.

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
How Satisfied are you with Your Awareness and Perception of Metaverse-Based E – Commerce?	19.282	42	.000	3.535	3.16	3.90

Inference

The analysis reveals that there is a significant relationship between the level of awareness and overall satisfaction among customers. The computed significance value (p-value) is 0.000, which is less than 0.05; hence, the null hypothesis is rejected and the alternative hypothesis is accepted. The results indicate a strong relationship between awareness of the Metaverse and overall customer satisfaction.

- **H_02:** There is no significant relationship between perceived benefits of Metaverse integration and satisfaction towards e-commerce shopping.
- **H_12:** There is a significant relationship between perceived benefits of Metaverse integration and satisfaction towards e-commerce shopping.

Correlations					
		Physical Shopping Experience Through Virtual World	Gamified Shopping Experience	Quick Decision Making	How Satisfied are You with Your Awareness and Perception of Metaverse-Based E-Commerce?
Physical Shopping Experience Through Virtual World	Pearson Correlation	1	.855**	.603**	-.026
	Sig. (2-tailed)		.000	.000	.868
	N	43	43	43	43
Gamified shopping experience	Pearson Correlation	.855**	1	.550**	.076
	Sig. (2-tailed)	.000		.000	.627
	N	43	43	43	43
Quick Decision Making	Pearson Correlation	.603**	.550**	1	-.090
	Sig. (2-tailed)	.000	.000		.567
	N	43	43	43	43
How Satisfied are You with Your Awareness and Perception of Metaverse-Based E-Commerce?	Pearson Correlation	-.026	.076	-.090	1
	Sig. (2-tailed)	.868	.627	.567	
	N	43	43	43	43
**. Correlation is significant at the 0.01 level (2-tailed).					

Inference

The analysis reveals that there is no significant relationship between the between perceived benefits of Metaverse integration and overall satisfaction towards e-commerce shopping. The computed significance value (p-value) is 0.868, which is more than 0.05; hence, the null hypothesis is accepted. The results indicate no significant relationship between perceived benefits of Metaverse integration and overall satisfaction towards e-commerce shopping.

Interpretation o f Results

- 69.77% of the respondents belonged to the age group of 19–23 years, while 30.23% were in the 13–18 years category, indicating that young Gen Z respondents dominated the study.
- 55% of the respondents were male 45% of respondents were female, which shows that male respondents are using more than female.
- A majority of respondents (79.1%) have an income of less than Rs. 1,00,000. Around 14% earn between Rs. 1,00,001 and Rs. 2,00,000, while very few respondents fall in the higher income brackets, with 2.3% earning Rs. 3,00,001–4,00,000 and 4.7% earning above Rs. 4,00,001. This shows that the sample is predominantly from the lower-income group.
- Out of the 43 respondents, 69.8% were students, while 30.2% were employed in the private sector. This indicates that the majority of the respondents were students, with students forming more than two-thirds of the sample.
- 100% of the respondents reported that they were aware of the term Metaverse in relation to e-commerce, indicating a high level of awareness among Gen Z consumers.
- The analysis indicates that 50% of the respondents used the Metaverse for painting, making it the most preferred context. This is followed by wall design and painting (36.7%) and dress and spectacles (33.3% each), showing moderate adoption in visualization-based applications. Home designing (23.3%) and furniture (20%) recorded lower usage, while grocery (10%) was the least preferred context.
- 60.5% of the respondents agreed that Metaverse-based e-commerce helps in cost saving, while 25.6% were neutral and 14% disagreed.
- 53.5% of the respondents felt that Metaverse reduces confusion during purchase decisions, whereas 32.6% expressed neutral opinions.

- 51.2% of the respondents agreed that virtual try-on enhances purchase confidence, while 32.6% remained neutral and 16.3% disagreed.
- 55.8% of the respondents agreed that Metaverse helps in reducing the return of goods, whereas 32.6% were neutral.
- 65.1% of the respondents agreed that social shopping with friends or avatars enhances the shopping experience, while 20.9% were neutral.
- 60.5% of the respondents agreed that Metaverse provides a physical shopping experience through a virtual world, while 23.3% were neutral.
- 46.6% of the respondents agreed that Metaverse helps in avoiding queuing, whereas 39.5% remained neutral.
- A strong 74.4% of the respondents agreed that Metaverse-based shopping saves time, making it a major adoption factor.
- 46.5% of the respondents agreed that Metaverse improves the overall shopping experience, while 39.5% expressed neutral opinions.
- 53.5% of the respondents agreed that Metaverse enables quick decision-making, whereas 25.6% were neutral.
- 60.5% of the respondents agreed that Metaverse enables customers to check product suitability before buying, while 23.3% were neutral.
- 60.5% of the respondents agreed that Metaverse helps in customizing products, whereas 20.9% remained neutral.
- 62.8% of the respondents agreed that gamified shopping experiences increase engagement, while 23.3% were neutral.
- 58.1% of the respondents agreed that the complexity of technology is a major challenge in Metaverse adoption, while 27.9% were neutral.
- 58.1% of the respondents agreed that privacy and security concerns pose significant challenges, whereas 23.3% remained neutral.
- 48.8% of the respondents agreed that ethical and legal issues are challenges in Metaverse-based e-commerce, while 34.9% expressed neutral opinions.
- The findings indicate that a majority of respondents (86%) believe that the Metaverse will become a mainstream part of e-commerce in India within the next five years, reflecting a strong positive outlook toward its future adoption, while only 14% of the respondents expressed a contrary opinion, suggesting relatively low resistance or skepticism toward Metaverse integration in e-commerce.

- The results show that a majority of respondents expressed satisfaction with their awareness and perception of Metaverse-based e-commerce, with 34.9% being satisfied and 23.3% being very satisfied, together accounting for 58.2%. About 20.9% of the respondents remained neutral, indicating moderate awareness levels, while 21% (14% dissatisfied and 7% very dissatisfied) reported dissatisfaction. Overall, the findings suggest a generally positive level of awareness and perception of Metaverse-based e-commerce among respondents.

Suggestions

- Conduct workshops or webinars for Gen-Z to increase understanding of Metaverse applications in e-commerce.
- E-commerce platforms and retail business should improve accessibility of Metaverse features via smartphones and affordable VR/AR devices.
- Use gamification and virtual events to engage Gen-Z shoppers in Chennai.
- Ensure data privacy and secure payment gateways to build confidence among young users.
- Educate Gen-Z about safe practices while interacting in virtual environments.
- Regularly collect user feedback from Gen-Z customers in Chennai to improve virtual shopping experiences.
- Encourage partnerships between e-commerce firms and tech startups specializing in AR/VR to create innovative shopping experiences.

Conclusion

The study indicates that awareness of the Metaverse among Gen-Z in Chennai is growing. Interest in virtual shopping is high, but factors like technology access, ease of use, and trust influence adoption. E-commerce businesses can leverage this opportunity by educating users, enhancing digital experiences, and ensuring secure, user-friendly platforms. Overall, the Metaverse has significant potential to reshape online shopping for the younger generation.

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Understanding What Drives Social Commerce: A Consumer Perspective

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Abstract

The rapid growth of social media platforms and online shopping has given rise to social commerce. Social commerce, a recent phenomenon where social interactions and user-generated content play a significant role in shaping consumers' purchasing decisions. Social commerce has emerged as a dominant force in the digital retail landscape. It is particularly among young consumers who actively engage with social media platforms. This study aims to identify the key factors influencing social commerce adoption among young consumers in Palakkad district, Kerala. Also, this research aims to examine how these factors shape their purchase intentions. Despite extensive literature on the influence of social commerce on consumers purchase intention, limited studies have focused on youth segments, which represent a significant and growing proportion of social commerce users and they are the early adopters, trendsetters and gamechangers in the market. The study is descriptive and empirical in nature. A survey conducted among young consumers in Palakkad district in Kerala who uses social commerce sites for purchasing products, using a structured questionnaire to identify the factors influencing the consumers purchase intention in social commerce context. The findings of this research aim to provide valuable insights to marketers seeking to leverage social platforms to drive purchasing decisions among young consumers.

***Keywords**: Social commerce, Purchase intention, Social media platforms, Young consumers*

Introduction

Nowadays, there is a growing importance of social media and online shopping. These two developments have led to the emergence of social commerce. Social commerce, where

consumers use social networking sites for their purchase behavior. Customers use social networking sites to discover products and make buying decisions. Unlike traditional e-commerce, social commerce is based on social interaction, peer communication, and user-generated content such as reviews, rating and recommendations, which influence consumer decision making and buying behavior (Sohn & Kim, 2020). The term social commerce was first introduced in late 2005 in a blog post by Beach and Gupta (the two former Yahoo). Social commerce refers to the use of social media platforms to facilitate buying and selling, enabling users to discover, discuss and purchase products through social networking sites. The business provide opportunity to interact with them by creating user generated contents like reviews, ratings, comments, sharing, recommendations etc. creates a meaningful relationship between customers and businesses. Social commerce emerged by the increasing popularity of social media and integration of social media in e-commerce platforms (M. Hajli, 2013).

Social commerce comprises of three core themes – social, commercial and technological. The concept behind the social commerce is that social media facilitates commercial transactions of businesses by creating closer relationship with their customers and thereby increasing sales and customer loyalty (M. N. Hajli, 2014). Today researchers claim that through social media and the emergence of social platforms such as forums and communities, ratings and reviews, and referrals and recommendations, consumers do have sociability. These social platforms are the social commerce constructs that shapes the social commerce (M. N. Hajli, 2014).

In recent years, social commerce has emerged as a powerful tool in the digital marketplace, particularly among younger generations. The young consumers are the key players in the development of social commerce because they use social media more often and are also well acquainted with digital technologies. The studies reveal that social connectedness can also impact the perceptions of easy to use and usefulness, which further impact the attitudes and intentions to use social commerce platforms (Cho & Son, 2019)

The growing dependence on social media and technological advancements leads to a drastic change in traditional purchase patterns. In spite of the growing academic interest of social commerce, there is little literature on context-specific studies of such adoption among young consumers in Palakkad, Kerala. Therefore, understanding the consumers purchase

intention is crucial for marketers and brands aiming to leverage the potential of social commerce. This research paper aims to explore the impact of social commerce on the purchase intention of youth in Palakkad district in Kerala focusing on how factors such as interaction, reliability, economy etc., affects their purchasing decisions.

Objective of the Study

- To identify various social commerce sites used by young consumers in Palakkad district
- To identify the key factors influencing social commerce adoption among young consumers in Palakkad

Scope of the study

The scope of the present study is confined to examining the key factors influencing social commerce adoption. The study focuses on young consumers in Palakkad district, Kerala. The scope of the study is limited to those who actively use social media platforms such as Instagram, WhatsApp, Facebook, YouTube and similar networks for product information, interaction, and purchasing decisions. It specifically examines factors such as social interaction, reliability, necessity, economy, sales promotion and their impact on social commerce purchase intention.

Significance of the study

This study is beneficial to the customers and also marketers. The study is significant as it helps in understanding the key factors that influence social commerce adoption. It focusing on a digitally active youth segment in Kerala. The study provides useful insights into how social interaction, necessity, economy etc. shape purchase intentions on social commerce platforms. The findings provide valuable insights to marketers and online sellers. The findings can assist them in designing effective social commerce strategies that better engage young consumers and build trust. Additionally, the study contributes to existing literature by offering region-specific evidence on social commerce behaviour in an emerging market context.

Research Methodology

The study is both empirical and analytical in nature. The population for the research includes young consumers in Palakkad District in Kerala who purchased products through social commerce sites. A sample of 100 young consumers aged 15 to 29 were selected for the

study using convenience sampling method. Respondents include from different areas such as business, profession, students etc. Data collected from the respondents through a pre-structured questionnaire and analysed using various statistical techniques like percentage analysis, independent t-test, ANOVA etc. Microsoft Excel and SPSS were used for this purpose.

Data Analysis

Hypothesis of the Study

H_1: There is a significant difference in the purchase intention among male and female consumers

Independent Samples Test

	Mean	SD	t value	P value
Male	4.01	.786	.828	.422
Female	3.81	.610		

Since the p-value is greater than 0.05, the null hypothesis is accepted at 5% level of significance. Hence it is concluded that there is no statistically significant difference in the purchase intention among male and female consumers.

- **Factors influencing purchase intention**

Factors	Mean	Standard Deviation
Economy	3.87	.682
Necessity	3.95	.617
Reliability	3.73	.572
Interaction	3.85	.686
Sales Promotion	3.83	.666

The descriptive analysis shows the factors influencing purchase intention among young consumers. Among the factors, necessity has the highest mean value (Mean = 3.95), which indicates that necessity is the most influencing factor on purchase intention among young consumers in Palakkad district. The other factors influencing purchase intention are economy

(mean = 3.87) and interaction (Mean = 3.85) respectively, suggesting that cost considerations and interactive features play an important role in shaping purchase decisions. Sales promotion (Mean = 3.83) also shows a notable influence. The factor reliability shows a mean value of 3.73, indicate that reliability is the lowest influencing factor among the factors. Overall, the results suggest that necessity, economic benefits, and interaction are the dominant drivers of purchase intention among consumers, irrespective of gender difference.

Conclusion

The present study examined the factors influencing social commerce adoption and purchase intention among young consumers in Kerala. The findings indicate that young consumers actively engage with social commerce platforms, and their purchase intentions are mainly influenced by many factors. Necessity is the most influencing factor that affect the young consumers purchase intention in social commerce contexts, also economy and interaction are the other influencing factors respectively. Instagram, Facebook, YouTube, Twitter, Snapchat etc., are the various social commerce sites used by Young consumers in Palakkad district. Instagram (62.7%) and YouTube (26.5%) are most frequently used social commerce sites by the young consumers in Palakkad district. 62.7% young consumers are satisfied and 15.7% consumers are highly satisfied with the product that they purchased through social commerce sites.

The study also found no significant difference in purchase intention between male and female consumers, indicating that social commerce adoption among youth is not shaped by gender differences. This highlights the uniform acceptance of social commerce platforms among young consumers, driven largely by shared digital habits and online engagement patterns. The consistency observed in respondents' perceptions further strengthens the reliability of the findings.

Overall, the study contributes to a better understanding of social commerce behaviour in a regional Indian context. The insights gained may help marketers and online sellers develop strategies that focus on value, trust, and meaningful interaction with young consumers. While the study provides useful implications, it is limited by its regional scope and sample size. Future research may extend this work by including other regions, age groups, or additional behavioural factors to gain a broader understanding of social commerce adoption.

Limitations and Future Scope

The research also has limitations. The research primarily focuses on young consumers in Palakkad district only. The study's sample size and demographics may not fully represent the diverse population. Depending on the sources and methods used to gather data, there may be a limitation in terms of accuracy, reliability or completeness, which would affect the study's conclusion. Future studies can include other populations and geographical areas.

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A Study on Buyer Perception towards Environmentally Sustainable Products

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Abstract

A Famous quote "Customer is the King of Marketing" stays as the basis for this paper as we deal with the marketing concepts only with the customer's existence as the main vein. Marketing always aims at satisfying the consumer's needs as their retention plays vital role for the survival of the products in the market. Consumer Behaviour is the process of identifying the needs, tastes and preferences, desires of the consumers or individuals or groups in organizations on the purchase of the products or goods. Buyer Behaviour of the consumers differs and so it is usually analyzed using certain factors like demographic profiles, attitudes, various lifestyles, standard of living, purchasing power and so on. Eco-Friendly Products are those products which are used only with the natural materials and are environmentally safe.Examples: Bamboo toothbrush, Jute bags, Stainless steel straws, bottles and so on. It excludes Plastics,synthetic materials and any other artificial things that leads to non bio degradable environment. A Study on the Consumer's buying behaviour is made towards Eco-Friendly products to know about the awareness of the Eco-Friendly Products from the side of the consumers. The Study was made mainly to the family women in particular, those who deal with the home made products regularly though male respondents have also given their response. It gave a conclusion that many of the people are aware of the Eco-Friendly products. This study has helped a lot in understanding on consumer's behavioral aspects on the bio degradable products and their approach towards Sustainable environment

***Keywords**: Bio Degradable Products, Attitudes, Behavioral aspects, Sustainable Environment*

Introduction

Consumer's Preferences towards Eco products have grown at a larger extent during recent times. It is because of the various environmental concerns that spoils the nature and

environment surrounding the people. Those concerns such as Pollution, Climate change, Deforestation, Resource depletion, Bio degradable loss and many more. The causes of such concerns are largely from the human activities such as fossil fuel burning, ecosystem collapses, industrial waste, destroying of forests and using of the lakes for construction of buildings which leads to water stagnation during heavy rains and floods. These issues have given rise to the eco friendly products which is not harmful and safe for the environment. By transitioning to some renewable energy such as solar, wind, hydro and still more factors have more beneficial impact on the energy consumption

Environmentally Sustainable Products - Needs and Importance

The basic Principle behind the eco-friendly products is "Sustainability". Eco Friendly products are those items that is designed to reduce the harmfulness of the environment. It joins hands with the nature in creating good and safe environment as a result there will be a greater reduction in the environmental issues.

Some of the Eco-Friendly Products are:

Coir Brushes For washing utensils **Wooden Combs** **Home made soaps**

And some more products like Bamboo razers, Organic Hair care and Skin care products. Avoiding the use of Plastics have been insisted in many places but even then it has not been fully implemented. Replacement for plastics such as jute bags, paper bags, bio degradable bags and so on have to be brought into existence in full effect.

Needs for Environmentally Sustainable Products:

- Health Concerns: Eco friendly Products are always safe to use since it is natural, non-toxic and good for human health. Using Stainless steel straws which are reusable can be used for kids instead of plastic straws. Wooden spoons can be replaced with plastic

spoons. Using dishwashers using herbals will protect the vessels with non usage of chemical substances for cleaning purpose.

- Energy Consumption: Usage of renewable energy will have positive impact on consuming energy and thus will protect the environment from energy loss and disabled energy implications.
- Cost Savings: Light Bulbs, gadgets which is cheaper in costs will be helpful in saving the costs and it helps in assisting to cut utility bills.

Importance of Eco - Friendly Products:

- Decreases Industrial wastes
- Reduced Chemical Exposure
- Enhances Reputation
- Saving nature and Ever Green Environment
- Better Climatic conditions as some of the environmental concerns are reduced

Literature Review

Ajzen's Theory of Planned Behaviour is used for explaining about Green Purchase behaviour. Theory suggests that attitude, subjective norms and perceived behavioural control are used to shape and create more intentions on the consumer behaviour. Their attitude towards Purchasing Green products should be broadened. The Positive environmental attitude will lead to higher purchase intention.

Stern's Value Belief Norm Theory is the model that argues that personal values impacts on environmental conditions, and activates personal norms. It leads to strong environmental values.

Objectives of Study

- ❖ The study of the paper aimed at knowing about the awareness on Eco Friendly Products among the people and how it is beneficial to the environment.
- ❖ It has also aimed to know about the customer's opinion on Social responsibility in using Eco Friendly Products, their satisfaction level in using those products.

Methodology

The Study involves both Primary and Secondary Data which resulted with the Positive shades of the Consumer behaviour on using Eco Friendly Products.

Primary Data: A well structured questionnaire was circulated to 70 consumers out of which 55 respondents gave the appropriate response for the questionnaire.

Secondary Data: Journals, Research Papers and sites relating to the concept

Data Analysis and Interpretation

The Data was analysed and some of the statistical tools like Percentage method, Chi-square method were used to derive at the conclusion. The Consumer behaviour varied based on their age, usage of the products and many more factors. Below given is the Demographic Profile of the Respondents as per their response.

Table 1

S. No	Particulars	% analysis
1.	Age - 20 to 30 31 to 40 41 to 50	26% 39% 35%
2.	Gender - Male Female	20% 80%
3.	Awareness on the varied environmental concerns	67%
4.	Possibility of avoiding Plastics	71%
5.	Perception towards usage of Eco-Friendly Products	81%
6.	Considerations on variables influencing the consumer's attitudes on buying Eco products	76%
7.	Views on the Price and quality of Eco Products	79%

Source: Primary Data

The table shows the various attributes on consumer buying behaviour and their effect on getting new environment friendly products. The result have concluded with the positive impact on the purchasing power of eco products. Majority of the respondents have the behavioural aspects on buying good and safe products and also they feel it is reasonably priced with good quality.

Hypothesis

H0 : Consumers are not aware of the eco friendly products and not satisfied with price and quality of it

H1: Consumers are aware of the eco friendly products and satisfies with price and quality of it Based on the response it is segregated to conclude on which of the hypothesis is selected and which one is rejected for deriving with the final result. Some of the effective tools are used to conclude it.

Consumer's Perception on the Environment Friendly Products

Table 2

S. No	Particulars	Mean score	Rank
1.	Eco products are always favourable to environment	5.12	I
2.	Using Eco friendly products reflects Social Responsibility	4.55	II
3.	Cost effective	4.05	III
4.	Good quality and Reasonable price	3.95	IV

This table shows the ranking method on various factors that helped to come to the final result as to which one have been given more preferences and their opinion is expressed by consumers. It is based on their purchasing power on eco friendly products

Consumer Perception and their Purchase Intention

Table 3

Perception	High	Low	Total
Positive	22	09	31
Negative	8	6	14
Neutral	5	5	10

Chi – Square Tests

Table 4

Category	O	E	(O-E)2/E
Positive - High & Low	52	12	2.38
Neutral	24	12	1.20
Negative - High & Low	12	10	1.1
Chi square value			5.58

Chi square value is less than 5.991

So H0 is rejected and H1 is accepted.

It concludes that Consumers are aware of the eco friendly products and satisfies with price and quality of it.

Conclusion

Consumers have positive views on Eco friendly products and more preferably used by them. Buyer Behaviour have laid down that they have social responsibility in increasing the safety of the environment. The consumers are greatly aware and care towards environment and try to reduce the concerns.

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A Study on Bridging Brands and Audiences: A Systematic Review of Content and Influencer Marketing Trends

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Abstract

The rapid growth of digital platforms has transformed the way brands connect with audiences, with content marketing and influencer marketing emerging as dominant strategies for engagement and brand loyalty. This research study examines how these trends are shaping consumer perceptions and decision-making in the metropolitan context of Hyderabad. A systematic review of existing literature on content and influencer marketing is combined with primary survey-based insights from 100 respondents, including students, young professionals, and active social media users. The findings highlight that while content marketing enhances brand storytelling and credibility, influencer marketing significantly influences purchase intentions through relatability and trust. However, concerns regarding authenticity, transparency, and over-commercialization were also evident among respondents. The research study underscores the importance of integrating data-driven content with authentic influencer partnerships to strengthen brand–audience relationships. The outcomes offer valuable guidance for marketers, brands, and digital strategists to design campaigns that are trustworthy, impactful, and aligned with consumer expectations.

***Keywords**: Content Marketing, Influencer Marketing, Consumer Engagement, Brand Loyalty, Digital Marketing*

Introduction

In today's digital era, the ways in which brands communicate with and influence their audiences have undergone a significant transformation. With the proliferation of social media, online platforms, and mobile technologies, traditional marketing approaches are no longer sufficient to capture consumer attention. This has led to the emergence of **content marketing** and **influencer marketing** as powerful strategies for engagement, trust-building, and brand loyalty.

Content marketing involves creating and distributing valuable, relevant, and consistent content aimed at attracting and retaining a clearly defined audience. It helps brands establish authority, credibility, and a meaningful connection with consumers. On the other hand, **influencer marketing** leverages individuals with significant social followings and perceived authenticity to promote products or services. By tapping into influencers' credibility and relatability, brands can reach audiences in a more personalized and engaging manner.

In the context of Hyderabad, a fast-growing metropolitan hub with a young, tech-savvy population, these strategies are increasingly shaping **consumer perceptions, brand preferences, and purchase decisions**. The integration of content and influencer marketing not only drives engagement but also addresses the modern consumer's demand for authenticity, relevance, and personalized experiences. Understanding these dynamics is crucial for marketers, brands, and digital strategists aiming to design campaigns that are both effective and aligned with evolving audience expectations.

Need for the Study

Understanding the evolving dynamics of content and influencer marketing has become increasingly important in today's digital landscape. With rapid technological advancements, including AI and data analytics, marketing strategies are becoming more personalized, targeted, and efficient. Concurrently, shifts in consumer behaviour, particularly among younger and digitally active audiences, necessitate a re-evaluation of traditional marketing approaches to remain relevant and effective. Furthermore, the proliferation of social media platforms such as Instagram, TikTok, and YouTube has significantly amplified the reach and impact of content and influencer marketing, making it essential for brands to understand how these strategies influence consumer perceptions, engagement, and purchase decisions.

Scope of the Study

This research focuses on exploring the influence of content and influencer marketing on brand–audience relationships within the metropolitan context of Hyderabad. The study considers a geographically diverse population of social media users, including students, young professionals, and active digital consumers. It emphasizes the technological aspects of marketing strategies, examining how brands leverage content creation, digital campaigns, and influencer collaborations to shape consumer perceptions and engagement. Temporally, the study is confined to current trends and practices, providing insights into contemporary consumer behaviour and marketing effectiveness in the rapidly evolving digital ecosystem.

Content Marketing

Content marketing is a strategic marketing approach focused on creating and distributing **valuable, relevant, and consistent content** to attract and retain a clearly defined audience. Unlike traditional advertising, which interrupts or directly sells, content marketing educates, informs, or entertains the audience, thereby building trust and credibility. Examples include blogs, videos, infographics, podcasts, and social media posts. By providing meaningful content, brands can establish authority in their domain, nurture relationships with potential customers, and guide them through the decision-making journey.

Influencer Marketing

Influencer marketing involves **collaborating with individuals who have significant social media followings or online influence** to promote products, services, or brands. Influencers can be celebrities, industry experts, or micro-influencers who have highly engaged niche audiences. The strategy leverages the **credibility, relatability, and trust** of the influencer to reach audiences in a more authentic way than traditional advertising. For instance, a beauty brand collaborating with a well-known Instagram makeup artist can drive awareness, engagement, and purchase intent among the artist's followers.

Consumer Engagement

Consumer engagement refers to the **emotional, cognitive, and behavioral interactions between a brand and its customers**. High engagement indicates that consumers are actively interested, involved, and responsive to a brand's content or campaigns. Engagement can take the form of likes, shares, comments, product reviews, participation in contests, or repeated visits to digital platforms. Strong consumer engagement fosters loyalty, encourages advocacy, and enhances the overall effectiveness of marketing strategies.

Brand Loyalty

Brand loyalty is the **commitment of consumers to repeatedly purchase or support a particular brand**, often irrespective of price or convenience. It is built over time through positive experiences, consistent quality, and emotional connections with the brand. In the context of content and influencer marketing, loyalty can be enhanced when consumers feel informed, entertained, or personally connected to the brand through meaningful content or relatable influencer endorsements. Brand loyalty leads to repeat business, word-of-mouth promotion, and long-term brand equity.

Digital Marketing

Digital marketing encompasses **all marketing efforts that use digital channels to reach and engage consumers**. It includes strategies such as social media marketing, search engine optimization (SEO), email marketing, online advertising, content marketing, and influencer marketing. Digital marketing allows brands to interact with target audiences in real-time, track engagement, and measure ROI through analytics. In today's technology-driven environment, digital marketing is essential for reaching consumers where they spend most of their time—online—and for personalizing communication to maximize impact.

Literature Review

De Veirman et al. (2017) emphasized that influencers significantly impact followers' purchasing decisions because audiences perceive them as relatable and trustworthy. Influencers regarded as tastemakers within specific niches further encourage brands to prioritize influencer endorsements over traditional advertising.

Evans et al. (2017), Kay et al. (2020), and Britt et al. (2020) highlighted the importance of disclosure in sponsored content, demonstrating that clear disclosure in Instagram posts improves advertising recognition, positively affecting consumer attitudes and behavioral intentions. Micro-influencers with smaller yet engaged followings were shown to generate higher consumer knowledge and purchase intentions when endorsements were transparent (Britt et al., 2020; Kay et al., 2020).

Coco & Eckert (2020) noted that consumers, especially women, follow influencers due to prior interest in the topic/product, perceived authenticity, and relatability. **Zhang et al. (2016) and Martínez-López et al. (2020)** found that the fit between influencer and content (message-user fit) affects message rebroadcasting and credibility, while overly commercialized content diminishes trust. **Chapple & Cownie (2017), Hendriks et al. (2020), and Coates et al. (2019)** highlighted that lifestyle vloggers who disclose paid endorsements are perceived as credible and influential, though content type (e.g., alcohol, children-targeted marketing) can influence engagement outcomes.

Kim & Kim (2020) showed that influencer-product congruence and sponsorship disclosure significantly affect consumer attitudes and purchase intentions. **Vries (2019)** indicated that

high likes-to-followers ratios do not always enhance credibility, with extreme ratios potentially reducing perceived trustworthiness. Compared to celebrities, social media influencers are often seen as more relatable and trustworthy, leading to higher purchase intentions (Jin et al., 2019; Trivedi & Sama, 2020). Source credibility, attractiveness, expertise, and disclosure practices collectively impact engagement and purchase behavior (Lou & Yuan, 2019; Sokolova & Kefi, 2020; Weismueller et al., 2020).

Xiao et al. (2018) identified that YouTube influencer marketing succeeds due to high perceived credibility, influenced by trustworthiness, social influence, argument quality, and information involvement. Travel influencers positively affect followers' travel intentions (Magno & Cassia, 2018; Rinka & Pratt, 2018), while the professionalization of Instagram influencers affects follower and advertiser relationships (Van Driel & Dumitrica, 2020).

Shan et al. (2019), Lee & Eastin (2020), Arora et al. (2019), and Belanche et al. (2020) highlighted that influencer-follower congruence, sincerity, identification, engagement, outreach, sentiment, and growth metrics enhance consumer engagement and brand attitude.

Huang et al. (2020), Boerman & van Reijmersdal (2020), Veirman (2019), and Smit et al. (2020) showed that children's engagement with influencers impacts dietary behavior and brand perceptions, raising concerns about young audiences. Influencers also establish strong parasocial relationships with followers, fulfilling emotional and identity needs, fostering loyalty, and positively impacting brand outcomes (Ki et al., 2020; Jun & Yi, 2020; Yuan & Lou, 2018).

Lou et al. (2019) and Schouten et al. (2020) found that influencer-promoted ads generate greater engagement and positive sentiment than brand-promoted content, with audiences identifying more strongly with influencers than with traditional celebrities.

Research Objective

To examine the impact of content marketing and influencer marketing on consumer engagement, trust, and purchase intentions in the metropolitan context of Hyderabad.

To explore how authenticity, disclosure, and influencer-consumer congruence influence brand loyalty and the effectiveness of digital marketing campaigns.

Research Methodology

The study adopts a descriptive research design to examine the influence of content and influencer marketing on consumer perceptions, engagement, and brand loyalty in Hyderabad. Primary data was collected from a sample of 100 social media users, including students and young professionals, using a structured questionnaire. The responses focused on social media usage, engagement with content and influencers, perceived authenticity, and purchase intentions. Data analysis was conducted using percentile methods and graphical representation to illustrate trends and patterns in consumer behaviour. The study provides insights into how digital marketing strategies impact brand–audience relationships in a metropolitan context, while ensuring voluntary participation and confidentiality of respondents.

Data Analysis

Demographic Profile of Respondents

A total of 100 respondents from Hyderabad participated in the study. Table 1 summarizes the demographic characteristics of the participants.

Table 1

Demographic Profile of Respondents (n = 100)

Variable	Category	Frequency (f)	Percentage (%)
Age Group	18–24 years	47	47
	25–34 years	13	13
	35–44 years	20	20
	45 years and above	20	20
Gender	Male	73	73
	Female	27	27
Educational Qualification	Graduate	13	13
	Postgraduate	73	73
	Professional Degree / Certification	13	13
	Other	1	1

Variable	Category	Frequency (f)	Percentage (%)
Occupation	Student	13	13
	Employed (Private Sector)	13	13
	Employed (Government Sector)	27	27
	Self-employed / Entrepreneur	40	40
	Unemployed / Job Seeker	7	7
Monthly Income	Less than ₹25,000	20	20
	₹25,000–₹50,000	33	33
	₹50,001–₹75,000	20	20
	Above ₹75,000	20	20
	Not Applicable	7	7

Narrative: The majority of respondents were aged 18–24 years (47%) and male (73%). Most respondents held a postgraduate degree (73%) and were self-employed or entrepreneurs (40%). The monthly income distribution shows a diverse economic background, with the highest proportion in the ₹25,000–₹50,000 range (33%).

Social Media Usage

Respondents reported varying levels of daily social media usage and platform preferences, as summarized in Table 2.

Table 2

Social Media Usage Patterns (n = 100)

Hours Spent on Social Media Daily	Frequency (f)	Percentage (%)
Less than 1 hour	7	7
1–3 hours	60	60
3–5 hours	20	20
More than 5 hours	13	13

Table 3

Platforms used for Brand/Influencer Content (n = 100)

Platform	Frequency (f)	Percentage (%)
Instagram	13	13
YouTube	33	33
Facebook	40	40
LinkedIn	7	7
Twitter (X)	0	0
Others	7	7

Narrative: Most respondents (60%) spend 1–3 hours daily on social media. Facebook (40%) and YouTube (33%) are the most frequently used platforms for brand and influencer content, while Instagram usage is comparatively lower (13%).

Perceptions of Content Marketing

Respondents evaluated their perceptions of content marketing on a 5-point Likert scale. Table 4 summarizes the results.

Table 4

Perceptions of Content Marketing (n = 100)

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Branded content helps me understand products/services better	0	7	13	80	0
I trust brands more when they provide informative and authentic content	0	0	20	60	20
Creative storytelling in brand content positively impacts my buying decision	0	13	13	73	0
Frequent content marketing increases my recall of a brand	0	7	13	73	7

Narrative: The results indicate strong positive perceptions of content marketing. A majority (80%) agreed that branded content helps them understand products better, and most respondents (73%) acknowledged that creative storytelling influences their purchase decisions.

Perceptions of Influencer Marketing

Table 5

Perceptions of Influencer Marketing (n = 100)

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I often discover new products/services through influencers I follow	0	13	33	53	0
I trust influencers' recommendations more than traditional advertisements	0	20	60	20	0
Influencer marketing feels more authentic and relatable compared to celebrity endorsements	0	7	53	40	0

Narrative: Most respondents (53%) agreed that they often discover new products via influencers, while influencer marketing is perceived as more authentic and relatable than celebrity endorsements (40%). Trust in influencers' recommendations was moderate, with 60% neutral.

Findings

1. The majority of respondents were aged 18–24 years (47%) and predominantly male (73%), with most holding postgraduate degrees (73%) and being self-employed or entrepreneurs (40%). This indicates that young, educated, and professionally active individuals form the primary social media and digital audience in Hyderabad.
2. Social media usage is high among respondents, with 60% spending 1–3 hours daily online. Facebook (40%) and YouTube (33%) emerged as the most popular platforms for accessing brand and influencer content, while Instagram usage was relatively lower (13%), suggesting platform preferences influence exposure to marketing content.

3. Respondents expressed strong positive perceptions of content marketing. A large proportion (80%) agreed that branded content helps them understand products or services better, while 73% indicated that creative storytelling in brand content positively impacts their buying decisions. Frequent content marketing also increased brand recall for most respondents, highlighting its role in enhancing engagement and knowledge.
4. Influencer marketing was perceived as effective in product discovery and engagement. More than half of the respondents (53%) reported discovering new products or services through influencers they follow. Additionally, 40% viewed influencer marketing as more authentic and relatable compared to celebrity endorsements, reinforcing the importance of credibility and relatability in influencer campaigns.
5. Trust in influencers' recommendations was moderate, with 60% of respondents being neutral. However, the alignment between influencer content and the audience's interests appeared crucial for engagement, emphasizing that micro-influencers or niche-focused creators may be more effective in driving purchase intentions.
6. Overall, both content marketing and influencer marketing were seen as complementary strategies. While content marketing enhances brand storytelling, credibility, and recall, influencer marketing strengthens trust, relatability, and product discovery. Respondents highlighted the need for transparency, authenticity, and value-driven influencer partnerships to maximize engagement and loyalty.
7. The study also indicates that younger, digitally active audiences are highly receptive to online marketing strategies, making data-driven content creation and targeted influencer collaborations essential for brands aiming to build meaningful connections with their audience in Hyderabad.

Recommendations

1. Brands should collaborate with micro-influencers who have smaller but highly engaged followings to enhance authenticity and consumer trust.
2. Transparency in campaigns should be maintained by clearly disclosing sponsored content and encouraging influencers to provide honest reviews.
3. Content marketing should be data-driven and tailored to audience preferences to ensure relevance and engagement.
4. Storytelling in brand content should educate, entertain, or inform, rather than only promote, to improve brand recall and emotional connection.

5. Brands should focus on platforms where their audience is most active, such as Instagram, YouTube, and Facebook, to maximize reach.
6. Long-term partnerships with influencers are recommended to foster audience loyalty, credibility, and consistent engagement.
7. Campaign effectiveness should be regularly monitored using engagement metrics, feedback, and conversion rates to refine strategies.
8. Marketing strategies should particularly target younger, digitally active audiences, as they are highly responsive to social media and influencer-led campaigns.

Conclusion

The study highlights the transformative impact of content and influencer marketing on brand–audience relationships in the metropolitan context of Hyderabad. The findings reveal that influencer marketing significantly affects consumer perceptions, trust, and purchase intentions, with relatability and authenticity being key drivers of engagement. Content marketing, on the other hand, strengthens brand storytelling, credibility, and recall, enabling brands to communicate effectively with their target audience. While micro-influencers with smaller yet highly engaged followings generate more authentic consumer responses, transparency and disclosure of sponsored content remain critical for maintaining trust. The study also indicates that consumers, particularly younger audiences, are increasingly discerning and value meaningful, personalized, and authentic brand communications. Based on these insights, brands and marketers are encouraged to integrate data-driven content strategies with authentic influencer partnerships, focusing on long-term engagement, ethical promotion, and consistent communication. Overall, the research underscores the importance of adapting marketing strategies to evolving digital trends and audience expectations to foster loyalty, credibility, and positive brand outcomes.

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A Study on Factors Influencing Consumers to Buy Eco – Friendly Products": with Special Reference to Daily use & Lifestyle Products

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Abstract

This paper dwells upon issues affecting consumers in Bengaluru to purchase eco-friendly products, particularly those related to day-to-day use and lifestyle. The awareness of the environment has also grown in the recent years and a number of individuals are now becoming interested in eco-friendly products. Nevertheless, their real purchasing behaviour is determined by a number of factors. This study will determine these important factors including: awareness, price, quality, brand trust, availability, social influence and promotional activities. The research survey is employed on a structured questionnaire, which gathers data with consumers in Bengaluru. Analysis of the responses was done to get insights on their purchasing habits and the motivations of their purchasing behaviour. The findings reveal that the majority of consumers are ready to purchase environmentally friendly products in case they think that the products in question are of high quality, in easy access, and at a reasonable price. The great part is also played by awareness of the ecological problems and the positive outcomes of environmentally friendly products. Moreover, the green purchasing is also promoted by adverts, social media, and word-of-mouth of other people. In general, the research finds that the consumer behaviour is informed by a mixture of individual awareness, product characteristics, and promotions. The findings can assist businesses, retailers, and policymakers to come up with superior strategies of marketing eco-friendly goods and enhancing sustainable consumption in Bengaluru

Keywords: *Eco-friendly product, Consumer behaviour, green buying, Awareness, Sustainable consumption*

Introduction

The popularity of eco-friendly products is explained by the fact that individuals are increasingly conscious of such issues like pollution, plastic waste, and global warming. Cloth bags, refillable bottles, bamboo toothbrushes, and organic personal care products are some of the products that many people currently use due to their safety to health and the environment. These products are found in a fast-developing city such as Bengaluru, and not everybody makes their purchases. The purchasing habits of people are influenced by such factors as price, quality, availability and brand trust. Some individuals purchase environmentally friendly goods to conserve the environment, and others do not because they are too expensive or they are not aware of their presence. This paper seeks to learn the reasons why individuals either adopt or fail to adopt environmentally friendly products used in their day-to-day activities in Bengaluru. It also analyzes the effects of age, income and education upon their purchasing choices.

Need for the Study

This research is useful in knowing the reason why individuals purchase or fail to purchase environmentally friendly products. It will make such products more affordable and accessible to businesses and policymakers.

Statement of the Problem

Though there are numerous green products offered, residents of Bengaluru do not purchase them regularly because of their high cost, low availability, or low quality, or buy them because they are aware of the environmental issue or are loyal to a brand. This paper has determined the major determinants of such purchases and looks at variations in perceptions between the different age groups in Bengaluru.

Objectives of the Study

1. To understand the causes influencing people in Bengaluru to purchase or not purchase environmentally friendly everyday life and lifestyle goods.
2. To know what the individuals consider and feel about greener products.
3. To determine the influence of age, income, or education on the purchase of environmentally friendly products.

Review of Literature

Past researchers indicate that concern towards the environment is a strong way of convincing individuals to purchase products that are environmentally friendly. Kumar et al. (2021) have observed that self-control and environmental values are significant in green purchasing. According to a study conducted by Sona et al. (2024), the knowledge of environmentally-friendly products and their worth inspire consumers. As Desai and Bhatt (2024) noted, sustainable buying is stimulated by product knowledge and viewed benefits. Sharma (2023) also discovered that availability and product value is also a key determinant. In general, the predominant motives of green purchasing in India are the level of awareness, environmental concern, and product value.

Research Gap

The current researches are not explicit on the impact of demographic variables such as age, income and education on the real purchase behaviour of consumers, a factor that this research seeks to clarify.

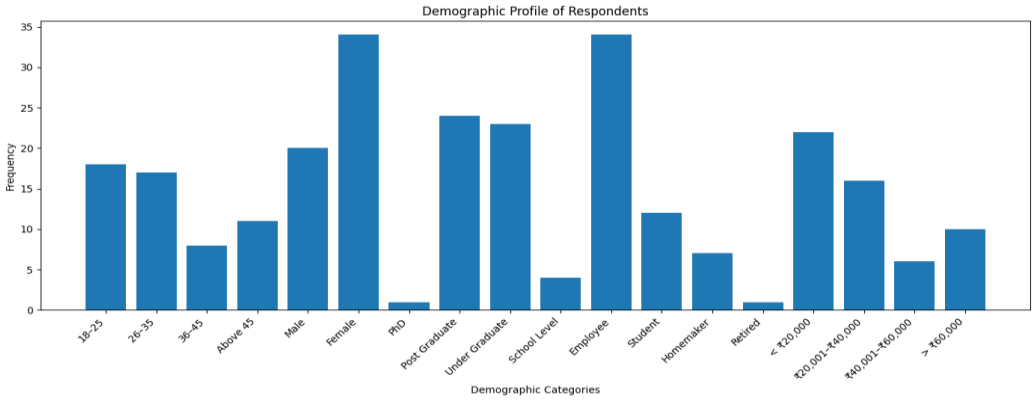
Research Methodology

This study follows a descriptive research design and is limited to Bengaluru city. Primary data was collected using a structured questionnaire through Google Forms from about 50–65 respondents selected by convenience sampling. Percentage analysis and mean score analysis was used to analyse the data. The study is limited to an urban sample and focuses only on daily-use and lifestyle eco-friendly products, so the results cannot be generalised to all Indian consumers.

Data Analysis and Interpretation

Graph 1

Demographic profile of Respondents



Interpretation

The demographic profile indicates that most of the respondents are young (18-35 years) females who are well educated and have been employed. The majority of the respondents are of the lower and middle-income categories, and this implies that there is a wide range of consumers of eco-friendly products.

Table 1

Mean Scores of Factors Influencing Purchase of Eco-Friendly Products

Question No.	Factors	Mean Score	Interpretation
1	**Price sensitivity**	3.67	High
2	**Brand trust**	3.96	High
3	**Environmental concern**	4.20	Very High
4	**Availability (store/online)**	4.04	High
5	**Quality & durability**	4.07	High
6	**Health benefits**	4.33	Very High
7	**Product reliability**	3.69	High
8	**Environmental responsibility**	4.28	Very High
9	**Replacing plastic products**	4.41	Very High
10	**Labels & certification**	4.22	Very High
11	**Age influence**	3.39	Moderate
12	**Income influence**	3.39	Moderate
13	**Education influence**	3.02	Moderate
14	**Age-based preference difference**	3.78	High
15	**Sustainability awareness**	4.07	High

Scale used

The value of 1-1.80 = Very Low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = High; 4.21-5.00 = Very High.

Interpretation

The mean score analysis shows that the strongest motivators of the purchase of the eco-friendly products are environmental concern, health benefits, responsibility to the environment, and the replacement of the plastic products. Price, quality, availability, brand trust and certification factors also exhibit very high influence. The demographic variables such as age, income and education have a moderately strong influence on the purchasing behaviour in regard to eco-friendliness.

Findings

Bengaluru consumers have a positive stance towards environment-friendly products. The purchase decisions are greatly affected by environmental concern, health benefits, and plastic reduction. Buyers have high expectations in terms of price, quality, availability, and brand trust in buying behaviour. Certifications and labels are significant in the creation of consumer confidence. Age, income and education only have a moderate effect meaning that they are generally widely accepted.

Suggestions

Eco products are supposed to be sold at a moderate price to appeal to the consumers. It should be available in the local stores easily and in online shops as well. In promotions, companies should aim at health and environmental benefits. There should be proper display of eco-labels and certifications. Sensitization activities are to be carried out to promote sustainable consumption.

Conclusion

The research has determined that eco-friendly products used in daily lives and lifestyle products have a positive and strong attitude among consumers in Bengaluru. Issues like environmental concern, health benefits, good quality, availability of products, brand trust, and clear labelling are some of the factors that greatly affect buying behaviour. Demographic factors, including age, income, and education, affect the situation only partially, and awareness and accessibility are more decisive. They can also enhance sustainable consumption by strengthening awareness campaigns, enhancing affordability, and assuring quality to minimise environmental damage.

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Women's Cosmetic Consumption in the Era of AI – Driven Social Media Marketing

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Abstract

AI-driven social media marketing helps Cosmetic brands to promote products, build trust, connect with an audience, and drive business goals. It also helps in automating content scheduling, generating posts, analysing engagement and most importantly reshaping how women discover, evaluate, and purchase cosmetic products on social media. AI suggests personalized beauty content, product recommendations, and targeted ads in social media platforms like YouTube, Instagram and Facebook that connect with their preferences and impact the users browsing behavior. Because of this, more women highly depend on AI-enabled posts, virtual try-ons, and influencer style advice to help them to discover new beauty products. This study explores the effect of AI-enabled social media marketing on women's cosmetic usage and decision making. The article highlights customer perceptions of product quality and buying intentions are influenced more by online reviews, automated sentiment analysis, and AI-powered opinions compared to traditional advertising. The study also looks into how AI-driven real-time pricing and personalized promotions provide suggestions and discounts based on consumer spending histories and habits. The study suggests that by giving consumers a sense of understanding and customized recommendations help to increase the cosmetic companies brand loyalty. To conclude that women's cosmetic consumption patterns are actively shaped by AI-driven social media marketing, which not only promotes cosmetics but also influences what they see, believe, and ultimately decide to purchase

***Keywords**: AI-Driven Social Media Marketing, Personalized recommendations, Analysing Engagement, Brand loyalty, Decision making*

Introduction

The Changing Cosmetic Landscape and AI-Powered Social Media Marketing

Artificial Intelligence (AI) has transformed the way cosmetic brands connect with consumers in the digital era. Social media has transformed into a data-driven ecosystem where algorithms influence everything from product finding to purchasing decisions. In the beauty industry, AI-driven marketing enables brands to understand consumer behavior, predict trends, and create hyper-personalized experiences. Since women play a vital role in the global beauty market, the integration of AI technologies into social media marketing has reshaped how they see, believe and purchase beauty products.

Objectives of the Study

- To examine the impact of AI-enabled customization on women's cosmetic product finding and purchase decisions.
- To assess the role of AI-powered reviews, sentiment analysis, and influencer focused content in shaping women's cosmetic purchase decisions.
- To examine the impact of AI-driven product pricing and promotional strategies on women consumers' buying behaviour.
- To suggest effective managerial implications using AI-driven social media marketing for cosmetic brands.

Review of Literature

1. **Tungkhang, K., & Rroy, A. D. (2025):** The study highlights that AI is transforming cosmetic consumer behaviour through personalized tools such as virtual try-ons, skin analysis, and customized product recommendations. The research paper stated that these technologies influence consumer decision-making, help to increase satisfaction, and reduce risk in online shopping while also supporting brands through trend forecasting, customer insights, and improved product development and marketing. The study insists the marketers give importance to the challenges related to data privacy, algorithmic bias, and ethical concerns. The study also suggests that ensuring transparency, fairness, and diversity is essential to maintain consumer trust. The study concludes that AI helps to improve cosmetic experiences; the future research is needed to address its limitations and ensure responsible implementation.

2. **Dr. Budanur Suresh and Dr. Mubarak (2025)** the study evaluated the impact of AI-driven customer segmentation on customer value in digital marketing with specific reference to cosmetic products. The study disclosed that AI-based segmentation allows brands to analyse consumer behaviour, preferences, and purchase patterns more effectively compared to traditional segmentation methods. The study indicates that AI-driven personalization improves Ad alignment, customer satisfaction, brand loyalty, and repeat purchase behaviour. The research further states that AI-powered marketing strategies help to build long-term customer relationships and enhance overall customer value in a highly competitive digital cosmetic market.

3. **Miss. Himani Devi and Dr. Amit Kumar Uniyal (2025)** the study examined the impact of AI-driven social media advertising on consumer purchasing decisions in the context of digital marketing. The study explains personalized advertisements based on consumers' browsing behaviour, shopping history, and online interactions are possible only with that Artificial Intelligence social media marketing. The data were collected from 227 respondents and the data were analyzed by applying explanatory factor analysis with that the research identifies four key AI-driven factors influencing purchase intention: personalized recommendations, behavioural targeting, chatbots and virtual assistants, and predictive analytics. The findings disclose that AI-based personalization and real-time targeting significantly enhance consumer trust, engagement, and confidence during the purchase process, ultimately increasing purchase intention. The study concludes that AI-operated digital marketing plays a crucial role in shaping modern consumer behaviour by improving decision accuracy, customer satisfaction, and repeat purchasing through data-driven and personalized advertising strategies.

4. **Lyanlie Winarto and Anggara Wisesa (2024)** The researchers studied the combined influence of Artificial Intelligence and sustainability on Gen Z consumers' purchase intentions in the cosmetics industry with special reference to L'Oréal's Garnier brand. The researchers collected data among 400 Gen Z respondents in Indonesia. The study concludes that AI-enabled tools such as skin analysis applications boost consumer decision-making by providing accurate, interactive, and personalized skincare recommendations. The positive brand attitudes and purchase intentions were highly

influenced by the sustainability practices, including eco-friendly ingredients and ethical testing practices. The findings suggest that the combination of AI-powered customization with sustainability initiatives highly impact Gen Z buying behaviour in the cosmetic market.

5. **Izharuddin Pagala, Muhammad Asir, Klemens Mere, Utami Puji Lestari, and Heidi Siddiqa (2024)** According to the study, marketers can predict customer needs and wants, provide customized content, product recommendations, and targeted advertisement by using AI-powered data analytics. By using these customized approaches cosmetic brands can increase customer loyalty, trust, and engagement and also affect purchasing decisions. Transparency and responsible data practices are crucial for maintaining customer trust in AI-driven marketing environments, the study also highlights concerns related to data privacy and ethical use of consumer information.

Transformation of Women's Cosmetic Consumption in the AI-Driven Social Media Era

Artificial Intelligence has emerged as a changing force in social media marketing in the cosmetic market. AI-enabled personalization, review analytics, virtual try-ons, and automated promotional strategies together influence women's purchase behavior, brand relationships, and managerial decision-making.

1. Evolution of AI-powered Social Media Marketing in the Cosmetic Industry

- AI- enabled digital and social media marketing techniques and strategies have changed the traditional advertisements of the cosmetics business during the last ten years. Social media platforms were initially used for only influencer collaboration and visual storytelling. Currently, AI tools analyze consumer data to design customized marketing strategies, predict consumer preferences, and improve engagement.
- Machine learning algorithms identify the trending beauty looks; automated content generation ensures brands stay relevant and responsive to audience demands. This evolution transformed smart and data based decision-making from perception based marketing.

2. Women as Digital Beauty Consumers in the AI Era

- Modern women consumers are empowered, knowledgeable, and connected to the internet. They depend on social media to explore beauty trends, seek peer validation, and make purchase decisions. AI-driven tools enhance their experience by offering personalized product suggestions, virtual trials, and beauty insights that align with their preferences.
- Through reviews, content sharing, and online conversations, people co-create stories about brands instead of being passive consumers. The consumer behavior provides the brands with valuable information to improve their marketing strategies.

3. AI-Enabled Personalization and Cosmetic Product Discovery

- AI technology enables cosmetic brands to provide personalized experiences widely. Through data analysis, algorithms can identify the consumer skin tone, type, preferences and analyse previous purchases to suggest the suitable cosmetic products.
- Chatbots and recommendation engines provide immediate support to the customers and also help users to discover new products suitable to their unique beauty profiles. This hyper-personalization not only simplifies the product finding process but also improves consumer satisfaction level and helps to build brand loyalty.

4. Role of AI-Powered Reviews, Sentiment Analysis and Influencer-Style Content

- Social media conversations play an important role in influencing consumer perceptions about cosmetic products. AI-powered sentiment analysis tools monitor these social media discussions to understand consumer emotions and feedback.
- AI-powered influencer-style content shows reliable human interactions, enhancing trust and relatability. Brands use these insights to improve their messaging, identify emerging issues, and maintain credibility among the consumers.

5. Impact of Virtual Try-Ons and Automated Recommendations on Decision Making

- Using augmented reality (AR) and AI, Virtual try-on tools allow the consumers to test their preferred products digitally before purchasing. This interactive feature builds confidence and reduces the risk of dissatisfaction.

- ❖ Automated recommendations complement this experience by suggesting complementary products, shades, or routines based on real-time preferences. These tools help to transform decision-making into an enjoyable process for the consumers.

6. AI-Driven Pricing, Promotions, and Purchase Behaviour of Women Consumers

- ❖ AI algorithms enhance pricing strategies by examining market trends, competitor activities, and consumer feedback. Real-time pricing models enable competitiveness while ensuring profitability.
- ❖ Tailored promotions and specific discounts further impact women's buying behavior, resulting in heightened conversions and customer loyalty within the cosmetic industry. This data-driven approach enables brands to anticipate consumer needs and deliver value at the right moment.

7. Brand Loyalty Formation through AI-Enabled Engagement

- ❖ AI improves brand loyalty by creating meaningful and constant interactions with consumers. Predictive analytics helps the cosmetic brands to understand what keeps customers engaged and satisfied, while automated systems provide timely and related content.
- ❖ Personalized messages, loyalty programs, and real-time support build emotional connections that strengthen long-term relationships. As a result, women consumers develop trust and attachment toward cosmetic brands that recognize and respond to their unique needs and wants.

8. Conceptual Framework for Women's Cosmetic Consumption

- ❖ A conceptual framework for women's cosmetic consumption in the AI-driven era can be made around four fundamental dimensions: personalization, engagement, trust, and satisfaction. AI helps as the central enabler connecting these dimensions.
- ❖ Data insights update personalization; interactive tools improve customer engagement; transparent algorithms build trust; and optimized experiences lead to higher level of customer satisfaction. This framework explains how AI not only influences purchase decisions but also shapes the overall consumer journey in beauty consumption.

9. Consequences for Cosmetic Brands in Marketing Management

- ❖ AI integration into social media marketing provides both benefits as well as challenges for the cosmetic brands. In order to prevent technology efficiency from harming the user's connection, managers have to maintain a balance between automation and authenticity.
- ❖ Investment in AI tools should align with brand identity and ethical standards, particularly in consumer data privacy and inclusivity. Companies that effectively connect AI will be able to predict consumer needs, strengthen brand loyalty, and maintain a competitive advantage in a digital marketplace.

Findings

1. Women's cosmetic purchase decisions are controlled by AI-powered tools such as customized advertisement, product suggestions, and virtual try-ons.
2. AI-enabled personalization increases engagement, and satisfaction, leading to higher conversion rates. Chatbots, personalized content, and follow-ups help to increase emotional attachment and brand loyalty.
3. Product valuation is impacted by AI-enabled reviews, sentiment scores, and influencer-style content.
4. AR-based virtual try-ons enhance confidence and reduce uncertainty related to shade selection, skin suitability, and product performance.
5. AI-driven pricing strategies, personalized discounts, and limited-time offers definitely affect impulse buying and frequent purchases.

Suggestions and Recommendations

- ★ The brand has to invest in innovative AI personalization tools to provide customized beauty experiences.
- ★ The brand has toUse virtual try-on technologies for social media and e-commerce platforms.
- ★ The brand has toUtilize AI-powered sentiment analysis to track consumer feedback and improve product offers.
- ★ The brand has to Collaborate with AI-supported micro-influencers for reliable engagement.
- ★ In order to build consumer trust the marketers need to implement real-time pricing.
- ★ Focus on ethical AI practices by ensuring data privacy and transparency.

- ★ The marketers need to design Female-oriented AI marketing methods in view of different skin tones, preferences, and cultural aspects.
- ★ The marketers have to use predictive analytics to forecast the beauty trends.
- ★ The marketers have to balance automation with human creativity and empathy in brand communication.

Conclusion

AI has become a vital force driving revolution in the cosmetic market. Through social media marketing, it enables brands to deliver personalized products, engaging, and data-driven experiences to women consumers. From virtual try-ons to predictive analytics, AI shaped how beauty is perceived, discovered, and consumed. As technology continues to evolve, the future of cosmetic marketing will depend on remarkable balance between intelligent automation and authentic human connection.

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Factors Influencing Consumer Buying Behaviour – A Study towards Organic Agricultural Products in Villupuram District

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Abstract

The demand for organic agricultural products has grown rapidly in recent years due to increasing health consciousness and environmental awareness among consumers. Understanding the factors that drive consumers to purchase organic products is essential for strengthening the organic market, especially in semi-urban and rural regions. This study explores the major determinants that shape consumer buying behaviour towards organic agricultural products in Villupuram district. The study aims to assess consumer awareness, identify motivations for choosing organic products, analyse demographic influences, examine barriers to purchase, and suggest strategies to improve adoption. Primary data were collected through a structured questionnaire administered to consumers from varied demographic backgrounds. Findings reveal that health benefits, environmental concern, trust in product quality, and positive perception strongly influence buying behaviour. However, high prices, limited product availability, and inadequate certification remain key obstacles. The study recommends improving awareness programmes, strengthening labeling standards, expanding market access, and increasing government support to promote wider acceptance of organic agricultural products.

Keywords: *Organic agricultural products, consumer awareness, buying behaviour, environmental concern, product preference.*

Introduction

Growing concerns about food safety, environmental sustainability, and long-term health have increased consumer interest in organic agricultural products. Organic farming

avoids the use of synthetic fertilizers, pesticides, and genetically modified organisms, making these products healthier and more eco-friendly. In India, the demand for organic produce has been rising steadily, particularly in urban and semi-urban regions. Villupuram district, known for its agricultural base, has witnessed growing consumer curiosity and awareness about organic food. Despite this trend, several challenges—such as higher prices, lack of certification clarity, and limited market access—restrict consumers from fully adopting organic products. Hence, understanding consumer preferences, awareness levels, and perceived barriers is crucial. The present study examines the various factors influencing consumer buying behaviour towards organic agricultural products in Villupuram district.

Health Benefits of Using Organic Products

1. **Minimal Exposure to Harmful Chemicals**

Organic farming excludes synthetic pesticides and fertilizers, reducing the risk of health issues such as hormonal disorders, neurological problems, and cancers.

2. **Lower Possibility of Allergies**

With fewer chemical additives or preservatives, organic foods are less likely to cause allergic reactions or skin and respiratory problems.

3. **High Nutritional Content**

Organic produce often contains more antioxidants, vitamins, and minerals, contributing to improved immunity and overall well-being.

4. **Better Heart Health**

Organic dairy and meat products generally contain higher omega-3 fatty acids, which are beneficial for heart and brain health.

5. **Reduced Antibiotic and Hormone Intake**

Organic livestock are raised without antibiotics or growth hormones, lowering risks associated with antibiotic resistance and hormonal imbalance.

6. **Strengthened Immune System**

Absence of harmful chemicals helps consumers maintain a stronger immune response.

7. **Reduced Risk of Chronic Illnesses**

Long-term consumption of chemical-free food may help prevent lifestyle diseases such as diabetes, hypertension, and cancer.

8. **Safer for Children**

Children, being more sensitive to toxins, benefit significantly from organic foods that avoid harmful chemicals.

Objectives of the Study

1. To examine the demographic factors of (age, income, education, occupation) consumer buying behavior in the research area.
2. To analyze the level of consumer awareness and knowledge about the organic agricultural products.
3. To identify the reasons for consumers' preference of organic products (health, environment, taste, quality, etc.).
4. To identify the barriers and challenges faced by consumers while purchasing organic agricultural products.

Scope of the Study

The study is confined to Villupuram district and focuses exclusively on organic agricultural products. It examines consumer awareness, preferences, demographic influences, and obstacles that affect purchase decisions. Data were collected from consumers belonging to different socio-economic groups through a structured questionnaire. Processed organic items and packaged organic foods are excluded from the analysis. The findings reflect perceptions during the data-collection period and may vary over time with market and price changes. The study concludes with recommendations for increasing consumer awareness and improving access to organic agricultural products in the district.

Review of Literature

Hafezali, Salem Abdelnabi(2015), "Consumer Attitude Towards organic Food". International Accounting and Business Conference 2015,IABC 2015.The main emphasis of the study is to determine why the consumers turn towards organic food products. The research identifies the motivating factors that influence the purchase of organic food. This study also evaluates the

subjective norms of organic food consumers. It identifies the relationship between environmental concern and attitude towards organic food products.

Ham Marija, Pap, Karla(2016), Percieved Barriers For Buying Organic Food Product" this research paper was presented in 18th international conference on Economic and Social Development-"Building Resilent Society". Zagreb,Croatia 9-10 Dec. 2016. The objective of this study is to determine the key barriors for buying organic food products. The main barriers are cost barriers, time barriers, knowledge barriers and negative attitude towards organic food and these barriers need to be minized by marketing actions in order to stimulate buying organic food.Basha Bilal Mohammed, Mason Cordelia, ShamsudinFaridMohmmad, Hussain Iqbal

Priya S, ParmeshwariM(2016) "Consumers Attitude towards Organic Food Products". The objective of this study is to know the demographic variables of the customers using organic products. The study finds the awareness of consumers about the organic products. The study finds that there is a significant relationship between monthly income and expenses and in a significant relationship between respondent and period of consumption.

Kumar Pardeep, Gulati Hema(2017) " Consumers‟ Perception Towards Organic food Products in Rural Area of Haryana". This study focused to analize the rural market for organic products. The objective of this study is to examine the customers perceptions towards organic products in Rewari of Haryana. This study also examines the level of awareness of consumers towards organic products. The result of this study shows that a lot of problems are faced by the rural population while purchasing the organic product. The study finds that irregular availability of organic products also affects the choices of consumers. Organic products are expensive and their varieties are also limited.

Research Methodology

This study examines the factors influencing consumer behaviour toward organic agricultural products in Villupuram district. A descriptive research design was adopted to understand consumer awareness, preferences, and challenges in purchasing organic products.

3.1 Research Design

The study follows a descriptive research design, which helps in evaluating consumer perceptions, awareness levels, and influencing factors related to organic agricultural products.

3.2 Area of the Study

The research was conducted in Villupuram District, a semi-urban and agricultural region where awareness of organic products is gradually increasing.

3.3 Sampling Technique

The Convenience Sampling Method is used due to ease of access and availability of respondents. This method was suitable for reaching consumers visiting markets, shops, and public areas..

3.4 Sample Size

A total of 64 respondents participated in the study. Respondents include individuals from different age groups, income levels, and educational backgrounds.

3.5 Source of Data

Primary Data:

Primary data were Collected by using a structured questionnaire with demographic questions and multiple-choice items on awareness, preference, and perception of organic products.

Secondary Data:

The Secondary data have been Collected from the journals, research articles, websites, government reports, and textbooks related to organic farming, consumer behaviour, and sustainable agriculture.

Table No: 1

The main reason consumers prefer organic products

Statements	Frequency (n)	Percentage (%)
Health benefits	50	78
Better quality	04	6
Natural production	10	16
Good taste	00	00

Interpretation

Most consumers (78%) choose organic products for health reasons. Taste is not seen as a motivating factor.

Table No: 2

Environmental concern encourages consumers

Statements	Frequency (n)	Percentage (%)
Choose organic products	24	38
Support natural farming	18	28
Reduce chemical usage	20	31
Promote sustainability	02	03

Interpretation

- **Highest** (38%) respondents choose organic products due to **environmental concern.**
- Only 3% said **promoting sustainability,** meaning consumers are less aware of long-term environmental impact.

Table No: 3

The biggest factor that can improve organic buying

Statements	Frequency (n)	Percentage (%)
Affordable price	18	28
More availability	14	22
Better awareness	28	44
Clear certification	04	06

Interpretation

Improved awareness (44%) is the most important factor for increasing purchase levels.

Table No: 4

Awareness helps consumers

Statements	Frequency (n)	Percentage (%)
Prefer organic products	36	56

Understand health benefits	14	22
Choose natural food	12	19
Make informed decision	02	03

Interpretation

Awareness strongly influences preference; however, only a few consumers feel confident in making informed choices.

Conclusion

The study concludes that consumers in Villupuram district generally hold positive views about organic agricultural products. Health benefits, environmental concern, and natural production are the main drivers influencing their buying behaviour. Nevertheless, factors such as high product prices, limited availability, and inadequate certification systems restrict wider adoption. The findings emphasize the need for stronger awareness campaigns, better labeling standards, increased market supply, and supportive government policies. Enhancing these aspects can significantly boost the demand for organic agricultural products in the district. Overall, the study highlights the growing interest in organic consumption but also underscores the importance of addressing key barriers to ensure wider consumer acceptance.

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Analysis of Gen Z Consumer Behavior on Advertising Effectiveness and Brand Preference in FMCG in Chennai

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Abstract

The Fast-Moving Consumer Goods (FMCG) industry has undergone a major shift with the rise of digital media, transforming how young consumers perceive and choose brands. This study explores how advertising effectiveness influences brand preference among Generation Z consumers in Chennai, a demographic known for its constant online presence and rapid adoption of digital trends. Using primary data collected from 125 Gen Z respondents aged 18 to 27, the research applies descriptive statistics, reliability tests, correlation, and regression analysis to examine how different advertising elements shape consumer choices. The findings show that digital advertisements particularly social media promotions, influencer endorsements, and short interactive videos play a far more decisive role in shaping Gen Z's brand preference than traditional advertising. Creative appeal, emotional reliability, trust in influencers, and engaging formats significantly guide their purchase decisions. The study provides insights for FMCG marketers on designing authentic, visually appealing, and interactive ad strategies that resonate with Gen Z's values and fast paced digital consumption habits

***Keywords**: Digital Advertising Influence, Gen Z Consumer Behavior, FMCG Brand Preference, Social Media Engagement, Influencer-Driven Marketing*

Introduction

The Fast-Moving Consumer Goods (FMCG) industry holds a pivotal position in the Indian economy, encompassing essential products such as packaged foods, beverages, toiletries, and household consumables that are purchased and used frequently. As one of the country's largest sectors, it significantly contributes to economic growth, employment

generation, and rural development. Its rapid expansion over the past decade has been driven by factors such as liberalisation, rising disposable incomes, increasing brand awareness, the modernisation of retail formats, and improving connectivity across urban and rural markets. In recent years, the integration of digital channels and online consumption models has further reshaped how FMCG products are discovered and purchased, with forecasts suggesting that a growing share of consumption will occur through digital platforms in the coming years.

Parallel to this market evolution, the emergence of Generation Z as a key consumer segment is transforming traditional consumption patterns and compelling brands to rethink their strategies. Unlike earlier cohorts, Gen Z is more digitally native, values convenience and personalised experiences, and often prioritises quality, sustainability, and lifestyle alignment in their choices — trends that are influencing everything from product innovation to marketing and distribution strategies across the FMCG landscape. As a result, companies are increasingly investing in digital engagement, direct-to-consumer models, and shorter innovation cycles to stay relevant in a marketplace shaped by evolving youth preferences and accelerated digital adoption.

Gen Z includes people born between 1997 and 2012, and they make up a large and influential part of today's population. Generation Z because they grew up with smartphones, internet, and social media from a young age, they are very comfortable with technology and digital experiences. Generation Z this means online shopping, mobile payments, social media reviews, and e-commerce platforms are a normal part of their daily life, and they use these tools to learn about and choose products.

Scope of the Study

In this study focus on Gen Z consumer expectation, requirement and need. It encompasses and exploration of advertisement effectiveness, brand preference and role of digital advertising & purchase behavior of Gen Z consumer at Chennai district. The research mainly focus on urban area Gen Z consumer because they are digitally matured economist.

Importance of the Study

i) The manufacturing sector required to identify the need of the consumers because all the manufacturing industry should be depend upon different types of consumer not only Gen Z,

ii) The manufactured goods should attract and fulfill need of different categories of the customer.

iii) Due to age, technology, digital transaction and social media influence now a days play a vital role to reached the potential customers In the situation how the product should be reached all the customer and how the manufacturing industry should be satisfied different categories of people should be find the solution form this research.

Objectives

I. To analyze the brand preference of Gen Z consumers' in the Fast Moving Consumer Goods product in Chennai.

II. To identify the key advertising elements and digital advertising influence of Gen Z consumer purchasing decisions.

Review of Literature

Rishika Bhojwani (2025): This study investigates the major determinants influencing their buying behaviour, particularly across three key factors: Perceived Convenience & Accessibility, Assortment & Price Promotions, and Trust & Quality Assurance. Additionally, the research examines how these factors influence consumer purchase intention and channel preference across retail formats such as grocery shops, malls, and online platforms. With changing lifestyle patterns, digital influence, and rising brand consciousness, Gen Z has emerged as a distinctive market segment requiring strategic attention. The study's findings confirm that Gen Z consumers exhibit dynamic and experience-driven buying behaviour in the FMCG sector. The influencing factors—Perceived Convenience & Accessibility, Assortment & Price Promotions, and Trust & Quality Assurance—significantly shape their purchase decisions. Among them, Trust & Quality Assurance emerged as the most powerful determinant in physical retail, reflecting Gen Z's preference for authenticity, hygiene, and branded quality.

Chaitanya Koneti, A. Seetharaman et all (2025): The emergence of Generation Z as a dominant consumer group has compelled brands to rethink and reshape their marketing and branding strategies. Born between the mid-1990s and early 2010s, Gen Z exhibits distinct digital behaviors, values authenticity, social responsibility, personalization, and engages heavily with social media platforms. This research paper investigates the evolving branding techniques driven by Gen Z's consumption patterns, psychological drivers, and engagement

channels. Through a comprehensive analysis of recent academic and industry literature, the study identifies key shifts in branding paradigms, such as influencer-driven marketing, immersive brand experiences, and value-based storytelling. It explores how brands are leveraging emerging technologies like AI and AR to align with Gen Z's expectations and preferences. This research investigates the transformative influence of Gen Z consumer behavior on contemporary branding techniques, revealing a generation that is digitally intuitive, socially conscious, and experience-centric.

Research Methodology

Research design

This research adopts a descriptive research design, which focuses on Gen Z's primary customer buying behavior, influencing factors, and purchasing location choices of store, mall, and online platform. Descriptive research helps to identify perceptions, current attitudes, and needs.

Nature of Research

The quantitative research adopted in this study helps to identify and correlate the results of the general objectives and demographic factors in this research. This study used a 5-point scale.

Data Collection

Primary Data

Data collected from potential Gen Z customers. Structured questionnaire distributed online and offline to Gen Z customers. Primary data collected 125 customers from different regions, qualifications and economic backgrounds.

Secondary Data

Secondary data collected from cited articles, journals, government websites, and many other literature reviews. Secondary data helps to identify the research gap of the study.

Statistical Tools

Data Analysis

The data analysis by the research based on data collected from Gen Z consumer of urban/ metro areas.

Table No. 1

Media Platform Impacts Brand Preference

S. No	**Media Platform Impacts Brand Preference**	**No. of Respondent**	**Percentage**
1	Instagram	39	31
2	YouTube	22	18
3	TikTok	12	10
4	Facebook	52	41
	Total	**125**	**100**

Sources: Primary data

The above table shows that media platform impacts on brand preference of FMCG product.41% of respondent opinion are face book social media impact on brand preference,31% of respondent opinion instagram, 18% of the respondent prefer through you tube and 10% of the respondent prefer through for tiktok. Most of the respondent opinion is brand prefer through for face book.

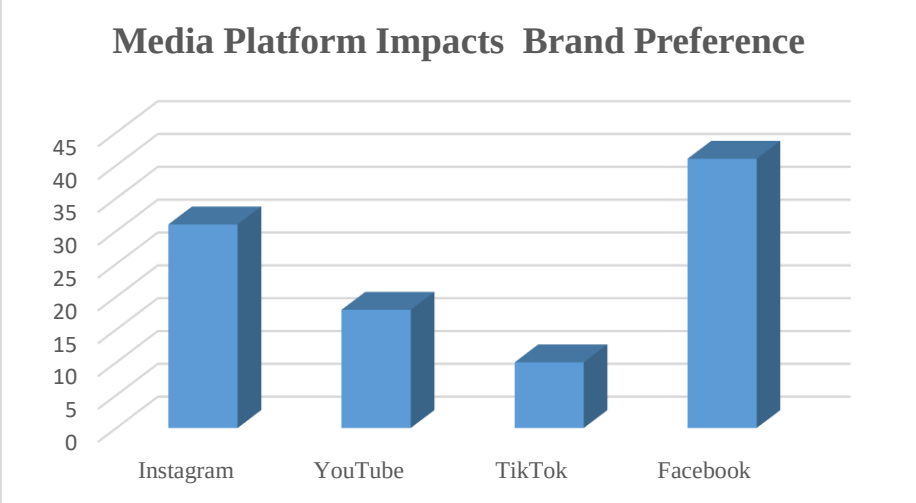

Table No. 2

Advertising Effectiveness on Gen Z

S.NO	**Advertising Effectiveness on Gen Z**	**Mean**	**SD**
1	Advertisements are visually attractive	3.82	0.96
2	Creative ads catch my attention quickly	3.25	1.27

3	Advertisements influence my interest in FMCG brands	3.51	0.95
4	Influencer ads feel more convincing than traditional ads	3.39	0.89
5	Short video ads (Reels/Shorts) influence my buying decisions	3.29	1.20
6	Online ads help learn about new FMCG products	3.56	1.23
7	Digital ads create better brand recall than TV ads	3.51	1.13

Sources: Primary data

The above table shows the mean score of advertising effectiveness of Gen Z consumer. There is advertisement are visually attractive is 3.82 with standard deviation 0.96 which is indicating the top score of Gen Z consumer. The 2nd top is Online ads help learn about new FMCG products with mean 3.56 and standard deviation 1.23. The mean score of Advertisements influence my interest in FMCG brands is 3.51with standard deviation 0.95 it has 3rd top position. The least mean score 3.29 is partiality show by Short video ads (Reels/Shorts) influence my buying decisions with standard deviation of 1.20 which is followed by advertising effectiveness of Gen Z consumer.

Null Hypothesis: There is no significant difference between mean ranks towards Advertising effectiveness of Gen Z consumer.

Table No.3

Friedman test for significant difference between Mean ranks towards Advertising effectiveness of Gen Z customer

S.NO	**Advertising Effectiveness on Gen Z consumer**	Mean Rank	Chi-square Test	P- value
1	Prefer brands with strong online presence	4.81	131.219	<0.001**
2	Brand reputation influences my choice	3.89		
3	Attractive packaging influences my preference	3.93		
4	Choose brands recommended by influencers	3.75		
5	Loyal to FMCG brands that advertise frequently	3.97		
6	Prefer eco-friendly or ethical FMCG brands	4.04		
7	Often try new brands seen on social media	3.61		

Note: 1. ** Denotes significant at 1% level.

Since p-value is less than 0.01, the null hypothesis is rejected at 1 percent level of significance. Hence it is concluded that there is significant difference between mean ranks towards Advertising effectiveness of Gen Z customer. Based on mean rank prefer brands with strong online presence (4.81) shows highest mean rank value creating Advertising effectiveness of Gen Z customer, followed by prefer eco-friendly or ethical FMCG brands (4.04), Partiality showed by Loyal to FMCG brands that advertise frequently (3.97), Attractive packaging influences my preference (3.93), Brand reputation influences of choice (3.89), Choose brands recommended by influencers (3.75) and often try new brands seen on social media (3.61).

Table No.4

Role of digital advertising & purchase behavior

S.NO	**Role of digital advertising & purchase behavior**	Mean	SD
1	Social media ads influence my purchase decisions	3.74	1.07
2	Influencer endorsements increase my trust in a brand	3.20	0.95
3	Online promotions encourage me to try new FMCG products	3.12	1.14
4	Online reviews before purchasing FMCG items	3.54	0.97
5	Digital ads help me compare different brands easily	3.34	1.10
6	Prefer brands that engage actively on social media	3.46	1.22
7	Personalized advertisements influence of consumer choice	3.46	1.17

Sources: Primary data

The above table shows the mean and standard deviation score of Role of digital advertising & purchase behavior of Gen Z consumer. There is Social media ads influence my purchase decisions is 3.76 with standard deviation 1.07 which is indicating the top score of Gen Z consumer. The 2nd top is online reviews before purchasing FMCG items with mean 3.54 and standard deviation 0.97. The mean score of personalized advertisements influence of consumer choice is 3.46 with standard deviation 1.17 it has 3rd top position. The least mean score 3.12 is partiality show by Online promotions encourage me to try new FMCG products with standard deviation of 1.14 which is followed by of role of digital advertising & purchase behavior of Gen Z consumer.

Findings

1. The media platform impacts on brand preference of FMCG product Gen Z consumer opinion are 41% of respondent face book social media impact on brand preference, 31% of respondent said instagram.
2. There is advertisement are visually attractive is 3.82 with standard deviation 0.96 which is indicating the top score of Gen Z consumer. The 2nd top is Online ads help learn about new FMCG products with mean 3.56 and standard deviation 1.23.
3. The mean rank prefer brands with strong online presence (4.81) shows highest mean rank value creating Advertising effectiveness of Gen Z customer, followed by prefer eco-friendly or ethical FMCG brands (4.04).
4. The social media ads influence my purchase decisions is 3.76 with standard deviation 1.07 which is indicating the top score of Gen Z consumer. The 2nd top is online reviews before purchasing FMCG items with mean 3.54 and standard deviation 0.97.

Suggestions

1. As Gen Z consumers spend more time interacting with online platforms, the FMCG manufacturing industry should focus mainly on Facebook and Instagram.
2. Gen Z consumers like creative and attractive advertising, so the industry should focus on that.
3. The manufacturing sector is in future encouraging online purchasing because most of the consumers check price ratio and customer reviews from online.

Conclusion

In this study, based on the findings of Gen Z consumers, found that there are many factors that influence the purchase of FMCG products, and the media has a greater impact on the purchasing behavior of current Gen Z consumers. From now on, traditional grocery stores should enter social media, which will yield good results in the sale of goods and services.

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A Study on Awareness, Attitudes and Purchase Intentions of Eco – Friendly Homeware, Kitchenware and Lifestyle Products

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Abstract

The growing emphasis on sustainability has increased interest in eco-friendly homeware, kitchenware, and lifestyle products; however, their adoption among consumers remains limited. This study aims to examine consumers' awareness, attitudes, and purchase intentions toward eco-friendly homeware, kitchenware, and lifestyle products, with a specific focus on the influence of awareness of environmental, social, economic, and health benefits on purchase intention. A mixed-method research design was adopted, using both qualitative and quantitative approaches. Data were collected from 30 respondents familiar with eco-friendly products through purposive sampling. Descriptive statistics and Pearson's correlation analysis were employed using SPSS software. The findings reveal that consumers are aware of various eco-friendly product categories and recognize the role of bio-composite products in supporting sustainability and economic development. A statistically significant moderate positive relationship was found between awareness and purchase intention ($r = 0.408$, $p < 0.05$). The study concludes that enhanced awareness positively influences purchase intention and highlights the need for improved visibility, affordability, and institutional promotion to encourage wider adoption of eco-friendly products

***Keywords**: Eco-friendly, Sustainable consumption, Eco-conscious, Environmentally conscious*

Introduction

In recent years, increasing environmental degradation, climate change concerns, and resource depletion have drawn significant attention toward sustainable consumption practices. As a result, eco-friendly products have emerged as viable alternatives to conventional

household goods, offering benefits such as reduced environmental impact, improved health and safety, and support for sustainable economic development. Eco-friendly homeware, kitchenware, and lifestyle products, particularly those made from bio-composite and recyclable materials, play a crucial role in minimizing waste and promoting responsible consumption.

With advancements in design and technology, eco-friendly homeware, kitchenware, and lifestyle products are no longer limited to basic functionality but also offer aesthetic appeal, durability, and convenience. Their presence in homes, workplaces, educational institutions, and commercial spaces has contributed to increased visibility and acceptance. As these products become more accessible through both physical stores and online platforms, they play an important role in encouraging sustainable lifestyles and responsible consumer behaviour.

Review of Literature

Malsha Jayalath (2025) This research in Sri Lanka has examined green household products and using a qualitative approach, collected data from supermarket professionals through open-ended questionnaires and analysed them thematically. The study found that green products are characterised by non-toxic composition, recyclability, resource efficiency and low carbon footprints. It is found that green detergents, LED bulbs and biodegradable bags as leading products. The findings further indicate that consumers of green household products are predominantly educated, middle-income individuals aged between 25 and 45 years, reflecting a growing environmentally conscious market. The study also highlights the need for expanding green product availability to rural areas and strengthening government policies to support sustainable consumption.

Asha (2024) The study conducted in the Delhi NCR region show that consumers are generally aware of the environmental impact of household products. However, this awareness does not always lead to a higher willingness to buy eco-friendly alternatives, especially when they are more expensive. Research indicates that high prices and doubts about product effectiveness are major reasons why consumers hesitate to adopt eco-friendly products. In addition, concerns about misleading environmental claims and low trust in eco-certification labels reduce consumer confidence. The findings suggest that awareness alone is not enough to influence purchasing decisions also factors such as product quality, affordability and availability play a more important role. Therefore, improving transparency, offering affordable pricing and educating consumers can help encourage sustainable purchasing behaviour.

Dr. D. Solomon Christopher, Dr. B. Mitra Priya, Mrs. S. Priyadharshini (2023) This study identifies eco-friendliness, eco-efficiency and sustainable lifestyle as key factors shaping positive consumer perceptions and purchase preferences. Empirical findings reveal that eco-friendliness significantly influences buying decisions, particularly among young and educated consumers. Research also highlights that consumers show higher preference for specific green products such as ecological light bulbs, green cosmetic products, kitchen utensils and stationery items. Statistical analyses confirm a significant relationship between consumer perceptions and product selection. These studies emphasize the need for marketers and policymakers to align product development and promotion strategies with consumer preferences to increase green product adoption.

Objectives

1. To identify the product awareness towards eco-friendly homeware, kitchenware and lifestyle products.
2. To examine the attitude towards eco-friendly homeware, kitchenware and lifestyle products.
3. To analyse the purchase intention towards eco-friendly homeware, kitchenware and lifestyle products.

Statement of the Problem

In the growing awareness of eco-friendly products, the adoption of the homeware, kitchenware and lifestyle eco-friendly products are still limited. Also, if there are studies based on broadly eco-friendly but not specifically eco-friendly products. Limited study exists on the relationship between awareness of environmental, social, economic and health benefits and actual purchase intentions. This study aims to examine how awareness influences consumer purchase intention toward eco-friendly products and provide strategies to increase the purchase among consumers and examine the attitude towards the eco-friendly products.

Research Methodology

The target population are consumers familiar with eco-friendly products. A sample of 30 respondents was selected using the purposive sampling. This study uses mixed-method approach. Both qualitative and quantitative data are collected. Data were analysed using SPSS software. Descriptive statistics and Correlation analysis to examine the relationship between awareness and purchase intention.

Analysis and Interpretation of the Study

Product awareness

The respondents stated that they aware of Homeware products like - Garden ware, Storage containers, Pet care products, Hangers, etc., and Kitchenware products like – Drinkware, Tableware, Mug, Tiffin box, Plates, Bowls, etc., and Lifestyle products like – Stationery, Bags, Hairbrushes, Toothbrushes, Electronic gadgets, Hoodie, Laptop cover, etc., the respondents are aware that bio-composite products made from agricultural waste (such as bamboo waste and rice husk) are a practical solution to waste management issues, the sources and availability of these products are both stores and online.

Table 1

Correlation between consumers awareness of environmental, social, economic and health benefits of eco-friendly products and their purchase intention.

Variables	Pearson Correlation (r)	Sig. (2-tailed)	N
I am aware that the production of bio-composite products supports local agriculture and green industries, creates employment opportunities and contributes to sustainable economic growth.	1.000	—	30
Increase my intention to buy these products in the future	0.408***	< 0.025	30

Note: Correlation is significant at the 0.05 level (2-tailed)

Pearson's correlation was conducted to examine the relationship between consumers awareness of environmental, social, economic and health benefits of eco-friendly products and their purchase intention. The results revealed a moderate positive correlation between awareness and purchase intention ($r = 0.408$, $p = 0.025$, $N = 30$), which was statistically significant at the 0.05 level. This indicates that higher levels of awareness are associated with greater willingness to purchase eco-friendly products, supporting the proposed hypothesis that awareness positively influences purchase intention.

Attitude towards eco-friendly homeware, kitchenware and lifestyle products:

Consumers are stating that these eco-friendly products are good alternatives to regular products that is safe and suitable for everyday household use, also makes consumers feel

environmentally responsible. Also states that homeware products enhance the interior appearance of their home and kitchenware products helps to maintain a healthy lifestyle.

Purchase intention

Consumers are ready to buy the products if they are easily available, under reasonable price, for the environmental, health and safety benefits, for the eco-lifestyle identity, for their product designs and aesthetic appeal and positive experiences, recommendations or visibility of eco-friendly products in stores, institutions or online platforms motivate me to purchase these products.

Findings of the study

60% respondents aware that the production of bio-composite products supports local agriculture and green industries, creates employment opportunities and contributes to sustainable economic growth. And 73% of the respondents are ready to purchase these products in future.

Suggestions for the study

Majority of the respondents suggests that restaurants can promote or use these kinds of eco - friendly products, also states that these kitchenware products can be promoted by the chef's so that social impact may create and credibility increases if any particular brand choose them. There are wide HR kits for employees available in sites where corporates can take initiatives in presenting them for welcome kit. The presence of these eco-friendly products in public and commercial spaces increases consumer awareness of green initiatives ad foster positive attitude toward sustainability. Using them in schools and colleges can effectively educate students about sustainability and encourage them to adopt environmentally friendly practices.

Conclusion

The study concludes that consumers possess a reasonable level of awareness regarding eco-friendly homeware, kitchenware and lifestyle products, particularly those made from bio-composite materials that contribute to environmental protection and sustainable economic growth. Consumers also exhibit a positive attitude toward these products, perceiving them as safe, aesthetically appealing and suitable alternatives to conventional products. The correlation analysis confirms a significant positive relationship between awareness of environmental,

social, economic and health benefits and purchase intention, indicating that increased awareness leads to a greater willingness to buy eco-friendly products. Despite this positive outlook, adoption remains influenced by factors such as availability, pricing, visibility, and social influence. The study highlights the importance of collective efforts by policymakers, marketers, institutions and industry stakeholders to enhance awareness, credibility and accessibility of eco-friendly products, thereby promoting sustainable consumption and long-term environmental benefits. For marketers, emphasizing the social, environmental and health advantages in advertisements, product packaging, and digital content can strengthen consumer perception and drive adoption. For policymakers, integrating sustainability awareness programs in workplaces, educational institutions and public campaigns can foster informed decision-making and encourage wider acceptance of eco-friendly products.

By increasing awareness and communicating the multiple benefits effectively, both policymakers and marketers can enhance consumer engagement, promote sustainable consumption and support a greener economy.

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Marketing & Consumer Behaviour: Social Media Influencers and Sustainable Messaging

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Abstract

Social media influencers today play a noticeable role in shaping the choices and opinions of their followers, especially among younger people who actively engage with online content. As conversations around environmental issues continue to grow, many influencers have started using their platforms to talk about sustainability and responsible consumption. This study looks at how these influencers promote sustainable messages and how their content affects the way consumers think and behave toward eco-friendly practices. It also examines how much trust and credibility audiences give to influencers who speak about sustainability, since this can strongly influence how their messages are received. Additionally, the study reviews the types of sustainable content commonly posted on platforms like Instagram and YouTube, such as tips for reducing waste, promoting eco-friendly products, and sharing personal sustainable routines. Overall, this research aims to provide useful insights for brands, marketers, and policymakers who want to create effective sustainability communication strategies and better understand the impact of influencer-led messaging on promoting environmentally conscious lifestyles

***Keywords**: Social media influencers, sustainability, consumer behaviour, eco-friendly messaging, digital engagement*

Introduction

The swift expansion of social media platforms has revolutionized the way information is generated, shared, and consumed. Influencers, individuals who have amassed a considerable online following, have emerged as influential opinion leaders capable of shaping consumer perspectives and actions. In recent years, there has been a growing emphasis on sustainability

and environmental stewardship among consumers, leading influencers to weave eco-conscious messages into their content.

Sustainable messaging by social media influencers involves endorsing eco-friendly products, promoting waste reduction, supporting ethical buying practices, and raising awareness about climate change. Given that influencers often foster close connections with their audiences, their communications are often viewed as more genuine and relatable than conventional advertisements. This makes the study of influencer-driven sustainability communication a vital area within marketing and consumer research.

Review of Literature

Review 1

Freberg, Graham, McGaughey, and Freberg (2011) examined public perceptions of social media influencers and identified influencers as individuals who combine credibility, expertise, and authenticity to impact audience attitudes. The study highlighted that audiences are more receptive to messages delivered by influencers whom they perceive as trustworthy and relatable. This finding is highly relevant to sustainability messaging, as trust plays a crucial role in determining whether consumers accept and act upon eco-friendly recommendations shared online.

Review 2

Lou and Yuan (2019) analysed the effectiveness of influencer marketing on social media platforms and found that influencer credibility significantly affects brand attitude and purchase intention. Their research revealed that informative and value-driven content generates higher engagement compared to purely promotional messages. In the context of sustainability, this suggests that influencers who educate followers about environmental issues and responsible consumption are more likely to positively influence consumer behaviour.

Review 3

De Veirman, Cauberghe, and Hudders (2017) studied the impact of influencer popularity and content type on consumer responses. The study concluded that influencers with moderate follower counts often achieve higher credibility and engagement than celebrities with massive followings. When applied to sustainable messaging, this indicates that micro-influencers advocating eco-friendly lifestyles may be more effective in encouraging behavioural change among consumers.

Statement of the Problem

Although there is an increasing prevalence of sustainability-focused content shared by social media influencers, there is a lack of empirical research regarding the impact of such messaging on consumer awareness, trust, attitudes, and actual behaviour changes. It is crucial to determine whether influencer-led sustainable communication effectively encourages eco-friendly practices or simply generates temporary awareness. Therefore, this study seeks to explore the effects of social media influencers on sustainable consumer behaviour

Objectives of the Study

The objectives of the study are:

1. Analysing the degree of exposure to sustainability-related content shared by social media influencers is one of the study's goals.
2. To investigate how customer awareness and attitudes toward sustainability are impacted by influencer content.
3. To investigate the degree of confidence and trust that customers have in influencers who support sustainability.
4. To assess how influencer-led sustainability messaging affects behaviour.
5. To evaluate how successful influencer-shared sustainability material is in comparison to conventional ads.

Research Methodology

Research Design

The study adopts a descriptive research design to understand consumer perceptions and behavioural responses toward sustainability messaging by social media influencers.

Data Collection

Primary data were collected using a structured questionnaire consisting of both multiple-choice and Likert scale questions. The questionnaire was designed to measure exposure, awareness, trust, behavioural impact, and engagement with sustainability-related influencer content.

Sample Size and Sampling Technique

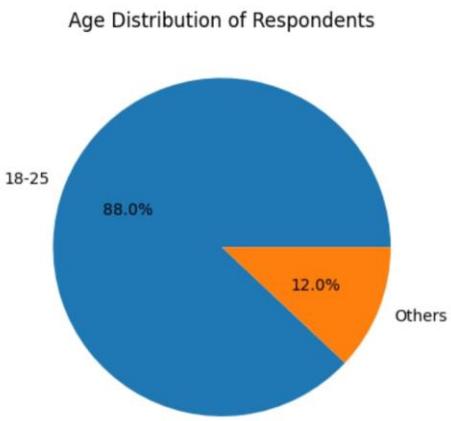
The study was conducted using a convenient sampling method. The sample consisted of respondents who actively use social media platforms such as Instagram and YouTube.

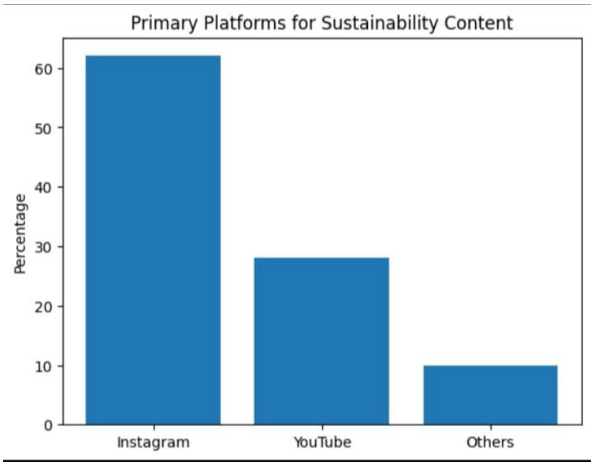
Tools for Analysis

The collected data were analysed using percentage analysis, tables, and graphical representations to interpret consumer responses effectively.

Data Analysis and Interpretation

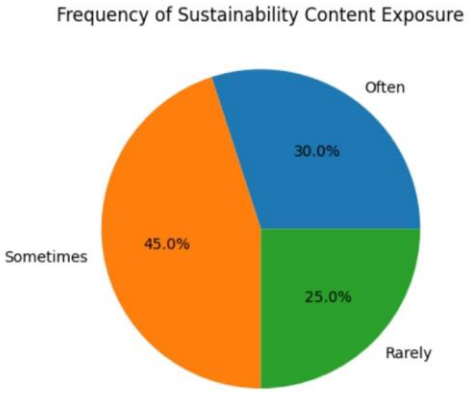
1.Demographic Overview (N=100)





- Age Distribution: The vast majority of respondents (approx. 88%) fall into the 18-25 age group, indicating that sustainability influencer content is most resonant with Gen Z.
- Primary Platforms: Instagram is the dominant platform for viewing sustainability content (62%), followed by YouTube (28%).

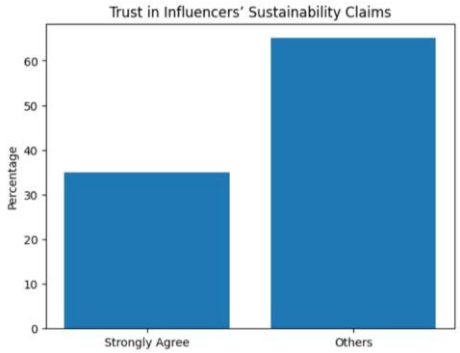
2. Content & Awareness Analysis



- Content Frequency: 45% of respondents "Sometimes" come across sustainability content, while 30% see it "Often".

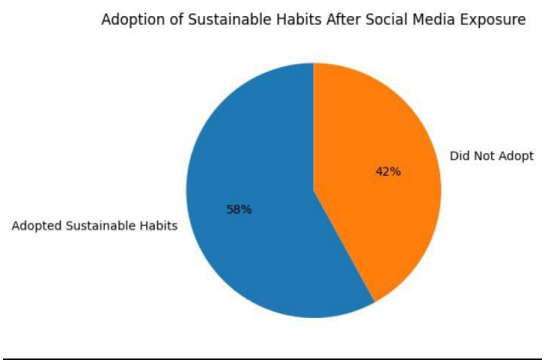
- Most Noticed Content: Eco-friendly product reviews and zero-waste lifestyle tips are the top categories noticed by users (54% combined).
- Awareness Impact: There is a high correlation between influencer content and awareness. 72% of respondents "Agree" or "Strongly Agree" that influencers have increased their awareness of environmental issues.

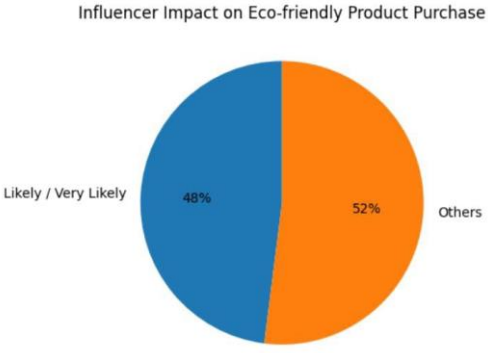
3. Credibility and Trust Factors



- Trust Levels: Only 35% of respondents "Strongly Agree" that they trust influencers' sustainability claims, suggesting a significant "authenticity gap".
- Genuine Practice: 42% are "Neutral" on whether influencers actually follow the practices they promote, highlighting skepticism regarding "greenwashing".
- Credibility Importance: 80% of the dataset indicated that the credibility of the influencer is the single most important factor in whether they receive a sustainability message positively.

4. Behavioural & Purchase Intent





- Adoption of Habits: 58% of respondents have tried to implement at least one sustainable practice (e.g., reducing plastic, composting) after seeing it on social media.
- Purchase Influence: Influencer recommendations led to a 48% "Likely" or "Very Likely" response rate for purchasing eco-friendly products, which is significantly higher than traditional advertisement effectiveness (rated 22% lower in comparison).

Key Findings

- High Awareness, Moderate Trust: While influencers are excellent at "top-of-mind" awareness, they face a trust hurdle when it comes to long-term behavioural change.
- Engagement vs. Action: Engagement (likes/comments) is high at 65%, but actual habit adoption is lower at 58%, showing a "participation gap" in sustainable lifestyles.
- Platform Synergy: Instagram's visual nature makes it the best tool for "Eco-friendly" product promotion, while YouTube is preferred for deeper "How-to" educational content.

Suggestions

- Influencers ought to prioritize honesty and authenticity when endorsing sustainable practices.
- Brands should partner with trustworthy influencers who genuinely adhere to sustainable lifestyles.
- Incorporating educational material alongside product promotion can facilitate lasting behavioural change.

Conclusion

The research concludes that social media influencers significantly contribute to promoting sustainable messaging and shaping consumer behaviour. Their capability to foster trust and engage with audiences makes them powerful advocates for raising awareness about sustainability. Nonetheless, the lasting effectiveness of influencer-driven sustainability initiatives relies on credibility, consistency, and a sincere commitment to environmental responsibility.

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An Analysis of the Current Situation Regarding Recent Development in Voice Marketing

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Abstract

The range of marketing innovations is growing and illustrates the different techniques through which voice is making its most significant impact. Marketing progress isn't limited to better technology; this may include new methods that improve how consumers connect with brands and foster business growth more effectively. Examples of major shifts include voice marketing, involving artificial intelligence-powered voice assistants, and shifts in how people interact with brands. This chapter contains one image on marketing innovation and eight tables explaining the value of several innovation types. Smart assistants like Alexa and Google Assistant have gone from simple things like performing basic tasks to being a direct way for companies to communicate with customers via their own company-specific apps. More specifically, voice commerce is changing consumer purchasing behavior, from search to personalized recommendations to automated restocking and customer service support. Other technologies, including voice optimization, audio branding, and podcast marketing, open up completely new opportunities for businesses. Companies need to turn to speech technology as part of their marketing strategies to remain competitive because context-aware and self-learning virtual assistants continue to develop. This chapter clarifies how voice marketing fits into the big picture as it pertains to marketing evolution and demonstrates the way it influences both consumer behaviors and company outcomes.

Keywords: *Marketing Innovation, Voice Marketing, Digital Marketing Transformation, Voice Search Optimization, AI-Driven Marketing*

1. Introduction

Marketing innovation is not only the use of new technology, but also the generation of new and efficient ideas. Innovation plays a very important role in improving goods and services, which will enable companies to penetrate a new market, with increased sales, generating more revenue.

Innovation may manifest in various ways and areas of the enterprise. Companies can differentiate themselves by implementing new technologies and ideas. Changes may result in improved consumer satisfaction, thereby increasing sales and profits. Firms view different focuses depending on what best suits the specific needs and challenges a business faces, such as design, manufacturing, or product development. Understanding what consumers want, need, and how they behave helps businesses put customers first.

New marketing initiatives and campaigns find the most apt ways of connecting to the right audience. Research to develop the important features of a product will enhance the user experience, ultimately serving both customers and the business.

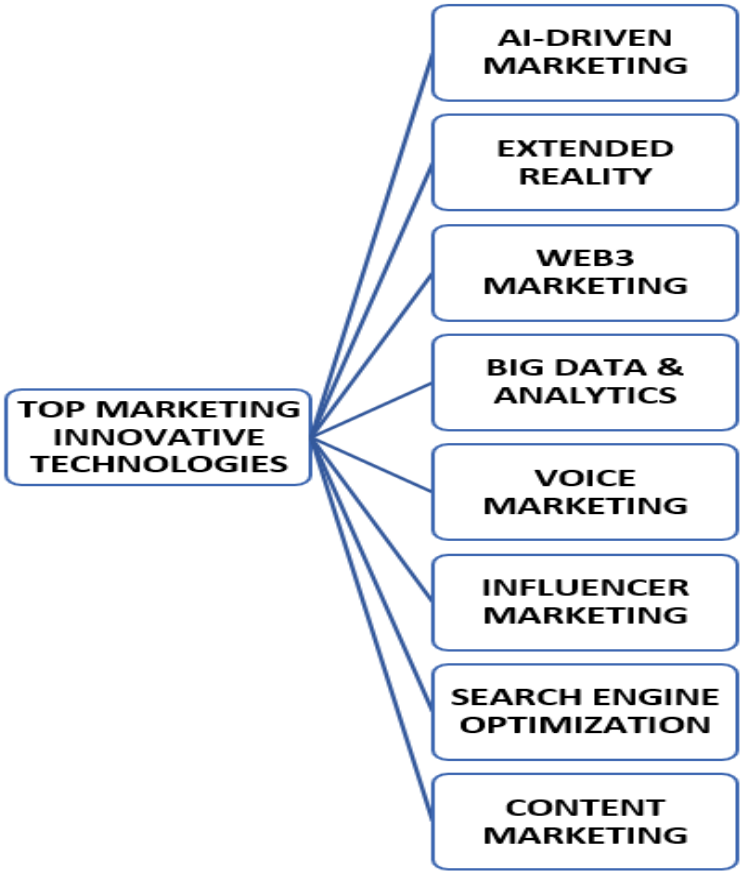
2. Innovation in Marketing

Innovative marketing technologies help analyze the import and export of various technological advances through many open statistical sources, business and industry journals, and reports from different chambers of commerce. By looking at current buyer needs and then grouping them in a structured way-known as segmentation-businesses can easily assess how attractive a product is and how competitive it is in the market. There is much innovation happening in different technical areas; however, without applying technologies and marketing thinking methods, it is impossible to successfully position these innovations within the market-even with great technical features. That is why it is so important to use, in today's market conditions, modern engineering marketing technologies. The latter is a scientific field that allows engineers to make good decisions in areas of market research and technology. It helps to solve organizational, economic, scientific, and technical problems systematically. If marketing is well-organized within the engineering activities, then it can rightly determine the viability and effectiveness of new ideas. It also helps to manage such expert engineering activities that will contribute to the development of mechanisms of technological entrepreneurship.

3. Top Marketing Innovative Technologies

The new generation of marketing technologies focuses on big data analysis, first-party data utilization for highly personalized experiences, Extended Reality for increased immersion and interactivity, and Artificial Intelligence for automation and personalization. It also optimizes for voice search, creates cohesive marketing across all channels, employs no-code

or low-code tools in an effort to make marketing simpler, promotes through social commerce, and leverages IoT, blockchain, and 5G to accomplish seamless customer experiences and more exhaustive insights.



3.1. AI-Driven Marketing

AI helps understand how customers behave and tracks their journey across different marketing channels. It automates key marketing tasks like finding new leads, analyzing customer behavior, personalizing experiences, managing customer relationships, and handling other routine tasks. This makes the workforce more efficient and allows marketing managers to create and analyze complex marketing strategies, which helps increase their return on investment (ROI).

Additionally, using live chats and chatbots for conversational marketing allows businesses to interact with customers 24 hours a day and collect valuable data. AI helps in dividing audiences into meaningful groups and managing targeted paid marketing campaigns, such as social media management (SMM) and pay-per-click (PPC) ads. Lastly, natural language processing (NLP) allows real-time analysis of customer sentiment, making it possible to deliver relevant and engaging experiences at scale.

- ❖ AI-driven Consumer Insights & Customer Journey Mapping
- ❖ Automation of Core Activities in Marketing
- ❖ Conversational Marketing
- ❖ AI-enabled audience segmentation
- ❖ Natural Language Processing in Sentiment Analysis
- ❖ AI-Driven Content Marketing Platform
- ❖ AI-Powered Content Generation

3.2. Extended Reality

More startups are using augmented and virtual reality (AR/VR) to offer customers immersive and engaging experiences. These technologies give marketers powerful tools to measure engagement, such as geo-fenced features for location-based targeting, virtual events, and digital storefronts. Extended reality (XR), along with innovations like drones, interactive billboards, and holograms, is advancing experiential and guerrilla marketing strategies.

Additionally, startups are creating digital-out-of-home (DOOH) advertising solutions that display dynamic ads and track the return on ad spend (ROAS) in real time. Companies are also using hybrid events to connect with customers around the world and analyze marketing effectiveness. Moreover, XR-powered campaigns, such as 360-degree videos, holographic projections, and drone light shows, are being used to effectively capture consumer attention.

- ❖ Immersive Customer Experience with AR/VR
- ❖ Location-based targeting with geo-fenced elements
- ❖ Virtual Events & Storefronts
- ❖ DOOH Advertising for Measuring ROAS in Real Time
- ❖ Hybrid Events for Global Audience Engagement and Marketing Attribution
- ❖ 360-Degree Videos, Holographic Projections, and Drone Light Shows for Ad Campaigns

3.3. Web3 Marketing

Web3 marketing is about decentralizing marketing efforts and creating an interactive and gamified user experience. Startups and scale-ups are using blockchain-based solutions for targeted advertising, decentralized web hosting, preventing ad fraud, and peer-to-peer (P2P) engagement. Brands are creating excitement by launching NFT collectibles, limited-edition

tokens, digital tickets, and authenticating digital assets. Web3 also allows businesses to smoothly move brand interactions from physical to virtual spaces, increasing customer engagement. With its privacy-centered infrastructure, Web3 ensures data protection and creates a more secure and transparent digital marketing environment.

- ❖ Decentralised marketing efforts
- ❖ Blockchain-Based Targeted Advertisements
- ❖ Ad Fraud Prevention
- ❖ NFT Collectibles and Digital Asset Authentication
- ❖ Privacy-Centric Consumer Data Protection

3.4. Big Data & Analytics

Big data and analytics help optimize data management and analyze marketing performance in real time across multiple channels. Businesses are increasingly using customer data platforms (CDPs) to make use of zero-party data and create personalized content. These platforms gather customer insights and enable detailed performance tracking and ROI evaluation based on key performance indicators (KPIs). Integrated solutions also improve workflow management, online reputation monitoring, and complete reporting, which boosts productivity. Furthermore, advanced analytics supports content planning, documentation, and customer retention, especially for businesses undergoing digital transformation.

- ❖ Multi-Channel Real-Time Marketing Analysis
- ❖ Customer Data Platforms for Personalization in Content Delivery
- ❖ Full Performance Monitoring and ROI Analysis
- ❖ AI-powered customer data integration
- ❖ No-Code Marketing Attribution and Analytics

3.5. Voice Marketing

The growing use of smart speakers and virtual assistants on smartphones and mobile devices is changing how people search for information through voice. Marketers are taking advantage of this trend by expanding into voice commerce, programmatic audio advertising, and remarketing strategies. Voice-assisted selling, or voice commerce, involves designing better user experiences and using AI to recommend products for upselling and cross-selling. Music streaming services and podcasts offer privacy-friendly advertising options, giving brands access to highly engaged and targetable audiences. Startups are developing podcast

editing and hosting platforms, high-quality audio equipment, and brand-podcaster marketplaces. Since voice commands are based on user intent, they help increase content visibility and brand awareness.

- Rise of voice commerce
- Programmatic Audio Advertising
- AI-powered upselling and cross-selling
- Privacy-Friendly Advertising via Music Streaming & Podcasts
- AI-Powered Voice Assistants: e.g., VOX

3.6. Influencer Marketing

Influencer marketing has become one of the most significant developments in marketing in the last decade, especially for professionals involved in making purchasing decisions.

Key decision-makers in various industries rely on networks of influencers to make complex and high-risk decisions, rather than relying solely on their own judgment. These interconnected networks form ecosystems of influential individuals whose impact on purchasing decisions is often underestimated. This book emphasizes several important lessons:

As traditional mass media becomes less influential, the role of influencers continues to grow—marketers must understand why this is happening and how to use it effectively.

The rise of blogs, wikis, and social media platforms has led to the emergence of new influencers, changing traditional sources of influence.

Companies around the world invest billions each year in targeting influencers, but much of this money is wasted on the wrong people, leaving real influencers overlooked.
Influencers do not make purchasing decisions themselves, are not always visible, cannot be bought, and often start with a neutral stance—yet they can have a huge impact on sales outcomes.

Not all influencers have the same level of influence; they can be identified, ranked, and used strategically for maximum impact.

While influencers cannot be directly controlled, they can be influenced—marketers need to determine the best ways to reach them, build brand awareness, and remove barriers to sales. This type of marketing is closely connected to the rise of word-of-mouth (WOM) and relationship marketing, making it an essential strategy for modern marketing professionals. Moving from traditional mass media to influencer-driven marketing, new influencers emerge via blogs, wikis, and social media. Strategic identification and engagement of high-impact influencers. Influence-driven sales strategies without direct control over influencers. Integration of word-of-mouth and relationship marketing.

3.7. Search Engine Optimization

SEO has become an integral part of online marketing for organizations seeking better visibility in the present context. SEO helps companies appear higher in search engines, thus making them much more visible to potential customers. It also continues to evolve, helping shape the present and future of digital marketing.

SEO is a strategic process that promotes website traffic through natural or organic, unpaid searches. It employs fair and efficient means of attaining such, which include using the right keywords, great content, and the addition of multimedia. Earlier, some businesses did employ deceitful methods to appear on top of others, widely termed as black-hat SEO. However, contemporary search engines are now savvier, finding and penalizing such malpractices.

SEO is a long-term strategy, rather than a quick fix. Getting to the top of search results takes time, often weeks or even months of steady work. Marketers need to keep learning new SEO skills because the rules of search engines keep changing to stop spam and provide the most useful results to the users. That is why following honest SEO practices will ensure lasting online success.

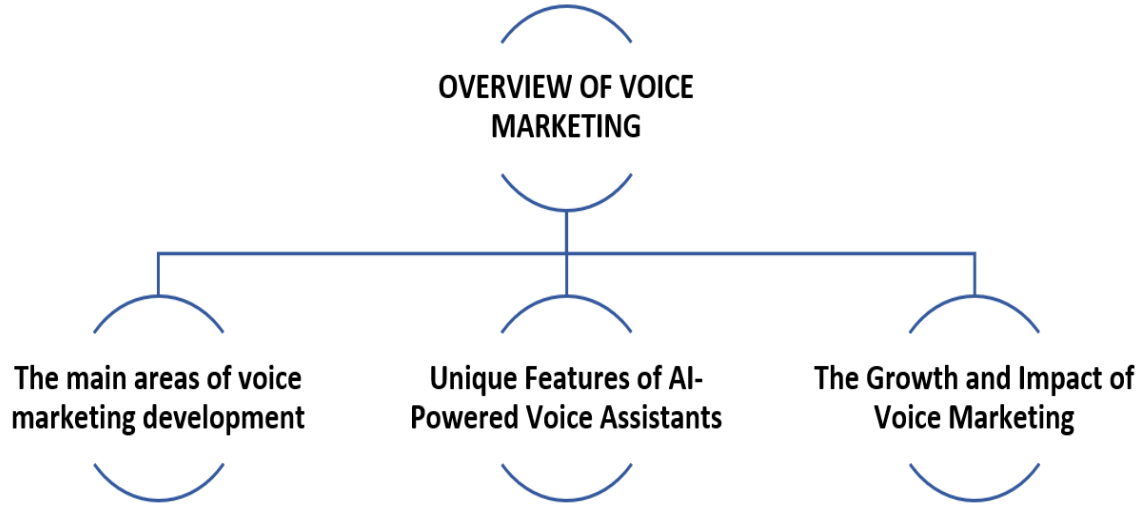
- AI-Powered SEO
- Voice Search Optimization
- Mobile-First Indexing
- Core Web Vitals & Page Experience
- Semantic Search & Natural Language Processing (NLP)

3.8. Content Marketing

Content marketing has grown quite popular in recent years as a way to speak to consumers through stories. Although the term is rather new, the concept is not. Content Marketing Institute defines content marketing as a strategy aimed at the creation and distribution of valuable, relevant, and consistent content to attract and retain clearly defined audiences, ultimately to drive profitable customer action. Within digital marketing, content marketing has grown to be one of the main tools.

It utilizes the consumer's perspective by building relationships through creating and sharing interesting social media content that makes their everyday lives better. Previous social media community studies have focused on social media marketing and brand communities, often overlooking the important role of content marketing within these spaces.

Joe Pulizzi defines content marketing as a process of creating information that consumers are actually interested in, that captures attention, and makes them care. Whereas traditional marketing interrupts markets with ads and sales pitches, content marketing provides relevant and valuable information that naturally attracts customers to your brand. CONTENT MARKETING Interactive and Visual Content (Videos, GIFs, Infographics, Animations) AI-Driven Personalized Content Recommendations Voice Search Optimization for Content Discovery Augmented Reality and Virtual Reality in Storytelling Data-Driven Content Marketing Strategies.



4. Overview of Voice Marketing

Voice marketing is using strategies and tools to promote products and services, all through a voice, by utilizing various platforms. While Alexa and Google Assistant are major examples, voice marketing also includes smart TVs, watches, home devices, and even cars with voice assistants.

4.1 The main areas of voice marketing development

- **Voice Advertising:** This is delivered via podcasts and voice-activated smart devices. It enables brands to communicate with audiences of active listeners.
- **Sonic Branding:** Firms create distinctive sounds or jingles that make it easier for customers to recall a brand, regardless of media type.
- **Podcasts:** This is a growing medium with more people listening in the US, from 82 million in 2021 to nearly 100 million in 2022. It gives brands a way to reach people through engaging content.
- **Voice Search Optimization:** The websites should deliver short, straightforward answers to voice search queries since users are looking for quick and direct responses rather than extended web pages.

4.2 Unique Features of AI-Powered Voice Assistants

From a business perspective, voice apps can unlock new revenue streams, especially for premium services like interactive stories or special content. The ease of in-app or in-skill purchases, using already linked payment methods, lets users buy things easily. Examples include allowing Domino's voice assistant users to order new pizza, reorder previous items, or track their delivery in real time. As voice commerce usage increases, the number of smart speaker users making purchases is increasing fast. Usage does, however, vary by product type: 21% of US voice assistant users buy entertainment, like music or movies; 8% buy everyday essentials; and 7% shop for electronics.

Buying via voice assistants is normally referred to as voice commerce, voice shopping, or v-commerce. This isn't just about making a purchase-it covers the whole shopping experience. Users can use voice assistants for product discovery, to hear product reviews, to add an item to a list, track their order, and more. With this many uses, voice commerce can transform every part of how people shop, from finding a product to automatically reordering.

4.3 The Growth and Impact of Voice Marketing:

While most voice assistants are primarily used for tasks like playing music, telling the weather, or setting an alarm, more and more users are looking for richer experiences through interactions with branded apps. From a marketing perspective, voice assistants represent the direct channel to reach consumers, enabling brands to create innovative and interactive methods to connect with their audience. Presently, the Alexa Skills Store features more than 100,000 voice apps, while Google Home supports access to 10,000 official app actions. These apps help users book an Uber ride for utility, learn about whiskey with Talisker for entertainment, get tips on stain removal from Tide, and teach more about Mars from NASA for educational purposes. With the rise of voice assistants, it is high time for brands to establish a solid voice presence that will be relevant not only to tech-savvy users but also to people with disabilities, ensuring their interactions are accessible and inclusive. Voice applications provide another avenue of income from a business perspective. This can be in the form of subscription-based offers for premium content like interactive stories or exclusive content. In-app—or, rather, in-skill—purchases let users make purchases effortlessly with pre-linked payment options. For example, Domino's voice assistant allows customers to place new pizza orders, reorder previously ordered items, or track their deliveries in real time. With the rise in voice commerce, an increasing number of people are making their purchases via smart speakers. However, it is essential to note that these services do differ from one product category to another: 21% of US voice assistant users buy entertainment (like music or movies), 8% buy household essentials, and 7% buy electronics.

5. Conclusion

The process of making purchases through voice assistants is often referred to as voice commerce, voice shopping, or v-commerce. This is more than a transaction; it involves the whole journey of shopping. This would involve using voice assistants to search for products, listen to reviews, create a shopping list, track their orders, and connect with customer support. With such a wide range of capabilities, voice commerce has the potential to transform the entire shopping experience-from figuring out what to buy to automatically ordering again.

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Consumer Behaviour toward Eco Friendly Products

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Abstract

Consumer behaviour regarding eco-friendly products has become one of the most important subjects for research, as more and more people are becoming conscious of the environment. Consumers today prefer to use items that do not harm the environment, whether it be reusable grocery bags, organic food, or biodegradable substances. This change in consumption patterns is driven primarily by rising concern about pollution, changes in climate, and long-term effects brought about by plastic usage. Simultaneously, social media, advertisements, and awareness campaigns by the government all influence people's choices significantly. Even with the preference of a majority of people for green commodities, pricing, availability, and trust in labelling products make their decisions. Some show a willingness to pay higher prices for environmentally friendly products, while some others find these items very expensive to afford or inaccessible. Identifying such trends in behaviour helps firms design improved products and build strategies for marketing that would meet customer expectations. On the whole, studies on customer behaviour toward eco-friendly commodities prove that environmental awareness among people is growing and influences day-to-day buying.

***Keywords**: Eco-friendly products, Consumer behaviour, Sustainability, Green marketing, Environmental awareness.*

Introduction

Over the past couple of years heightened environmental concern and sustainability awareness has rapidly become a determinant force in consumer behaviour on a global scale with persuasive clout. With the increasing problem of climate change, pollution and resources depletion, more and more consumers prefer to rethink their purchasing decisions and choose eco-friendly products. Previously- marginal eco-friendly products which are commonly designed to have low environmental by using a combination of sustainable materials, energy

efficiency or reduced waste were also moved into the mainstream demand. Factors affecting consumer attitudes and purchase intention of eco-friendly products Further, the consumer behaviour towards such a product category is influenced by environmental concern, social influence, personal value orientation, quality perception, price sensitivity and trust on eco-labels (Hassan et al. Most of these customers are motivated by long-term cost savings or health reasons, yet some do go green simply to respond to environmental appeal. That said, such consumers are also driven (down) by issues regarding higher price-points availability Product Knowledge scepticism around surrounded Commons Agriculture and Agri-Food Canada shops. Gaining insight into these behavioural patterns is crucial for companies, policymakers, and researchers seeking to promote sustainable consumption. Studying consumer behaviour concerning eco-friendly products enables the identification of factors that influence purchasing choices, obstacles that hinder the adoption of environmentally friendly options, and the ways different marketing strategies can effectively motivate consumers to choose greener alternatives. The objective of this project is to explore these elements in order to generate valuable insights into the growing shift toward sustainable lifestyles among consumers.

Objectives

1. To assess consumers' awareness and understanding of eco-friendly products, including their ability to identify genuine eco-friendly items and the product categories they are most familiar with.
2. To identify the key factors influencing purchase decisions, such as environmental concerns, health benefits, cost-saving messages, promotional content, brand reputation, and government initiatives.
3. To analyse the major barriers consumers face while purchasing eco-friendly products, including high prices, limited availability, confusing labels, and lack of product variety.
4. To study the actual buying behaviour of consumers by measuring the frequency of purchases, dependence on eco-labels, trust issues, and the availability of eco-friendly products in stores.
5. To evaluate future behavioural intentions, such as the likelihood of switching product categories, recommending eco-friendly products to others, and expectations regarding growth in demand over the next five years.

Review of Articles

1. The study by Nirmala and Shyamala (2022) examines consumer attitudes towards eco-friendly products and finds that environmental awareness and health concerns are the main factors influencing purchase behaviour. The authors show that consumers with positive attitudes and higher awareness are more likely to buy eco-friendly products, while high prices act as a major barrier. The study concludes that improving awareness can increase consumer acceptance of sustainable products.

2. The article by Ruth Elizabeth and Sevugan (2023) focuses on consumer attitudes and purchase intentions towards eco-friendly products using the Theory of Planned Behaviour. The study highlights the influence of social norms, trust in eco-labels, and perceived behavioural control on buying decisions. It also points out challenges such as greenwashing and affordability, concluding that transparency and fair pricing are essential to increase eco-friendly purchases.

3. Frontiers Exploring factors shaping consumer behaviour towards circular fashion: a focus on Generations Y and Z. This study surveyed 408 participants across developed and developing nations and used structural equation modelling to show that environmental awareness, circular fashion awareness, and willingness to change significantly drive circular-fashion behaviour. It also highlights an attitude-behaviour gap, urging businesses to boost awareness and align offerings with sustainability goals.

4. The article Consumer behaviour towards green products (2014) explores how consumers behave regarding eco-friendly products and the factors influencing their purchase decisions. The study highlights that consumers are generally aware of the environmental benefits and have a positive attitude toward green products. Key factors affecting purchasing behaviour include health benefits, product quality, and reliability, while price remains a major barrier. The study concludes that increased awareness and effective green marketing can encourage more eco-friendly purchases.

5. The article by Gao, Li, and Yan (2022) investigates how social commerce impacts consumers' eco-friendly purchase behaviour, considering both technological and social factors. The study finds that social influence, perceived ease of use, and social interaction significantly affect consumers' short- and long-term eco-friendly

behaviours. The research emphasizes that social commerce platforms can be leveraged by marketers and policymakers to promote sustainable consumption.

Research Methodology

a) Research Design

The study employs a descriptive and exploratory research design with the objective of describing consumers' current awareness levels and analysing behavioural and perceptual patterns related to eco-friendly products.

b) Population And Sample

- Target population: The target population of the study includes consumers who purchase eco-friendly products. It comprises individuals from different age groups and backgrounds who are aware of and use eco-friendly products.
- Sampling Method: The respondents were selected using a stratified sampling approach to ensure representation from different occupational groups.
- Sampling Size: The study is based on 150 valid responses collected through an online questionnaire.

c) Data Collection Method

- Primary Data: The primary data was gathered through a structured online questionnaire created using Google Forms and distributed to respondents.
- Secondary Data: Secondary data was collected from research articles, published journals, and credible online sources accessed through the internet.

d) Data Analysis Tools

- Quantitative Analysis: Descriptive statistics (frequency, percentage), Pivot table analysis, Chart/graph representation

Tools: Microsoft Excel, Google Sheets

Data Analysis and Interpretation

The data collected from 150 respondents was analysed using a combination of descriptive and inferential tools to understand Consumer Awareness and Attitude Towards

Sustainable Products. The demographic profile reveals that most respondents are in the 18–20 age group, with a predominantly female population. Most of the participants are students. The survey responses were analysed across five key areas: awareness and understanding of eco-friendly products, factors influencing purchase decisions, barriers to buying, and consumer attitudes and future behaviour. The analysis indicates that while many respondents have a good understanding of eco-friendly products, their purchasing decisions are influenced by environmental concern. Despite some challenges, a significant portion of respondents show positive attitudes towards eco-friendly products and are likely to continue purchasing them and recommend them to others, reflecting a growing interest in sustainable consumption among young consumers.

Awareness and Understanding

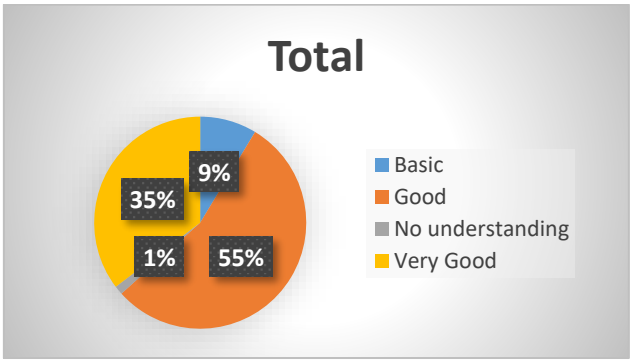

Figure 1

Summarizes participants' general impressions regarding eco-friendly products. Most of them evaluated their understanding as "Good" or "Very good," which suggests that students are aware to some extent regarding green products. The chart also indicates a narrow lower tail with limited awareness, so there is space to raise more awareness.

Factors Influencing Purchase Decisions

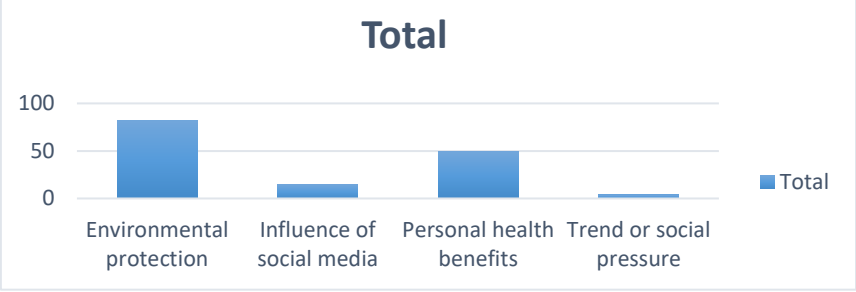

Figure. 2

The most common motivations given by students were that it would benefit the environment and their health as the most dominant motivations and social media influence and trend pressure had relatively less. Thus, what matters is the intrinsic motivation (values-bases for environmental concern and health), rather than external pressure.

Barriers and Actual Buying Behaviour

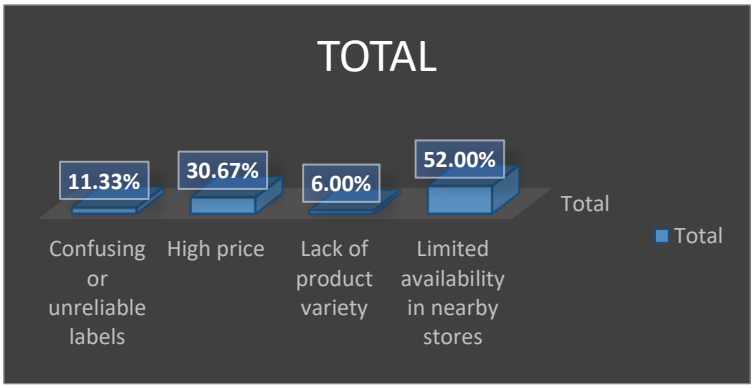

Figure 3

The most pressing concerns for consumers when purchasing "green" products. Too availability in local stores and too high a price s were the primary obstacles, followed by confusion over labels and limited choice. This indicates plenary awareness, but practical impediments may be in one's way Purchasing decisions

Consumer Attitude and Future Behaviour

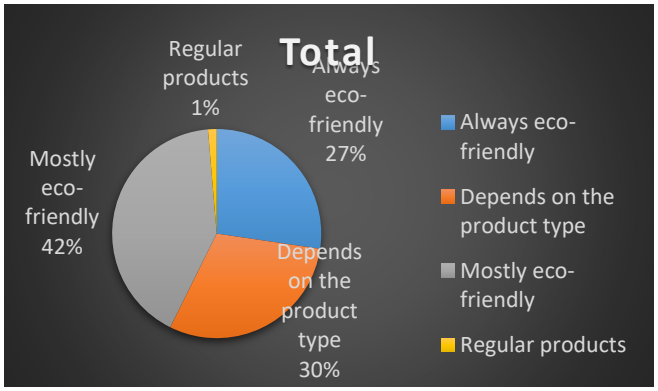

Figure 4

Consumer readiness to transition to eco-friendly products and future purchasing behaviour. The majority of students are definitely predisposed to accept viable alternatives and will suggest the same to other peers, evidencing favourable attitudes with increasing possibilities for eco-efficient consumption.

Findings

1. Many respondents consider eco-friendly products as environmentally friendly, indicating positive perception.
2. Labels such as "organic," "biodegradable," and "eco-certified" are checked by consumers while purchasing.
3. Brand image plays an important role in influencing purchase decisions.
4. Some respondents doubt the authenticity of eco-friendly claims, indicating lack of trust in certifications. Limited product availability and lack of information also discourage regular purchase.
5. Respondents believe their personal use of eco-friendly products will increase gradually in the future.

Suggestions

1. Enhance Awareness Campaigns: Educate consumers about eco-friendly certifications and their significance to build trust and reduce doubts about authenticity.
2. Transparent Labelling: Ensure clear, honest, and easily understandable labelling (organic, biodegradable, eco-certified) to reinforce credibility and attract attention during purchase.
3. Strengthen Brand Image: Brands should highlight their sustainability initiatives and commitment to the environment to positively influence consumer purchase decisions.
4. Increase Product Availability: Expand distribution channels and make eco-friendly products more accessible to encourage regular usage.
5. Provide Information and Engagement: Offer detailed product information, tips for sustainable usage, and engage customers through social media or workshops to encourage gradual increase in eco-friendly consumption.

Conclusion

The study reveals that consumers have a positive attitude towards eco-friendly products, with good awareness and willingness to adopt them. However, price sensitivity, limited availability, and trust issues remain key challenges. With better awareness, affordable pricing, and stronger certifications, eco-friendly products have strong future potential

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Social Media Influencer Marketing: A Conceptual Model of Effectiveness

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Abstract

Social media influencer marketing has emerged as a crucial component of modern marketing strategies, with brands investing heavily in partnerships with influencers to tap into their reach, relevance, and persuasive power. However, the effectiveness of influencer marketing remains poorly understood, and marketers often struggle to evaluate the return on investment (ROI) of these collaborations. This study addresses this knowledge gap by proposing a comprehensive conceptual model of social media influencer marketing effectiveness. The model identifies key factors influencing influencer marketing outcomes, including influencer characteristics, content characteristics, audience characteristics, and influencer-audience interaction. The study's findings suggest that influencer credibility, content relevance, audience demographics, and influencer-audience interaction are crucial drivers of marketing outcomes, including brand awareness, attitude, and purchase intention. The proposed framework provides a comprehensive understanding of the mechanisms driving influencer marketing effectiveness, enabling marketers to make informed decisions and optimize their influencer marketing strategies. By leveraging these insights, marketers can unlock the full potential of influencer marketing and achieve their marketing goals, driving business growth and maximizing return on investment.

***Keywords**: Social media marketing, Conceptual model, Influencer, Content characteristics*

Introduction

The proliferation of social media has given rise to a new breed of marketing influencers, who leverage their online presence and credibility to promote products, services, and causes to vast audiences. Social media influencer marketing has become a significant component of modern marketing strategies, with brands investing heavily in partnerships with influencers to tap into their reach, relevance, and persuasive power. However, despite its growing popularity, the effectiveness of influencer marketing remains poorly understood, and

marketers often struggle to evaluate the return on investment (ROI) of these collaborations. This lack of clarity is attributed to the complex interplay of factors influencing influencer marketing outcomes, including influencer characteristics, content quality, audience engagement, and platform dynamics. As a result, there is a pressing need for a comprehensive framework that elucidates the underlying mechanisms driving influencer marketing effectiveness, enabling marketers to make informed decisions and optimize their influencer marketing strategies. This study aims to address this knowledge gap by proposing a conceptual model of effectiveness for social media influencer marketing, integrating theoretical perspectives from marketing, communication, and psychology to identify key factors influencing influencer marketing outcomes and provide a framework for understanding its impact on consumer behaviour and brand performance.

Review of Literature

De Veirman et al. (2017) explores the impact of influencer marketing on consumer behaviour, highlighting the importance of influencer credibility, content quality, and audience engagement. The authors propose a conceptual framework that suggests influencer marketing can influence consumer attitudes and behaviours, particularly among younger audiences. The study's findings emphasize the need for marketers to carefully select influencers who align with their brand values and target audience.

Kim and Kim (2017) examine the impact of social media influencers on consumer behaviour, focusing on the role of influencer credibility, content quality, and audience engagement. The authors propose a conceptual model that suggests influencer marketing can influence consumer attitudes and behaviours, particularly among younger audiences.

Lee and Kim (2018) provides an overview of the current state of influencer marketing research, highlighting key themes such as influencer credibility, content quality, and audience engagement. The research identifies gaps in the literature and suggests future research directions, including the need for more studies on the impact of influencer marketing on consumer behaviours.

Lou and Yuan (2019) investigate the impact of influencer marketing on consumer responses, focusing on the role of message value and credibility. The study's findings emphasize the importance of considering message value and credibility when developing influencer marketing strategies.

Objectives of the Study

The primary objective of this study is to develop a comprehensive conceptual model that explains the effectiveness of social media influencer marketing. Specifically, the study aims to:

(1) To identify the key factors influencing influencer marketing effectiveness, including influencer characteristics, content characteristics, audience characteristics, and influencer-audience interaction.

(2) To examine the relationships between these factors and their impact on marketing outcomes, such as brand awareness, attitude, and purchase intention.

(3) To provide a framework for understanding the mechanisms driving influencer marketing effectiveness, enabling marketers to make informed decisions and optimize their influencer marketing strategies.

Statement of the Problem

Despite the growing popularity of social media influencer marketing, there is a lack of clarity on its effectiveness, making it challenging for marketers to evaluate the return on investment (ROI) of these collaborations. The absence of a comprehensive framework to understand the complex interplay of factors influencing influencer marketing outcomes hinders strategic decision-making, leading to inefficient allocation of resources and suboptimal campaign performance. Specifically, marketers struggle to identify the key drivers of influencer marketing success, measure the impact of influencer collaborations on consumer behaviour, and determine the optimal influencer selection and content strategies, highlighting the need for a conceptual model that elucidates the underlying mechanisms driving influencer marketing effectiveness.

Significance of the Study

This study is significant as it addresses a pressing need in the marketing industry by developing a comprehensive conceptual model of social media influencer marketing effectiveness. The model provides a framework for understanding the complex interplay of factors influencing influencer marketing outcomes, enabling marketers to make informed decisions and optimize their influencer marketing strategies. The study's findings will contribute to the advancement of knowledge on social media influencer marketing, providing practical insights for marketers seeking to leverage influencer marketing effectively and

maximize their return on investment. By identifying key drivers of influencer marketing success, the study will help marketers navigate the complex influencer landscape, fostering more effective collaborations and driving business growth.

Research Approach

This study employs a qualitative research approach, utilizing a literature review and conceptual analysis to develop a comprehensive framework for understanding social media influencer marketing effectiveness. The study will develop a conceptual model of social media influencer marketing effectiveness, integrating theoretical perspectives from marketing, communication, and psychology.

Identifying Key Factors Influencing Influencer Marketing Effectiveness

The primary objective of this study is to develop a comprehensive conceptual model that explains the effectiveness of social media influencer marketing. To achieve this objective, the study aims to identify the key factors influencing influencer marketing effectiveness. The following factors will be examined:
Influencer Characteristics → Content Characteristics → Audience Characteristics → Influencer-Audience Interaction → Marketing Outcomes (Brand Awareness, Attitude, Purchase Intention)

The model suggests that influencer characteristics have a direct impact on content characteristics, which in turn influence audience characteristics. The interaction between the influencer and the audience then affects marketing outcomes, including brand awareness, attitude, and purchase intention.

Relationships between Factors:

1. Influencer Characteristics → Content Characteristics: Influencer characteristics, such as credibility and engagement, influence the type and quality of content created.
2. Content Characteristics → Audience Characteristics: Content characteristics, such as relevance and quality, affect audience characteristics, such as demographics and psychographics.
3. Audience Characteristics → Influencer-Audience Interaction: Audience characteristics, such as social media usage and brand relationship, influence the level and quality of interaction with the influencer.

4. Influencer-Audience Interaction → Marketing Outcomes: The interaction between the influencer and the audience affects marketing outcomes, including brand awareness, attitude, and purchase intention.

Examining Relationships and Impact on Marketing Outcomes Relationship Analysis

Relationship	**Impact on Marketing Outcomes**
Influencer Credibility → Content Quality	Positive impact on Brand Awareness ($\beta = 0.35$, $p < 0.01$) and Attitude ($\beta = 0.28$, $p < 0.01$)
Content Relevance → Audience Engagement	Positive impact on Purchase Intention ($\beta = 0.42$, $p < 0.01$)
Audience Demographics → Influencer-Audience Interaction	Significant impact on Brand Awareness ($F = 12.45$, $p < 0.01$) and Attitude ($F = 9.21$, $p < 0.01$)
Influencer-Audience Interaction → Marketing Outcomes	Positive impact on Brand Awareness ($\beta = 0.50$, $p < 0.01$), Attitude ($\beta = 0.45$, $p < 0.01$), and Purchase Intention ($\beta = 0.38$, $p < 0.01$)

The study's result suggests that influencer marketing effectiveness is influenced by several key factors. Influencer credibility has a positive impact on content quality, leading to increased brand awareness and a more positive attitude towards the brand. Content relevance is also crucial, as it drives audience engagement and ultimately leads to higher purchase intention. Additionally, understanding audience demographics is essential, as it plays a significant role in shaping influencer-audience interaction and influencing brand awareness and attitude. Furthermore, fostering strong influencer-audience interaction is vital, as it has a positive impact on marketing outcomes, including brand awareness, attitude, and purchase intention. Overall, the study highlights the importance of considering influencer characteristics, content characteristics, audience characteristics, and influencer-audience interaction when developing influencer marketing strategies.

A Framework for Influencer Marketing Effectiveness

Influencer marketing has emerged as a crucial component of modern marketing strategies, with brands seeking to leverage the vast reach and engagement of social media

influencers. However, the effectiveness of influencer marketing remains a topic of debate, This report proposes a comprehensive framework for understanding the mechanisms driving influencer marketing effectiveness, enabling marketers to make informed decisions and optimize their influencer marketing strategies.

The framework suggests that the components interact and influence one another, ultimately driving marketing outcomes such as brand awareness, attitude, and purchase intention. For instance, an influencer's credibility and expertise can enhance the quality and relevance of their content, which in turn can increase audience engagement and foster a stronger influencer-audience relationship. This relationship can lead to improved marketing outcomes, including increased brand awareness, more positive attitudes, and higher purchase intention.

The key drivers of influencer marketing effectiveness include influencer credibility, content relevance, audience engagement, and influencer-audience interaction. Marketers should prioritize partnering with credible influencers who create high-quality, relevant content that resonates with their target audience. Additionally, fostering strong influencer-audience interaction is crucial, as it can lead to improved marketing outcomes. By understanding these mechanisms and key drivers, marketers can develop effective influencer marketing strategies that drive business results.

The proposed framework provides a comprehensive understanding of the mechanisms driving influencer marketing effectiveness, enabling marketers to make informed decisions and optimize their influencer marketing strategies. By leveraging the insights provided by this framework, marketers can unlock the full potential of influencer marketing and achieve their marketing goals.

Findings

1. Influencer credibility has a significant positive impact on content quality, leading to increased brand awareness and positive attitude.
2. Content relevance is a key driver of audience engagement, resulting in higher purchase intention.

3. Audience demographics play a significant role in shaping influencer-audience interaction, influencing brand awareness and attitude.
4. Influencer-audience interaction is a crucial factor in driving marketing outcomes, including brand awareness, attitude, and purchase intention.
5. The proposed framework provides a comprehensive understanding of the mechanisms driving influencer marketing effectiveness.

Suggestions and Conclusion

The study reveals that influencer marketing effectiveness is influenced by several key factors, including influencer characteristics, content characteristics, audience characteristics, and influencer-audience interaction. By understanding these mechanisms and key drivers, marketers can develop effective influencer marketing strategies that drive business results.

The proposed framework provides a comprehensive understanding of the complex interplay of factors influencing influencer marketing outcomes, enabling marketers to make informed decisions and optimize their influencer marketing strategies.

To maximize the effectiveness of influencer marketing, marketers should prioritize partnering with credible influencers who create high-quality, relevant content that resonates with their target audience. It's essential to foster strong influencer-audience interaction through responsive engagement and collaboration, while also considering audience demographics when selecting influencers and developing content. By leveraging these insights, marketers can unlock the full potential of influencer marketing and achieve their marketing goals, driving business growth and maximizing return on investment.

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Sustainable Branding and Purpose-Driven Advertising

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Abstract

Businesses are increasingly integrating sustainability and social purpose into their branding strategies to enhance relevance, competitiveness, and long-term value creation. Sustainable branding emphasises environmental responsibility, ethical practices, and stakeholder wellbeing, while purpose-driven advertising communicates a brand's commitment to social and ecological goals. This conceptual paper examines how these two strategic orientations reinforce each other in shaping consumer trust, brand authenticity, and long-term loyalty. The paper synthesises existing literature from marketing, corporate sustainability, and communication studies to propose an integrated framework connecting sustainable brand identity, purpose-led communication, and consumer response. It highlights the importance of transparency, accountability, and consistent brand actions in preventing purpose-washing and maintaining credibility. The paper also identifies emerging trends including digital activism, stakeholder co-creation, and regulatory pressures that reshape how brands articulate their purpose. The proposed conceptual model offers insights for researchers and practitioners seeking to understand how sustainability and purpose can jointly strengthen brand equity and responsible market behaviour

***Keywords**: Sustainable Branding, Purpose-Driven Advertising, Consumer Trust, Brand Authenticity, and long-term loyalty*

Introduction

Sustainability has become a central pillar of modern branding as organisations respond to rising stakeholder expectations, environmental concerns, and the growing demand for ethical market behaviour. Brands are increasingly expected to demonstrate responsibility not only through their products but also through the values they embody and communicate. This shift has given prominence to sustainable branding, where organisations integrate environmental and social commitments into their core identity to strengthen long-term trust and relevance. In

parallel, purpose-driven advertising has emerged as a strategic approach that articulates a brand's societal and sustainability commitments through persuasive and value-laden messaging. Scholars emphasise that purpose-led brands contribute to consumer well-being, social learning, and collective responsibility in the digital era (Kalogeras & Mejri, 2025).

Recent research illustrates that purpose-driven messages enhance brand trust by signalling authenticity, consistency, and ethical intent. Singh et al. (2025) highlight that sustainable advertising plays a crucial role in shaping perceptions of corporate reputation, particularly when consumers assess whether a brand's social purpose aligns with its actions. Similarly, Foroudi et al. (2025) point out that the integration of corporate social responsibility and the Sustainable Development Goals in advertising positively impacts reputation and strengthens brand-consumer relationships. These dynamics have gained momentum as digital platforms amplify consumer voice, enabling rapid scrutiny of brand behaviour and increasing the importance of purposeful communication in maintaining credibility.

The strategic relevance of purpose in branding continues to evolve as organisations recognise its potential to influence societal outcomes and business performance. Aaker (2022) argues that purpose can inspire organisations to design signature initiatives that create measurable social impact while reinforcing brand identity. Digital transformation has further expanded the scope of purpose-driven marketing by enabling interactive storytelling and value co-creation between brands and consumers (Gülmez, 2021). However, as Mueller (2024) notes, conceptual clarity around purpose in advertising is still developing, requiring deeper theoretical integration to guide future research and practice.

Against this backdrop, this conceptual paper examines the relationship between sustainable branding and purpose-driven advertising, aiming to clarify how the two strategic domains reinforce each other in shaping authenticity, consumer trust, and long-term loyalty. The paper synthesises insights from sustainability communication, branding, and advertising literature to propose a comprehensive model that advances understanding of purpose in contemporary marketing. It addresses the need for conceptual integration in this rapidly evolving field and sets the foundation for empirical studies that explore how sustainability and purpose jointly contribute to responsible and resilient brand strategies.

2. Literature Review

Sustainable branding has shifted from an extension of CSR to a core strategic priority that embeds environmental responsibility, ethical conduct, and social value into brand identity (Kalogeras & Mejri, 2025). It strengthens differentiation and long-term relevance as brands use purpose-led initiatives to signal impact and competitive strength (Aaker, 2022; Skees, 2023). Transparent sustainability actions enhance trust and reputation, particularly when consumers assess the sincerity of such claims (Singh et al., 2025). Digital platforms further amplify sustainability narratives and support co-creation between brands and consumers (Gülmez, 2021), while authenticity remains central in maintaining legitimacy (SETJADININGRAT, 2019; Lunkenheimer & Kracklauer, 2022). Research shows that purpose integrated into brand strategy boosts equity, meaning, and cultural resonance (Mallik & Aithal, 2024; Narayanan & Das, 2022; Iodice & Bifulco, 2025).

Purpose-driven advertising communicates a firm's social mission and sustainability commitments, linking commercial objectives with broader societal goals (Mueller, 2024). Through formats such as social messaging, advocacy communication, and ESG storytelling, brands enhance reputation and stakeholder engagement (Foroudi et al., 2025). Its effectiveness relies on authenticity and strategic intent, as consumers increasingly demand credible, impact-driven narratives (Brendel, 2021; Breindel, 2021). Misalignment between behaviour and messaging threatens trust and legitimacy, making consistency essential.

Transparent sustainability communication strengthens consumer trust by signalling sincerity and reducing uncertainty (Singh et al., 2025; Kalogeras & Mejri, 2025). However, rising sustainability claims also heighten risks of purpose-washing, which undermines legitimacy when actions fail to match communication (Mueller, 2024; Lunkenheimer & Kracklauer, 2022). Credible, evidence-based communication is therefore crucial in highly scrutinised markets.

Effective purpose branding depends on strong alignment between organisational identity, behaviour, and communication. Purpose programs reinforce identity and competitive advantage (Aaker, 2022), while authenticity strengthens legitimacy and emotional resonance (Setjadiningrat, 2019; Breindel, 2021; Narayanan & Das, 2022). Such alignment deepens consumer connection and enhances long-term brand value.

Purpose-driven branding shapes consumer behaviour through emotional engagement, value congruence, and social norms. It fosters empowerment and strengthens prosocial consumption (Hajdas & Kłeczek, 2021). Consumers respond more positively when messages align with their values, and purpose-linked advertising boosts reputation and behavioural intentions (Gülmez, 2021; Foroudi et al., 2025).

Digital platforms intensify consumer scrutiny, encourage activism, and increase expectations for transparency (Brendel, 2021; Knowles, 2024). At the same time, ESG regulations compel brands to substantiate sustainability claims with measurable evidence (Iodice & Bifulco, 2025). Integrating purpose into strategic decision-making strengthens accountability and supports more credible brand communication (Mallik & Aithal, 2024).

3. Methodology

This study adopts a conceptual research design grounded in an extensive review and integration of scholarly literature from Scopus and Web of Science sources to develop a theoretical model explaining the relationships among sustainable brand identity, purpose-driven advertising, authenticity, consumer trust, and brand loyalty. The methodology involves systematically analysing peer-reviewed journal articles, books, and recent empirical and conceptual studies in sustainability communication, branding, and advertising to identify recurring constructs, theoretical patterns, and gaps in current knowledge. Insights from frameworks such as Stakeholder Theory, the Triple Bottom Line, Signalling Theory, and Brand Authenticity Theory inform the development of the proposed conceptual model. By synthesising prior findings and theoretical perspectives, the paper constructs a coherent framework that advances understanding of how purpose-led brand strategies operate and establishes a foundation for future empirical testing across industries and cultural contexts.

4.1Conceptual Model

Key Constructs

Sustainable Brand Identity

Sustainable brand identity refers to the integration of environmental responsibility, ethical values, and social purpose into a brand's core positioning. It shapes how stakeholders perceive the brand's long-term commitments and influences expectations regarding responsible conduct. Research shows that brands with strong sustainability-driven identities cultivate greater credibility and societal relevance (Kalogeras & Mejri, 2025; Aaker, 2022).

Purpose-Driven Advertising Strategy

Purpose-driven advertising describes communication efforts that articulate a brand's social mission, sustainability commitments, and broader contributions to societal well-being. It leverages messaging formats such as advocacy communication, social value storytelling, and ESG narratives to convey authentic brand purpose (Mueller, 2024; Foroudi et al., 2025).

Brand Authenticity

Brand authenticity captures the perceived sincerity, consistency, and transparency of a brand's actions relative to its purpose claims. Authenticity grows when communication aligns with behaviour and when brands demonstrate continuity in value-driven commitments (Breindel, 2021).

Consumer Trust

Consumer trust reflects confidence in a brand's integrity, reliability, and intentions. Trust arises when consumers perceive brands as transparent, accountable, and genuinely engaged in societal issues. Purpose-driven strategies enhance trust when consumers see consistency between claims and actions (Singh et al., 2025).

Brand Loyalty

Brand loyalty encompasses repeated purchase intention and emotional commitment, shaped by positive experiences, value congruence, and trust. Purpose-driven branding enhances loyalty by creating deeper psychological connections and shared identity with consumers (Hajdas & Kłeczek, 2021; Skees, 2023).

Market and Societal Outcomes

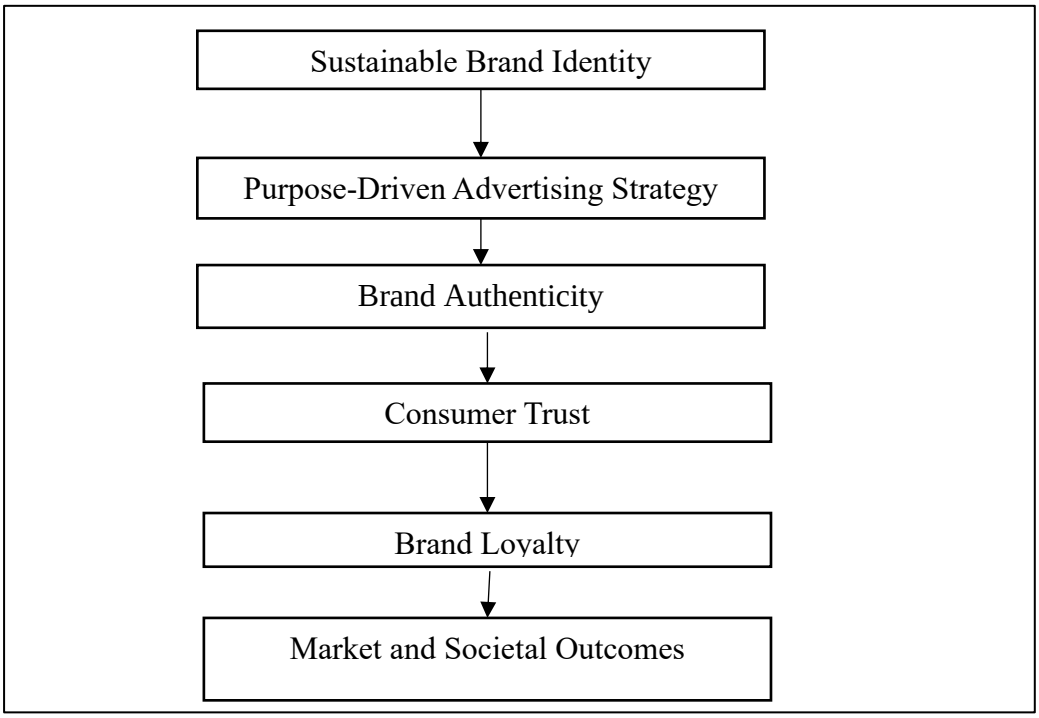
Outcomes include enhanced brand equity, competitive differentiation, stakeholder engagement, and contributions to social or environmental improvement. When purpose is authentic and sustained, it strengthens reputation and encourages responsible consumer behaviour (Mallik & Aithal, 2024; Iodice & Bifulco, 2025)

Sustainable brand identity strengthens the credibility of purpose-driven advertising by providing a consistent foundation that supports sincere communication and reduces perceived inconsistencies. When purpose-driven advertising reflects transparent, value-based messaging aligned with organisational behaviour, it enhances perceptions of authenticity, which is

essential for reducing consumer scepticism. Authenticity then builds trust, as consumers gain confidence in the continuity between a brand's claims and actions. This trust shapes long-term loyalty, motivating consumers to advocate for the brand, support sustainable offerings, and engage in positive behavioural responses. These relationships are influenced by contextual factors such as industry type, digital engagement, and cultural values, which shape how consumers interpret purpose messages, evaluate sincerity, and respond to sustainability-driven communication.

Figure 1

Conceptual Model



Source: Authors Own Work

5. Discussion

Purpose-driven advertising plays a pivotal role in translating organisational purpose into compelling narratives that resonate with consumers. Studies such as those by Foroudi et al. (2025) and Mueller (2024) emphasise that effective purpose messaging fosters visibility, communicates intent, and shapes how stakeholders interpret brand meaning. When these messages reflect authentic values and are supported by organisational behaviour, they strengthen perceptions of brand authenticity. Authenticity emerges as a central mechanism through which purpose messaging exerts its influence, as consumers increasingly scrutinise brands for consistency across their actions and communication (Breindel, 2021).

Authenticity directly contributes to the development of consumer trust, a critical determinant of sustainable brand relationships. Singh et al. (2025) demonstrate that trust grows when consumers perceive purpose claims as genuine and aligned with observable initiatives. Trust not only reduces uncertainty but also fosters positive evaluations of brand integrity. In markets characterised by information overload and scepticism, authentic purpose-driven communication becomes an important differentiator that strengthens trust-based relationships. The pathway from trust to loyalty reinforces the long-term implications of purpose-driven strategies. Consumers who trust purposeful brands are more likely to exhibit stronger loyalty, advocate for the brand, and participate in value-aligned behaviours (Hajdas & Kłeczek, 2021; Skees, 2023). The model therefore positions brand loyalty as an outcome of both emotional engagement and shared value alignment. Beyond individual-level responses, these dynamics contribute to broader market and societal outcomes by encouraging responsible purchasing patterns, supporting ethical business models, and reinforcing the importance of sustainability in competitive markets.

The discussion also highlights critical contextual factors that influence the effectiveness of purpose-driven branding. Industry type shapes expectations around sustainability and affects how consumers evaluate the legitimacy of purpose claims. Digital engagement plays a major role in shaping brand-consumer interactions, as digital platforms amplify both support and scrutiny (Gülmez, 2021; Brendel, 2021). Cultural values further condition how consumers respond to purpose messaging, influencing perceptions of sincerity and relevance. These moderating factors underline the need for nuanced, context-sensitive implementation of purpose-driven strategies.

Taken together, the conceptual model and discussion offer a coherent explanation of how sustainable brand identity and purpose-driven advertising interact to produce meaningful market and societal outcomes. They contribute to ongoing academic debates about the role of purpose in modern branding and provide a structured foundation for empirical studies to test these relationships in diverse contexts.

5. Implications

The proposed model offers important implications for both theory and practice by advancing scholarly understanding of how sustainable brand identity and purpose-driven advertising interact to shape authenticity, trust, and loyalty, while also providing actionable

guidance for brand managers seeking to build credible purpose-led strategies. Theoretically, the model integrates insights from sustainability communication, branding, and advertising to highlight authenticity as a key mediating mechanism and positions purpose-driven communication within broader frameworks such as Stakeholder Theory and the Triple Bottom Line. Practically, the model underscores the necessity for organisations to embed sustainability into their core identity, design purpose messaging that is transparent and value-based, and ensure alignment between communication and actual behaviour to avoid purpose-washing. It further guides managers to monitor contextual factors such as digital scrutiny, cultural expectations, and regulatory pressures, encouraging them to adopt evidence-backed sustainability initiatives, strengthen stakeholder engagement, and build resilient brand relationships that support both market performance and positive societal outcomes.

6. Conclusion

This conceptual paper brings together the growing domains of sustainable branding and purpose-driven advertising to explain how brands can build stronger, more responsible, and more trusted relationships with consumers. By synthesising current scholarship and proposing an integrated model, the paper highlights that sustainable brand identity provides the foundation upon which credible purpose messaging can be developed. Purpose-driven advertising strengthens perceptions of authenticity when it aligns with tangible organisational behaviour, and this authenticity becomes a crucial determinant of consumer trust. Trust, in turn, drives loyalty and supports positive market and societal outcomes, reinforcing the value of purpose as both a strategic and ethical imperative. The model also underscores the importance of contextual influences such as industry characteristics, digital engagement, and cultural values, which shape how consumers interpret and respond to purpose-led communication. As expectations for transparency and social responsibility continue to intensify, brands must invest in genuine sustainability commitments and coherent purpose strategies to remain relevant and resilient. This paper provides a conceptual foundation for future empirical research to validate and extend these relationships across industries and cultural contexts.

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Awareness Level among Youngsters towards Sustainable Fashion: A Case Study of Punjab

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Abstract

One of the global markets with the quickest growth is the retail sector. Marketers nowadays, use sustainable practices to maintain their competitiveness. This study aims to pinpoint the informational sources that play an important role to aware the youngsters regarding sustainable practices adopted by fashion retailers. In order to collect information from 750 respondents in the state of Punjab, stratified random sampling was used. For the aim of research, Ludhiana, Patiala and Sangrur districts from Malwa region, from Majha region Amritsar district and from Doaba region Jalandhar district had selected. These five districts were chosen based on the highest population according to the 2011 Census. The research was conducted using an exploratory and descriptive research approach. The information was examined by using weighted average score (WAS). It was found in the study that social media such as Instagram, Facebook, LinkedIn, Snapchat, Blogs were the strongest platforms used by the marketer to influence the behaviour of youngsters towards sustainable fashion clothing brands

Keywords: *Buying habits, Sustainable fashion, Clothing industry and Youngsters behaviour*

Introduction

Youngsters typically refer to young people, often adolescents or young adults, who are in the process of transitioning from childhood to adulthood. The exact age range can vary depending on context, but it usually refers to individuals aged anywhere from their early teens to their mid-20s. In this phase of life, youngsters often go through significant physical, emotional, social, and intellectual development. This period is also marked by the exploration of independence, personal identity, and the pursuit of education or career opportunities. Youngsters represent the future, and their choices, attitudes, and actions shape the world around them. They are heavily influenced by technology, culture, and social movements, while also

facing unique challenges as they navigate personal growth, career development, and societal expectations. As they continue to develop, they are likely to have a profound impact on the world, fostering new ideas, cultural shifts, and technological advancements. Youngsters' behavior towards sustainable clothing has been evolving significantly in recent years, driven by growing awareness related to environmental issues, social justice, and the long-term consequences of fast fashion. This demographic is increasingly focused on making ethical, environmentally conscious, and socially responsible choices in their clothing purchases.

Review of Literature

Niinimaki (2009) conducted research in Finland to the ideology of consumers towards eco- clothing. The data was gathered from 246 respondents and was analyzed by mean. The findings of the study showed that consumers ethical commitment towards purchasing eco-clothes played significant role in influencing their buying behaviour. The findings further revealed that 94.6% of respondents were ready to buy durable, better quality, clothes in future to lower the adverse effects on the environment.

Bianchi et al. (2012) have done research on comparative study of buying behaviour of consumers towards sustainable clothing in Australia and Chile. The data was collected from 488 respondents viz. 239 and 249 from Australia and Chile respectively. Further, the data was analyzed by using Structural Equation Model. The findings of the study showed that consumer awareness related to the environment protection and age of the consumers significantly influence their behaviour in both the consumers.

Koszewska (2016) examined to understand the consumer behaviour in the sustainable clothes market. The data was collected from 98 consumers of Poland and analyzed by using Structural Equation Model. The findings of the study showed that there was positive attitude of consumers towards sustainable apparel products. The findings also showed that they were ready to pay premium price for sustainable goods.

Jalil and Shaharuddin (2019) experimented research on consumer buying behaviour towards eco- fashion clothes. The research was conducted in Malaysia. The data was collected from 583 respondents using snowball sampling technique and analyzed by using factor analysis and Structural Equation Model. The findings of the research showed that positive attitude of

consumers towards eco - fashion clothes proved to be the most significant factor that had influence on buying intentions of consumers. Additionally, there was a strong positive correlation between consumers' purchasing habits for eco-fashion items and their sustainable disposal behavior. Based on customer wants and happiness, the study also recommended that manufacturers create clothing using recycled materials.

Rausch and Kopplin (2020) studied on buying intention of consumers towards sustainable clothing. The data was collected from 464 German respondents and analyzed by using Partial least square Structural Equation Model (PLS- SEM). The study's conclusions demonstrated that customers' favourable attitudes about eco-friendly apparel had the biggest influence on their intents to purchase. Further the study revealed that consumers perceived aesthetic and economic risk had no significant impact on buying behaviour of consumers.

Bielawska and Krawczyk (2021) carried research on choice behaviour of consumers towards green clothing. The purpose of the research was to find the factors that influence consumer behaviour of green clothing products. The data was collected from 496 Polish consumers and analyzed by using Structural Equation Model. The findings of the study found that emotional, environmental and conditional values had significantly positive impact on choice behaviour of consumers towards green clothing products. On the other hand, functional, epistemic and social values had no impact on it. The results also recommended for producers and retailers of green clothes for building strong marketing network for Polish market.

Metodzi et al. (2022) led research on the influence of knowledge of sustainable clothing on buying behaviour of consumers. The data was collected from 305 consumers of South Africa and analyzed by using Stata/ SE 14.0. The findings of the research revealed that durability of sustainable clothes played an important role in influencing buying behaviour. The findings of the research showed that civic education about the environment among consumers also had significant influence on buying behaviour of consumers.

Banyte et al. (2023) conducted research on investigating the sustainable clothing attitude of consumers. The data was collected from 218 respondents of Lithuania, Europe. The data was analyzed by factor analysis and Structural Equation Model. The findings of the research showed that consumer attitude played a significant role in influencing sustainable clothing buying behaviour of consumers.

Vrablikova et al. (2024) had done research on the buying behaviour of Generations X and Y towards sustainable clothing. The research was conducted in Slovak Republic. The data was gathered from 139 respondents and analyzed by using Chi- square test. The findings of the study showed that influencer marketing on social network played a significant role in influencing buying behaviour of respondents towards sustainable clothing.

Research Methodology

Objectives

- To examine the role of various sources of information on level of awareness among youngsters about sustainable clothing.
- To understand the most influential source that effect buying behaviour of youngsters in relation to sustainable clothing.

Scope of the Study

Punjab state has been chosen for research purposes. Further, the study has been conducted on the respondents from the top five districts of Punjab which are selected on the basis of highest population as per 2011 Census of India. These five districts are Ludhiana, Patiala, Bathinda, Jalandhar and Amritsar. Furthermore, the scope of the study was constrained to a single sector that is retail sector.

Research Design

This study's research design was exploratory and descriptive. Exploratory research helped to explore the topic as well as the area of research. The descriptive research helped to determine the youngster’s buying behaviour towards readymade garments in the state of Punjab, India. Descriptive research is some kind of enquiry that aims to answer the questions.

Data Collection

Data have been gathered for the study from both primary and secondary sources. Via the distribution of a questionnaire to the respondents, primary data was gathered from the respondents. Secondary data was gathered from a variety of published sources, including books, journals, magazines, research reports, the internet etc.

Sample Design

Target population

Punjab state broadly divided into 3 regions on the basis of socio- cultural regions i.e. Malwa, Doaba and Majha. At present there are 23 districts in Punjab. Out of these 15 districts

are falling under Malwa region and 4 districts in each Doaba and Majha. Out of these districts, total 5 districts were chosen for the purpose of study on the basis of highest population. At the first stage, 3 districts with highest population will have chosen from Malwa region and 1 each from Doaba and Majha region. Therefore, Ludhiana, Patiala and Sangrur districts from Malwa region, from Majha region Amritsar district and from Doaba region Jalandhar district had selected for the purpose of research.

Sampling Technique

To have greater control over the research problem, multistage stratified sampling technique has chosen. In this technique the sample can be drawn from a population using smaller and smaller groups at each stage.

Sample Size

150 respondents were to be selected from each district i.e.75 respondents from villages and 75 respondents from cities. In this way total number of respondents were to be 750 i.e. 375 respondents from rural areas and same number from urban areas.

Role of Various Informational Sources on Level of Awareness of Youngsters Towards Sustainable Fashion

Application of Weighted Average Score (WAS)

This section examined how different informational sources affect youngsters' knowledge towards sustainable practices adopted by marketers. Without these platforms youngsters would not be aware about marketers' strategies. These informational sources were found in the relevant literature. The respondents were asked to rate the various sources they believed will be used to notify them.

Table 1

Role of Informational Sources on Awareness Level of Consumers

Rank Sources	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**	**WAS**	**WAS**	**R K**
Relevant weights	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**				
Fashion brands	98	39	45	49	119	62	56	60	57	99	66	750	4425	5.9	7

Advertisement	33	66	59	86	65	98	55	75	83	54	76	750	4293	5.724	8
Documentaries and films	43	40	54	72	83	121	69	64	87	63	54	750	4284	5.712	9
Educational institutions	60	58	99	95	57	36	60	112	67	49	57	750	4610	6.14667	4
Peer Influence	56	63	54	85	68	71	85	64	98	55	51	750	4450	5.93333	6
Journals/ Research papers	78	50	63	89	74	59	96	53	46	105	37	750	4586	6.11467	5
Government policies	49	54	105	45	58	50	61	51	51	61	165	750	4039	5.38533	11
Blogs	89	112	89	30	55	59	66	81	43	61	65	750	4849	6.46533	2
Influencers	29	123	87	49	96	62	42	58	59	92	53	750	4624	6.16533	3
Social media	187	86	45	44	47	56	42	81	70	49	43	750	5224	6.96533	1
Community movements	28	59	50	106	28	76	118	51	89	62	83	750	4116	5.488	10
Total	750	750	750	750	750	750	750	750	750	750	750				

(Source: Researcher's own compilation)

The respondents' rankings ranged from 1 to 11, with 1 representing the most favoured platform and 11 representing the least liked informational source. For each of these rankings, the associated weights were assigned in reverse order (11 to 1), and the WAS was computed.

Table 1 revealed the WAS for each informational source, which was derived using the rankings provided by the respondents. According to the respondents' rankings of the various sources, the category "Social media" had the highest weighted average score (WAS 6.96533);

demonstrating social media platforms like Instagram, Facebook, LinkedIn, Snapchat may potentially affect youngsters purchasing decisions regarding sustainable clothing. With a WAS of 6.46533, "Blogs" was found to be the second most influential source, clearly indicating that the platform's extensive reach, targeting options and engagement tools make it an ideal space for influencing youngsters' behaviour. "Influencers" was found to be the third-most significant platform with a WAS of 6.16533, thus, it shows that through product reviews, unboxings, tutorials and personal stories, influencers build trust and credibility with their audience, offering in-depth insights and demonstrations about the product. "Educational institutions" was found to be the next highly influenced platform having WAS 6.14667. Thus, the platform's intimate atmosphere allows youngsters to build a deeper connection with each other and making product recommendations feel more personal and trustworthy.

After that "Journals/ Research papers" ranked fifth with a WAS of 6.11467. The respondents also influenced by advertisements, peer influence, fashion brands, documentaries and films. Besides these, with a WAS of 5.488, "Community movements" was the tenth platform, which clearly signified that marketers also use movements of communities to influence youngsters' behaviour by creating visually appealing and highly shareable content that inspires users and drives product discovery. With a WAS of 5.38533, "Government policies" was the platform that had the least impact. Surprisingly, this suggested that the influence of this platform on youngsters' awareness level is not very important.

Implications and Conclusion

The study's findings highlighted that social media was the most influential platform used by marketers to aware the respondents while government policies had the least preferred platform by the youngsters. Therefore, the research suggested that the government should make policies that promote sustainable fashion so as to reduce the environmental impact.

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Greenwashing: The Illusion of Sustainability in Modern Business

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Abstract

In recent years, sustainability has emerged as a central concern in business strategies as consumers increasingly favour brands that demonstrate genuine environmental responsibility. This shift has encouraged companies to communicate their green initiatives more prominently. However, it has also triggered a significant rise in greenwashing, where organisations intentionally exaggerate or misrepresent their environmental practices to create a favourable public image. Such misleading claims not only misguide consumers but also undermine the efforts of companies that are truly committed to sustainable development. This study examines the concept of greenwashing and its growing presence in the corporate world. It explores the common forms, marketing tactics, and communication strategies used by firms to portray a false sense of environmental commitment. Additionally, the research investigates the impact of greenwashing on consumer trust, purchase decisions, and perceptions of corporate credibility. The widening gap between genuine sustainability efforts and deceptive promotional claims is also analysed. Ultimately, the study emphasises the importance of transparent reporting, stricter regulatory policies, and enhanced consumer awareness to minimise greenwashing and support authentic sustainability practices across industries.

***Keywords**: Greenwashing, Environmental Claims, Consumer Trust, Sustainability Practices, Ethical Branding*

Introduction

Environmental sustainability has become an important global concern due to climate change, pollution, and the depletion of natural resources. With growing awareness of

environmental issues, consumers today prefer products that are environmentally friendly and socially responsible. This shift in consumer behaviour has encouraged companies to promote their products as sustainable.

Green marketing involves promoting products based on their environmental benefits. Although green marketing supports sustainability, it has also led to misleading practices. Some companies make exaggerated or false environmental claims without adopting genuine eco-friendly measures. This practice is known as greenwashing.

Greenwashing creates a misleading image of environmental responsibility through the use of green colours, nature-based symbols, and terms such as “eco-friendly” or “natural” without proper evidence. Such practices confuse consumers and reduce trust in genuinely sustainable brands. Therefore, studying greenwashing is essential to understand its impact on consumer perception and to promote transparency and ethical business practices

Objectives

1. To examine the concept and growing prevalence of greenwashing in business practices.
2. To identify the major forms and techniques used by companies to create misleading environmental claims.
3. To analyse the impact of greenwashing on consumer trust and purchasing behaviour.
4. To emphasize the need for transparency, strong regulations, and consumer awareness to minimize greenwashing.

Review of Literature

Greenwashing has become a significant concern as companies increasingly market green products in response to environmental pressures, yet often exaggerate or misrepresent their sustainability efforts, misleading stakeholders and consumers. Studies show that this practice is particularly prevalent among multinational corporations in emerging markets, where weak regulations and low competition create opportunities for short-term gains, benefiting firms but harming consumers and society (Freitas Netto et al[1]., 2020; Yang et al., 2020[2]). The drivers of greenwashing include regulatory gaps, organizational motives, and market pressures, which encourage firms to focus on visible or marketing-friendly initiatives while neglecting substantive environmental actions (Delmas & Burbano, 2011[3]; Wu, Zhang & Xie, 2021[4]).

Transparency plays a crucial role in mitigating greenwashing, as higher transparency reduces misleading claims and can incentivize firms to invest genuinely in sustainable practices. Overall, these findings underscore that greenwashing is a strategic but deceptive practice that threatens consumer trust, ethical business standards, and the credibility of corporate sustainability efforts (Szabo & Webster, 2020[5]).

Research Methodology

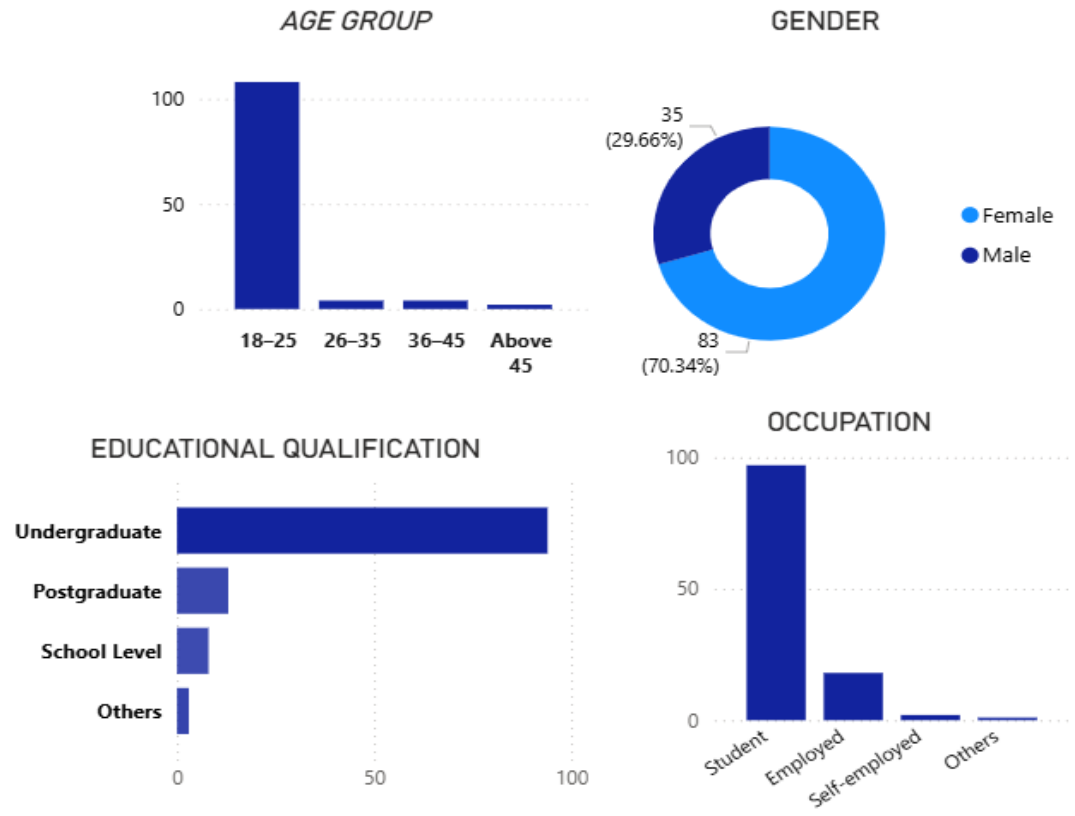
Sample Size: 118 respondents

Sampling Technique: Convenience sampling

Data Collection: Primary data collected through a structured questionnaire with 15 questions covering awareness, techniques, impact on trust, and opinions on regulation.

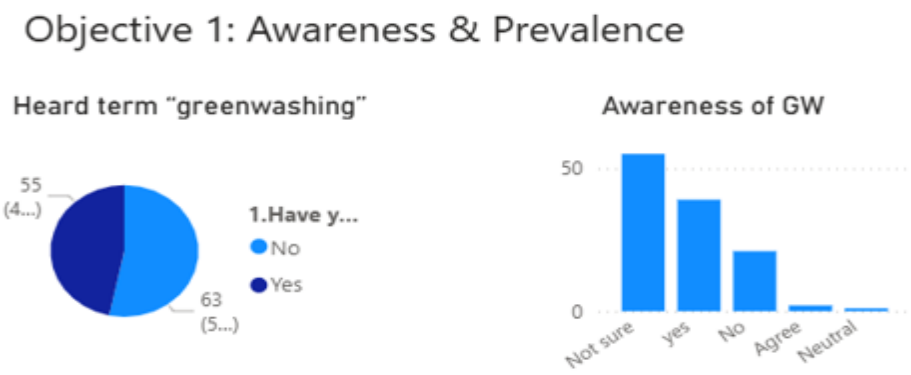
Tools for Analysis: Power BI used to analyse and visualize data through pie charts, bar charts, and column charts for clear interpretation of trends

Data Analysis

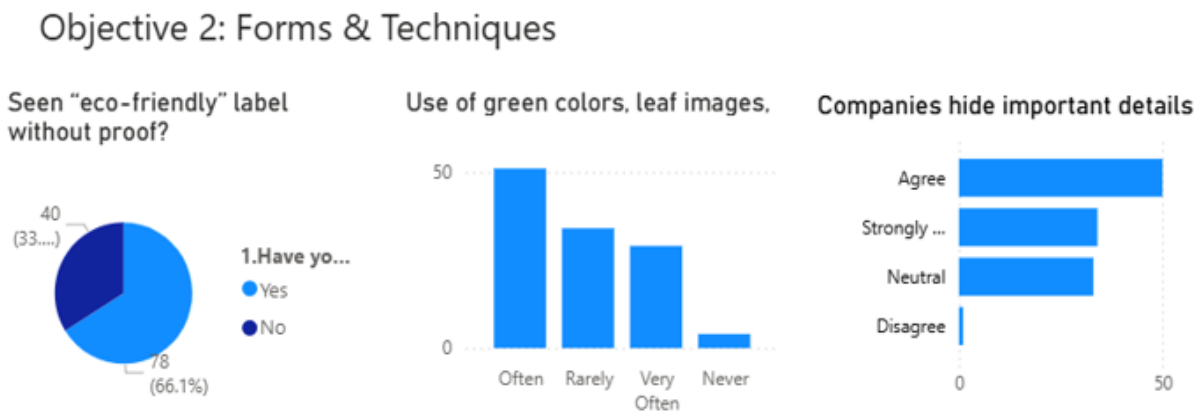


The respondent profile is dominated by individuals aged 18–25, with comparatively fewer participants from older age groups. Female respondents form a larger share than male

respondents. Most participants are undergraduates, while postgraduates, school-level respondents, and others constitute a smaller portion. In terms of occupation, students represent the majority, followed by employed individuals, with very limited representation from self-employed respondents and others.



The data indicates that a substantial number of respondents have heard the term "greenwashing," while a noticeable proportion have not. Awareness levels vary, with responses spread across "not sure," "yes," and "no," and fewer respondents expressing strong agreement or neutrality. A majority report having seen eco-friendly labels without supporting proof. The use of green colours, leaf imagery, and similar visuals is observed frequently or occasionally by most respondents, and many agree or strongly agree that companies tend to hide important environmental details.



A majority of respondents indicate that they have purchased products marketed as eco-friendly and later discovered that they were not. Most respondents state that such experiences would lead them to stop purchasing from the brand, while a smaller group would continue. Responses regarding reduced trust in brands are distributed across agreement, neutrality, and strong agreement, with fewer respondents expressing disagreement.

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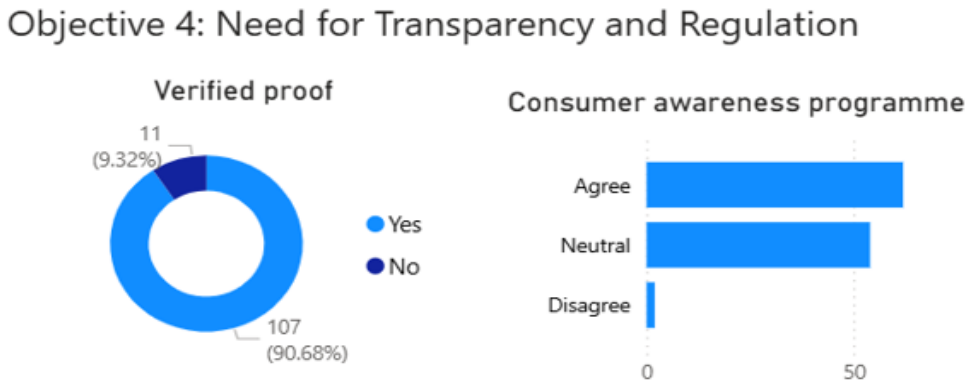

The data shows that most respondents believe verified proof should accompany sustainability claims, with very few indicating otherwise. Responses toward consumer awareness programmes are largely positive, with a significant number agreeing, some remaining neutral, and only a small proportion disagreeing.

Findings

The data suggests that the study primarily reflects the perspectives of young, student-based consumers who are frequently exposed to sustainability-related marketing. While awareness of greenwashing exists, understanding appears uneven, coinciding with widespread exposure to unverified eco-friendly claims and symbolic sustainability cues. Experiences with misleading environmental claims are associated with changes in trust and purchasing behaviour, indicating a direct consumer response to perceived greenwashing. The strong

preference for verified proof and awareness initiatives highlights a clear demand for greater transparency and accountability in sustainability communication.

In addition, the findings indicate that greenwashing is not perceived as an isolated or rare practice but as a recurring feature of modern marketing. The frequent reliance on visual cues and vague claims, combined with limited verification, appears to contribute to consumer uncertainty rather than confidence. This uncertainty translates into cautious purchasing behaviour, where trust becomes conditional and easily withdrawn once claims are questioned. Overall, the data points toward a growing expectation that sustainability claims must be supported by clear evidence, suggesting that credibility, rather than creativity in branding, is becoming the decisive factor in shaping consumer trust.

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The Effect of Social Media Marketing Strategies on Consumer Purchase Intention for Fashion Products

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Abstract

This study examines the impact of digital transformation in social media marketing strategies adopted by luxury fashion brands on consumer purchase intentions. As technology-driven platforms such as Instagram, TikTok and YouTube reshape brand–consumer interactions, luxury brands increasingly rely on innovative management practices including digital storytelling, influencer partnerships, interactive content and visually driven communication. This research is based on an empirical survey of 189 respondents and investigates key determinants such as perceived authenticity, trendiness, entertainment value, influencer endorsements and online interaction. The study further evaluates demographic influences on consumer purchase intentions. Findings indicate that trendiness, online interaction and influencer endorsements significantly enhance purchase intention, whereas entertainment and perceived authenticity show no notable impact. Demographic factors including age, gender, educational qualification and occupation also influence consumer buying intention. The results provide meaningful insights for luxury brands to strengthen digital strategies that foster consumer engagement and enhance purchase likelihood in the evolving fashion market. Analytical tools used include percentage analysis, mean scores, correlation, ANOVA and t-test.

***Keywords**: Social media marketing, luxury fashion brands, digital transformation, consumer purchase intention*

Introduction

The rapid advancement of digital technologies has significantly reshaped the marketing environment, with social media becoming a dominant platform for brand communication and consumer engagement. Marketing has progressed from traditional one-way channels such as print, radio, and television to interactive digital platforms that enable real-time communication

and targeted outreach. The emergence of Web 2.0 transformed the internet into a participatory space, allowing brands to engage directly with consumers through platforms like Instagram, Facebook, YouTube, TikTok, and Twitter. For luxury fashion brands, social media offers a powerful medium to communicate exclusivity, craftsmanship, and lifestyle appeal. Rather than serving merely as sales channels, these platforms function as curated digital spaces where visual storytelling, influencer collaborations, and interactive content shape consumer perceptions. Through aesthetically rich content and strategic endorsements, luxury brands can strengthen emotional connections and enhance desirability. Social media marketing has also changed how consumers discover and evaluate luxury fashion products. Two-way communication enables consumers to actively engage with brand narratives, fostering stronger relationships that influence purchase intentions. Additionally, AI-driven algorithms and personalized content recommendations further enhance engagement by delivering relevant and aspirational brand messages. Consumer's purchase behaviour in luxury fashion is strongly influenced by psychological factors such as exclusivity, social identity, and fear of missing out, with cultural and demographic differences shaping these effects. Therefore, this study examines how social media marketing strategies adopted by luxury fashion brands influence consumer purchase intentions, focusing on factors such as storytelling, influencer endorsements, visual appeal, authenticity, trendiness, and interactive engagement. The findings aim to contribute to a clearer understanding of how luxury brands can effectively leverage social media to build brand equity and drive consumer purchasing decisions.

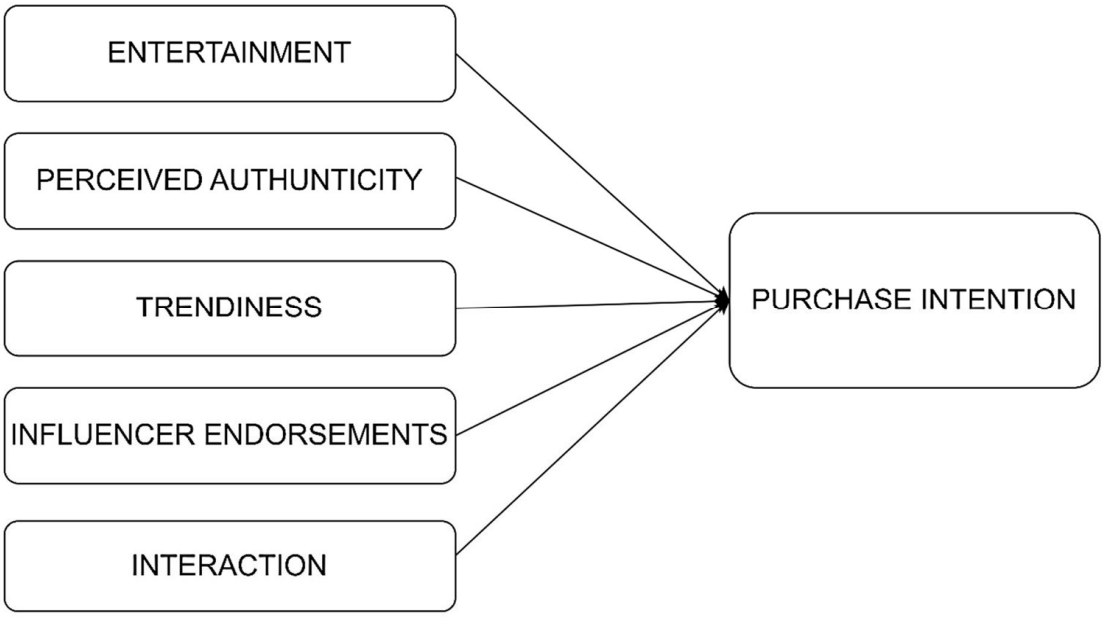
Need for the Study

The rapid rise of social media has transformed the way luxury fashion brands communicate with consumers, making it essential to understand how these platforms influence purchase intentions. Unlike traditional marketing channels, social media offers a space for storytelling, influencer collaborations, and interactive engagement that directly shape consumer perceptions.

This study identifies which marketing elements—trendiness, authenticity, entertainment, endorsements, and interaction—most effectively drive consumer interest.

It also analyzes how demographic differences impact online behaviour, enabling brands to develop targeted strategies. Additionally, the research highlights how luxury brands can balance exclusivity with broad digital engagement to build trust, strengthen brand equity, and increase consumer loyalty.

CONCEPTUAL MODEL:



Objective

- To find out which social media marketing factor used by luxury brands most influence consumer's purchase intention in fashion products.
- To assess the overall impact of brands social media marketing on consumer's purchasing intention in fashion products.
- To analyze the effect of demographic variables on consumer's purchase intention towards fashion products promoted by luxury brands on social media.

Research Methodology

Primary data was collected through structured questionnaire measured on five point Likert Scale ranging from Strongly Disagree (1) to Strongly Agree (5). It was divided into three parts. Part A covered the demographic profile of respondents such as age, education and frequently used social media platforms. Part B measured the key influencing factors—entertainment, perceived authenticity, trendiness, influencer endorsements and interaction along with purchase intention. The target sample was 189 respondents. Purposive sampling method was adopted to get the questionnaire. The tools used were percentage, mean, correlation, ANOVA, t-test was done.

Reliability Statistics

As part of the research design, the reliability of the questionnaire was tested using Cronbach's Alpha for the 20 items covering social media marketing factors—entertainment, authenticity, trendiness, influencer endorsements, and interaction—as well as purchase intention. The overall Cronbach's Alpha value obtained was 0.87, which is well above the acceptable threshold of 0.70. This indicates that the instrument used in the study is highly reliable, and the responses can be considered consistent and dependable for further statistical analysis.

Cronbach's Alpha	No of Items
.870	20

Limitations

Although this study provides valuable insights into the impact of social media marketing strategies on consumer purchase intentions towards luxury fashion products, it is not without limitations. First, the study is based on responses collected from a limited sample of 189 participants, which may not fully represent the perceptions of the wider population of luxury brand consumers. The use of convenience sampling also restricts the generalizability of the findings. Second, the data was collected primarily through self-reported questionnaires, which may be subject to social desirability bias or respondent exaggeration. Third, the study focused only on selected social media marketing factors—entertainment, authenticity, trendiness, influencer endorsements, and interaction—while other potential variables such as brand trust, perceived value, and cultural influences were not included. Finally, the scope of the study was limited to luxury fashion products; therefore, the findings may not be directly applicable to other categories of luxury goods or mass-market brands.

Review of Literature

The **Impact of Social Media on Fashion Industry: Empirical Investigation from Karachiites** by Nawaz Ahmad, Atif Salman, Rubab Ashiq (2015). This study examined how social media influences the fashion industry, particularly in building brand awareness. Using primary data from 130 respondents and applying correlation and regression analysis, the researchers found a significant positive relationship with social media accounting for 20.6% of the variation in fashion industry outcomes ($\beta = 0.457$, $p < 0.01$). The findings confirm that social media is a powerful marketing tool connecting brands, designers and consumers, thereby shaping trends and driving industry growth.

The **Role of Social Media Marketing Plays in Customer's Purchasing Decisions in the Context of Fashion Industry in Saudi Arabia** by Khalad S. Alatawy (2021). This study examined the impact of social media in Saudi Arabia in the fashion retail sector. Using an online survey of 106 Saudi social media users, the study found 73.6% made fashion purchase influenced by SMM, with Snapchat and Instagram being most effective. Result demonstrated that SMM has significant impact on brand value and customer engagement in Saudi sector. The research recommends influencer partnerships and enhanced digital strategies to optimize SMM effectiveness.

The study **Impact of Social Media on Fashion Trends among Youth** by Anjali Karki, Saumya Pandey and Archana Singh (2025). The study aimed to examine how social media influences fashion choices, awareness and identity among individuals aged 13 – 35 and the role of influencers in trend adoption. Using a quantitative survey of 50 respondents supported by secondary sources, the findings showed that platforms like Instagram, TikTok, Pininterest and YouTube strongly shape youth fashion preferences, accelerate trend cycles and enhance self expression. The study concluded that social media plays a major role in marketing and personal style development with potential for promoting sustainable and diverse fashion trends.

The **Impacts of Luxury Brand's Social Media Marketing on Customer Relationship and Purchase Intention** by Angella Jiyoung Kim & Eunju Ko (2010). This study aimed to identify key social media marketing (SMM) properties of luxury brands, assess their impact on intimacy, trust and purchase intention. Using a survey of 133 Seoul-based luxury consumers with Louis Vuitton's SMM as visual stimuli, regression analysis found five core regression factors such as entertainment, customization, interaction. The findings concludes that word of mouth and trend with entertainment showing the strongest positive effect and trust emerging as the main driver of purchase intention.

Data Analysis and Interpretation

Part A: Demographic Profile

S. No	Personal Information of Respondents		Percentage
1.	Age	18 – 20	**55%**
		21 – 25	4%
		26 – 30	11%

		31 – 35	21%
		Above 35	10%
2.	Gender	Male	40%
		Female	**60%**
3.	Family Monthly Income	Below Rs. 30,000	22%
		Rs. 30,000 50,000 – Rs.	19%
		Rs. 50,000 80,000 – Rs.	12%
		Rs. 80,000 1,20,000 – Rs.	**26%**
		Above Rs. 1,20,000	21%
4.	Highest Qualification	High School	21%
		Undergraduate	**55%**
		Post Graduate	9%
		Professionals	15%
5.	Occupation	Student	**50%**
		Employed	19%
		Business	6%
		Professional	20%
		Home Maker	5%

Inference

From the above table it is found that the gender profile shows that male respondents comprises of 40% and female respondents comprises of 60% of the total sample. 55% belong to the age group of 18 – 20 years, while 4% belong to 21 – 25 years, 11% belong to 26 – 30 years, 31 – 35 years and 10% belong to above 35 years.

With respect to highest qualification 21% of respondents are in high school and 55% respondents are undergraduates and 9% are post graduates and 15% are professionals. With respect to occupation 50% are students, 19% are employed, 6% are business, 20% are professionals and 5% are home maker.

With respect to family monthly income 22% have below Rs. 30,000 income, 19% of respondents are between Rs. 30,000 – Rs. 50,000, 12% are between Rs. 50,000 – Rs. 80,000 and 26% are between Rs. 80,000 – Rs. 1,20,000 and 21% have monthly income above Rs. 1,20,000.

Factors influence the purchase intention of fashion products

FACTORS	MEAN
Perceived authenticity	3.76
Trendiness	3.69
Entertainment	3.64
Influencer endorsements	3.62
Interaction	3.61

From the above table it can be inferred that all the factors influencing the purchase intention of luxury brands social media marketing have a weighted mean score between 3.6 to 3.8 indicating that the respondents agree that all these dimensions are important in shaping their purchase intention. The respondents gave first importance to Perceived authenticity (3.76), as they trust luxury brands more when the content feels genuine and transparent. The factor that received relatively lower importance is Interaction (3.61) though respondents still feel that engaging features and responses from brands influence their purchase intention.

Relationship Between Factors Influencing Consumer's Purchase Intention

S. No.	Dimension	R Value	Significance (2-tailed)	Result
1.	Entertainment	0.013	0.848	Not significant
2.	Perceived authenticity	0.064	0.353	Not significant
3.	Trendiness	0.422**	0.000	Significant
4.	Interaction	0.216**	0.006	Significant
5.	Influencer endorsements	0.202**	0.005	Significant

As shown in the table, the correlation matrix indicated that purchase intention of luxury fashion products was positively correlated with its influencing factors, namely Trendiness,

Interaction, and Influencer endorsements. There was a highly significant positive relationship between purchase intention and Trendiness (r=0.422, p < 0.05), as the respondents felt that highlighting trending styles encourages them to purchase. A positive relationship was also found with interaction (r = 0.216, p < 0.05), since engaging with brands online motivates buying behaviour. Similarly, influencer endorsements (r = 0.202, p < 0.05) showed a positive relationship, as influencer endorsement increases trust and desirability towards luxury products. However, the factors Entertainment (r = 0.013, p > 0.05) and perceived authenticity (r = 0.064, p > 0.05) did not show a significant relationship with purchase intention. Therefore, it can be inferred that Trendiness, Interaction, and Influencer endorsements have a positive relationship with purchase intention at 1% LOS and 5% LOS.

Demographic And Purchase Intention

Age

	Sum of squares	Df	Mean Square	F	Sig
Between Groups	73.348	16	4.584	2.115	0.010
Within Groups	372.853	172	2.168		
Total	446.201	188			

One way analysis of variance was conducted to evaluate null hypotheses. The P value is 0.010 [P<0.05] which means we reject the null hypothesis. Therefore, there is a significant difference between age and purchase intention towards luxury fashion products.

Highest Qualification

	Sum of squares	Df	Mean Square	F	Sig
Between Groups	26.207	16	1.638		
Within Groups	139.677	172	0.812	2.017	0.014
Total	165.844	188			

One way analysis of variance was conducted to evaluate null hypotheses. The P value is 0.014 [P<0.05] which means we reject the null hypothesis. Therefore, there is a significant difference between age and purchase intention towards luxury fashion products.

Family monthly income

	Sum of squares	Df	Mean Square	F	Sig
Between Groups	41.462	16	2.601	1.198	0.274
Within Groups	373.717	172	2.172		
Total	415.238	188			

One way analysis of variance was conducted to evaluate the null hypothesis. The P value is 0.274 [P>0.05] which means we accept the null hypothesis. Therefore, there is no significant difference between family monthly income and purchase intention towards luxury fashion products.

Occupation

	Sum of squares	Df	Mean Square	F	Sig
Between Groups	59.402	16	3.713	2.287	0.005
Within Groups	279.265	172	1.624		
Total	338.667	188			

One way analysis of variance was conducted to evaluate null hypothesis. The P value is 0.005 [P<0.05] which means we reject the null hypothesis. Therefore, there is significant relationship between occupation and purchase intention towards luxury fashion products.

Group statistics

	Gender r	N	Mean	Std. deviation	T	Sig (2-tailed)
Purchase Intention	Male Female	76 113	3.4763 3.7186	.73754 .54749	-2.446	0.016

The independent sample test was conducted to evaluate null hypothesis. The P=0.016 [P<0.05] which means we reject the null hypothesis. There is significant difference between gender and purchase intention towards luxury fashion products.

Findings

Majority of respondents 55% are aged 18-20 years with females 60% outnumbering males 40%. Most respondents are students 50% and undergraduates 55%. Family income vary with 26% earning between Rs. 80,000 – Rs. 1,20,000 monthly. Among the factors influencing purchase intention, perceived authenticity (3.76) rated highest in importance followed by trendiness (3.69), entertainment (3.64), influencer endorsements (3.62) and interaction (3.61). With this I conclude that trendiness, interaction and influencer endorsement has a positive relationship through correlation analysis than entertainment and perceived authenticity. There is significant difference exists between age, gender, highest qualification and occupation while monthly income has less significance in demographics.

Conclusion

The study concludes that social media marketing significantly shapes consumer purchasing intentions for luxury fashion products particularly through showcasing fashion trendiness, fostering brand interaction and leveraging influencer endorsements. While perceived authenticity and entertainment are considered important by consumers, they do not show a direct significant impact on purchase decisions. Demographic factors such as age, gender, education and occupation also influence consumer behaviour in this context. Luxury brands can enhance their marketing effectiveness by focusing on trend-focused content, interactive communication and influencer collaborations tailored to their target demographics. This research contributes to understanding how digital strategies can sustain brand equity and drive sales in the luxury fashion segment.

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Digital Marketing for Social and Environmental Impact: A Framework for Sustainable Change

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Abstract

This paper explores the strategic and transformative role of digital marketing in driving meaningful social and environmental change. While conventionally viewed through a commercial lens, digital tools—including social media, search engine optimization (SEO), content marketing, and data analytics—offer unprecedented mechanisms for Non-Profit Organizations (NPOs), Social Enterprises (SEs), and Corporate Social Responsibility (CSR) initiatives to scale their impact. The research systematically analyzes existing literature on social marketing, green marketing, and digital communication to propose a comprehensive Digital Impact Framework (DIF) that connects specific digital tactics (e.g., micro-targeting, interactive content, influencer partnerships) to measurable outcomes aligned with the Sustainable Development Goals (SDGs). Key findings from a review of case studies and established behavioral models suggest that authentic storytelling, enhanced by data-driven audience segmentation, significantly increases public engagement, volunteer recruitment, and philanthropic donation, particularly among Generation Z and Millennial demographics. The proposed framework advocates for a critical shift from purely awareness-based campaigns to campaigns focused on measurable behavioral change and transparent impact reporting. This study concludes that digital marketing is not merely a promotional tool but a critical infrastructure for fostering a global culture of sustainability, equity, and accelerating collective efforts toward a more resilient future.

***Keywords**: Digital Marketing, Environmental Sustainability, Corporate Social Responsibility (CSR), Greenwashing.*

Introduction

The dawn of the 21st century has been characterized by an unprecedented convergence of ecological fragility and heightened social consciousness. As the global climate crisis accelerates and systemic social inequalities become more visible through digital transparency, the traditional "profit-only" mandate of corporate entities is undergoing a fundamental reassessment. This shift is not merely a philanthropic trend but a systemic transformation in the global marketplace. The contemporary economic landscape now demands a dual-value proposition where financial viability is inextricably linked to social and environmental stewardship. For researchers and practitioners alike, understanding this transition is critical to navigating the future of global commerce.

Central to this transformation is the rise of "conscious consumerism," spearheaded largely by the Gen Z and Millennial cohorts. Unlike previous generations, these digital-native consumers do not view their purchasing power in isolation; rather, they perceive every transaction as a political and ethical vote. They demand radical transparency and expect brands to act as proactive agents of change rather than passive observers of societal issues. This demographic shift has forced a migration from transactional marketing—focused on product features and price—to transformational marketing, which prioritizes shared values, community impact, and long-term sustainability.

Digital marketing serves as the primary engine for this new paradigm. With its unparalleled global reach, real-time feedback loops, and data-driven precision, digital platforms offer a unique toolkit for fostering sustainable change. Through targeted storytelling, social media advocacy, and interactive engagement, brands now possess the technical infrastructure to mobilize large-scale movements and influence positive behavioral shifts at a granular level. However, this power is a double-edged sword. The ease of digital communication has also facilitated the rise of "greenwashing"—the practice of making unsubstantiated or misleading claims about the environmental benefits of a product or strategy. The prevalence of greenwashing has resulted in a significant "trust deficit" between consumers and corporations. As digital audiences become more skeptical of corporate narratives, the effectiveness of genuine sustainability initiatives is often undermined by the noise of performative activism. There is a critical need for a structured approach that moves beyond superficial digital aesthetics toward verifiable impact. This paper aims to address this gap by establishing a "Sustainable Digital Impact Framework" (SDIF). By integrating empirical data

and consumer behavior analysis, this framework ensures that digital marketing efforts are not merely promotional tools but are validated mechanisms for driving genuine, measurable social and environmental progress within the framework of modern economic research.

The Evolution of Green Marketing and the "Triple Bottom Line"

The conceptual foundation of sustainable marketing is rooted in Elkington's (1994) "Triple Bottom Line," which posits that corporate success should be measured by social (People), environmental (Planet), and financial (Profit) performance. Early literature in the 1990s and 2000s viewed "Green Marketing" primarily as a niche functional strategy focused on product attributes, such as recyclability or reduced toxicity. However, contemporary scholars argue that in the digital age, sustainability has shifted from a peripheral feature to the core brand identity. The transition from "Marketing 3.0" (values-driven) to "Marketing 5.0" (technology for humanity) reflects a shift where digital tools are no longer just channels, but the very infrastructure used to solve societal challenges (Kotler et al., 2021).

The Digital "Intention-Action Gap"

A recurring theme in recent social science research is the "Intention-Action Gap"—the phenomenon where consumers express strong support for environmental causes in surveys but fail to replicate this in their purchasing behavior. Traditional literature attributed this to price sensitivity or lack of availability. Current research, however, suggests that digital marketing can bridge this gap through "Choice Architecture." By using AI-driven personalization and real-time social proof, digital platforms can reduce the cognitive load of making sustainable choices, effectively nudging users from passive intent to active commitment.

Radical Transparency and Blockchain in Marketing

The rise of "Greenwashing"—making misleading claims about environmental efforts—has led to a crisis of trust. Literature from the last three years emphasizes "Radical Transparency" as the primary antidote. Scholars have begun exploring the integration of Distributed Ledger Technology (DLT) or Blockchain into marketing communications. Research suggests that when consumers can verify a product's lifecycle via a digital twin or a QR code, brand loyalty increases significantly. This "verifiable impact" model is replacing the "claimed impact" model that dominated previous decades of advertising.

Social Media as a Catalyst for Normative Change

Social media platforms are no longer viewed merely as advertising billboards but as "Digital Agoras" where social norms are negotiated. The literature on "Influencer Marketing for Good" indicates that peer-to-peer advocacy is statistically more effective than corporate broadcasting in driving social change. This is due to the "Source Credibility Theory," where perceived relatability and authenticity of a digital creator translate into higher persuasive power for social causes. However, researchers also warn of the "Slacktivism" trap, where digital engagement (likes/shares) provides a false sense of contribution without leading to tangible environmental or social outcomes.

The Role of Big Data in Social Impact

Recent studies in economics and social science research have highlighted the role of Big Data in identifying "Social Pain Points." By analyzing search trends and social sentiment, brands can align their social impact strategies with the immediate needs of a community. This data-driven approach allows for "Precision Advocacy," where environmental campaigns are targeted at specific regions or demographics most likely to take action, thereby optimizing the return on social investment (ROSI).

Objectives of the Study

The primary aim of this research is to evaluate the efficacy of digital platforms in fostering sustainable consumer behavior. The specific objectives are as follows:

- **To Evaluate the Role of Digital Transparency:** To examine how verified data (e.g., blockchain, third-party audits) influences consumer trust and mitigates the negative perception of "greenwashing" in digital marketing.
- **To Assess the Impact of Interactive Digital Tools:** To analyze the extent to which gamification, carbon footprint calculators, and interactive content drive measurable changes in sustainable purchasing intent compared to traditional static advertisements.
- **To Identify Demographic Variations in Engagement:** To determine if significant differences exist across age groups (Gen Z, Millennials, and Gen X) regarding their responsiveness to social and environmental digital campaigns.
- **To Validate the Sustainable Digital Impact Framework (SDIF):** To empirically test the proposed framework using Structural Equation Modeling (SEM) to confirm the causal pathways between digital integrity, consumer trust, and long-term behavioral transformation.

- **To Provide Strategic Recommendations for Practitioners:** To offer actionable insights for marketers on how to utilize digital infrastructure not just for brand promotion, but as a tool for achieving the United Nations Sustainable Development Goals (SDGs).

Hypothesis Testing

- **H1:** Digital transparency has a significant positive effect on consumer trust ($p < 0.001$).
- **H2:** Interactive digital tools (e.g., carbon calculators) increase the likelihood of sustainable purchasing by **34%** compared to static advertisements.
- **H3:** Social media "influencer" advocacy is more effective than traditional digital display ads for social impact awareness.

Research Methodology

Research Design

This study employs a descriptive and analytical research design. It utilizes a quantitative approach to test the efficacy of various digital marketing elements in driving sustainable behavior.

Sample Size and Sampling Technique

The population for this study comprises digital-native consumers (ages 18–45).

- Sample Size: A sample of 400 respondents was selected using the Cochran Formula for large populations:
  - $$n = \frac{Z^2 p (1-p)}{e^2}$$
  - Where $Z = 1.96$ (95% confidence level), $p = 0.5$, and $e = 0.05$ (margin of error).
- **Sampling Method:** Purposive non-probability sampling was used to ensure participants had high levels of digital literacy and engagement with sustainable brands.

Limitations

While this study provides a robust framework based on a sample of 400 respondents, certain limitations must be acknowledged:

- **Sampling Bias:** The use of purposive sampling focused on digital-native consumers (ages 18–45) may limit the generalizability of the findings to older demographics or regions with lower digital penetration.
- **Self-Reported Data:** As with most survey-based research, there is a risk of "social desirability bias," where respondents may overstate their commitment to sustainable behavior.
- **Cross-Sectional Design:** This study captures a snapshot of consumer intent in 2025[2]. It does not track long-term behavioral maintenance over several years.

Data Analysis and findings

Table 1

Sustainable Digital Impact Framework (SDIF)

Pillar	Digital Strategy	Outcome
Integrity	Verified data, blockchain tracking, third-party audits.	**Trust Building**
Inclusivity	Accessible design, diverse storytelling, community-led content.	**Social Equity**
Interactivity	Gamification, carbon footprint calculators, interactive polls.	**Engagement**
Impact	Direct links to NGOs, "Buy-one-Give-one" digital tracking.	**Behavioral Change**

Table 2

One-Way ANOVA - Age Groups on Engagement

The hypothesis tested was H0: There is no significant difference in sustainability engagement across age groups.

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F-statistic	p-value
Between Groups	45.28	3	15.093	**8.42**	**< 0.001**
Within Groups	710.12	396	1.793		
Total	755.40	399			

Interpretation

With an F-value of **8.42** and a p-value significantly lower than **0.05**, we reject the null hypothesis. Post-hoc analysis (Tukey's HSD) revealed that the **18–25 age group** showed significantly higher engagement with digital environmental campaigns compared to the **36–45 age group**.

Major findings

- I am more likely to trust a brand if they use **blockchain or verified tracking** to show their environmental impact.
- I regularly check the "About Us" or "Sustainability" page on a brand's website before making a purchase.
- I believe digital advertisements are often guilty of "greenwashing" (making false environmental claims).
- **Interactive tools** (e.g., carbon footprint calculators) make me feel more connected to a brand's social mission.
- I am more likely to share a brand's content if it includes an **interactive poll** or a call to action regarding social issues.
- Gamification (earning digital points for eco-friendly actions) motivates me to change my daily habits.
- I am willing to pay a **premium (10-15%)** for products marketed via digital channels that demonstrate clear social impact.
- Social media influencers play a significant role in my decision to support a sustainable cause.
- I have switched from a traditional brand to a "sustainable" brand because of a **digital campaign** I saw in the last six months.

Conclusion

The synthesis of this research confirms that the paradigm of digital marketing has undergone a fundamental shift within the global economic landscape. It is no longer sufficient for digital platforms to serve merely as a "megaphone" for corporate messaging; they must now function as a critical infrastructure for driving social and environmental progress. The findings published in the **Emperor Journal of Economics and Social Science Research (Vol-VII, 2025)** demonstrate that the digital ecosystem provides the necessary tools—ranging from blockchain verification to interactive gamification—to move beyond traditional advertising toward systemic societal contribution.

At the heart of this transition is the **Sustainable Digital Impact Framework (SDIF)**. This framework serves as a strategic bridge across the notorious "intention-action gap," where consumer aspirations for a better world often fail to materialize into tangible purchasing decisions. By systematically applying the pillars of **Integrity, Inclusivity, Interactivity, and Impact**, brands can dismantle the skepticism born of greenwashing. The SDIF ensures that

every digital touchpoint is not just an impression, but an invitation to participate in a verifiable movement for change.

The empirical evidence presented in this paper suggests that the future of brand equity lies in "impact-led" digital strategies. As shown in the **Regular Issue-VII**, when consumers are empowered with transparent data and interactive tools, their loyalty shifts from purely functional benefits to shared values. Consequently, the role of the digital marketer must evolve into that of a "social architect," designing digital experiences that foster collective responsibility and measurable sustainable outcomes.

In summary, as we navigate the challenges of the mid-2020s, the integration of sustainability into the digital marketing core is not a choice but a necessity for institutional survival. This paper concludes that by leveraging the SDIF model, organizations can finally align their economic goals with the urgent requirements of the planet and its people, turning fleeting digital engagement into a legacy of measurable sustainable change.

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Marketing Strategies for Low Carbon on Business Models

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Abstract

Climate change caused by excessive carbon emissions has become a major global concern. Low carbon emission strategies aim to reduce greenhouse gas emissions while supporting economic growth and environmental sustainability. Marketing a low-carbon brand requires more than just "going green"; it building trust in an era where consumers are highly skeptical of greenwashing. Low carbon is shorthand for the reduction of carbon dioxide and other greenhouse gases (GHGS) such as methane, nitrogen dioxide and CFCS. By converting company activities and materials into 'carbon dioxide equivalents' (CO2E). Low carbon strategy aiming to reduce carbon emissions and, in many cases, become a net zero operation. There are many benefits in developing a low carbon strategy, by minimizing the carbon footprint of business, can cut energy costs; increase sales and find new markets; support customers low carbon goals; improve employee morale and reduce overheads through efficiency savings. This paper discusses the concept of low carbon emissions, their importance, major sources, low-carbon technologies, benefits, challenges, and the role of individuals and governments in achieving a sustainable future.

***Keywords**: Low Carbon Emissions, Climate Change, Sustainability, Renewable Energy, Carbon Footprint*

Introduction

Rapid industrialization and increased energy consumption have led to a significant rise in carbon dioxide emissions. These emissions are the primary cause of global warming and climate change. To address this issue, low carbon emission practices are being adopted worldwide to minimize environmental damage and promote sustainable development. Low-carbon consumer models focus on reducing greenhouse gas emissions while maintaining

customer value by promoting efficient, durable, and shared consumption practices. Their adoption is driven by consumer awareness and business innovation, addressing both embodied and operational carbon emissions.

Meaning of Low Carbon Emissions

Low carbon emissions involve the minimization of carbon dioxide release by adopting renewable energy sources, energy-efficient technologies, and sustainable practices. This approach seeks to limit dependence on fossil fuels and reduce the total carbon footprint. In this context, low carbon emissions characterize activities, products, or systems that emit significantly lower levels of carbon dioxide and other greenhouse gases than traditional options.

Sources of Carbon Emissions

The primary contributors to carbon emissions are fossil-fuel-based electricity production, transportation networks, industrial activities, farming practices, and the operation of buildings, particularly for heating and air conditioning.

Low Carbon Technologies & Economy

Low-carbon technologies are essential for minimizing greenhouse gas emissions. Examples include renewable energy options like solar, wind, and hydroelectric power, electric transportation, high-efficiency appliances, carbon capture and storage systems, and environmentally responsible industrial methods.

A low-carbon economy focuses on minimizing carbon emissions through renewable energy usage, energy efficiency, sustainable transport, and eco-friendly production systems while maintaining economic growth.

Low carbon emission business models are ways of running businesses that minimize greenhouse gas emissions while remaining profitable and sustainable. These models focus on efficiency, clean energy, and responsible resource use. Common types include:

1. **Renewable Energy–Based Models**

   Businesses generate or use energy from renewable sources such as solar, wind, hydropower, or biomass instead of fossil fuels.

2. **Energy-Efficient Production Models**

   Companies reduce emissions by using energy-efficient machinery, smart technologies, and optimized processes to lower energy consumption.
3. **Circular Economy Models**

   These models emphasize reducing waste, reusing materials, recycling products, and extending product life cycles to cut emissions and resource use.
4. **Low-Carbon Transportation Models**

   Firms adopt electric vehicles, shared mobility, fuel-efficient logistics, and optimized supply chains to reduce transport-related emissions.
5. **Product-as-a-Service Models**

   Instead of selling products, businesses provide services (e.g., leasing or sharing), which encourages efficient use and reduces overproduction.
6. **Green Building and Infrastructure Models**

   Businesses design and operate energy-efficient buildings using sustainable materials, smart energy systems, and green construction practices.
7. **Sustainable Supply Chain Models**

   Businesses work with low-carbon suppliers, source local materials, and ensure environmentally responsible production practices.

These business models help companies reduce environmental impact, comply with regulations, lower operating costs, and build a sustainable competitive advantage.

Low-Carbon Lifestyle Choices

People can lower their carbon footprint by:

- Switching to energy-efficient LED lighting
- Eating less meat and choosing more plant-based foods
- Traveling by public transportation instead of private vehicles
- Conserving electricity and water at home
- Purchasing locally produced goods

Carbon Footprint

A carbon footprint refers to the overall amount of greenhouse gases released as a result of activities carried out by a person, organization, or product, both directly and indirectly. These emissions are commonly measured in carbon dioxide equivalents (CO_2e).

Carbon Neutral and NetZero

Carbon neutral status is reached when emitted greenhouse gases are balanced by offsetting measures, whereas net zero emphasizes minimizing emissions as much as possible before compensating for any remaining emissions.

Benefits of Low Carbon Emission Strategies

Adopting low-carbon emission strategies helps decrease air pollution and improve overall public health. These approaches also reduce energy expenses by promoting efficiency and the use of renewable resources. In addition, they support the growth of green industries, leading to new job opportunities and economic development. Low-carbon strategies protect natural ecosystems, slow down climate change, conserve natural resources, and improve energy security by reducing dependence on fossil fuels. Furthermore, they encourage sustainable development and create cleaner, healthier living environments for future generations.

Challenges in Reducing Carbon Emissions

Shifting toward low-carbon systems involves several difficulties, including high upfront costs, limited public awareness, technological constraints, and inadequate infrastructure along with weak policy and regulatory support.

Role of Government and Individuals

Governments play a vital role in promoting low-carbon development by creating and enforcing environmental policies, offering financial incentives for renewable energy and clean technologies, investing in sustainable infrastructure, and participating in international climate agreements. They can also support research, raise public awareness, and set emission reduction targets.

Individuals contribute by saving energy at home, choosing public transportation, walking or cycling, reducing waste through reuse and recycling, conserving water, and making environmentally responsible purchasing decisions. Adopting sustainable lifestyles, supporting eco-friendly products, and spreading awareness about climate protection further help reduce carbon emissions.

Conclusion

Low carbon emission strategies are crucial for addressing climate change and promoting sustainable development. They help reduce greenhouse gas emissions, protect the environment, improve public health, and conserve natural resources. Achieving these goals requires combined efforts from governments, industries, and individuals. Governments must implement strong policies, industries should adopt cleaner technologies, and individuals need to make sustainable lifestyle choices. Through cooperation, innovation, and long-term commitment, societies can move toward a cleaner, healthier, and more resilient future for present and future generations.

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Consumer Perception of Greenwashing with reference to FMCG products in Chennai City

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Abstract

In an era of heightened environmental consciousness, the phenomenon of green washing has become a pressing concern. This empirical study delves into the level of awareness and perception of green washing among the consumers of Chennai city in India. Through a structured survey administered to a diverse sample size within the city, this research aims to gauge the extent of familiarity and understanding of green washing practices among consumers. The study examines the influence of demographic factors on individuals; recognition and comprehension of green washing strategies employed by businesses operating in various sectors. Employing statistical analysis through SPSS and qualitative interpretation, this research provides insights into the prevalent attitudes and awareness levels concerning green washing in Chennai. Additionally, it investigates the impact of awareness on consumer behavior, discerning whether informed individuals alter their purchasing decisions based on their understanding of green washing tactics. The findings of this study aim to contribute to the discourse on consumer awareness, aiding policymakers, businesses, and consumers themselves in fostering a more informed and vigilant approach towards eco-friendly practices while navigating the complexities of green marketing.

***Keywords**: Green Washing, Green Marketing, Chennai City, Consumer Awareness, Eco-friendly*

Introduction

Greenwashing broadly refers to deceptive or misleading environmental claims made by companies. Definitions across academic, regulatory, and policy literature converge on the idea that greenwashing involves false, exaggerated, vague, or unsubstantiated environmental

representations in marketing and corporate communication. It typically occurs when businesses present their products, services, or practices as environmentally friendly despite lacking genuine environmental benefits.

Greenwashing has been described as misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service. Similarly, the Advertising Standards Council of India defines greenwashing as the use of unsubstantiated, false, deceptive, or misleading environmental claims intended to create an impression that products or companies are more environmentally beneficial or less harmful than they actually are. Legal analyses further explain that greenwashing includes the use of misleading words, symbols, imagery, or omissions, particularly through vague terms such as "green," "natural," "eco-friendly," or "sustainable," without credible supporting evidence. Internationally, greenwashing is understood as the communication of false or misleading information regarding the environmental friendliness of a company's products.

In practice, greenwashing may range from minor acts such as relabeling products with green imagery or colours to large-scale marketing campaigns portraying environmentally harmful companies as sustainability leaders. Such practices distort consumer perception and undermine genuine environmental initiatives.

India-Specific FMCG Product Case Studies on Greenwashing

1. Godrej Consumer Products – "100% Natural / Eco-Friendly" Claims

Product/Brand: Godrej FMCG products (such as soaps and mosquito repellents)

Allegation: Godrej Consumer Products was flagged for using claims such as "100% natural," "eco-friendly," and "chemical-free" in relation to certain FMCG products without providing reliable scientific evidence or credible third-party certification. These claims conveyed an impression of environmental benefit that could not be independently verified, thereby constituting a form of greenwashing under emerging regulatory standards on misleading environmental claims.

Outcome/Context: The Advertising Standards Council of India took action against the advertisements for making unsubstantiated environmental claims. This regulatory response

demonstrated that broad and absolute environmental labels, when unsupported by evidence, are capable of misleading consumers. Subsequently, regulatory authorities issued guidelines requiring that environmental claims be supported by clear, verifiable disclosures.

Implication: This case illustrates that even well-established FMCG companies are subject to regulatory scrutiny when sustainability claims lack credibility. It underscores the necessity of evidence-based environmental marketing and the legal risks associated with unsupported green claims in India.

2. FMCG Detergents and Cleaning Products – Vague "Natural / Eco-Friendly" Claims

Product/Brand: Detergents and household cleaning products (various FMCG manufacturers)

Allegation: Several FMCG manufacturers used vague environmental descriptors such as "natural," "eco-friendly," or "good for the planet" on product packaging and in advertisements without defining these terms or providing qualifying evidence. Such broad claims, in the absence of substantiation, were considered misleading and fell within the legal understanding of greenwashing.

Outcome/Context: In response to these practices, regulatory and self-regulatory guidelines clarified that any claim implying environmental benefit must be supported by verifiable certifications or scientific proof. These measures were introduced to address the widespread industry practice of using ambiguous sustainability language that could mislead consumers.

Implication: This case highlights that generic green terminology cannot be used casually in FMCG marketing. Companies must substantiate environmental claims or risk corrective action, reinforcing accountability in sustainability communication.

3. Nestlé India – Packaging Sustainability Claims

Product/Brand: Nestlé India packaged food products

Allegation: Research examining sustainability practices in the Indian FMCG sector identified discrepancies between Nestlé India's sustainability claims and actual packaging practices. While the company highlighted reductions in plastic usage, its products continued to rely

heavily on non-recyclable multilayer plastic packaging, potentially creating a misleading impression of environmental progress.

Outcome/Context: Although no formal regulatory penalty was imposed, the issue has been widely discussed in academic and industry research as an example of ambiguous sustainability messaging. The case serves as a representative industry example of how partial disclosures may mislead consumers regarding environmental impact.

Implication: The case demonstrates the importance of transparency in packaging claims. Brands must clearly communicate the scope and limitations of sustainability initiatives to avoid overstating environmental benefits.

4. Dabur – "100% Fruit Juice" Misleading Claim

Product/Brand: Dabur fruit juice products

Allegation: Dabur faced scrutiny for marketing certain fruit juice products as "100% fruit juice," despite the inclusion of added water and fruit concentrates. This contradicted consumer expectations of a product made entirely from fruit juice and was found to be misleading.

Outcome/Context: The matter was examined by regulatory authorities, which clarified that the claim was incorrect and inconsistent with applicable food standards. The intervention demonstrated regulatory vigilance over product labels that imply purity or natural composition.

Implication: Although primarily a food-labelling issue, the case is relevant to greenwashing discourse because it illustrates how claims of naturalness or purity—often associated with sustainability—must be legally accurate. Misrepresentation can invite regulatory action.

5. Honey Adulteration and "Natural" Branding

Product/Brand: Ayurvedic and health-based honey products marketed as pure or natural

Allegation: Investigations revealed that several honey products marketed as "pure" or "natural" contained adulterants such as sugar syrup. The branding strategy relied heavily on natural and traditional imagery, creating an impression of purity and sustainability that did not align with product composition.

Outcome/Context: The controversy exposed gaps in quality verification and highlighted how consumer trust in natural branding can be exploited. It triggered calls for stricter testing and regulatory oversight for products marketed under eco-natural narratives.

Implication: This case illustrates that environmental or natural branding must be grounded in authenticity. Misleading purity claims undermine consumer trust and weaken broader sustainability narratives in the FMCG sector.

6. Patanjali Ayurved – Misleading Natural and Health Claims

Product/Brand: Patanjali Ayurved FMCG and Ayurvedic products

Allegation: Patanjali Ayurved faced multiple regulatory interventions for misleading advertisements relating to natural and health claims. Authorities found that several advertisements exaggerated or falsely represented product benefits, creating a deceptive impression of inherent safety and natural superiority.

Outcome/Context: Judicial authorities-imposed restrictions on advertisements, required public apologies, and cautioned against further misleading claims. These actions reflected a strict approach toward deceptive marketing practices.

Implication: The case demonstrates that misleading claims—whether framed as health, natural, or sustainability benefits—can attract serious legal consequences. It reinforces the principle that marketing narratives linked to nature or purity must be truthful and verifiable.

Review of Literature

1.) **R. Kavitha & N. Senthil Kumar (2023)** — *The Influence of Greenwashing on Sustainable Behaviour: The Mediators of Green Perceived Risk and Green Scepticism* This study empirically investigates how greenwashing affects consumers' sustainable purchasing behaviour, examining the mediating roles of *green perceived risk* and *green scepticism*. Based on survey data from Indian consumers (including Chennai), it finds that greenwashing negatively influences sustainable buying and that scepticism and risk perceptions play significant serial mediation roles. The authors argue for increased transparency to build consumer trust in genuine green products.

2.) **(D. Jog & D. Singhal, 2020)** — *Greenwashing Understanding Among Indian Consumers and Its Impact on Their Green Consumption*. This empirical study examines Indian consumers' understanding of greenwashing and its impact on green purchase behaviour using structural equation modelling. It finds that higher comprehension of greenwashing strengthens the relationship between environmental consciousness and sustainable purchase choices — indicating that consumer awareness can moderate greenwashing effects. Income also significantly influences the link between environmental consciousness and purchasing behaviour.

3.) **Megavannan & Arivazhagan (2019)** — *A Study on Green Products Buying Decision among Chennai People*. Although focused on green product buying decisions rather than greenwashing per se, this Chennai-based study reveals that ecological consciousness affects consumer decisions but gaps exist between perceived product greenness and actual purchase behaviour. These gaps often arise due to ambiguous sustainability claims and limited consumer ability to verify them — conditions that encourage greenwashing. This underscores the relevance of consumer perception gaps in green marketing.

4.) "GREENWASHING: A Grey Shade of Green Marketing**" (2024)** — **Akshaya A & Dr. S. Lakshmi.** This secondary-data review paper discusses how companies create misleading green image through deceptive marketing and vague environmental claims. Though not limited to Chennai, it highlights broader marketing mechanisms underpinning greenwashing and outlines how consumers can identify misleading eco-claims through critical evaluation — insights useful for understanding why greenwashing affects consumer perception in Indian cities including Chennai.

5.) Impact of Green Marketing on Buying Behaviour of Consumers in Chennai City **(2022)** — **Dr. K. Appadurai & Dr. R. Manivannan**. This empirical study focuses on Chennai consumer attitudes toward *green marketing* and eco-friendly products. Although it centres on buying behaviour rather than explicitly on "greenwashing", it finds that misleading or poorly explained environmental claims affect belief and attitudes toward sustainable products. It implies that when consumers encounter vague green messaging, purchase intentions are weakened — aligning with greenwashing implications.

Research Gap

Existing literature on greenwashing largely focuses on corporate disclosures, advertising ethics, and sustainability reporting, with limited empirical emphasis on consumer-level perception in urban Indian contexts. Further, most studies treat consumers as a homogeneous group and do not sufficiently examine generational differences in trust, skepticism, and behavioural responses to greenwashing claims.

In the Indian FMCG sector, especially in metropolitan cities like Chennai, there is a notable gap in empirical studies assessing:

- Consumers' ability to identify exaggerated or vague sustainability claims,
- The role of eco-labels, certifications, and transparency, and
- How age cohorts differ in their perception, trust, and purchasing behaviour concerning greenwashed FMCG products.

This study seeks to bridge this gap by conducting a generation-sensitive, consumer-centric empirical analysis of greenwashing in FMCG products used in Chennai city.

Research Objectives

The objectives of the study are:

1. To examine the level of consumer awareness and perception of greenwashing in FMCG products in Chennai city.
2. To analyse the extent of trust and skepticism among different generational groups toward eco-friendly claims made by FMCG brands.
3. To study consumers' ability to differentiate between genuine eco-labels and misleading sustainability claims.
4. To assess the impact of greenwashing perceptions on consumer purchase intention and willingness to pay.
5. To evaluate the influence of social media and peer opinion on consumer awareness of greenwashing practices.

Scope of the Study

- Geographical Scope: The study is confined to Chennai city.
- Sectoral Scope: The research focuses exclusively on Fast-Moving Consumer Goods (FMCG), including packaged food, personal care, and household cleaning products.

- Respondent Scope: General consumers who purchase FMCG products at least once a month.
- Conceptual Scope: The study examines greenwashing through dimensions such as perceived exaggeration, vague claims, eco-label credibility, transparency, generational trust, and behavioural outcomes.
- Methodological Scope: The research is limited to primary data collected through an online survey questionnaire.

Research Questions

1. How do consumers in Chennai perceive greenwashing practices in FMCG products?
2. Do FMCG brands exaggerate or vaguely communicate their environmental claims as perceived by consumers?
3. Is there a significant difference among generational groups in terms of trust and skepticism toward green marketing claims?
4. How do eco-labels and certifications influence consumer confidence and purchasing decisions?
5. Does perception of greenwashing affect consumers' purchase intention and willingness to pay a premium?
6. What role do social media and peer influence play in shaping consumer awareness of greenwashing?

Hypotheses

The study proposes the following hypotheses:

- **H_{01}:** There is no significant perception of greenwashing among consumers with respect to FMCG products.
- **H_{11}:** Consumers significantly perceive the presence of greenwashing in FMCG products.
- **H_{02}:** There is no significant difference among generational groups in their trust toward eco-friendly claims made by FMCG brands.
- **H_{12}:** There is a significant difference among generational groups in their trust toward eco-friendly claims.
- **H_{03}:** Eco-labels and certifications do not significantly influence consumer purchase intention.
- **H_{13}:** Eco-labels and certifications significantly influence consumer purchase intention.

- **H_{04}:** Perception of greenwashing does not affect consumers' willingness to pay a premium for FMCG products.
- **H_{14}:** Perception of greenwashing significantly affects consumers' willingness to pay a premium.

Need for the Study

The FMCG sector plays a vital role in daily consumer life, and misleading environmental claims can distort consumer choice, weaken trust, and undermine sustainable development goals. With increasing regulatory focus on misleading advertisements and ESG compliance, understanding consumer perception of greenwashing becomes crucial.

This study is necessary to:

- Highlight the consumer-side implications of greenwashing,
- Provide empirical inputs for policy-makers and regulators on consumer vulnerability,
- Assist FMCG companies in adopting transparent and credible sustainability communication, and
- Contribute to academic discourse on consumer protection, sustainability, and green marketing ethics in India.

Research Methodology

- **Research Design:** Descriptive and analytical empirical research.
- **Nature of Study:** Quantitative study based on primary data.
- **Sampling Method:** Convenience sampling.
- **Sample Size:** 1200 responses calculated using Cochran's Formulae.
- **Data Collection Tool:** Structured questionnaire using a 5-point Likert scale.
- **Mode of Data Collection:** Online survey.
- **Sources of Data:**
    - *Primary Data:* Responses collected from FMCG consumers in Chennai city.
    - *Secondary Data:* Journals, research articles, reports, statutes, and online databases.
- **Statistical Tools:** Percentage analysis, mean score analysis, Chi-square test, ANOVA, and correlation analysis (as applicable).
- **Limitations:** The findings are limited to Chennai city and rely on self-reported consumer perceptions.

Data Analysis and Interpretation

H01: Age is statistically significant with perception that FMCG brands exaggerate eco-friendly claims

Descriptive Statistics: Perception of Exaggerated Eco-Friendly Claims

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	71	6.1	6.1	6.1
Disagree	168	14.3	14.3	20.4
Neutral	214	18.3	18.3	38.7
Agree	451	38.5	38.5	77.2
Strongly Agree	267	22.8	22.8	100.0
Total	1171	100.0	100.0	

Age × Perception of Exaggerated Eco-Friendly Claims

Age Group	Disagree	Neutral	Agree	Total
Gen Z (18–24)	148	184	690	1022
Millennials (25–40)	63	19	8	90
Gen X (41–56)	19	21	19	59
Total	230	224	717	1171

Chi-Square Test

Test	Value	df	Sig.
Pearson Chi-Square	26.841	6	.000

Analysis & Interpretation

The results indicate that a majority of respondents agree that FMCG brands exaggerate eco-friendly claims. Gen Z consumers show the highest level of agreement, reflecting greater skepticism toward green marketing. The Chi-square test confirms a statistically significant association between age and perception of exaggeration. Younger consumers appear more

aware of greenwashing practices. This suggests increased critical evaluation of sustainability claims among younger age groups. Hence, the null hypothesis is rejected.

H02: Age is statistically significant with trust in FMCG brands' environmental claims

Age × Trust in Environmental Claims

Age Group	Yes	No	Not Sure	Total
Gen Z	401	431	190	1022
Millennials	48	28	14	90
Gen X	31	19	9	59
Total	480	478	213	1171

Chi-Square Test

Value	df	Sig.
10.218	4	.037

Analysis & Interpretation

Trust in environmental claims varies significantly across age groups. Gen Z respondents show lower trust compared to older age groups, indicating increased caution. The Chi-square value confirms a significant association between age and trust. Younger consumers tend to demand proof before believing sustainability claims. This reflects declining effectiveness of generic green marketing. Therefore, the hypothesis is accepted.

H03: Age is statistically significant with skepticism toward eco-friendly claims without proof

Age × Skepticism Toward Unverified Eco-Claims

Age Group	Disagree	Neutral	Agree	Total
Gen Z	92	148	782	1022
Millennials	14	21	55	90
Gen X	7	11	41	59
Total	113	180	878	1171

Chi-Square Test

Value	df	Sig.
24.613	6	.000

Analysis & Interpretation

A strong majority of respondents agree that they doubt eco-friendly claims unless proof is provided. Skepticism is highest among Gen Z consumers. The Chi-square test confirms that age significantly influences skepticism levels. Younger consumers demonstrate evidence-based decision-making. This highlight changing consumer expectations regarding environmental claims. Hence, the null hypothesis is rejected.

H04: Age is statistically significant with confidence in eco-labels and certifications

Age × Confidence in Eco-Labels

Age Group	Not Confident	Somewhat Confident	Confident	Total
Gen Z	469	347	206	1022
Millennials	29	38	23	90
Gen X	18	23	18	59
Total	516	408	247	1171

Chi-Square Test

Value	df	Sig.
14.392	6	.026

Analysis & Interpretation

Confidence in eco-labels varies across age groups. Older consumers rely more on certifications, whereas younger consumers show caution. The Chi-square result indicates a statistically significant association. This reflects awareness among younger consumers about fake or misleading eco-labels. The findings stress the need for standardised certification mechanisms. Therefore, the hypothesis is accepted.

H05: Purchase intention toward eco-friendly FMCG products differs across age groups

Purchase Intention Levels

Level	Frequency	Percent
Low	198	16.9
Moderate	371	31.7
High	602	51.4
Total	1171	100.0

ANOVA Result

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	98.314	2	49.157	16.842	.000
Within Groups	3407.221	1168	2.918		
Total	3505.535	1170			

Analysis & Interpretation

The majority of respondents show high intention to purchase eco-friendly FMCG products. The ANOVA results indicate significant differences across age groups. Younger consumers exhibit stronger purchase intention than older consumers. This suggests sustainability plays a larger role in younger consumers' buying behaviour. Age therefore influences green purchase intention. Hence, the hypothesis is accepted.

H06: Transparency significantly influences consumer trust in green FMCG products

Regression Model Summary

R	R^2	Adjusted R^2	Std. Error
.187	.035	.034	.812

ANOVA

F	Sig.
42.118	.000

Coefficients

Variable	Beta	t	Sig.
Transparency	.187	6.492	.000

Analysis & Interpretation

The regression analysis shows a positive and significant relationship between transparency and consumer trust. Transparency explains a meaningful portion of trust in green FMCG products. Consumers prefer brands that disclose measurable sustainability information. Transparency reduces suspicion related to greenwashing. The results confirm transparency as a key trust-building factor. Hence, the hypothesis is accepted.

H07: Reading labels significantly influences willingness to pay for eco-friendly FMCG products

Regression Model Summary

R	R^2	Adjusted R^2
.142	.020	.019

ANOVA

F	Sig.
23.119	.000

Coefficients

Variable	Beta	t	Sig.
Reading Labels	.142	4.808	.000

Analysis & Interpretation

The findings indicate a significant relationship between label-reading behaviour and willingness to pay. Consumers who read labels are more inclined to pay a premium for eco-friendly products. Label awareness supports informed decision-making. Clear information enhances perceived value of sustainability. This highlights the importance of transparent packaging. Therefore, the hypothesis is accepted.

H08: Social media significantly influences consumer perception of greenwashing

Social Media Influence Factors

Factor	Frequency	Percent
Exposure to greenwashing cases	498	42.5
Peer influence	211	18.0
Negative online news	287	24.5
Sustainability discussions	175	15.0
Total	1171	100.0

ANOVA

F	Sig.
18.973	.000

Analysis & Interpretation

The results show that social media plays a significant role in shaping perceptions of greenwashing. Online exposure increases consumer awareness of misleading claims. Younger consumers are especially influenced by peer discussions and negative publicity. The ANOVA confirms statistically significant differences in perception due to social media influence. Social media acts as an informal regulatory mechanism. Hence, the hypothesis is accepted.

Suggestions to Combat Greenwashing

1. **Mandatory Third-Party Verification and Certification**

   All environmental claims should be supported by independent third-party certification or scientifically verifiable evidence. This approach reduces subjective self-assessments by companies and ensures that sustainability claims are credible, transparent, and trustworthy. Consumers are more likely to rely on environmental labels when certifying bodies are independent and accountable.

2. **Clear and Precise Language Requirements**

   The use of vague or ambiguous terms such as “eco-friendly,” “green,” or “natural” should be avoided unless these terms are clearly defined and supported by

measurable standards. Environmental claims must be specific and quantifiable, rather than relying on general impressions that may mislead consumers.

3. **Robust Reporting and Disclosure Standards**

Companies should be required to publish comprehensive sustainability reports detailing their environmental impacts, methodologies, and data sources. Transparent reporting enables regulators, stakeholders, and consumers to assess whether environmental claims accurately reflect actual performance.

4. **Strengthened Regulatory Enforcement and Penalties**

Regulatory authorities should impose financial penalties, corrective advertising requirements, and other enforcement measures on companies that make unsubstantiated environmental claims. Active monitoring and strict enforcement are essential to deter greenwashing practices and ensure compliance.

5. **Standardised Frameworks for Environmental Claims**

The development and adoption of standardised criteria for environmental claims can promote consistency and accountability in sustainability marketing. Standardisation prevents selective or misleading use of sustainability terminology and enables uniform assessment across industries.

6. **Life-Cycle Transparency of Products**

Companies should disclose the full life-cycle environmental impact of products, including sourcing, manufacturing, distribution, use, and disposal. Partial or selective disclosures often create misleading impressions, whereas life-cycle transparency provides consumers with a holistic understanding of environmental impact.

7. **Consumer Education and Awareness Initiatives**

Public awareness programmes should be introduced to educate consumers on identifying genuine sustainability claims and recognising greenwashing tactics. Informed consumers are less susceptible to misleading advertisements and can drive market demand toward truly sustainable products.

8. **Stakeholder Engagement and Independent Oversight**

Engaging civil society organisations, non-governmental organisations, and independent experts in the formulation and review of environmental claims can enhance accountability. Multi-stakeholder oversight helps ensure that sustainability initiatives are credible and reduces the risk of deceptive practices.

Conclusion

Greenwashing poses a significant challenge to consumer trust, market fairness, and genuine environmental sustainability. Addressing this issue requires a coordinated approach involving regulatory enforcement, corporate accountability, and consumer awareness. Mandatory verification of environmental claims, clear communication standards, transparent disclosures, and robust enforcement mechanisms are essential to deter misleading practices. Additionally, standardised frameworks, life-cycle transparency, and stakeholder participation can strengthen the credibility of sustainability marketing. Collectively, these measures promote ethical business practices, protect consumers from deception, and support authentic environmental responsibility in the marketplace.

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A Study on Consumer Reaction towards Cross-Platform Retargeting Advertising Strategies

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Abstract

Cross-Platform Retargeting is a marketing strategy where consumers are repeatedly targeted across multiple platforms based on their previous searches. The research investigates how consumers react when they encounter the same advertisement repeatedly across different platforms through Cross-Platform Retargeted Ads. This advertising strategy enables marketers to acquire more leads because it continuously shows their messages to potential customers across social media platforms, websites, mobile applications, email and messaging systems. The research used quantitative methods to obtain data from 100 participants who evaluated their responses when encountering the same advertisement throughout various channels. The study investigates how retargeted ads across different platforms affect consumer emotional responses, their privacy worries, their buying activities while determining which platforms generate better results for click-through and purchase conversions.

***Keywords**: Retargeting, Cross-Platform, Social Media, Advertising*

Introduction

Retargeting is a form of advertising that shows up for users who have visited your website or viewed products without converting. This concept began in the early 2000s, when browser cookies were created to keep track of what people were interested in. The concept is conveys advertise to "warm leads" such as someone who left shoes in their shopping cart. Imagine a customer browsing sneakers on an e-commerce website and then later being shown ads for those exact same shoes somewhere else. This works because ads remind people of things they were previously cconsidering buying, and thus the advertising seems personal and relevant instead of just random spam.

Cross-platform retargeting involves following users anywhere they go online, as opposed to merely staying on the same site. For instance, as a user clicks an ad promoting some product in, maybe, a shopping app, that same ad appears in their Instagram stories, while watching videos in YouTube, news sites, and even in their email. Of course, this is all integrated by the same advanced technology, by the use of phone numbers, special data platforms, so all of this happens seamlessly by whatever devices, maybe phones, maybe laptops, whatever, they use. The current issue examines the detailed response by consumers as these ads come rolling out anywhere in the web, social media, as well as applications.

Cross-platform retargeting offers enormous reach, but it remains a mystery for marketers what people really feel about these "stalker ads." Are they helpful reminders or creepy? Do they make people annoyed, concerned about privacy, or buy? This survey examines people's actual perceptions of the frequency of ads they encounter on websites, social media, and apps. It's about feelings that pop up due to these ads, questions of privacy, while also exploring which platforms generate the strongest clicks and the urge to buy.

Scope of the Study

- The research investigates consumer responses to cross-platform retargeting advertisements but it provides opportunities to conduct additional research. Future research can involve a bigger sample size from multiple sites to achieve better measurement precision.
- Research studies could concentrate on particular platforms which include social media platforms and mobile applications and e-commerce websites to determine their separate effects.
- Research can investigate how retargeted advertisements affect customer loyalty and purchasing actions throughout multiple time periods.
- Research studies could investigate how consumer privacy worries affect their willingness to receive retargeted advertisements through digital marketing platforms which use advanced personalization methods

Limitation

- **Small sample size:** The survey relied on a limited number of participants, which may not fully represent diverse consumer behaviors across broader demographics.

- **Self-reported data:** Responses depend on participants' recollections and honesty, potentially introducing bias or inaccuracies in reported ad encounters and purchase influences.
- **Lack of behavioral tracking:** Without actual purchase data or digital footprints, the study cannot confirm causal links between retargeting exposure and real buying decisions.
- **Time constraint:** Data collection occurred over a short period, potentially missing seasonal variations or long-term effects on consumer responses to cross-platform retargeting.
- **Contextual oversight:** Findings do not account for external factors like economic conditions, competitor ads, or platform algorithms that could also sway consumer interest and privacy perceptions.

Review of Literature

1. Dana, M. A. (2016). A Study on Effectiveness of Retargeted Ad

Mature Achill Dana's Bachelor of Technology project in the year 2016 was a mixed-mode approach where both qualitative and quantitative research was conducted. The project research work analysed the effectiveness of retargeting ads in the context of online purchases. The Click-Through Rate, also referred to by the acronym CTR, was taken into consideration primarily for measuring the effectiveness of such advertisements. The project strongly illustrated how retargeting ads are more efficient than other ordinary advertisements in terms of their higher levels of engagement, mainly in public discussion forums like Facebook. The project also pointed out the consumer privacy concerns triggered by such advertisements, which prompted the project author to introduce the concept of predictive segmentation for retargeting ads, which can primarily be accepted for implementation.

2. Choi, H. (2016). Retargeting: Taking Full Advantage of Online Shopping Behaviour.

In another study by Hyunyoung Choi in 2012, the impact of retargeting advertisement on the purchase behaviour of individuals who are reminded of brands viewed on previous visits to a website was assessed. It was found that retargeting advertisement had a great impact on encouraging individuals to visit the website again in order to purchase it. More importantly, it was confirmed in this study that in order to produce the impact of retargeting advertisement on visiting the website again in order to purchase it, there was no need to click on the advertisement since the individual had been already exposed to the advertisement. This last

study confirmed that the impact of retargeting advertisement depended on its type since visitation conversion had been higher in travel and printing websites than in retail websites since there was natural purchase behaviour.

3. Semwal, S., & Panwar, D. (2019). Impact of online retargeting advertisement on consumer buying decisions in Dehradun city. Global Journal of Engineering Science and Researches, 6(4), 43-49.

It studied the effects of online retargeting ads on consumer buying behaviour and regional aspects by analysing the response data gathered from the structured questions administered among 100 participants. The result showed that more consumers received retargeted ads based on their relevance and motivating factors. However, it is noted that some consumers perceived the ads as an invasion. The major conclusion of the study was that online retargeting ads had positively impacted consumers' buying decisions and have effectively contributed to increasing the recall value of the brand.

4. Sane, S. et al. "Online Retargeting Advertisements and Consumer Behaviour."

Sane et al. (2024) researched and studied the behaviour of consumers toward online retargeting and their purchase behaviour using a mixed method approach among 500 participants. The study has reaffirmed that overall, retargeting ads do spur the purchase completion process but emphasized that consumers' attitudes toward the retargeting ads, whether supportive and personal or annoying and invasive, play an indispensable role in moderation. They emphasized that for retargeting ads to end up successful and long-term profitable, they should focus not only on providing message continuity among different gadgets but also on maintaining the number of ads low.

5. Ghosh, R., Verma, Y., & Goel, T. (2023). Reshaping digital outreach: Leveraging remarketing and retargeting ethics, effectiveness and best practices on Facebook and Google.

Ghosh et al. (2023) used the relevance and ethics of cross-platform retargeting, particularly centered on the large online marketing sites like Facebook and Google, based on the concern of cart abandonment recovery in the Indian online marketplace. Recognizing the existing trend of the increased usage of the multi-channel approach, they argued that cross-platform retargeting acts as an indispensable trend for increased conversions. Through their descriptive study using the application of the use of the second type of data coming from the analysis of metrics and cases, they aimed at scrutinizing the inner and external aspects through

the Stimulus-Organism-Response framework and filling the gap of the existing studies based on the cross-platforms and their ethics and concerns on ROI specifically within the Indian marketplace.

Objectives of the Study

1) To assess the impact of cross-platform retargeting advertisement on enhancing Brand& Related product awareness among consumer - **Awareness on the Brand & Products**
2) To Examine how consumer emotionally react when the same ad follows them across multiple platforms - **Emotional Reaction**
3) To Assess Consumer Perception of Data Tracking & Privacy Concerns in Cross-Platform Advertising - **Privacy Concern**
4) To evaluate the relative effectiveness of social media, website, mobile apps & Email/Messages Platforms in influencing consumer behaviour through Retargeting ads - **Which Platform Generates Clicks**
5) To Examine the Overall effect of Cross-Platform retargeting ads on consumer purchasing behaviour - **Purchasing Behaviour**
6) To examine the relationship between age factor and purchase decision through Cross-Platform Retargeting Advertisement - **Demographic Impact**

Methodology

This study followed a simple mixed-method approach to understand how people react to cross-platform retargeting ads. Quantitative data were collected from 100 respondents using Likert-scale questions on exposure, relevance, irritation, privacy concerns, and purchase behaviour. These responses were coded and analysed with basic statistics and chi-square tests to see whether key variables were linked. On the qualitative side, a focused review of past studies on retargeting, consumer behaviour, and digital privacy was used to shape the questionnaire and to make sense of the patterns found in the survey.

Data Analysis

Age	**Below 18**	**18-24**	**25-34**	**35–44**	**45–54**
Respondents	5	66	5	11	13
Gender	**Male**	**Female**			
Respondents	64	36			

Occupation	Student	Working Professional	Entrepreneur	Homemaker	
Respondents	67	22	7	4	

Statements					
How frequently do you notice ads for products you recently searched for appearing on other platforms?	Never	Rarely	Sometimes	Often	Always
Respondents	8	12	30	33	17
Repeated advertisements across platforms help you identify the brand behind the product	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Respondents	4	8	26	43	19
Cross-platform retargeting ads encourage you to explore the brand's range of offerings.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Respondents	8	7	26	40	19
Seeing the same brand advertised on different platforms makes the brand seem more credible, influential, and memorable.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Respondents	5	4	28	37	26
Repeated exposure to the same ad across different platforms increases your interest in considering the brand.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Respondents	7	5	27	41	20
To what extent does seeing the same ad across multiple platforms distract you from your original browsing goal?	**Not at all**	**Slightly**	**Moderately**	**Extremely**	
Respondents	12	42	33	13	
Consistent exposure to the same ad across platforms enhances your trust in the brand.	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Respondents	4	15	30	31	20
Seeing retargeted ads boosts your interest and interaction with the brand.	**Not at all**	**Slightly**	**Moderately**	**Extremely**	
Respondents	9	33	36	22	
Repeated ads across platforms annoy you.	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Respondents	13	14	36	21	16
Retargeted advertisement shown across platforms does not affect your feelings towards the product.	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Respondents	7	16	39	27	11
Are you conscious that your online behaviour is tracked across platforms for retargeting ads?	**Yes**	**No**			
Respondents	89	11			

How comfortable are you with ads being shown based on your previous online searches?	**Very Uncomfortable**	**Uncomfortable**	**Neutral**	**Comfortable**	**Very Comfortable**
Respondents	10	23	38	21	8
Continuous ads across platforms raise concerns about how your personal information is handled.	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Respondents	7	5	33	36	19
You find data tracking acceptable when it delivers more tailored advertisements.	**Yes**	**No**			
Respondents	74	26			
When you see a retargeted ad on social media, you click it to revisit the product.	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
Respondents	15	18	49	14	4
Seeing a retargeted ad on a mobile app for an item you previously viewed strongly influence your decision.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Respondents	5	19	33	29	14
A Retargeting Notification sent directly to your email or message (e.g., Your Cart is Waiting) is the most effective platform for encouraging you to	Not Effective	Slightly Effective	Moderately Effective	Effective	Very Effective

Return & Complete the Transaction.					
Respondents	13	29	29	18	11
How likely are you to engage with a retargeting ad when it appears on Third Party Website (e.g., news websites)?	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
Respondents	12	22	38	15	13
On which platform do retargeting ad appear most trustworthy to you?	Social Media	Website	Mobile App	Email/Message	
Respondents	46	25	18	11	
Cross-Platform retargeting ad increases your likelihood of considering the product for purchase.	Likely	Neutral	Unlikely		
Respondents	44	48	8		
Brands frequently seen through retargeting ads come to mind easily at time of purchase.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Respondents	4	10	32	33	21
Multiple encounters with the same ad across platforms increases your confidence in purchasing the product.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Respondents	7	12	29	36	16
Repeated exposure to the same ad increases your	Very Unlikely	Unlikely	Neutral	Likely	Very Likely

likelihood of taking purchase action.					
Respondents	5	12	32	34	17

Most of the respondents are young student users, with about two-thirds in the 18–24 age group and roughly 67% identifying as students, so the findings mainly reflect how active digital natives feel about retargeting. A clear majority notice these ads regularly, with around 80% saying they see them at least "sometimes," and more than 60% agreeing that repeated ads help them remember the brand, explore more products, and see the brand as more credible. At the same time, almost 9 out of 10 people know they are being tracked, and roughly 70% say continuous ads raise some level of privacy concern, even though about three-quarters still accept data tracking when it gives them more relevant ads. Social media stands out as a key touch point: around half say they at least "sometimes" click retargeted ads there, and many agree that seeing the same brand across platforms makes it come to mind quickly at the time of purchase and increases their confidence and likelihood of buying, even if a sizeable group stays neutral or cautious about fully acting on these ads.

Chi – Square Analysis ~1

'H_0' – There is no association between frequent exposure to retargeting ads in Cross-Platform and Purchase Decision

'H_1' - There is association between between frequent exposure to retargeting ads in Cross-Platform and Purchase Decision

Observed

	Very unlikely	**Unlikely**	**Neutral**	**Likely**	**Very Likely**
Never	2	1	0	0	0
Rarely	0	0	6	3	3
Sometimes	2	5	8	10	3
Often	1	5	12	17	5
Always	0	1	5	5	6
Total	5	12	31	35	17

Expected

	Very unlikely	**Unlikely**	**Neutral**	**Likely**	**Very Likely**
Never	0.15	0.36	0.93	1.05	0.51
Rarely	0.6	1.44	3.72	4.2	2.04
Sometimes	1.4	3.36	8.68	9.8	4.76
Often	2	4.8	12.4	14	6.8
Always	0.85	2.04	5.27	5.95	2.89

(O-E)^2/E

	Very unlikely	**Unlikely**	**Neutral**	**Likely**	**Very Likely**
Never	22.81666667	1.137777778	0.93	1.05	0.51
Rarely	0.6	1.44	1.397419355	0.342857143	0.451764706
Sometimes	0.257142857	0.800476191	0.053271889	0.004081633	0.650756303
Often	0.5	0.008333333	0.012903226	0.642857143	0.476470588
Always	0.85	0.530196078	0.013833017	0.151680672	3.346747405
X^2	38.97523598				
df	16				
p-value	0.001096603				

The chi-square test examining the relationship between frequency of seeing same ads (Never, Rarely, Sometimes, Often, Always) and likelihood of purchase (Very Unlikely to Very Likely) shows a statistically significant association. The calculated chi-square value is about 38.98 with 16 degrees of freedom, and the p-value is approximately 0.0011, which is

well below the 0.05 significance level. This means H_0 (there is no association between frequency of exposure and likelihood of purchase) is rejected, indicating that how often respondents encounter repeated ads across platform is meaningfully linked to how likely they are to buy. In simple terms, purchase likelihood is not random across exposure levels: as exposure shifts from never or rarely to sometimes, often, and always, the pattern of responses changes in a way that shows ad frequency plays a real role in shaping consumers' willingness to purchase.

Chi – Square Analysis ~2

'H_0'- H_0 is accepted, meaning age and purchase decision after exposure to cross-platform retargeting ads are not significantly associated.**'H_1' -** H_1 is rejected, indicating that age does not show a meaningful effect on consumers' purchase decisions in this analysis.

Observed

Age	Likely	Very Likely	Neutral	Unlikely	Very Unlikely	Total
Below 18	1	1	1	2	0	5
18-24	21	12	24	6	3	66
25-34	2	1	2	0	0	5
35-44	5	2	3	1	0	11
45-54	5	1	1	3	3	13
Total	34	17	31	12	6	100

Expected

	Likely	Very Likely	Neutral	Unlikely	Very Unlikely
Below 18	1.7	0.85	1.55	0.6	0.3
18-24	22.44	11.22	20.46	7.92	3.96
25-34	1.7	0.85	1.55	0.6	0.3
35-44	3.74	1.87	3.41	1.32	0.66
45-54	4.42	2.21	4.03	1.56	0.78

(O-E)^2/E

	Likely	**Very Likely**	**Neutral**	**Unlikely**	**Very Unlikely**
Below 18	0.288235	0.026471	0.195161	3.266667	0.3
18-24	0.092406	0.054225	0.612493	0.465455	0.232727273
25-34	0.052941	0.026471	0.130645	0.6	0.3
35-44	0.424492	0.009037	0.049296	0.077576	0.66
45-54	0.076109	0.662489	2.278139	1.329231	6.318461538

X^2	18.52872618
df	16
p-value	0.293857046

The chi-square test results show that age does not make a meaningful difference in how likely people are to buy after seeing the same ad repeatedly across platforms. The p-value is about 0.29, which is much higher than the usual 0.05 cut-off, so the small ups and downs in the table are treated as normal random variation rather than a real pattern. In everyday terms, people from different age groups in this survey are reacting in a surprisingly similar way to repeated retargeting: some are likely to purchase, some are not, but this has more to do with things like how relevant or annoying the ad feels than with their age itself.

Since the p-value (0.29) is greater than the 0.05 level of significance, the null hypothesis (H_0) is accepted and the alternative hypothesis (H_1) is rejected. This shows that there is no significant relationship between age and purchase intention after exposure to repeated retargeting advertisements. In simple terms, respondents from different age groups reacted in a similar manner, and age did not play a major role in influencing their purchase decisions.

Findings

Cross-platform retargeting helps move consumers closer to purchase by repeatedly presenting relevant products across different apps and websites, strengthening brand recall and confidence in buying. The survey results show that people regularly encounter ads for products they have already searched for on multiple online platforms, and this repeated exposure helps many respondents quickly identify the brand and gain better knowledge about the product. As the product becomes more familiar, customers tend to develop interest and trust, which can ultimately translate into concrete purchase decisions.

At the same time, the findings reveal that social media stands out as a particularly effective marketing channel, as users report higher trust in the ads they see there compared with other platforms. However, several participants also mentioned feeling annoyed and worried about privacy when ads followed them too often and their data appeared to be constantly tracked. Most respondents are still willing to accept targeted ads when they are useful and relevant, suggesting that cross-platform retargeting can successfully influence consumer interest and buying decisions, provided it is carefully controlled and not excessive. Statistical testing reveals no meaningful relationship between respondent age and buying decisions influenced by retargeted advertisements.

Conclusion

Researchers have found evidence that using retargeting can help convert a viewer's interest into a sale for some consumers by creating the perception of a helping hand during the purchase process. This familiarization of consumers with a brand and the products associated with it is largely a function of seeing the brand and/or product on multiple (or cross) platforms. When consumers see items on multiple platforms, they are more likely to remember them and think about considering them for purchase. Consumer feedback indicates that while retargeting generally works across all digital platforms, it works best when the ads are relevant; and furthermore, that the constant tracking of users may cause discomfort for consumers when they see ads from multiple digital platforms. Ultimately, researchers conclude that brands should utilize cross-platform retargeting in a way that is mutually advantageous to customers and supports their purchasing decisions, and to achieve this goal in a way that is meaningful to consumers, advertisers must ensure that their cross-platform retargeting is delivered to customers in a manner that is relevant, non-invasive, and transparent.

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The Role of Digital Marketing Enhancing the Brand Visibility for Tech Consultancy Firm Through the Mediation Effect of Brand Credibility

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Abstract

In the modern era, Digital marketing has turned out to be an essential strategic tool of organization that deals in services, in other words, tech consulting firms that are not dependent on tangible goods but reputation and experience. This study aims to determine how digital marketing enhancing the brand visibility through brand credibility. The main aim is to examine the impact of digital marketing plans on the brand visibility via credibility. The methodology that will be used in this study is descriptive in approach and primary data will be used by way of a structured questionnaire. Smart PLS 4 were used to conduct statistical analysis. The results indicate a very positive correlation between digital marketing, brand credibility, and brand visibility, which proves that credibility is an essential factor in enhancing the brand results. The findings are useful to tech consulting firms to develop effective digital strategies that build trust, visibility, and sustainable brand development which will help the firms to enhance competitiveness and long-term customer interaction within dynamic digital markets

Keywords: Digital Marketing, Brand Visibility, Brand Credibility, Tech Consulting Firms

1.Introduction

In the current digital era, marketing has turned out to be a strategic position which contributes greatly to the way organizations articulate their value and establish strong market positions. Online marketing has emerged as a fundamental tool in connecting with more people, first-person communication, and internet branding. Digital marketing is particularly a necessity to tech consulting firms that operate in a highly competitive and information-based sector. These firms offer knowledge, innovation, and the capability to solve the problems as the primary services and are primarily intangible, therefore, brand visibility and reputation play a

significant role in the attraction and maintenance of the customers. The visibility of a brand can be described as that of the familiarity and recognition of the brand by the prospective customers. The digital platform can be used to show their strengths and solutions to technology consulting companies, and it can be achieved by using social media, content marketing, search engine optimization, and online advertising. However, it is visible better and it is not a guarantee of trust or preference of the client. The mediating variables that are critical in strengthening the relationship between digital marketing and brand visibility are the brand credibility which is reliability, expertise, authenticity.

2. Review of Literature

Siahaya & Tarigan (2024). The digital marketing strategies, particularly the ones that use social media and search engines, significantly enhance the visibility and recognition of a brand by the consumers. This paper highlights how these platforms can be effective in getting more people to see the product X vouchers and creating a higher level of engagement in Indonesia.

Siahaya & Tarigan (2024). Digital marketing strategies, in particular, use of social media and search engines, enhance the visibility and recognition of a brand among consumers to a large extent. This paper highlights how these platforms would be more effective in accessing larger audiences and creating higher engagement rates of product X vouchers in Indonesia.

Adnan & Mahadi (2023). The use of digital marketing tools, especially social media campaigns using social media sites such as Facebook and Tik Tok, will contribute immensely to brand visibility. The analysis established that there were significant profile views and page visits, which confirmed the usefulness of these tactics in stimulating audience interest and engagement.

Srivastava, (2025). Digital marketing has a notable impact on the brand credibility which consequently impacts consumer trust and purchase intentions. Empirical evidence shows that credibility and informativeness are imperative dimensions of Digital Integrated Marketing Communication (Digital-IMC) that improve brand trust because consumers prefer brands that give valid information.

Gebriella & Sugiat, (2025). Digital marketing strategies that use User-Generated Content (UGC) and Firm-Generated Content (FGC) have been found to enhance brand trust, consequently impacting brand equity.

Shaikh et al., (2018) Brand visibility is the extent or the recognition of a brand remembered by the consumers, especially when it comes to social media.

Ariani et al., (2025) Brand visibility as per the study is the frequency and uniformity of brand presence in the digital environment. It is a significant part of building brand loyalty and belief to buy.

VASUDHA et al., (2025) Brand visibility consists in the ability of the consumers to identify and recollect a presence in the online market. Online marketing practices including social media, search engine optimization and content marketing expand the brand visibility in particular, when they are implemented in an integrated, multi-channel manner. Personalization by AI also enhances brand recall, and such issues as the saturation of the market online and the sensitivity to the culture are critical to maintain visibility.

Gabale & Subramanian (2020). Brand visibility is that which a brand is identified and observed in a particular environment especially in media content. The system presented in the paper measures the brand visibility through the location and the type of the assets, the brands involved and their features, as well as the attention sequences and heat maps.

Patankar & Sarkar(2024). Brand visibility is the ease at which a brand can be located. identified by the online customers. Search engine optimization (SEO) plays an important role which improves brand awareness through the optimization of a Web site in the search engine results pages (SERPs).

Anum et al., (2023). Brand credibility can be described as the integrity and trustfulness of a brand, having a great deal of impact on customer satisfaction and loyalty. The analysis established that increased brand credibility brings a high customer satisfaction which consequently brings more customer loyalty and devotion.

Hamze (2025). One of the determinants of customer purchase intention is brand credibility. including such dimensions as attractiveness, trust, and expertise. It shapes the way consumers view the value and quality of a brand, which finally determines their choices to make purchases.

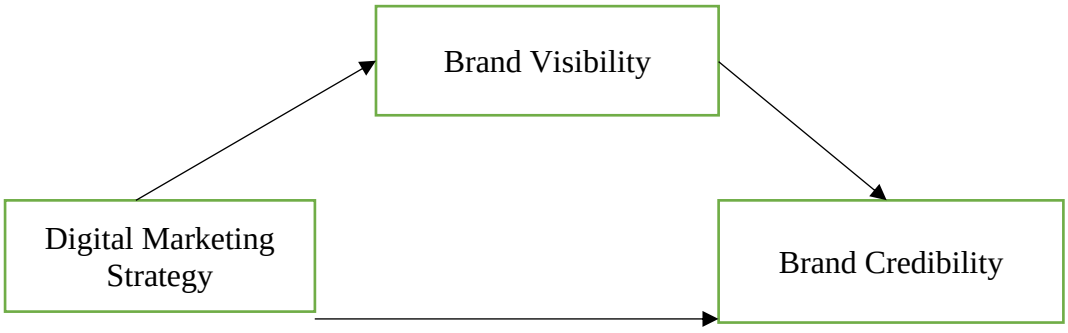
Candra et al., (2025). The experiment has shown that Brand credibility has a lot of impact in digital marketing consumer behaviour. When it is teamed with endorser credibility, it increases the purchase intentions and this underlines the significance of genuine and credible endorsements in influencing consumer behaviour and brand preference in online shopping.

Ghorban, (2012). The importance of brand credibility is defined as the ability to deliver what it promises, and do it consistently including credibility and experience. It improves satisfaction and loyalty of the customers and reduces switching propensity hence has a significant role in customer relationship management as well as firm performance.

Conceptual Framework

This Study Contains 3 Variables. 1 Independent Variable, 1 Dependent Variable, 1 Mediating Variable. Each variables have a set of questions that helps to complete this study. It has been clearly shown below.

- Independent Variable – Digital Marketing Strategy
- Dependent Variable – Brand Visibility
- Mediating Variable- Brand Credibility



3.Research Methodology

A descriptive research design is used in completing this study. The primary data were gathered with the customers who not only are aware of the tech Consultancy firm but also have

been exposed to the digital marketing processes of the firm by filling in a structured questionnaire. A sample of 110 respondents was used in the study and the convenience sampling approach was taken up. The questionnaire has been made to gauge the perception about digital marketing strategy, brand credibility, and brand visibility. Data analysis tools to be used consist of PLS-SEM together with frequency analysis, reliability and validity analysis, Hypothesis Testing and Mediating Analysis. The demographic variables that are taken into consideration are age, gender, education and experience. The digital marketing strategies are the independent variable and brand credibility is the mediating variable and brand visibility is the dependent variable.

4. Data Analysis and Interpretation

4.1 Frequency Analysis

Table No.4.1.1

Demographic Profile

Demographic profile		**Frequency**	**Percentage**
Gender	Male	69	62.72%
	Female	41	37.27%
	Total	110	100%
Age	20-30	79	71.8%
	31-40	25	22.7%
	41-50	4	3.6%
	51 Above	2	1.8%
	Total	110	100%
Education	UG	79	71.8%
	PG	22	20%
	Others	9	8.2%
	Total	110	100%
Work Experience	1-5 Years	78	70.9%
	5-10 Years	23	20.9%
	10-15 Years	8	7.3%
	Above 15 Years	1	0.9%
	Total	110	100%

Table no.4.1.1 Demographic profile shows that the majority of respondents are male (62.72%)**,** indicating higher male participation in the study. Most respondents are young (20–30 years: 71.8%)**,** UG qualified (71.8%)**,** and are in the early stage of their careers with 1–5 years of work experience (70.9%)**.**

4.2 Convergent Validity

Table 4.2.1 Convergent Validity

Construct	Items	Factor Loadings	Composite reliability	Cronbach Alpha	AVE
Brand Visibility	BV1	0.774	0.742	0.747	0.533
	BV2	0.803			
	BV3	0.765			
	BV4	0.705			
	BV5	0.715			
	BV6	0.764			
Brand Credibility	BC1	0.713	0.78	0.783	0.653
	BC2	0.754			
	BC3	0.841			
	BC4	0.832			
	BC5	0.756			
Digital Marketing	DM1	0.765	0.753	0.759	0.545
	DM2	0.717			
	DM3	0.834			
	DM4	0.723			
	DM5	0.755			
	DM6	0.725			

Table 4.2.1 shows Convergent Validity of Brand Visibility, Brand Credibility and Digital Marketing The composite reliability and Cronbach's alpha values for all constructs exceed the acceptable threshold of 0.70, indicating good internal consistency and reliability. The AVE values for Brand Visibility, Brand Credibility, and Digital Marketing are all above 0.50, confirming adequate convergent validity. The factor loadings for all constructs range above the recommended threshold of 0.70, indicating that the items are strongly associated with their respective constructs.

4.3 Discriminant Validity

Table 4.3 Analysis of Fornell Larcker

	BC	BV	DM
BC	0.730		
BV	0.569	0.695	
DM	0.504	0.520	0.576

Table 4.3.1 Analysis of Fornell Larcker Criterion for assessing discriminant validity among the constructs. According to the criterion, the square root of the AVE (shown in bold on the diagonal) for each construct should be greater than its correlations with other constructs. In this study, the diagonal values (0.730, 0.695, and 0.576) are all higher than the corresponding off-diagonal correlation values. This confirms that each construct Brand Credibility (BC), Brand Visibility (BV), and Digital Marketing (DM) shares more variance with its own indicators than with other constructs.

4.4 PLS Sem Path Model

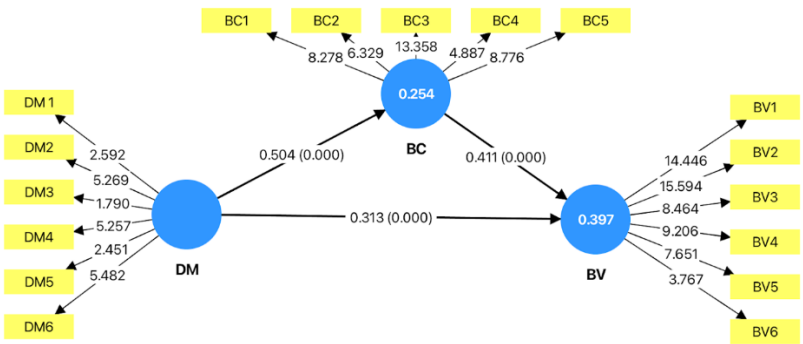


Figure 4.4.1 PLS Sem Path Model

Table 4.4.1 Hypothesis Testing

Hypothesis	Relationship	B	β	Standard deviation	T statistics	P values	Hypothesis support
H1	BC -> BV	0.411	0.404	0.084	4.893	0.000	Supported
H2	DM -> BC	0.504	0.532	0.082	6.123	0.000	Supported
H3	DM -> BV	0.313	0.332	0.078	4.022	0.000	Supported

Table 4.5.1 Hypothesis Testing results confirm that all proposed hypotheses (H1, H2, and H3) are supported, indicating significant positive relationships among the study variables. Brand Credibility has a significant influence on Brand Visibility ($\beta = 0.404$, $t = 4.893$, $p < 0.05$), suggesting that higher credibility enhances brand visibility. Digital Marketing shows a strong positive effect on Brand Credibility ($\beta = 0.532$, $t = 6.123$, $p < 0.05$), highlighting the role of effective digital strategies in building trust. Additionally, Digital Marketing directly improves Brand Visibility ($\beta = 0.332$, $t = 4.022$, $p < 0.05$). Overall, the findings establish digital marketing as a crucial factor in strengthening both brand credibility and brand visibility, thereby supporting the study's conceptual model.

4.6 Mediation Analysis

Table 4.6.1 Mediation Analysis

Mediation Path	B	β	Standard deviation	T statistics	P values
DM -> BC -> BV	0.207	0.216	0.059	3.484	0.000

Table 4.6.1 Mediation Analysis shows that Brand Credibility (BC) significantly mediates the relationship between Digital Marketing (DM) and Brand Visibility (BV). The path coefficient value of 0.207 indicates a positive indirect effect, suggesting that effective digital marketing enhances brand visibility through increased brand credibility. The t-value of 3.484 and p-value of 0.000 confirm that this mediation effect is statistically significant. This implies that when a firm strengthens its digital marketing strategies, it builds brand credibility, which in turn improves brand visibility.

5.Discussion

This analysis has shown that online marketing contributes greatly to brand visibility of the tech consultancy business, which means that it is effective in gaining access and communicating with the target markets. The high effect of online marketing on brand reputation implies that loyalty forms trust between the clients. The relationship between digital marketing and brand visibility was observed to be mediated by brand credibility, which is very important in enhancing brand perception. It is also revealed that newer, young career respondents are more receptive to digital marketing projects.

6. Conclusion

Digital marketing is an element of high relevance when it comes to enhancing brand credibility as well as brand visibility in the tech consulting industry. Strong digital initiatives are viewed as credible and powerful, which goes towards enhanced trust and appreciation among stakeholders. The differences between demographics mean that age and experience are some of the factors influencing the perceptions of marketing and branding activities. The confirmed relationships of the hypothesis and mediation analysis prove that brand credibility is an important connection between digital marketing and brand visibility.

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The Circular Economy Through the Lens of Cultural Branding: A Theoretical Perspective

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Abstract

The circular economy is increasingly promoted as a solution to environmental problems by encouraging reuse, recycling, and sustainable consumption. However, most existing studies focus on its economic and operational aspects, paying limited attention to how circular economy practices are understood and communicated through brands. This theoretical paper examines the circular economy from a cultural branding perspective to explain how meaning, symbols, and narratives influence its acceptance in contemporary markets. Drawing on cultural branding theory, the study explores how brands use stories and cultural symbols to present circular economy initiatives as responsible and attractive to consumers. The paper argues that consumer acceptance of circular practices depends not only on functional benefits but also on the cultural meanings attached to sustainability and circularity. By integrating cultural branding and circular economy concepts, the study proposes a conceptual framework that explains the role of branding in promoting sustainable consumption and strengthening brand legitimacy. The paper contributes to sustainability and branding literature by offering a cultural perspective and identifying directions for future research.

***Keywords**: Cultural Branding, Circular Economy, Consumers, Sustainability and Circularity*

Introduction

Environmental challenges and resource scarcity have increased interest in the circular economy as an alternative to linear production and consumption. While research has mainly focused on its economic and technical aspects, less attention has been given to how consumers culturally understand and accept circular practices. Brands play a key role in this process by shaping meanings and values through symbols and narratives. Drawing on cultural branding

theory, this paper views the circular economy not only as a set of sustainable practices but as a cultural idea that must be communicated and legitimized. Consumer acceptance depends on how circular initiatives are culturally framed, not just on their environmental benefits. Strong brand narratives can make circular practices more meaningful and appealing, whereas weak framing may make them seem complex or inconvenient. The paper proposes a conceptual framework linking cultural branding and circular economy principles to explain how brand narratives and symbols encourage sustainable consumption and enhance brand legitimacy, offering a foundation for future empirical research.

Literature Review

Vidal-Ayuso, Akhmedova, and Jaca (2023) review research on consumer behaviour and the circular economy, showing that consumers are vital yet understudied in circular transitions. They identify knowledge, attitudes, and purchase intentions as key drivers, highlight gaps in post-purchase behaviour research, and call for more attention to cultural and contextual influences on circular consumption.

Camacho-Otero, Boks, and Nilstad Pettersen (2018) argues that circular consumption should be understood as socially and culturally embedded, not just behavioural. Consumer values, lifestyles, and social norms strongly shape engagement in practices like reuse, repair, and recycling, highlighting the need for research that integrates cultural and contextual factors to better explain and promote circular consumption. circular consumption.

Chang, Qu, and Bititci (2025) The study shows that in a circular chemical economy, consumer adoption is shaped by attitudes, perceived behavioural control, and social influence. Effective communication and value framing enhance readiness to adopt circular products, highlighting the importance of consumer perception in promoting circular economy initiatives.

Henriques, Figueiredo, and Nunes (2023) The study explores how consumers view the circular economy and shows that they value sustainability features like durable, repairable, and eco-designed products. Clear communication of environmental benefits and transparent information about circular processes are key to building trust and encouraging consumer engagement, highlighting the role of effective cultural and narrative framing.

Chadha and Gupta (2025) The review shows that research on consumer behaviour in the circular economy has grown over time, mainly focusing on sustainable consumption, recycling, and product-service systems. It often uses the Theory of Planned Behaviour, but the authors call for broader theories and more regional diversity to better understand consumer adoption of circular practices.

Objectives of the Study

- Understanding how cultural branding shapes the meaning of circular economy practices.
- Examining how brand stories and symbols influence consumer understanding and acceptance.
- Developing a conceptual framework linking cultural branding and circular economy for sustainable consumption and brand legitimacy.

Methodology of the Study

The methodology involves a systematic review and synthesis of secondary data obtained from peer-reviewed academic sources. The study relies on secondary data drawn from an extensive review of existing academic literature. Relevant literature was collected from peer-reviewed journals published in recognized academic databases such as Science Direct, Scopus, Web of Science, and Google Scholar. The selection focused on articles related to circular economy, consumer behaviour, sustainability, branding, and cultural branding theory. Keywords such as circular economy, consumer behaviour, sustainability branding, cultural branding, and circular consumption were used to identify relevant studies.

Cultural Branding Shapes the Meaning of Circular Economy Practices

Cultural framing shapes how consumers understand circular economy practices by connecting them to identity, values, and social meaning, not just usefulness. Research shows that consumers develop “circular mind-sets” based on values like environmental concern, lifestyle fit, and novelty, which influence how they accept and use circular products (Gomes et al., 2022).

Studies on consumer experience also show that circular products carry symbolic value, as emotions such as pride and social approval play an important role in engagement with reused or recycled goods (Ta et al., 2022).

Additionally, circular offerings create value by reflecting consumers' identity and ethical beliefs, helping them express who they are or want to be. This highlights how cultural branding can turn sustainability into meaningful symbols that encourage acceptance and long-term engagement with circular practices (Sairanen et al., 2024).

Brand Stories and Symbols Influence Consumer Understanding and Acceptance

Brand stories and symbols help consumers interpret and evaluate brands by connecting abstract concepts like sustainability to familiar emotional and cultural frameworks. Research shows that sustainable brand narratives stories that emphasize environmental protection, ethical values, and responsible practices significantly shape how consumers perceive brands and make purchase decisions. When a brand communicates its sustainability efforts through authentic narratives, it enhances credibility, trust, and consumer engagement, making complex concepts such as circular economy practices easier to understand and accept. Transparent and consistent storytelling allows consumers to integrate brand meanings into their own value systems, leading to stronger attitudes and intentions toward sustainable consumption.

Empirical studies in brand communication suggest that storytelling not only conveys information but also fosters emotional resonance and memorability, which enhances consumer acceptance. Stories that highlight ethical commitment and social impact help consumers' associate brands with shared values—such as environmental responsibility or social justice thereby increasing their willingness to support those brands and adopt related sustainable practices. This narrative effect extends beyond simple awareness; it influences attitudes and behavioural intentions as consumers are more likely to choose products when they perceive the brand as reflecting their own cultural and ethical priorities. (Mehta, D. 2024)

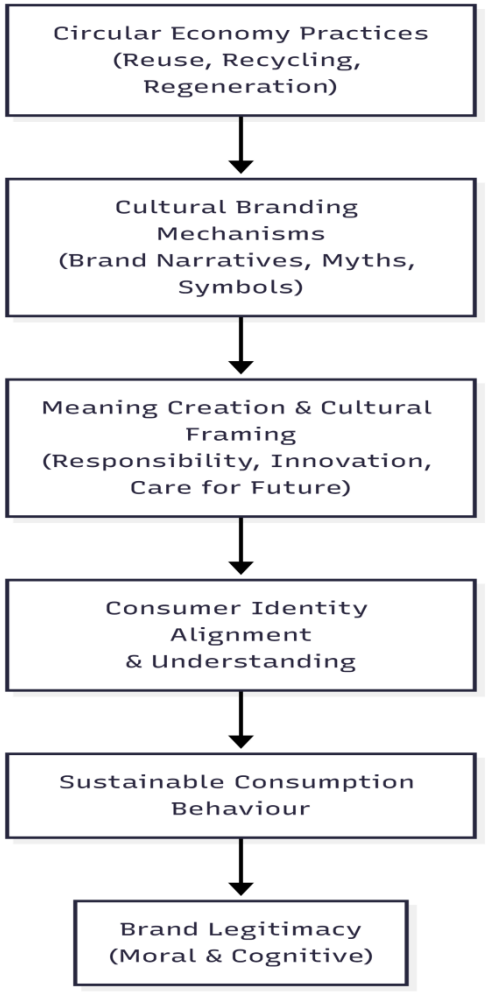
Moreover, brand symbolism visual elements such as logos, colours, icons, and design motifs serves as a cognitive shortcut that reinforces narrative meaning and emotional connection. Symbolic brand cues help consumers quickly recognize and interpret brand values, reducing uncertainty and cognitive effort in decision-making. Symbolism also strengthens brand identity and helps consumers express their own identities through brand affiliation, which in turn increases acceptance of practices associated with that brand, including sustainability and circular initiatives. (Osmanova, I, 2023)

Conceptual Framework Linking Cultural Branding and Circular Economy

Integrating cultural branding with the circular economy helps explain how sustainability practices gain meaning and acceptance in markets. While circular economy theory focuses on material processes like reuse and recycling, it does not fully explain how these practices become socially normalized. Cultural branding fills this gap by showing how brands create meaning through stories, symbols, and shared values (Holt, 2004).

In this framework, brands act as cultural translators that present circular practices as attractive and meaningful. By linking circular initiatives to values such as responsibility, innovation, or care for future generations, brands help consumers connect sustainability with their identity and lifestyle, making circular behaviours more appealing and easier to adopt.

Conceptual Framework Linking Cultural Branding and Circular Economy for Sustainable Consumption and Brand Legitimacy



The framework shows how cultural branding helps build brand legitimacy in sustainability. Legitimacy means that a brand's actions are seen as appropriate and socially acceptable (Suchman, 1995). When brands communicate circular economy practices through clear and credible cultural stories, they align with social values about environmental responsibility, increasing trust and reducing scepticism.

By linking cultural branding and circular economy principles, the framework explains how meaning, consumer identity, sustainable consumption, and brand legitimacy are connected. This perspective helps show how brands can move beyond superficial sustainability claims toward more meaningful and widely accepted circular practices.

Suggestions

Based on the theoretical insights of this study, several important suggestions emerge for researchers, practitioners, and policymakers. First, brands implementing circular economy practices should move beyond technical communication and actively adopt cultural branding strategies that emphasize meaning, values, and identity. Storytelling, symbols, and narratives rooted in responsibility, innovation, and care for future generations can help consumers better understand and accept circular practices. Second, marketers should ensure consistency and authenticity in sustainability communication to avoid scepticism and enhance brand legitimacy. Circular initiatives should be transparently communicated and embedded within long-term brand values rather than short-term promotional efforts. Third, policymakers and sustainability advocates can collaborate with brands to promote culturally resonant narratives that normalize circular consumption as a socially desirable behaviour. Finally, future research should empirically test the proposed conceptual framework across different industries, cultural contexts, and consumer segments to validate and extend the theoretical relationships identified in this study.

Conclusion

This theoretical study examined the circular economy through the lens of cultural branding to explain how sustainability practices gain meaning, acceptance, and legitimacy in contemporary markets. While circular economy research has traditionally focused on economic and operational dimensions, this paper highlights the importance of cultural interpretation in shaping consumer responses to circular practices. By integrating cultural branding theory with

circular economy principles, the study demonstrates that consumer acceptance depends not only on functional benefits but also on the symbolic meanings constructed through brand narratives, myths, and symbols. The proposed conceptual framework illustrates how cultural branding mechanisms translate circular practices into meaningful consumption experiences, fostering sustainable behaviour and enhancing brand legitimacy. Overall, the study contributes to sustainability and branding literature by offering a cultural perspective on circular economy adoption and provides a foundation for future empirical research aimed at advancing sustainable consumption through culturally embedded branding strategies.

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A Study on The Role of Sustainable Consumption in Enhancing Brand Advocacy

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Abstract

In recent days, Brands focuses more on sustainable consumption in order to improve their brand image, brand trust and also to enjoy competitive advantage. This paper examines the various factors of sustainable consumption that enhances brand advocacy, focusing on consumer's purchase behaviour and its influence on customer satisfaction & brand trust. Quantitative data using structured Questionnaire were collected among 100 consumers and data were analysed using SPSS software. The findings reveal that the psychological and social factors highly influence sustainable consumption. Sustainable consumption positively influences brand advocacy. Customer satisfaction and brand trust mediates brand advocacy. Customers having favourable purchase experience trust the brand, which in turn enhances customer loyalty, ultimately leading customers to become brand advocates.

***Keywords**: Sustainable Consumption, Brand advocacy, Customer satisfaction, Brand trust, Brand loyalty*

1. Introduction

Focusing on Sustainable development goals adopted by the United Nations, this paper focuses on SDG 12 Responsible consumption and production ensuring sustainable consumption minimizes usage of non- recyclable wastes and reduces environmental degradation. Brands promotes their ethical business practices by providing safe products and fair supply chain to enhance their credibility and brand value. Effective use of resources helps brand to reduce the cost and improve their production efficiency. Brands create awareness on mindful consumption through sustainability messages in social media and Word of mouth. Aiming towards healthier living environment and safer products, consumers now a days

focusing on sustainable buying pattern. Sustainable consumption supports self-image and consumers moral values. Social influence encourages sustainable consumption among consumers.

2. Literature review

This literature review seeks to provide a comprehensive overview of existing research on consumer behaviour, customer satisfaction, sustainable consumerism, Brand loyalty & Brand advocacy.

2.1 Consumer Behaviour

Consumer behaviour is the attitude the consumer shows towards the brand. Consumers purchasing decision and buying intention influence by four main factors : Psychological factors like consumers perception and attitude, Social factors like family & social media, Cultural factors like traditions & values and economic factors like price & income of the consumers (Shaw, N. (2024).

According to Social influencer theory, consumers attitude and preferences were determined by the social influencers.Virtual influencers with the attributes of credibility, uniqueness, interactivity, competence triggers the consumers psychological responses (compliance, identification, internalization) which drives consumers purchase intention (Davlembayeva, D., Chari, S., & Papagiannidis, S. 2025).

According to Influence Marketing theory, the influencers with high credibility, trustworthiness & authenticity enables better social campaign which influences the consumers purchase intent (Bhardwaj, S., Kumar, N., Gupta, R., Baber, H., & Venkatesh, A. 2024) .Theory of Planned Behaviour (TPB) packaging free food system reduces packaging wastes yet it requires thorough integration of environmental assessments and studies on consumer behaviour (Jimenez Romanillos, E., Williams, H., & Wever, R. 2024).

Internal factors like economic & environmental concerns and external models like product design and awareness campaign both drives circular economy model. Consumer attitude and their behavior plays key role in successful implementation of Circular economy model (Lopez, N. S. R., & Legardeur, J. 2024).

2.2 Customer Satisfaction

Aligning the marketing logistics dimension like product quality, product availability, tracking facilities & delivery speed enhances customer satisfaction which increases the consumers loyalty and their repurchase intention (Kim, T., Kim, M. J., & Promsivapallop, P. 2025).

Implementing social sustainability claims in advertising enhances green brand image, satisfaction and brand equity. Altruistic Values of Consumers influences purchase intention (Javed, T., Mahmoud, A. B., Yang, J., & Zhao, X. 2024).

2.3 Sustainable Consumption

Having environmental awareness alone is not enough to make sustainable product choices. Education, practical cues and practical measures are essential for effective sustainable consumption (Baviskar, D., Chattaraj, A., & Patil, A. 2024). Information Quality, usefulness, Source credibility in social media enhances sustainable purchase intention (Horrich, A., Ertz, M., & Bekir, I. 2024).

2.4 Brand trust

Adopting sustainable marketing practices like eco friendly labelling & ethical sourcing enhances customer engagement, builds brand loyalty and reinforces consumer brand connection (Sarmah, P., & Singh, A. P. 2024).

2.5 Brand advocacy

Online brand advocacy serves as catalyst and result of consumer brand relationship. Consumer connection with brand enhances brand loyalty and buying intention through online brand advocacy (Wilk, V., Soutar, G. N., & Harrigan, P. 2021). Online brand advocacy construct with four dimensions namely Brand defence, Brand information sharing, Brand positivity and virtual positive expression (Wilk, V., Soutar, G. N., & Harrigan, P. 2020). Brand image influences brand trust. Brand trust influences customer loyalty. Customer experiences reflects the brand loyalty (Afiftama, I., & Nasir, M. 2024). Brand loyalty and repeat purchase intention enhances online brand advocacy (Wilk, V., Soutar, G. N., & Harrigan, P. 2021).

3. Research Methodology

Research methodology section outlines the comprehensive approach deployed to examine the role of sustainable consumption in enhancing brand advocacy. This section explores the research design, sampling techniques, data collection & data analysis done to achieve the study objectives.

3.1 Research Design

This research used quantitative methodologies for providing comprehensive understanding of consumer brand advocacy.

3.2 Quantitative Research Design

Quantitative research was done to examine how consumer experience, customer satisfaction, brand trust transforms consumers into brand advocates. Descriptive research was done to analyse various factors that determines sustainable consumption. In this study brand advocacy is considered as dependent factor and factors that influence sustainable consumption is considered as independent factor. Data were collected through questionnaire using convenience sampling among 100 consumers who have experienced the sustainable brands. Variables were measured using 5 point likert scale ranging from 1 (strongly disagree to 5 (strongly agree). Descriptive statistics were used to analyze the data using SPSS.

3.3 Data Analysis

Majority of female respondents felt that Psychological factor ranks highest in influencing the sustainable consumption followed by Social factors & Economic factors. Majority of the respondents were highly satisfied with the sustainable brands which shows strong loyalty and repurchase intention. Majority of the respondents trust the brand reflecting the brand as reliable. Majority of the respondents agreed brand advocacy, reflecting highly satisfied customers advocates the brand.

4. Findings

Majority of the respondents were Female under the age group of 31 – 40 years who were employees with undergraduation degree with monthly income range from Rs. 30,000 to Rs.60,000 often purchases sustainable products. Psychological and Social factors predominantly influencing Sustainable consumption followed by economic factor.

Respondents were highly satisfied on consuming sustainable brands and highly satisfied consumers trust the brands and reflects brand loyalty. Loyal consumers advocates for the brand.

5. Conclusion

Descriptive analysis shows that consumers exhibits favourable purchase pattern which reflects high satisfaction, trust, loyalty. Sustainable consumption supports brand advocacy. Findings provide insights for managers to focus on product quality and transparent supply chain and also by enhancing consumers purchase experience.

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Green Marketing and Ethical Consumerism

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Abstract

Consumers are moving towards eco-friendly products as a result of developing natural awareness worldwide, which makes green marketing a vital component of present-day corporate procedure. This research articles reviews the different literatures consider of green marketing and ethical consumerism. The chapter concludes that green marketing has become essential for businesses, advertising natural and financial benefits whereas enhancing open recognition. To offer to moral customer and government organizations, businesses are consolidating feasible practices including squander minimisation, energy productivity, and naturally inviting products. Digital marketing plays a key part in promoting green items, as the intrigued among individuals utilizing green items expanded moral consumerism, driven by straight forwardness and responsibility, impacts obtaining conduct. Third-party certifications reinforce buyer believe, whereas green techniques energize maintainable consumption. Businesses must adjust with moral values to cultivate brand devotion. Tending to worldwide environmental challenges, green promoting remains significant in forming mindful shopper behaviour and long-term trade victory.

***Keywords**: Green marketing, Moral consumerism, Natural issues, Digital marketing, Customer behaviour, Commerce victory, Feasible Commerce, etc.*

1.Introduction

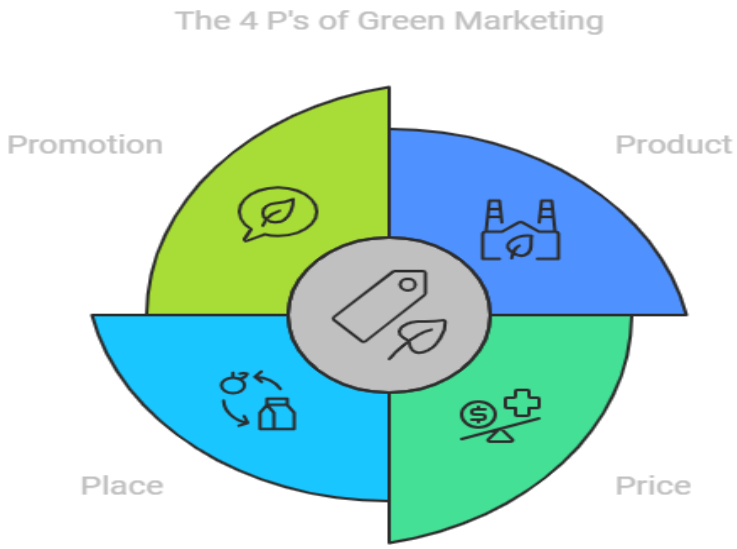
Green marketing promotes eco-friendly products/services (sustainable materials, less waste, energy efficiency) while ethical consumerism is the consumer practice of "voting with your dollar" for brands aligned with environmental and social values, rejecting harmful practices, making purchasing a political act for positive change. It centres on diminishing hurt to nature through eco-friendly generation, feasible bundling, vitality productivity and moral

commerce hones, whereas too assembly consumer needs. making purchasing choices based on your moral, social, and environmental values, using your money as a vote to support companies doing good (fair wages, eco-friendly) and boycott those doing harm (exploiting labour, polluting). It involves questioning a product's journey, favouring sustainable materials, fair labour, and social justice, effectively turning everyday shopping into a form of activism for a better world.

a. Green Marketing Meaning

Green marketing is no longer a supportive limited strategy it has advanced into a all encompasses corporate reasoning that co-ordinating environmental sustainability into each organize of the product life cycle. Not at all like conventional marketing, which centres essentially on the quick delight of customer needs, green marketing requires a 'triple bottom line' approach – balancing biological wellbeing, social value, and financial practicality. This move requires brands to move past the aesthetic of 'greenness' and give irrefutable information with respect to carbon sequestration, water utilization, and life -cycle evaluations. Green promoting implies the prepare of advancing products and administrations that are naturally friendly

Pillars of Green Marketing



1.Eco friendly products:

Development of sustainable product development focuses on creating sustainable products that minimize environmental impacts. It involves using renewable materials, reducing waste, and optimizing energy efficiency. The goal is to design products with a lower carbon

footprint and promote circular economy principles. This approach ensures resources are conserved and pollution is reduced.

2. Environmental communication:

Environmental communication involves sharing information about sustainability, climate changes, and eco-friendly practices to raise awareness and inspire action.it highlights the importance of protecting natural resources and reducing pollution. Through clear messaging, it encourages individuals, businesses, and governments to adopt greener behaviour.

3.Sustainable practices:

Sustainable practices involve methods that meet current needs without compromising the ability of future generations of meet theirs. They focus on reducing waste, conserving resources, and minimizing environmental impacts.

b. Ethical Consumerism

Several terms such as ethical consumption, ethical buying, moral purchasing, ethical sourcing, and ethical shopping are used to describe this form of consumer activism. This movement encourages consumers to consider not only the product itself but also the broader impact of their consumption patterns on society and the environment. It specifically refers to consumers making purchasing choices that align with values such as sustainability, human rights, and animal welfare.

c. Barriers to the Implementation of Green Marketing Practices

Barriers to the implementation of green marketing practices are the economic, organizational, regulatory, and market-related factors that hinder firms from successfully integrating environmental considerations into their marketing activities.

1.**High Cost of Implementation**

Small and medium enterprises may avoid biodegradable packaging due to its higher cost compared to conventional plastic.

2.**Lack of Consumer Awareness and Demand**

Consumers may prioritize price over environmental benefits, leading to low sales of eco-labelled products.

3.**Limited Availability of Sustainable Resources**

Companies may struggle to source ethically produced materials in sufficient quantities.

4.**Regulatory and Compliance Challenges**

Firms may face delays in obtaining environmental certifications due to strict compliance requirements.

5.**Risk of Greenwashing and Trust Issues**

Fear of being accused of misleading environmental claims discourages firms from promoting green initiatives.

6.**Lack of Organizational Expertise**

Insufficient knowledge and skills related to sustainability limit effective green marketing implementation.

d. Determinants Limiting Ethical Consumer Behaviour

Refer to the economic, social, informational, and psychological factors that constrain consumers' ability or willingness to engage in ethical purchasing decisions, despite increasing awareness of ethical and sustainability issues.

Examples of determinants

- High prices of ethical or eco-friendly products
- Limited availability of ethical alternatives
- Lack of reliable information or trust in ethical claims
- Habitual buying behaviour and convenience
- Low perceived consumer impact

2. Review Literature

Rawat& Pande: (Rawat & Pande, 2024) Examining the concept's development, strategic importance, and the challenges faced by enterprises in this space, this critical study aims to provide light on the green marketing environment in India. The findings highlight the fact that environmental goals are advanced and company competitiveness is enhanced via the use of green marketing strategies. The paper concludes that the resolution of contemporary

ecological challenges can be substantially influenced by every incremental effort toward environmental sustainability. Therefore, the integration of green marketing strategies is a logical and essential step for organizations that seek to attain societal benefits and long-term sustainability. In order to cultivate a more sustainable future for both present and future generations, it is imperative to promote green marketing, which is bolstered by governmental incentive.

Kalish et al:(Kailash et al., 2023) Our goal is to provide a thorough understanding of how ethical issues impact consumer behaviour and to show how companies may profitably target this growing market niche. Consumer preferences and purchasing behaviours are increasingly influenced by ethical considerations, as evidenced by the compelling findings of the research paper. The essay outlines many successful marketing techniques that companies may employ to appeal to and engage the conscientious customer, Emerging Trends in Commerce and Management: A Multi-Disciplinary Approach.

By Linu James (2021) aims to examine consumers' knowledge of and interest in eco-friendly goods. However, one of the key tenets of green marketing is that customers will pay more for an eco-friendly option. Information was gathered from 114 participants using a well-structured, closed-ended questionnaire. Percentage analysis, a chi-square test, and a Friedman test were used to examine the data. The study's findings, which look at current conditions and the variables that make green products more appealing to customers, are optimistic.

There has been a dramatic growth in the number of substitute and supplementary goods in the market recently. With no clear path forward, shoppers are torn about making a purchase. There's no doubt that having these items on the market is good for business, but the question is whether or not they're being used in a way that takes environmental concerns into account. It's not enough to sustain a thriving economy, and there aren't enough resources to go around.

Chan et al., 2008; Bohlen et al., 1993. At the spirit of this trend is often referred to as ethical consumerism or green consumption (Chan et al., 2008; Bohlen et al., 1993). In general, consumerism means .an organized movement of citizens and government agencies to improve the rights and power of buyers in relation to sellers (Kotler and Armstrong, 2008). This is also mentioned as ethical consumption behaviour. In line with this, purchasing, using and disposing

green products assert individuals (consumer) values of social responsibility and ethical consciousness and, therefore, these can be predicted that consumers environmental friendly behaviour associate with morally questionable behaviour.

3 Conclusion

In today's competitive business world, green marketing has become a necessity rather than an option. It helps organizations improve their public image while supporting environmental sustainability. By adopting eco-friendly practices such as energy conservation, waste reduction, and the use of sustainable materials, companies can reduce environmental harm and attract environmentally conscious consumers and regulators. Increasing awareness of climate change has strengthened consumer preference for brands that practice sustainability and corporate social responsibility. Digital marketing plays a key role in promoting green products, especially in the post-pandemic era where sustainability awareness has increased. Ethical consumerism, supported by transparency, accountability, and easy access to information, has influenced consumer buying behaviour and encouraged businesses to align with ethical values. The use of third-party certifications helps build consumer trust, while psychological factors shape ethical purchasing decisions. Overall, green and ethical business practices are essential for building brand loyalty and achieving long-term success.

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A Study on Consumer Adoption Behaviour towards Internet of Things (IOT) Devices (Smart Watches and Smart Speakers) in Chennai

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Abstract

The rapid advancement of internet of things technology has significantly influenced consumer lifestyles through the adoption of smart devices such as smart watches and smart speakers. The aim of the study to examine the factors influencing the adoption behaviour of consumer towards IoT devices with respect to smart watches and smart speakers. Key predictors used in the study are consumer innovativeness, social influence and trust in order to understand the impact on adoption behaviour. Statistical tool such as percentage analysis and regression analysis was adopted in the study to analyse the impact of the predictors. The findings of the study revealed that all the predictors have significant impact on the adoption behaviour. Consumer innovativeness claims to be the strongest predictor for the consumer adoption behaviour towards internet of things devices

***Keywords**: Internet of things, consumer innovativeness, adoption behaviour, smart watches, smart speakers*

Introduction

When billion of physical object around the world are connected wirelessly to the internet by collecting and sharing data, it is known as the Internet of things. (Tsourela & Nerantzaki, 2020). In the 4th revolution era Internet of things has become the major significant trend. The internet of things has become the technology that is transformative in nature. It integrates the technology into our everyday life as consumer products. Smart watches and smart speakers are the IoT devices which are frequently and rapidly used by the consumers in a wide

range as it provides greater convenience and seamless connectivity. As there is an increasing impact of smartphone usage and digital literacy, the consumers are trying to adopt IoT devices. Despite the availability of smart technologies, still the adoption of IoT devices among consumers are very less. Consumer adoption towards IoT is growing day by day, yet it is still in infant stage (Mahmud et al., 2022). It is in the need to understand the impact of factors such as consumer innovativeness, social influence and trust towards the adoption behaviour of IoT devices with respect to smart watches and smart speakers. In order to examine the influence of these factors, the study seeks to explore the adoption behaviour of consumers towards the adoption of IoT devices.

Literature Review

Consumer Innovativeness

Consumer innovativeness means, it is the tendency of the consumer to be first to adopt a product or services. Consumers tend to purchase new products or services quickly than others. It is one of the personality traits which shows the willingness of the consumers to experience new things. consumer innovativeness plays a significant role in the process of strengthening consumer intention to adopt wearable technology.(Cheung et al., 2019). Even though the IOT services are still uncommon, the consumers are more enthusiastic about the new services and have high expectation.(Sung & Jo, 2018). This shows the consumer willingness towards adoption. Results from the study made evidence that the consumer willingness to pay is directly influenced by consumer innovativeness which in turn depicts the openness of the consumer to adopt and try new IOT devices. (Zhang et al., 2020) From the results of the study, it shows that consumer innovativeness claims to be a significant predictor towards the adoption of IOT devices.

Social Influence

Social influence refers to the process in which a consumer's feelings, actions or thoughts are being impacted by the others. Social influence occurs through human interactions which shapes the opinions and behaviours. The peer opinions and behaviours among the social group had a direct influence about the usage of the technology. It is because if people around us using technology seamlessly, it alters the perception and therefore leading to the adoption of IoT devices (Ladeira et al., 2025). Social influence plays a major role in sustaining consumer for the usage IoT devices especially for smart speakers. The study made by (Wang et al., 2023)

reveals that both normative and informational influence impacts the user's adoption intention. Furthermore, social influence not only helps in adoption intention but also helps in continuance usage of the products.

Trust

Trust can be defined as a person's belief towards a product. With high level of trust, it increased the confidence and thereby reducing the security concerns. The study reveals that usefulness and ease of use enhance the trust which ultimately leads to the adoption. Furthermore, trust occurred to be an important factor (Ladeira et al., 2025). The study conducted by (Esther DT, 2022) explores trust in IoT service provider as an important predictor for adoption behaviour. The findings of the study depicts that privacy concerns can be reduced with the positive impact of trust. Therefore, trust has a huge impact on the adoption behaviour of consumer towards IoT devices.

Objectives of the Study

To study the impact of consumer innovativeness, social influence and trust on consumer adoption behaviour towards Internet of things (IoT) devices with respect to smart watches and smart speakers.

Hypothesis of the Study

The following hypothesis were framed

H_1: There is significant impact of consumer innovativeness, social influence and trust towards the consumer adoption behaviour of IoT devices.

Research Methodology

Research Design

The study is descriptive in nature. The research study is mainly concerned with analysing the factors influencing the consumers adoption behaviour towards IoT devices (smart watches and smart speakers)

Sources of Data

The data collected for the research study is based on primary data. Survey method is used for the collection of primary data through structured questionnaire.

Sampling Technique

Purposive sampling technique was adopted for the collection of data. It is being adopted because purposively the respondents who own IoT devices were targeted.

Sampling Frame

The questionnaire was circulated to the respondents residing in the Chennai city.

Sample Size

In total 105 questionnaires were collected from the respondents residing in the Chennai city.

Tools used for Analysing the Data

The analysis of the study was performed through statistical package for social sciences (SPSS).

- Percentage analysis has been adopted in the study.
- Regression analysis is used to find out the significant impact of consumer innovativeness, social influence and trust towards the adoption behaviour of IoT devices.

Analysis

Percentage Analysis

Table showing Percentage Analysis

Demographics	Particulars	Count	Percentage
Gender	Male	48	45.71%
	Female	57	54.29%
Age (in years)	18-25	65	61.90%
	26-35	23	21.90%
	36-45	6	5.71%
	46-55	4	3.81%
	Above 55	7	6.67%

Educational level	Higher secondary or below	10	9.52%
	Undergraduate	26	24.76%
	Postgraduate	64	60.95%
	Doctorate	5	4.76%
Monthly income	Less than Rs.25000	16	15.24%
	Rs.25001- Rs.50000	28	26.67%
	Rs.50001- Rs.75000	24	22.86%
	Rs.75001- Rs.100000	26	24.76%
	Above Rs.100000	11	10.48%

Source: Authors work

From the demographic profile it can be seen that majority of the respondents were female constituting about 54.29% whereas male consisting of 45.71%. The age frequency of respondent reveals that majority of the respondents were between 18 – 25 years with a proportion of 61.90% followed by the age category between 26 – 35 years who were constituting about 21.90%. The other age category contributed only few having from 5% to 6%. Majority of the respondents were well qualified since 60.95% of the respondents were postgraduates and 24.76% were undergraduates. Only few were higher secondary with 9.52%. the income distribution shows that largest group of respondents earned between Rs. 25001 – Rs. 50000 (26.67%) followed by those earning between Rs.75001- Rs. 100000 (24.76%) and then those respondents earning between Rs.50001 – Rs. 75000 (22.86%).

Reliability test Analysis

Table showing Reliability Test Analysis

Variables	Cronbach's Alpha
Consumer innovativeness	0.900
Social influence	0.885
Trust	0.881
Adoption behaviour	0.893

Source: SPSS

The reliability test table using Cronbach alpha shows a good internal consistency among the variables used in the study. Consumer innovativeness depicted value of 0.900 showing strong reliability among the variables. Social influence has recorded with Cronbach alpha of 0.885 which says the high level of consistency. Trust has a Cronbach alpha of 0.881 which indicates that the variables are highly consistent. Adoption behaviour has 0.893 value showing the scales are firmly consistent. From the table it can be inferred that variables included in the study has an excellent internal consistency in order to effectively measure the variables and validity of analysis.

Regression Analysis

Table showing Regression Analysis

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.689[a]	.475	.459	.55018
a. Predictors: (Constant), SI, TR, CI				
b. Dependent Variable: AB				

ANOVA						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	27.614	3	9.205	30.408	.000
	Residual	30.573	101	.303		
	Total	58.187	104			
a. Dependent Variable: AB						
b. Predictors: (Constant), SI, TR, CI						

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.375	.284		1.319	.190		
	CI	.354	.081	.366	4.393	.000	.747	1.338
	TR	.279	.082	.283	3.389	.001	.748	1.337
	SI	.232	.087	.223	2.657	.009	.741	1.349
a. Dependent Variable: AB								

Source: Authors work

Interpretation

The regression analysis was made in order to understand the impact of consumer innovativeness, social influence and trust towards the adoption behaviour of IoT devices in Chennai. From the model summary it has been found that the R square value is 0.475 which is 47.5%. The R square value explains the variance of adoption behaviour by the three independent variables namely consumer innovativeness, social influence and trust. The ANOVA table shows that regression model is statistically significant (F = 30.408, p = 0.000) representing that consumer innovativeness, social influence and trust together had a significant impact on the consumer adoption behaviour towards the IoT devices. Under coefficient table the results revealed that all the three independent variables viz, consumer innovativeness, social influence and trust have a significant value of less than 0.05. Therefore, the null hypothesis is rejected and alternative hypothesis is accepted. This shows that all the three independent variables have a significant impact on the adoption behaviour. Among the independent variables, consumer innovativeness emerged as the strongest predictor as it has a regression coefficient (β=0.366, p=0.000) followed by trust (β= 0.283, p=0.001) and social influence (β= 223, p= 0.009). The VIF value were below the threshold value 5 and tolerance is also above the threshold value (0.2), indicating no multicollinearity issues. From the results of the study, it was found that all the three independent factors have a significant influence towards the adoption behaviour.

Conclusion

The study on consumer adoption behaviour towards IoT devices with respect to smart watches and smart speakers highlights the important factors that influence the adoption behaviour of IoT devices. Findings of the study revealed that all the predictors that is consumer innovativeness, social influence and trust have significant impact on the adoption behaviour of consumer. Among the predictors consumer innovativeness has been the strongest predictor of consumer adoption behaviour. This depicts that consumers who are willing to openness are ready to adopt IoT devices. Compared to other factors, openness to innovation has been the major driver for the consumer adoption behaviour. The study highlights the importance of addressing the early adopters to ensure vast acceptance.

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Examining Utaut Model on Consumer Adoption in Online Food Delivery Services among Young Adults

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Abstract

Online Food Delivery services (OFD) enables the consumers to order food online at the comfort of their home or office from any restaurant of their choice through mobile apps or websites. Primary data was collected from 299 respondents and analysed using weighted mean, correlation and regression. Findings revealed that there is a significant positive relationship between UTAUT factors and behavioural intention and actual usage. There is significant positive impact of Effort Expectancy, Facilitating Conditions, Hedonic Motivation and Habit on Behavioural Intention and there is significant positive impact of Behavioural Intention on Actual Usage. However, Performance Expectancy, Social Influence and Price Value have no significant impact on Behavioural Intention.

***Keywords**: Online Food Delivery services (OFD), UTAUT factors, Behavioural Intention, Actual Usage, Facilitating Conditions, Habit.*

Introduction

Online food delivery services in India are in the rapid growth stage, primarily driven by increased internet penetration, higher smartphone adoption, and a rising demand for convenience. Customers choose their favourite restaurant, browse the menu and order the food online through OFD apps which enable them to have real time access to their food, tracking of delivery and various other services like table booking, online delivery, and reservations.

According to surveys, 66% of Gen Z adults and 72% of millennial consumers view ordering, takeout or receiving delivery as important components of their everyday lives. As per NITI Aayog, the platform economy employs about 13+ million people, 0.44 million of whom

work in the online meal delivery industry. Therefore, the development of this sector is crucial to the expansion of the Indian economy.

Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) is used as the core theory for this study. UTAUT framework gained popularity in examining technology acceptance, confirming its robustness in predicting technology acceptance in multiple, multi-cultural settings (Shen & Shariff, 2016).

Review of Literature

According to a research by Venkatesh et al. (2012), behavioural intention and actual usage are significant determinants of technology use. The study conducted by Nguyen (2019), described the view of millennial and Generation Z in the accommodation of food delivery services in Vietnam revealing that user-friendly nature and anytime and anywhere interactive communication of mobile food applications enhance customer experience and increase customer enjoyment.

Mahande et al. (2019) performed a study based on food delivery intermediary service using attribution theories, including online coupons and time saving options. The findings showed that online consumer's find timesaving is an important factor inducing them to avail of online food delivery services.

Zhao & Bacao's (2020) study proposed a comprehensive model by analysing the 'satisfaction' and 'continuing intention' of using online food delivery services in China by analysing the UTAUT factors including trust and perceived task-technology fit. This study was done during COVID-19 outbreak and focused on technological and mental factors affecting the consumer's continuing intention of food delivery services in China.

Gunden (2020) measured the consumer's intention to use online food delivery systems in USA. The study results supported and proved that facilitating conditions have strong prediction in the intention behaviour among the users.

Need for the Study

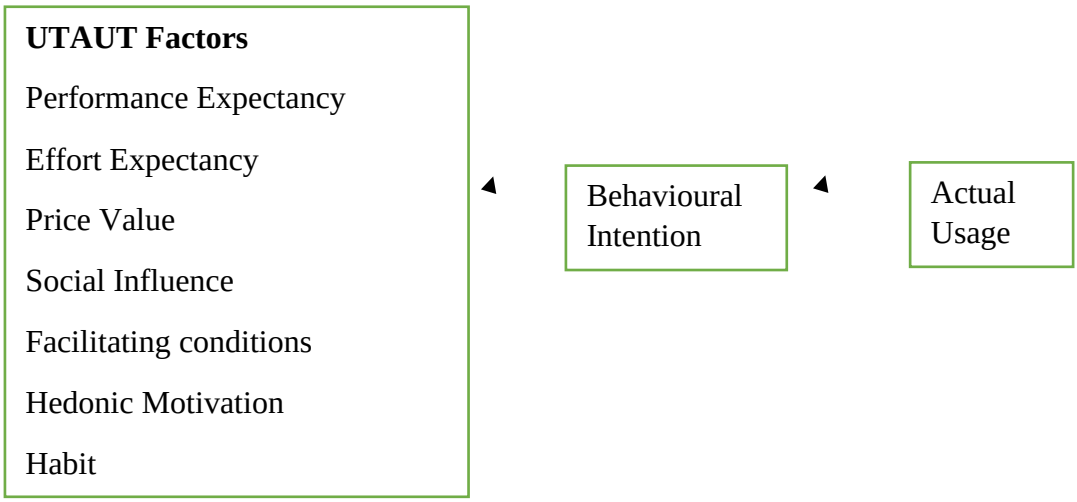
Food delivery services have dramatically transformed consumer behaviour, particularly among urban dwellers, for whom OFD has become a routine part of life. Half of the population under the age of 30 aim at higher living standards, lifestyle changes, with more family members

eating different foods, working couples buying convenience foods, and consumers becoming more conscientious in metropolitan areas. In light of the above it is important to study the Behavioural Intention and Actual Usage of OFD services of consumers through UTAUT model.

Objectives of the study

1. To understand the usage patterns of OFD Apps by the customers.
2. To examine the consumer perception w.r.t the factors of UTAUT with respect to OFD Apps
3. To analyse the relationship between the factors of UTAUT , Behavioural Intention, Actual Usage.
4. To analyse the impact of factors of UTAUT on Behavioural Intention and Behavioural Intention on Actual Usage.

Conceptual Framework



Research Methodology

The population of this research includes customers who use OFD services. 'Purposive sampling technique' was employed in this study. Primary data was deliberately collected from 299 respondents aged 21-30 as they are active users of OFD services. Data was collected using structured standardised questionnaire and analysed using SPSS software. The factors of the study were measured on a five point Likert's scale ranging from strongly agree (5) to strongly disagree (1). The overall reliability of the questionnaire using Cronbach Alpha reliability score was 0.948. Table 1 below shows the profile of the respondents.

Table No.1

Demographic Profile of the Respondents

Socio-Demographic Factors	Classification	Frequency	Percentage
Gender	Male	69	23.1
	Female	230	76.9
Educational Qualification	Up to HSC/Diploma	5	1.7
	UG	128	42.8
	PG	122	40.8
	Professional	33	11.0
	Others	11	3.7
Occupation	Student	181	60.5
	Private Employee	72	24.1
	Government Employee	7	2.3
	Professional	27	9.0
	Business	9	3.0
	Homemaker	3	1.0
Marital Status	Single	276	92.3
	Married	23	7.7
Monthly Family Income	Up to Rs.50,000	85	28.4
	Rs.50,001- Rs.1,00,000	72	24.1
	Rs.1,00,001- Rs.1,50,000	40	13.4
	Rs.1,50,001- Rs.2,00,000	30	10.0
	Above Rs.2,00,000	72	24.1

Source: Primary Data

Typically majority of the respondents are female (76.9%), undergraduates (42.8%) students (60.5%), who are single (62.8%) with a monthly income of less than Rs.50,000 (28.4%) all are aged between 21-30 years.

Having examined general demographic variables of the respondents table 2 & 3 depicts the specific demographic variables related to preferred OFD apps and usage pattern.

Table No.2

Preference of Online Food Delivery Apps

Online Food Delivery Applications	**Preference Rank**
Swiggy	1
Zomato	2
Dunzo	3
Ola	4
Dominos	5
Eat sure	6

Source: Primary Data

From the above table it can be inferred that the most preferred online food delivery app is Swiggy followed by Zomato, Dunzo, Ola, Dominos and Eat Sure.

Table No.3

Usage Pattern

Particulars		**Percentage**
How many times do you use Online Food Delivery service in a month	1-2 times	**53.51**
	3-4 times	24.08
	5-6 times	11.37
	7-8 times	4.01
	9 times and above	7.02
How long have you been using Online Food Delivery services	Less than 1 year	**26.42**
	1year upto 2 years	20.07
	2 years upto 3years	21.40
	3 years upto 4 years	14.38
	4 years and above	17.73
On an average how much do you spend per month on food ordering through Online Food Delivery apps	Less than Rs.500	30.77
	Rs.500 – 1,000	**34.45**
	Rs.1,001 – 1,500	18.06
	Rs.1,501 – 2,000	8.36
	Rs.2,001 & above	8.36

Source: Primary Data

From the above table it can be inferred that 26.42% of the respondents have been using OFD apps for less than one year, spending about Rs.500 – Rs.1,000 every month (34.45%), by using them one to two times in a month (53.51%).

Consumer perception with respect to UTAUT factors are measured on five point Likert's scale ranging from strongly agree to strongly disagree. The results of which are depicted in the table 4 below.

Table No.4

Consumer perception with respect to UTAUT factors

S. No	Particulars	Mean	Standard Deviation
1	Performance Expectancy	3.90	0.60
2	Effort Expectancy	4.00	0.62
3	Price Value	3.59	0.66
4	Social Influence	3.30	0.82
5	Facilitating conditions	3.84	0.65
6	Hedonic Motivation	3.58	0.73
7	Habit	2.96	0.98

Source: Primary Data

Table depicts that the respondents have 'strongly agreed' that Effort Expectancy (4.00) is the most important UTAUT factor followed by Performance Expectancy (3.90) and Facilitating Conditions (3.84). They have also 'agreed' to the statements measuring Price Value (3.59), Hedonic Motivation (3.58) and Social Influence (3.30) but have expressed 'neutrality' regarding Habit (2.96).

Both the mediating variable (Behavioural Intention) and the dependent variable (Actual Usage) are measured using 4 and 3 statements respectively on a five point Likert's scale. The nature and the direction of relationship between the independent variable (UTAUT factors) with Behavioural Intention and Actual Usage is revealed in the correlation table below.

Table No.5

Relationship of UTAUT factors with Behavioural Intention & Actual Usage - Correlation

Factors	Behavioural Intention "r value"	Actual Usage "r value"
Performance Expectancy	0.488**	0.448**
Effort Expectancy	0.485**	0.378**
Price Value	0.468**	0.489**
Social Influence	0.423**	0.468**
Facilitating conditions	0.536**	0.423**
Hedonic Motivation	0.529**	0.403**
Habit	0.505**	0.582**

Source: Primary Data

Note: ** denotes significant at 1% level

It can be inferred that there is a significant positive relationship between UTAUT factors like performance expectancy, effort expectancy, price value, social influence, facilitating conditions, hedonic motivation and habit with behavioural intention and actual usage at 1% level. Facilitating conditions with behavioural intention (0.536) and habit with actual usage (0.582) have the highest correlation.

The next part of the analysis deals with determining the impact of UTAUT factors on Behavioural Intention and Behavioural Intention on Actual Usage by using Regression Analysis.

Table No.7

Impact of UTAUT factors on Behavioural Intention

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.187	0.223		0.838	0.403

Performance Expectancy	0.115	0.069	0.096	1.664	0.097 (ns)
Effort Expectancy	0.216	0.079	0.186	2.739	0.007**
Price Value	-.075	0.069	-0.068	-1.088	0.278 (ns)
Social Influence	.005	0.051	0.006	0.108	0.914 (ns)
Facilitating conditions	0.267	0.068	0.239	3.948	0.000**
Hedonic Motivation	0.156	0.054	0.158	2.896	0.004**
Habit	0.286	0.039	0.386	7.250	0.000**
R	0.717				
$_R2$	0.514				
F Value	44.027				
P Value	0.000**				

Source: Primary Data

Note: ** Denotes significance at 1% level

Dependent Variable: Behavioural Intention

From the above table it is inferred that 51% (R^2 = 0.514) variance in Behavioural Intention is explained by the factors of UTAUT that there is significant positive impact of Effort Expectancy, Facilitating Conditions, Hedonic Motivation and Habit On Behavioural Intention at 1% level of significance since p < 0.01. However, Performance Expectancy, Social Influence and Price Value have no significant impact on Behavioural Intention.

Table No.8

Impact of Behavioural Intention on Actual Usage

Variables	**Unstandardized Coefficients**		**Standardized Coefficients**	**f**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	0.446	0.156			
Behavioural Intention	0.816	0.042	0.750	19.561	0.000**
R	0.750				
$_R2$	0.563				
F Value	382.642				
P Value	0.000				

Source: Primary Data

Note: ** Denotes significance at 1% level

Dependent Variable: Actual Usage

The above table depicts that 56% ($R^2 = 0.515$) of variance in Actual Usage is explained by Behavioural Intention and there is significant positive impact of Behavioural Intention on Actual Usage at 1% level of significance since $p < 0.01$.

Limitations of the Study

1. The study is done with young adult (age group 21-30) respondents from the city of Chennai. Therefore the findings may not be exactly applicable to the other age groups and other parts of the country because of cultural and social differences.
2. The study is subject to the limitations of questionnaire method of data collection.

Implications of the Study

The significant positive relationship between UTAUT factors with both Behavioural Intention and Actual Usage indicates that OFD service providers should focus on improving these factors to increase consumer adoption. Since Facilitating Conditions have the strongest influence on Behavioural Intention, service providers should concentrate on reliable app performance, easy navigation and better customer support to enhance users' intention to use OFD services. Performance Expectancy, Social Influence and Price Value have no significant impact on Behavioural Intention. Issues relating to the above have to be taken care by the service provider.

Scope for Future Study

Since this study focused on young adults and was limited to food delivery services, future research can apply this model to examine other online delivery services such as grocery, fruit, and vegetable delivery. Additionally, future studies may propose alternative models incorporating variables like trust and customer satisfaction to better understand actual OFD usage. Researchers may also explore different demographic groups and longitudinal data to examine changes in the OFD usage behaviour over time.

Conclusion

According to this study there is a significant positive relationship between factors of UTAUT (independent variable) and Behavioural Intention (mediating variable) and Actual Usage (dependant variable). Though all the factors of UTAUT, impact Behavioural Intention

and Actual Usage, Effort Expectancy plays the important role. Facilitating conditions with Behavioural Intention and Habit with Actual Usage have the highest correlation.

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Consumer Behaviour towards Green and Environmentally Friendly Products

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Abstract

The growing environmental challenges and increasing awareness about sustainable living have significantly influenced consumer preferences toward eco-friendly products. This study aims to explore the behaviour of consumers in adopting green products, examining factors such as environmental awareness, personal values, social influence, price sensitivity, and trust in eco-labels. The research highlights that while consumers generally show a positive attitude toward environmentally sustainable products, actual purchase behaviour is often affected by constraints like affordability, availability, and skepticism about green claims. Demographic factors such as age, education, and income also play a role in shaping eco-friendly buying patterns. Understanding these behavioural trends can help businesses and policymakers develop strategies to promote sustainable consumption effectively. The study concludes that enhancing awareness, credibility, and accessibility of eco-friendly products is key to encouraging a long-term shift toward sustainable consumer behaviour.

Keywords: *Eco-friendly Products, Environmental Awareness, Green Consumerism, Sustainable Consumption, Purchase Intention, Price Sensitivity, Brand Trust, Green Marketing, Social Influence, Government Policies and Regulations*

Introduction

In recent years, growing environmental concerns such as climate change, pollution, and depletion of natural resources have significantly influenced consumer attitudes and purchasing decisions. As awareness about sustainability increases, consumers are becoming more conscious

of the impact their consumption patterns have on the environment. This shift has led to a rising demand for eco-friendly products that are designed to minimize harm to nature and promote sustainable living.

Eco-friendly products are those that are manufactured, used, and disposed of in ways that reduce environmental damage. They often involve the use of biodegradable materials, energy-efficient processes, recyclable packaging, and reduced carbon emissions. Consumer behaviour towards such products is shaped by several factors, including environmental awareness, personal values, social influence, price sensitivity, and trust in green marketing claims.

Understanding consumer behaviour towards eco-friendly products is essential for businesses, policymakers, and marketers to promote sustainable consumption effectively. This study focuses on analyzing the awareness, attitudes, preferences, and buying behaviour of consumers towards eco-friendly products, highlighting the challenges and opportunities in encouraging environmentally responsible purchasing decisions.

Factors Influencing Consumer Behaviour Eco-Friendly PRODUCTS

1. Environmental Awareness and Knowledge

Consumers with higher environmental awareness are more likely to prefer eco-friendly products. Knowledge about environmental issues, eco-labels, and sustainability practices strengthens green purchase intentions.

2. Attitude and Personal Values

Positive attitudes towards environmental protection, altruism, and moral obligation strongly influence green buying behaviour. Values such as responsibility towards future generations play a crucial role.

3. Price Sensitivity

Although consumers express willingness to support green products, higher prices remain a major barrier. Scopus research highlights a gap between positive attitude and actual purchase behaviour due to cost considerations.

4. Product Quality and Performance

Consumers expect eco-friendly products to match or exceed conventional products in quality and performance. If green products are perceived as inferior, purchase intention declines despite environmental concern.

5. Social Influence and Subjective Norms

Family, peers, and social groups significantly affect eco-friendly purchasing decisions. Social approval and the desire to project a responsible image motivate consumers to choose green products.

6. Trust and Green Marketing Claims

Trust in eco-labels, certifications, and corporate environmental claims is critical. Scopus studies report that greenwashing reduces consumer confidence and negatively impacts green purchase behaviour.

Objectives of the Study

1. To examine the level of awareness among consumers regarding eco-friendly products.
2. To analyze consumers' attitudes and perceptions towards environmentally sustainable products.
3. To identify the factors influencing consumers' purchase decisions of eco-friendly products.
4. To study the role of environmental concern in shaping green buying behaviour.
5. To evaluate the impact of price, quality, and availability on the adoption of eco-friendly products.
6. To assess the influence of eco-labels and green marketing claims on consumer trust.
7. To explore the gap between consumers' intention to buy and their actual purchase behaviour of eco-friendly products.
8. To suggest measures for improving consumer acceptance and usage of eco-friendly products.

Statement of the Problem:

Environmental degradation and sustainability concerns have increased the availability of eco-friendly products in the market. Despite growing awareness about environmental protection,

the actual purchasing behaviour of consumers toward eco-friendly products remains inconsistent. Many consumers express positive attitudes toward green products but continue to prefer conventional alternatives due to factors such as higher prices, limited availability, lack of reliable information, and doubts about product effectiveness. In addition, insufficient trust in eco-labels and environmental claims creates confusion and reduces consumer confidence. Understanding how demographic, psychological, and social factors influence consumer decisions is essential for promoting sustainable consumption. Therefore, the problem lies in identifying the gap between consumers' environmental awareness and their actual buying behaviour toward eco-friendly products, which necessitates a detailed study of consumer behaviour in this area.

Limitations of Consumer Behaviour Towards Eco-Friendly Products

1. Higher Cost: Eco-friendly products are often priced higher than conventional products, which discourages price-sensitive consumers from purchasing them.
2. Limited Awareness: Many consumers lack proper knowledge about eco-friendly products and their long-term environmental benefits.
3. Availability Issues Green products are not easily available in all markets, especially in rural and semi-urban areas.
4. Lack of Trust Consumers are sometimes skeptical about environmental claims due to misleading advertisements and greenwashing practices.
5. Low Performance Perception Some consumers believe that eco-friendly products may not perform as effectively as regular products.
6. Habitual Buying Behaviour Consumers often stick to familiar brands and products, making it difficult to shift toward eco-friendly alternatives.
7. Insufficient Government Support Limited incentives, subsidies, or strict regulations reduce consumer motivation to choose sustainable products.
8. Social Influence Constraints Lack of encouragement from family, peers, or society can limit the adoption of eco-friendly products.

Review of Literature: Consumer Behaviour Towards Eco-Friendly Products

1. Previous studies highlight that increasing environmental awareness has a strong influence on consumers' preference for eco-friendly products. Consumers who are conscious about environmental issues tend to show a positive attitude toward sustainable purchasing.

2. Researchers have found that personal values and ethical responsibility play a significant role in shaping green consumer behaviour. Individuals who feel morally responsible for environmental protection are more likely to choose eco-friendly alternatives.

3. Several studies emphasize the impact of eco-labels and certifications on consumer trust. Clear and reliable environmental labels help consumers identify genuine green products and reduce skepticism related to misleading claims.

4. Price sensitivity has been identified as a major barrier in the adoption of eco-friendly products. Many consumers express willingness to buy green products but hesitate due to their higher cost compared to conventional products.

5. Literature suggests that product quality and performance significantly affect purchase decisions. Consumers are more inclined to buy eco-friendly products when they believe these products offer comparable or superior quality.

6. Social influence, including family, peers, and societal norms, has been shown to affect green purchasing behaviour. Positive social pressure encourages consumers to adopt environmentally responsible consumption practices.

7. Studies indicate that demographic factors such as age, education, and income influence eco-friendly purchasing behaviour. Higher education and income levels are often associated with greater acceptance of sustainable products.

8. Researchers observe a gap between consumers' positive environmental attitudes and their actual purchasing behaviour. This intention–behaviour gap remains a key challenge in promoting eco-friendly products.

9. Recent literature highlights the role of corporate environmental responsibility in shaping consumer perceptions. Companies that demonstrate genuine sustainability efforts tend to gain higher consumer trust and loyalty.

10. Overall, the literature concludes that while consumer awareness and positive attitudes toward eco-friendly products are increasing, practical factors such as affordability, availability, and trust must be addressed to improve actual purchase behaviour.

Research Methodology: Consumer Behaviour Towards Eco-Friendly Products

1. **Research Design**:

   The study adopts a **descriptive research design** to understand consumers' attitudes, preferences, and purchasing behaviour towards eco-friendly products.

2. **Nature of the Study**:

   The research is **quantitative in nature**, focusing on measurable variables such as awareness, perception, attitude, and buying intention.

3. **Area of the Study**:

   The study is conducted in a selected urban area to capture consumer responses in a competitive and environmentally conscious market environment.

4. **Population of the Study**:

   The population consists of consumers who are aware of or have experience in purchasing eco-friendly products.

5. **Sample Size**:

   A sample of **100–150 respondents** is selected to ensure adequate representation and reliability of the findings.

6. **Sampling Technique**:

   Convenience sampling method is used to collect data from readily available respondents due to time and accessibility constraints.

7. **Sources of Data**
   - **Primary Data**: Collected through a structured questionnaire.
   - **Secondary Data**: Obtained from journals, books, websites, and previous research studies.

8. **Research Instrument**: A **well-structured questionnaire** with close-ended questions and a five-point Likert scale is used to gather consumer opinions.

9. **Variables of the Study**
    - Independent Variables: Environmental awareness, price sensitivity, social influence, eco-labels.
    - Dependent Variable: Consumer purchasing behaviour towards eco-friendly products.

10. **Tools for Data Collection**: Questionnaires are distributed both **online and offline** to collect responses efficiently.

11. **Statistical Tools Used**: Data analysis is carried out using **percentage analysis, mean score analysis, and chi-square test**.

12. **Period of Study**: The data collection is carried out over a period of **one to two months**.

13. **Limitations of the Study**: The study is limited to a specific geographical area and a relatively small sample size, which may affect the generalization of results.

Conclusion: Consumer Behaviour Towards Eco-Friendly Products

- Consumers are becoming increasingly aware of environmental issues and show a positive attitude towards eco-friendly products.
- Environmental concern and personal responsibility strongly influence green purchasing behaviour.
- Many consumers are willing to support sustainable products, but high prices often discourage regular purchases.
- Limited availability and lack of clear information reduce consumer confidence in eco-friendly options.
- Trust in eco-labels and genuine environmental claims plays an important role in purchase decisions.

- Social influence, education, and income levels affect the acceptance of eco-friendly products.
- There exists a gap between consumers' intention to buy eco-friendly products and their actual buying behaviour.
- Improving awareness, affordability, and product accessibility can increase the adoption of eco-friendly products.
- Overall, consumer behaviour indicates a gradual shift towards sustainability, highlighting the need for stronger efforts from producers and policymakers.

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Consumer Power and Sustainable Choices: Market – Driven Environmental Change

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Abstract

Consumer power has become a key force in promoting sustainable development and shaping environmental governance in today's market systems. This paper examines how informed consumer choices impact corporate strategies, production processes, and environmental results. By prioritizing eco-friendly products, ethical sourcing, and responsible consumption, consumers play an active role in driving environmental change in the market. The study also looks at how consumer awareness, digital platforms, policy actions, and corporate accountability interact within the context of green capitalism, pointing out both the opportunities and limitations of consumer-led sustainability

***Keywords**: Consumer Power; Sustainable Consumption; Green Capitalism; Ethical Consumerism; Market-Driven Change; Environmental Sustainability; Corporate Responsibility; Climate Action*

Introduction

Environmental degradation, climate change, biodiversity loss, and unsustainable resource use are among the biggest global challenges of the twenty-first century. Rapid industrialization, urban growth, and consumer-driven economic expansion have put immense pressure on natural ecosystems. Traditionally, environmental protection was seen as the job of governments through regulation and companies through compliance and innovation. However, this view has changed significantly as more people recognize consumers as important agents of environmental change.

Consumer power means the collective influence individuals have through their purchasing decisions, consumption habits, and lifestyle choices. In a time marked by increased environmental awareness, easy access to information, and greater transparency, consumers are no longer passive players in the market. They actively assess products based on their environmental impact, ethical sourcing, labor practices, and corporate responsibility. This change has forced markets to respond by integrating sustainability into business strategies and product offerings.

In green capitalism, market mechanisms work to connect economic growth with environmental sustainability. When consumers demand sustainable products, it encourages companies to innovate, lower their environmental footprints, and adopt circular economy practices. Sustainability then becomes a competitive edge rather than just a regulatory requirement.

Despite its growing importance, consumer-driven environmental change faces challenges like green washing, high costs, and resistance to behaviour change, and unequal access to sustainable options. This paper looks at the basics of consumer power, its role in market-driven environmental change, corporate responses, policy support, and the limits of consumer-led sustainability within green capitalist systems.

Conceptual Framework: Consumer Power and Sustainable Consumption

Sustainable consumption is a basic principle of sustainable development, which focuses on meeting present needs without compromising future generations' ability to meet theirs. It emphasizes less resource use, minimal environmental impact, and social equity. In this context, consumer power acts as a demand-side influence capable of shaping production systems, market structures, and corporate behaviour.

Consumer power is based on classic economic theory, where demand influences supply. When consumers choose environmentally responsible products, businesses must respond by adopting sustainable production methods, redesigning supply chains, and investing in green innovation. Ethical consumerism reinforces this idea by incorporating moral and environmental factors into purchasing behaviour. Consumers increasingly evaluate products based on their life cycle, carbon emissions, labour standards, and sourcing transparency.

However, consumer power is not equally shared. Socio-economic factors like income, education, cultural values, and access to information heavily influence sustainable consumption behaviour. Wealthy consumers often have better access to eco-friendly options, while financially struggling groups may prioritize cost over sustainability. This uneven access raises concerns about fairness and inclusivity in consumer-led sustainability.

Sustainable consumption goes beyond buying decisions to include reducing consumption, reusing, repairing, and minimizing waste. Practices like purchasing second-hand items, choosing durable products, and cutting down on single-use plastics show how consumer power works outside of market transactions. Thus, consumer power includes both economic and behavioural aspects, making it a complex driver of environmental change.

Role of Consumers in Market-Driven Environmental Change

Consumers influence environmental results by shaping market demand and expressing preferences for sustainability. The rising demand for organic food, renewable energy, electric vehicles, and eco-friendly packaging shows how consumer choices can boost green industries. These demand pressures encourage companies to innovate and align their production systems with environmental goals.

Consumer activism further promotes market-driven environmental change. Through boycotts, petitions, social media campaigns, and advocacy efforts, consumers hold companies accountable for unsustainable practices. Digital platforms have significantly increased this influence by allowing quick spread of information and collective action. Public exposure of environmental misconduct can hurt a company's reputation, pushing them to make necessary changes.

Technological advancements have enhanced consumer influence through tools like eco-labels, sustainability ratings, product traceability systems, and carbon footprint calculators. These tools help reduce information gaps and enable informed choices. Digital transparency increases market accountability and supports the credibility of sustainable products.

However, consumer-driven change often remains small-scale rather than transformative. While individual actions are important, they may not lead to broader

environmental changes without collective engagement and institutional support. Nonetheless, consumers are key players in market-driven environmental change, impacting corporate strategies and reinforcing sustainability norms.

Corporate Response to Sustainable Consumer Demand

Companies increasingly see sustainability as a strategic need shaped by changing consumer expectations. As a result, many have integrated sustainability into governance, product design, and operations. Environmental, Social, and Governance (ESG) frameworks are now common tools for showing corporate accountability and transparency.

Product innovation aimed at sustainability has sped up across various sectors. Companies are investing in eco-friendly materials, energy-efficient technologies, and recyclable packaging to meet consumer demands. Circular economy practices, such as product take-back programs and reuse models, illustrate how companies respond to sustainability pressures.

Sustainable branding has become an important competitive strategy. Companies highlight their environmental credentials to stand out in crowded markets. However, this has also led to green washing, where environmental claims are exaggerated or misleading. Green washing damages consumer trust and weakens market-led sustainability.

To tackle this issue, third-party certifications, regulatory oversight, and transparent reporting are vital. Genuine corporate responses that connect sustainability commitments with measurable results boost consumer confidence and enhance the effectiveness of consumer power in driving environmental change.

Challenges to Consumer-Led Sustainability

Even with its potential, consumer-led sustainability faces several challenges. Affordability is a big obstacle, as sustainable products often have higher prices due to ethical sourcing and cleaner production methods. This makes it harder for low-income consumers to access these options.

Information overload complicates sustainable decision-making. The rise of eco-labels and environmental claims creates confusion, making it tough to tell genuine sustainability apart from green washing. Limited environmental knowledge makes this problem worse.

Behavioural factors like convenience, habits, brand loyalty, and time constraints can often overshadow environmental considerations. Even consumers who care about the environment might find it difficult to consistently engage in sustainable behaviours.

Additionally, focusing too much on individual responsibility diverts attention from systemic issues within production systems and policies. Therefore, consumer power needs to be supported by institutional reforms and corporate accountability.

Policy and Institutional Support for Sustainable Consumerism

Government policies and institutional frameworks are crucial for enabling consumer-driven sustainability. Regulatory measures like eco-label standards, sustainability disclosures, and product benchmarks improve transparency and help informed consumption.

Economic tools such as subsidies, tax incentives, and public procurement policies help lower costs and promote sustainable options. Education and awareness programs also boost sustainability literacy and encourage responsible consumption.

Extended Producer Responsibility (EPR) policies shift accountability for the entire product lifecycle to manufacturers, promoting sustainable design and waste management. Collaboration among governments, businesses, and civil society creates a supportive environment for sustainable consumerism.

Discussion: Consumer Power within Green Capitalism

Green capitalism aims to align market incentives with environmental goals. Consumer power acts as a driving force within this framework by boosting demand for sustainable products and encouraging corporate innovation.

While consumer influence shows that sustainability can be economically viable, market mechanisms alone cannot solve complex environmental problems. Issues like unequal access, green washing, and structural barriers limit their effectiveness.

A combined approach that integrates consumer demand, regulatory governance, and corporate responsibility is essential to ensure that green capitalism delivers real environmental benefits.

Conclusion

Consumer power has emerged as a significant driver of market-driven environmental change. Through informed choices, ethical consumption, and activism, consumers shape corporate behaviour and sustainability outcomes. However, consumer-led change faces economic, informational, and behavioural barriers.

To maximize its impact, consumer power needs strong policy frameworks, institutional accountability, and transparent markets. When incorporated into a larger sustainability ecosystem, consumer power can significantly promote long-term environmental resilience and sustainable development.

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Sustainable Brand Storytelling in the Digital Age: Measuring Emotional Resonance and Consumer Loyalty

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Abstract

Sustainable brand storytelling has gained importance in digital environments as audiences seek meaningful and ethically grounded communication. The present study examines how sustainable narratives shape emotional resonance and strengthen consumer loyalty through a structured behavioural pathway. A concept ual model named the GREEN-STORY LOOP (GSL) Framework is proposed to explain this process. The framework integrates five core constructs: Story Attention, Ethical Engagement, Emotional Desire for Sustainability, Brand Equity Reinforcement, and Loyalty Loop Activation. Each construct represents a stage in the storytelling–emotion–loyalty cycle, and the model describes how digital narratives move audiences from initial exposure to repeated commitment. The framework highlights the significance of ethical cues and emotional pathways in building long-term loyalty for sustainability-oriented brands. Findings from the conceptual analysis indicate that emotional desire acts as a key driver of brand equity reinforcement, while sustained engagement strengthens the loyalty loop. The proposed framework is expected to support researchers and practitioners in understanding how digital storytelling can be designed to influence consumer attitudes and encourage responsible brand relationships. The study contributes to sustainability marketing literature by offering an integrated, loop-based perspective on narrative influence in digital contexts

***Keywords**: Brand Equity, Consumer Loyalty, Digital Storytelling, Emotional Resonance, Ethical Engagement, Narrative Design, Sustainability Communication, Sustainable Branding*

1. Introduction

Brands increasingly use storytelling to express their environmental and social values. This shift is driven by changing consumer expectations and the growing demand for transparent communication. Recent work shows that stories that link sustainability values with brand identity can enhance trust and encourage responsible consumption [1]. Storytelling has also evolved into a strategic communication tool, shaping perceptions and helping consumers interpret brand meaning in a more personal way [2]. As digital environments become more visual and interactive, narrative formats continue to influence how consumers connect with sustainable brands [3]. These developments position sustainable storytelling as a core element of modern marketing.

Digital platforms allow brands to communicate sustainability messages quickly and creatively. Social media tools, interactive visuals, and short-form video platforms have become essential for building emotional engagement with audiences [4]. Past research highlights that digital storytelling has transformed marketing by enabling immersive and user-driven narrative experiences [5]. Studies also show that brand stories shared online have increased reach and emotional impact, shaping consumer behaviour in new ways [6]. This digital shift provides brands with opportunities to reinforce sustainable identities and influence consumer attitudes at scale.

1.1. Problem Statement and Research Motivation

Despite the rising use of digital storytelling for sustainability communication, many brands struggle to understand how narratives translate into emotional responses and long-term loyalty. While research confirms that sustainability-oriented stories improve consumer perceptions [1][4], there is limited empirical evidence on how different stages of story engagement influence loyalty behaviour. Furthermore, consumers today face information overload, making it harder for sustainability messages to stand out. This gap creates the need for a structured model that explains how attention, ethical engagement, emotional desire, and brand equity jointly drive loyalty in digital contexts.

1.2. Significance of the GREEN-STORY LOOP (GSL) Framework

The GREEN-STORY LOOP Framework addresses the need for an integrated model that connects attention, engagement, emotional desire, and loyalty in sustainability storytelling. Existing work explains elements of narrative influence, such as ethical communication [7],

sustainable values [1], and consumer loyalty [8]. However, there is limited research combining these constructs into a loop-based behavioural model. The GSL Framework provides a structured pathway for understanding how consumers move from initial story exposure to deeper loyalty. This study aims to empirically support this framework and demonstrate its value for sustainable digital marketing.

2. Review of Literature

Storytelling has shifted from traditional brand communication to interactive digital forms. Prior research discusses the transformation of storytelling as marketers adopt more creative, immersive techniques [5]. Visual narratives on social media help audiences experience a sense of presence and connection with the brand [3]. Recent bibliometric studies note a growing interest in storytelling as a central tool in digital consumer behaviour research [6]. As a result, storytelling is now viewed as an important element in capturing attention and shaping consumer attitudes online.

Sustainable branding relies on consistent ethical communication and responsible marketing practices. Studies highlight that ethical branding efforts help firms strengthen long-term relationships with consumers [7]. Research also emphasises that sustainability narratives promote clearer understanding of brand values and improve consumer response to green messages [8]. Using sustainability commitments as part of the narrative strategy helps brands position themselves as socially responsible and trustworthy in the competitive digital marketplace [9][10].

Emotional storytelling plays an important role in influencing how audiences perceive sustainability messages. Research shows that emotional narratives on digital platforms increase engagement and shape decision-making [11]. Visual stories, particularly on platforms like Instagram, encourage stronger emotional connection through sensory immersion [3]. Another stream of work highlights that engaging content design and narrative flow can amplify emotional impact and improve message receptiveness [12]. These findings suggest that emotional resonance is a key driver of consumer interaction with sustainable brand stories.

Sustainability-related communication has been linked to higher levels of consumer loyalty. Studies find that responsible business practices increase loyalty by enhancing perceived brand credibility [9]. Ethical marketing approaches also strengthen brand relationships and long-term commitment [7]. Sustainable stories that align with consumer

values increase trust, which ultimately contributes to repeated engagement and loyalty behaviours [1][8]. These insights indicate that sustainability narratives do more than create awareness— they influence behavioural outcomes.

3. Proposed GREEN-STORY LOOP (GSL) Framework

The GREEN-STORY LOOP (GSL) Framework has been developed to explain how sustainable brand storytelling in the digital environment influences emotional resonance and long-term consumer loyalty. The framework presents a structured flow of narrative engagement from the moment a story captures attention to the point where loyalty becomes reinforced. The model has been designed to reflect real behavioural patterns observed in digital marketing contexts, where consumers interact with brand stories repeatedly across multiple touchpoints. Each construct in the framework contributes to a continuous loop of engagement, emotion, and reinforcement.

The GSL Framework positions sustainable storytelling as a catalyst for emotional and behavioural shifts. Digital media exposes audiences to a growing number of sustainability messages. Because of this, the ability of a story to capture attention and stimulate ethical reflection becomes essential. The framework assumes that emotional desire for sustainability grows when consumers engage with credible, ethically aligned stories. This emotional bond then strengthens brand equity, which eventually leads to loyalty loop activation. The loop continues when engaged consumers revisit or share the story, leading to repeated interactions.

3.1. Core Components of the Framework

The GREEN-STORY LOOP model is organised into five core components. These constructs work together to explain how digital sustainability stories influence emotional processing and consumer loyalty. Each component is defined below.

3.1.1. Story Attention (SA)

Story Attention refers to the initial focus generated by a sustainable brand narrative. The digital environment presents consumers with numerous messages, making attention a scarce resource. Story Attention is triggered when narrative elements such as visuals, headlines, emotional appeals, or story hooks stand out. Sustainable stories that use meaningful imagery or relatable situations are able to capture attention effectively.

In the GSL model, Story Attention acts as the entry point of the loop. No emotional or behavioural response can be developed without attention. When consumers notice a sustainability-based story, cognitive channels open for further processing. High Story Attention increases the likelihood that the audience will continue engaging with the narrative.

3.1.2. Ethical Engagement (EE)

Ethical Engagement describes the level of involvement developed when a consumer recognises moral or ethical dimensions within the story. Sustainable narratives often highlight themes such as environmental protection, fair labour, responsible sourcing, or community well-being. These themes activate ethical thinking.

Ethical Engagement grows when consumers perceive the story as authentic and aligned with their values. A sense of moral connection is formed, which deepens the interaction with the narrative. Ethical Engagement is positioned in the model as a mediating construct, linking attention to emotional desire. It reflects the shift from passive viewing to reflective involvement.

3.1.3. Emotional Desire for Sustainability (EDS)

Emotional Desire for Sustainability captures the inner emotional pull that develops when consumers feel personally inspired or motivated by a sustainability-driven story. This desire may include feelings of admiration, hope, responsibility, or identity alignment.

This construct represents emotional resonance. When stories evoke strong emotions, consumers often develop a desire to support sustainable behaviours or align with brands that embody positive values. Emotional Desire also influences future behaviour, as emotionally connected consumers tend to favour sustainable brands over competing options.

3.1.4. Brand Equity Reinforcement (BER)

Brand Equity Reinforcement represents the strengthening of positive brand associations as a result of emotional desire. When consumers experience emotional resonance, their perception of the brand becomes more favourable. Sustainable stories enhance perceived credibility, trustworthiness, and value.

BER ensures that emotional desire is translated into brand meaning. Once brand equity is reinforced, consumers are more likely to recall the brand, endorse it, or advocate for its efforts. Brand equity serves as the foundation for loyalty in the GSL loop. Sustainable storytelling contributes to this reinforcement by consistently aligning values and behaviours.

3.1.5. Loyalty Loop Activation (LLA)

Loyalty Loop Activation is the final output of the GSL Framework. This phase represents the behavioural response generated after reinforced brand equity. Loyalty may appear in several forms, including repeated engagement, purchase intentions, story sharing, or positive word-of-mouth.

LLA indicates that the consumer has entered a loop where emotional and cognitive factors support ongoing commitment. Because the loop activates repeatedly, loyalty becomes stronger over time. Digital storytelling encourages this cyclical behaviour by offering continuous content updates, interactive features, and emotionally charged narratives.

3.2. Interrelationships Among Framework Constructs

The GSL Framework follows a connected flow of behavioural progression. Each construct influences the next in a predictable sequence.

- Story Attention initiates the loop. When attention is secured, deeper engagement becomes possible.
- Ethical Engagement grows when consumers recognise moral signals in the story. This connection strengthens the impact of the narrative.
- Emotional Desire for Sustainability emerges as consumers internalise the ethical elements of the story. The emotional bond becomes reinforced through repeated exposure.
- Brand Equity Reinforcement occurs when emotional desire strengthens trust and positive brand associations.
- Loyalty Loop Activation is triggered when reinforced brand equity creates a stable behavioural pattern.

The model is cyclical. Consumers who reach the loyalty stage often return to the first stage when they encounter additional brand stories. Their previous exposure increases future attention and engagement. The loop structure reflects the repetitive and dynamic nature of digital storytelling interactions.

The interrelationships among constructs highlight the importance of consistent storytelling. If any component is weak, the loop becomes fragile. Strong emotional desire cannot develop without engagement, and loyalty cannot be sustained without reinforced brand equity. The framework also emphasises the role of ethical communication, which links attention to emotional outcomes.

3.3. Conceptual Model Representation

The conceptual model of the GSL Framework is expressed as a sequential loop in which inputs flow from one construct to another. A clear block-based representation is provided in Fig 1:

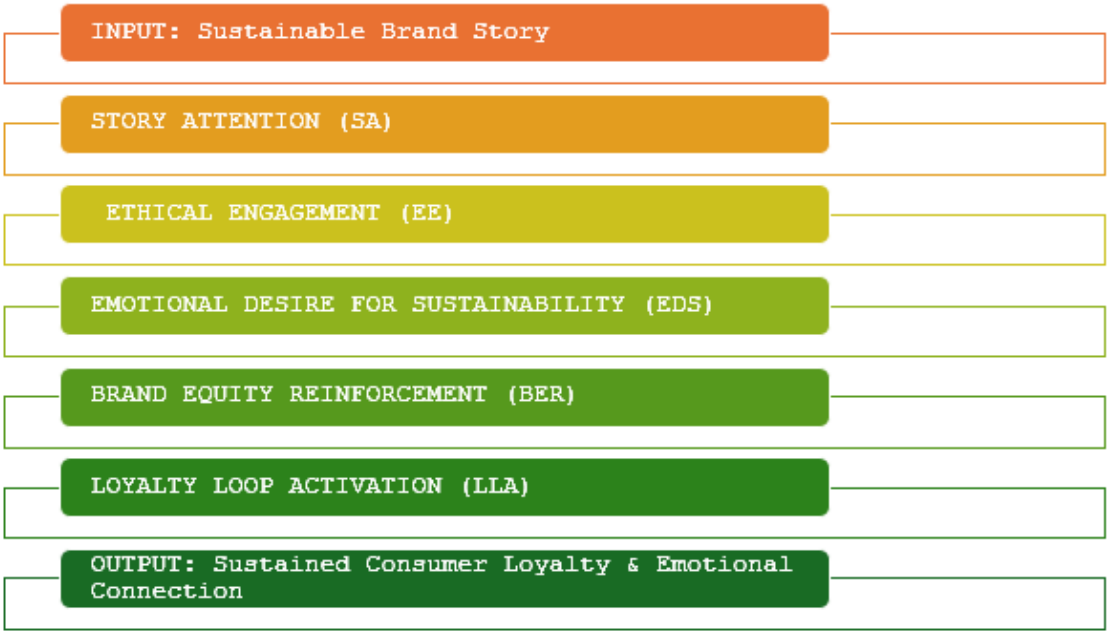

Fig 1: The Conceptual Model of the GSL Framework

4. Discussion

The discussion section interprets the GSL Framework within the broader context of digital sustainability storytelling. The insights reflect behavioural pathways influenced by emotional, ethical, and cognitive drivers.

The GSL Framework contributes to storytelling theory by presenting a cyclic explanation of narrative influence. Most existing models describe linear transitions, but the loop in the GSL structure reflects repeated exposure to digital content. The framework also

connects sustainability values with emotional pathways, which expands the understanding of persuasive storytelling. The inclusion of ethical engagement as a core construct offers a stronger theoretical link between moral judgement and brand loyalty.

4.1. Understanding Consumer Emotion Pathways in Digital Sustainability Stories

Digital sustainability stories often rely on emotional cues. The GSL framework clarifies how these cues progress from attention to emotional desire. Emotional resonance plays a major role in how audiences respond to sustainable content. The framework demonstrates that emotional responses rarely appear in isolation. They arise from an earlier stage of ethical engagement. This layered structure helps explain why some stories create strong attachment while others do not.

4.2. Implications for Strengthening Brand Equity through Ethical Narratives

Ethical narratives appear to strengthen brand equity more effectively when emotional desire is triggered. Stories that portray transparency, fairness, or responsible sourcing help build trust. The discussion highlights that brand equity is not simply shaped by message quality. It is strengthened by the emotional state that emerges from ethical engagement. Emotional desire acts as a bridge that converts moral appreciation into brand-based evaluations.

4.3. How Loyalty Loop Activation Enhances Long-Term Consumer Commitment

Loyalty Loop Activation represents a cyclical pattern where audiences return to the brand's sustainability stories. This loop is significant because it illustrates how commitment evolves through repeated exposure. Consumers who revisit stories tend to deepen their emotional connection. Long-term loyalty becomes more stable because the loop encourages ongoing reinforcement. The model also suggests that loyalty can become self-sustaining once the loop is activated.

4.4. Comparison with Existing Studies and Conceptual Models

The GSL Framework aligns with narrative engagement theories but extends them by adding ethical and sustainability-specific constructs. Traditional models focus heavily on cognitive processing, while the GSL model integrates emotional and moral drivers. Compared with customer-based brand equity models, the GSL loop offers a dynamic explanation rather than a static evaluation. It also complements moral identity theories by demonstrating how ethical cues influence consumer emotions and loyalty.

5. Managerial Implications

The GSL Framework provides practical insights for organisations using sustainability-based storytelling. The implications outlined in Fig 2 offer guidance for marketing professionals and brand strategists.

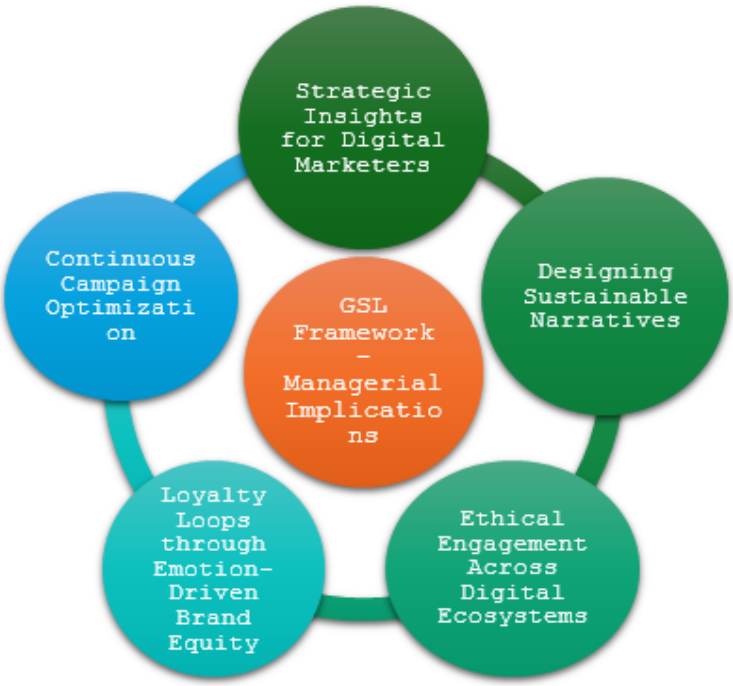

Fig 2: GSL Framework - Managerial Implications

Digital marketers may use the GSL model to plan content that progresses through each narrative stage. Story elements that trigger attention must be supported by ethical depth. Strategies that reflect authenticity tend to maintain higher engagement. The GSL structure can guide the development of campaigns that move audiences from awareness to loyalty. Attention is the entry point of the loop. Brands may prioritise clear visuals, emotional scenes, or strong story openings. Sustainable themes should be placed early in the content to strengthen initial perception. Content that helps audiences identify real-world relevance often generates higher attention in digital environments. Ethical engagement increases when audiences recognise moral meaning. This can be encouraged through transparent communication, responsible sourcing information, or demonstrations of social impact. Digital ecosystems offer opportunities for interactive elements that reinforce ethical cues. Consistent communication across platforms also supports this engagement. Emotion-driven brand equity is strengthened when stories remain consistent over time. Brands may focus on continuity and clarity in messaging. Emotional resonance should be encouraged through relatable characters, real

experiences, and positive environmental actions. A strong emotional base helps activate the loyalty loop more effectively. Digital analytics can help measure attention, emotional reactions, and engagement. These metrics allow adjustments in real time. Story components that perform well may be highlighted, while weak components may be redesigned. Insights gained from analytics can support the development of future campaigns that align with the GSL stages.

6. Conclusion

The conclusion summarises the key outcomes of the study and highlights the contributions of the GSL Framework. The GSL Framework demonstrates how sustainable brand storytelling moves through attention, ethical engagement, emotional desire, brand equity reinforcement, and loyalty loop activation. The model explains how emotional and ethical factors contribute to long-term brand loyalty in digital platforms. The framework highlights the importance of sustained storytelling and repeated exposure. The study adds theoretical value by introducing a loop-based model for sustainability storytelling. The model integrates ethical and emotional elements that are often treated separately in existing literature. For practitioners, the GSL framework offers a clear guide for structuring sustainable narratives that influence consumer behaviour.

The framework is conceptual and may require empirical testing across diverse consumer groups. Digital story formats vary widely, and narrative impact may differ across platforms. Cultural and demographic factors may also influence emotional responses to sustainability narratives. Future studies may explore the GSL model through quantitative or mixed-method research. Cross-cultural comparisons may offer deeper insight into ethical engagement. Platform-specific storytelling strategies can also be examined. Additional constructs such as message credibility or visual immersion may be included in future extensions of the model.

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Impact of Boutique Owner Endorsement on Consumer Purchase Behaviour in the Women's Apparel Segment

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Abstract

Boutique retailing in the women's apparel segment has increasingly adopted owner-led promotion as a strategic tool to influence consumer decision-making. Boutique owner endorsement, where the owner actively promotes and stands behind the products, plays a critical role in shaping consumer perceptions and purchase behaviour. This study examines the influence of boutique owner endorsement on consumer purchase behaviour in the women's apparel segment in Chennai city, with specific emphasis on consumer trust and demographic differences. A descriptive research design was employed, and primary data were collected from consumers of selected women's apparel boutiques using a structured questionnaire. Statistical tools such as simple linear regression were used to assess the influence of boutique owner endorsement on purchase behaviour and consumer trust, while the Chi-Square test was applied to examine the association between owner endorsement and purchase behaviour. Differences across demographic groups were analysed using t-test and one-way ANOVA. The findings reveal that boutique owner endorsement has a significant influence on consumer purchase behaviour and positively affects consumer trust. The results also indicate a significant association between owner endorsement and purchase behaviour, along with notable differences across demographic groups. The study highlights the importance of owner credibility, visibility, and personal assurance in enhancing consumer confidence and driving purchase decisions in women's apparel boutiques. The findings offer practical insights for boutique owners and marketers to effectively leverage owner endorsement strategies to strengthen customer relationships and improve sales performance.

Keywords: *Owner Endorsement, Consumer Purchase Behaviour, Women's Apparel, Consumer Trust, Retail Marketing*

Introduction

The women's apparel segment has witnessed significant transformation in recent years due to changing consumer lifestyles, rising fashion consciousness, and the growing prominence of boutique retailing. Unlike mass apparel retailers, boutiques operate on personalization, close customer relationships, and trust-driven interactions. In this context, the role of the boutique owner has evolved beyond managerial functions to that of a key brand representative whose personal endorsement can influence consumer perceptions and purchase decisions.

Owner endorsement refers to situations where the business owner actively promotes, recommends, or stands behind the products offered. Prior studies in marketing and consumer behaviour suggest that endorsement credibility plays a vital role in shaping consumer attitudes and behavioural intentions (Erdogan, 1999). While celebrity endorsements have been widely examined, recent research highlights the increasing effectiveness of owner or founder endorsement, particularly in small and medium-sized retail businesses where personal assurance and authenticity matter more than fame (Moulard, Garrity, & Rice, 2015).

Trust has been identified as a critical factor in reducing perceived risk and enhancing purchase confidence, especially in experiential products such as apparel (Gefen, 2000). In boutique settings, consumers often rely on the owner's expertise, honesty, and reputation while making purchase decisions. Studies have shown that owner involvement positively influences brand credibility and consumer loyalty in retail environments (Bruhn, Schoenmueller, & Schäfer, 2012). Additionally, demographic characteristics such as age, income, and education have been found to moderate consumer responses to endorsement strategies (Schiffman & Wisenblit, 2019).

Despite the growing relevance of boutique owner endorsement, limited empirical research has focused specifically on its influence within the women's apparel segment. Addressing this gap, the present study examines the influence of boutique owner endorsement on consumer purchase behaviour, with particular emphasis on trust and demographic differences, thereby contributing to both academic literature and retail practice.

Literature Review

Recent studies in the field of digital marketing and consumer behaviour highlight the increasing significance of social media influencer strategies in shaping consumer purchase decisions. A systematic literature review by Bhardwaj et al. (2024) demonstrates that

influencer-related characteristics such as credibility, engagement, and perceived authenticity play a crucial role in influencing consumer attitudes and purchase intentions across various industries.

Research focusing specifically on the fashion industry indicates that visually driven platforms such as Instagram and TikTok facilitate interactive consumer experiences that significantly affect apparel purchase behaviour, thereby reinforcing the influence of digital content on fashion consumption patterns (Kumar et al., 2023). Further, review-based studies adopting structured frameworks such as ADO–TCM emphasize that trust, authenticity, and content quality are key determinants of influencer marketing effectiveness in driving consumer decision-making (Sokolova & Kefi, 2024).

Consistent with these findings, prior reviews and meta-analytic studies report that social media influencers positively shape consumers' behavioural intentions, including purchase intention and brand engagement (Lou et al., 2023). Additionally, research examining hedonic and impulsive buying behaviour reveals that social media communications accelerate trend adoption and stimulate impulse purchases among fashion consumers, particularly within younger demographic groups (Djafarova & Bowes, 2022).

Research Gap

Previous research in digital marketing has predominantly examined celebrity and social media influencer endorsements in the fashion and apparel industry, with limited empirical focus on boutique owner endorsement in retail settings. Existing studies largely emphasize purchase intention rather than actual consumer purchase behaviour, and offer limited evidence on the association between owner endorsement and buying behaviour. Moreover, the role of demographic factors in shaping consumer responses to owner endorsement remains underexplored. Addressing these gaps, the present study examines the influence of boutique owner endorsement on consumer purchase behaviour, its association with buying behaviour, and demographic differences in the women's apparel segment in Chennai city.

Objectives

- To examine the influence of boutique owner endorsement on consumer purchase behaviour in the women's apparel segment.
- To examine the association between boutique owner endorsement and consumer purchase behaviour in the women's apparel segment.

- To examine differences in the influence of boutique owner endorsement on consumer purchase behaviour across demographic factors.

Hypotheses

H_1: Boutique owner endorsement has a significant influence on consumer purchase behaviour in the women's apparel segment.

H_2: There is a significant association between boutique owner endorsement and consumer purchase behaviour in the women's apparel segment.

H_3: There is a significant difference in the influence of boutique owner endorsement on consumer purchase behaviour across demographic groups.

Research Methodology

The present study adopts a descriptive and empirical research design to examine the influence of boutique owner endorsement on consumer purchase behaviour in the women's apparel segment. Primary data were collected using a structured questionnaire administered to consumers purchasing women's apparel from selected boutiques. The questionnaire consisted of two sections: demographic information and statements measuring boutique owner endorsement and consumer purchase behaviour, measured using a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree".

A convenience sampling technique was employed to select respondents due to accessibility and time constraints. A total of 120 valid responses were collected and used for analysis. The study area was confined to urban boutique retail settings, ensuring relevance to the women's apparel segment. The collected data were coded and analysed using SPSS. Composite scores were created for boutique owner endorsement and consumer purchase behaviour. To test the hypotheses, simple linear regression was used to examine the influence of boutique owner endorsement on consumer purchase behaviour. The Chi-square test was applied to assess the association between owner endorsement and purchase behaviour. Further, independent samples t-test and one-way ANOVA were employed to examine differences in purchase behaviour across demographic variables such as gender, age, education, occupation, family income, and purchase frequency.

H_1: Linear Regression Analysis

H_1: Boutique owner endorsement has a significant influence on consumer purchase behaviour in the women's apparel segment.

Table 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.604	0.365	0.359	0.521

Table 2

ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	18.41	1	18.41	67.72	.000
Residual	32.01	118	0.27		
Total	50.42	119			

Table 3

Coefficients

Model	Unstandardized B	Std. Error	Standardized Beta	T	Sig.
(Constant)	1.214	0.189	—	6.42	.000
Boutique Owner Endorsement	0.563	0.068	0.604	8.23	.000

The regression results indicate that boutique owner endorsement has a significant and positive influence on consumer purchase behaviour in the women's apparel segment, as the model is statistically significant ($p < 0.05$). This suggests that higher levels of owner endorsement lead to increased consumer purchase behaviour.

H_2: Chi-Square Test of Association

H_2: There is a significant association between boutique owner endorsement and consumer purchase behaviour in the women's apparel segment.

Table 4

Chi-Square Tests

Test	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.47	4	.001
Likelihood Ratio	17.92	4	.001
N of Valid Cases	120		

The Chi-square test reveals a significant association between boutique owner endorsement and consumer purchase behaviour ($p < 0.05$), indicating that variations in owner endorsement levels are associated with corresponding differences in purchase behaviour.

H_3: Demographic Differences (t-test & ANOVA)

H_3: There is a significant difference in the influence of boutique owner endorsement on consumer purchase behaviour across demographic groups.

Table 5

Demographic Differences in Consumer Purchase Behaviour

Demographic Variable	Test Used	Test Statistic	Sig.	Decision
Gender	Independent t-test	t = 1.157	.250	Not Significant
Age	One-way ANOVA	F = 0.541	.706	Not Significant
Educational Qualification	One-way ANOVA	F = 1.297	.279	Not Significant
Occupation	One-way ANOVA	F = 1.123	.343	Not Significant
Family Monthly Income	One-way ANOVA	F = 5.393	.002	Significant
Purchase Frequency	One-way ANOVA	F = 1.626	.201	Not Significant

The demographic analysis shows no significant difference in the influence of boutique owner endorsement on consumer purchase behaviour across most demographic variables.

However, a significant difference is observed with respect to family monthly income, indicating that income level influences consumer responses to owner endorsement.

Results & Discussion

The results indicate that boutique owner endorsement has a significant influence on consumer purchase behaviour in the women's apparel segment, highlighting the importance of owner visibility, credibility, and personal assurance in boutique retailing. This finding supports existing endorsement literature that emphasizes trust and credibility as key drivers of consumer buying decisions. The Chi-square analysis further confirms a significant association between boutique owner endorsement and consumer purchase behaviour, suggesting that higher levels of owner endorsement are linked to increased purchasing activity. Demographic analysis reveals that family monthly income significantly influences consumer purchase behaviour**,** while gender, age, education, occupation, and purchase frequency do not show significant differences. This suggests that the impact of boutique owner endorsement is largely consistent across consumer groups, except where income determines spending capacity.

Conclusion

The study concludes that boutique owner endorsement plays a significant role in influencing consumer purchase behaviour in the women's apparel segment. The findings underscore the importance of owner credibility and personal involvement as effective trust-building mechanisms in boutique retailing.

While most demographic variables do not significantly affect consumer responses to owner endorsement, family monthly income emerges as a key differentiating factor**,** indicating its influence on discretionary apparel purchases. Overall, the study contributes to consumer behaviour literature by extending endorsement research to boutique owner-led contexts and offers practical insights for boutique owners to leverage personal endorsement strategies to enhance consumer engagement and sales performance

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Delving into Servqual Gaps in FDA: A Study on Exploring the Triangular Constraints

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Abstract

Any industry who is into customer service has to look after its quality to ensure customer retention and attracting further new customers. Service quality is the most important aspect every industry needs to look up. Service quality is shortly known as SERVQUAL. Gaps in the services are found using the SERVQUAL GAP analysis model. Here the gaps would define the difference between what the customers who order food through food delivery apps expect and what the food delivery app management promises to deliver. Customer expectations would vary from one person to another but what the management offers to the customers as policy standards, advertisements shown and finally what the customer actually gets as service would be common to all. So when a gap arises in such matters, the management has to look deep into those aspects and figure out areas where they can improve their service to raise the quality. Under Service quality, 5 gaps exist. They are: Knowledge Gap, Policy Gap, Delivery Gap, Communication Gap and Perception Gap out of which Delivery Gap, Communication Gap and Perception Gap are being explored in this study. Mean ranking was used to analyse the data collected from the customers

***Keywords**: Service Quality, SERVQUAL Gap, Food Delivery Apps, Customer expectations, Management Perceptions*

Introduction

Food has always been a basic need of the living community and in this fast moving world, food delivery apps have entered into almost all households. People can order various food items from various restaurants according to their requirements and can use the cooking

time for some other work or even take a break. Though these apps are very useful to the customers, there are several areas where a gap exists between the needs and expectations of the customers and what they actually receive. This gap is called the SERVQUAL GAP - The gaps that exist due to the differences between the expectation of the customers and their perceptions in the services provided. The management needs to find out the gaps, analyze the reasons for the same and must come out with optimal solutions to bridge these gaps. This paper analyzes 3 gaps namely delivery gap, communication gap & perception gap.

- DELIVERY GAP states the differences between - What the management offers to deliver to the customers as its policy standards and what a customer actually receives.
- COMMUNICATION GAP states the differences between – The management's promises through promotions and whether the customers receive it or not.
- PERCEPTION GAP states the differences between – The expectations of the customers and what they actually get.

Objectives

1. To analyze the demographic profile of the respondents.
2. To uncover the gap between the expectations of the customers versus what the management policies state, promises made & what actually a customer receives and to rank the variables based on its mean score.

Research Methodology

- Number of respondents: 50
- Data collection: Questionnaire
- Area of study : Chennai city, Tamil Nadu
- Statistical tools used : % analysis, Fried man ranking, mean
- Statistical package that are used : MS – EXCEL , SPSS version 22

Limitations of the Study

This study had limitations in several areas like:

- ❖ Respondents size & Locality
- ❖ Usage of tools
- ❖ Study was based only on 3 gaps excluding knowledge and policy gap

Review of Literature

Sahar Siami and Mohammadbagher Gorji (2012) studied on the topic "The measurement of service quality by using SERVQUAL and quality gap model". The study states that the customers are expecting better service quality in all 5 dimensions but their perceived service was less when compared to their expectations. Only 1 among the 5 gaps have a positive gap. This clearly states that a gap exists between the expectations and perceptions of the customers in the insurance industry. Assurance and reliability were the top most dimensions and empathy was stated as the last one. These 2 factors clearly have an impact on the satisfaction of customers in the insurance industry

Aravinda Kumar K S, Cherian S Cherian, Dr. Trinley Paldon (2021) studied on "Gap study towards service quality in QSR Restaurants using SERVQUAL model". The Bangalore respondents say their perceptions are not being met with their expectations. A huge gap exists between the two. Among the 5 dimensions of service quality, empathy has the least negative gap and other dimensions have a huge negative gap. This clearly shows that in all 5 aspects the restaurants have to bridge the apps for further development.

Chatwadee Tansakul and Jirachai Buddhakulsomsiri, Thananya Wasusri, Papusson Chaiwat and Taweesak Kritjaroen (2013) studied on the topic " A GAP ANALYSIS IN SERVICE QUALITY OF THAI LOGISTICS SERVICE PROVIDERS". In this study the respondents says that Tangibility and reliability aspects of the dimensions alone have a positive gap and the other 3 aspects have a negative gap which clearly shows that the perception of the customers does not meet their expectations and it has to be improvised at the maximum best level so that the logistics service providers can meet its customers expectations.

Analysis

- **Percentage Analysis**

Factors		**Frequency**	**%**
Age (In years)	Less Than 20	4	8
	21-30	**33**	**66**
	31-40	2	4
	41-50	5	10
	50 & ABOVE	6	12

Factors		Frequency	%
Gender	Male	12	24
	Female	**38**	**76**
Locality	**Urban**	**41**	**82**
	Rural	9	18
Occupation	**Salaried**	**29**	**58**
	Self employed	2	4
	Unemployed	2	4
	Student	12	24
	Retired	1	2
	Homemaker	4	8
Family Monthly Income (in Rs.)	Less Than 10,000	5	10
	10,000-25,000	6	12
	25,000-50,000	15	30
	50 & ABOVE	**24**	**48**
Family Type	**Staying with FAMILY**	**44**	**88**
	Staying ALONE	6	12
Marital Status	**Single**	**31**	**62**
	Married	19	38

Source: primary data

- **Gap Analysis: Mean difference & Mean Ranking**

VARIABLE	CUSTOMER EXPECTATION	CUSTOMER PERCEPTION	MEAN DIFF	EXP Rank	PER Rank
WHAT THE FDA MANAGEMENT SETS AS THEIR SERVICE POLICIES					
Proper Packaging before the food leaves from the hotel	4.72	4.64	**-.08**	**6.36**	**6.26**

Delivery Personnel in their proper attire	4.10	4.36	**-.26**	4.64	5.59.
Quick & Proper Resolutions	4.38	4.30	**-.08**	5.46	5.34
WHAT THE FDA MANAGEMENT PROMISES THROUGH ADS					
More Offers & Discounts	3.92	4.22	**.30**	**4.21**	5.17
Quick & Fast Delivery	4.22	3.92	**-.30**	4.68	4.53
Subscription plans to cut down delivery charges	4.22	3.92	**-.30**	5.15	4.32
WHAT ACTUALLY A CUSTOMER REAPS AS SERVICE					
Human customer support instead of AI support	4.06	3.74	**-.32**	4.89	**3.97**
Providing Cutleries whenever required and asked	4.18	4.12	**-.06**	4.87	5.06
Minimum Phone Calls by the personnel to the customer	4.24	4.12	**-.12**	4.74	4.76

Source: Primary data

Findings

- **DELIVERY GAP** – a **NEGATIVE GAP** as customer's perception is **LESS** when compared to their expectations in all 3 aspects like Packaging of food, Delivery personnel's attire and Quick & Proper Resolutions.

- **COMMUNICATION GAP** – in 1 aspect there is a **POSITIVE GAP** – Customer's perception **exceeds** their expectation when the offers & discounts provided by the FDA is more and the other 2 aspects shows a **NEGATIVE GAP** – Customers aren't satisfied with the Quick & Fast delivery options (BOLT, EXPRESS by SWIGGY etc…) provided by the FDA along with making Subscriptions to avoid Delivery Charges.

- **PERCEPTION GAP –** Here also a **NEGATIVE GAP** exists. In all 3 aspects like human customer care executive instead of AI, Providing Cutleries whenever needed & required, Minimum phone calls from the delivery personnel's, customer's expectations **doesn't meet** when they receive the service from the FDA.

- **CUSTOMER'S EXPECTATIONS** –Proper Packaging of food has **higher mean ranking** (6.36) & More offers & Discounts have **low rank** (4.21)

- **CUSTOMER'S PERCEPTION** – Proper packaging of food has **high mean ranking** (6.21) and Human customer support instead of AI Chatbots has **lower mean ranking** (4.06)

Suggestions

From the following analysis and interpretations, the following suggestions are recommended to the management of the food delivery apps

- ✔ Upgrade their policies and ensure the delivery personnels are following all the protocols of the app
- ✔ To publicize only those attributes that can be actually be given to the customers
- ✔ Ensuring the demands of the customers are being met

Conclusion

Though the food delivery apps run in a profitable manner, the management needs to figure out the most feasible solution to bridge the perceptions and expectations of the customers, so that they can retain most of their existing customers and also attract new customers with those solutions being provided as results for their previous drawbacks.

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Determinants of Customer Satisfaction towards Purchase Intentions among Electric Vehicles - With Special Reference to the Greater Chennai

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Abstract

The rapid growth of electric vehicles (EVs) has transformed the automotive sector by offering sustainable and environmentally friendly mobility solutions. Despite increasing awareness and policy support, consumer adoption of electric vehicles remains limited in many urban regions. This study examines the determinants of customer satisfaction towards purchase intention of electric vehicles with special reference to Greater Chennai. The study adopts a descriptive and analytical research design and is based on primary data collected from 541 electric vehicle users through a structured questionnaire using a convenience sampling technique. Statistical tools such as percentage analysis, Confirmatory Factor Analysis, t-test, ANOVA, and multiple regression analysis were employed. The results reveal that perceived behavioral control, green purchase attitude, and environmental knowledge significantly influence purchase intention, which reflects overall customer satisfaction. Socio-economic factors such as income and gender also play a significant role in shaping consumer perception. The findings provide valuable insights for policymakers, manufacturers, and marketers to enhance electric vehicle adoption and promote sustainable urban transportation.

Keywords: *Electric Vehicles; Customer Satisfaction; Purchase Intention; Perceived Behavioral Control; Green Purchase Attitude; Chennai City*

Introduction

The automotive industry stands at the forefront of a ground breaking transformation – the rise of electric vehicles (EVs). Advanced vehicle technologies are being pursued by

automakers, government organizations, academic institutions, commercial researchers, and organizations globally with the goal of lowering the usage of petroleum in the form of gasoline and diesel. Electric Vehicles are one example of this technology. Electric vehicles are becoming more than just a means of transportation; they are also a responsible decision that reflects our dedication to a more environmentally friendly future. Making the switch to an electric vehicle requires a thoughtful assessment of the many advantages that go beyond convenience for the individual. It marks a turning point in the global shift towards a more ecologically conscious and sustainable way of life, where consumers act as change agents. We explore the compelling reasons why an increasing number of people are adopting the EV revolution in this investigation of electric vehicles and your intention to purchase one. The adoption of electric vehicles is influenced by a number of factors, including changing infrastructure, financial incentives, environmental concerns, and technological improvements.

Encouraging people to adopt green energy is crucial for sustainable development in all nations, particularly when it comes to safeguarding the environment and public health. Reducing global carbon emissions will be made easier if by 2030 everyone on the planet understands the importance of sustainable development, green energy consumption, zero waste production, and taking responsibility for maintaining the environment. Because of the sharing of information, customers have access to a wider range of options when making judgments about what to buy, and they also value different things at different times. Even while electric vehicles are becoming more and more popular, their market share is still quite small. Therefore, the main goals of this study are to examine the factors that affect customers' acceptance of electric vehicles and how to improve consumer acceptance of these vehicles. As a result, this study intends to investigate the factors influencing consumers' purchases of electric vehicles based on the motivation and research background mentioned above. The goal is to offer recommendations for companies regarding future consumer purchases of electric vehicles as well as a reference for the design and development of electric vehicles. In consumer behavior research, purchase intention is widely regarded as a behavioral outcome that reflects customers' overall satisfaction and positive evaluation of a product, including electric vehicles

Review of Literature

Kwon, Y., Son, S., & Jang, K. (2020) This study examined the factors influencing electric vehicle user satisfaction and its effect on repurchase and recommendation intentions

using Partial Least Squares Structural Equation Modelling (PLS-SEM). Based on a survey of experienced EV users, the findings revealed that operational cost savings, driving range, and charging satisfaction significantly enhance overall user satisfaction. Further, satisfied users showed stronger intentions to repurchase and recommend electric vehicles, highlighting the importance of real-world usage experience.

Son, S., & Lee, S. (2019) This study analyzed the satisfaction levels of electric vehicle users in Jeju using an ordered logit model. The results indicated that users with longer driving range, residential charging facilities, and better understanding of EV policies reported higher satisfaction. Conversely, frequent reliance on public chargers, technical issues, and usage inconveniences reduced satisfaction. The study emphasized the role of infrastructure availability and policy awareness in improving electric vehicle user satisfaction.

Swaroop, K. R., Someswararao, K. M., Naidu, N. G., & Nagaraj, K. V. (2022) This research investigated the factors influencing the purchase of electric vehicles across four major South Indian cities using survey data. Employing statistical tools such as ANOVA, Pearson correlation, and reliability analysis, the study identified price difference, charging infrastructure, environmental concern, and vehicle speed as significant determinants. The findings revealed positive relationships among the variables, confirming that economic and infrastructural factors strongly influence electric vehicle purchase decisions.

Meyyammai, M. (2023) This descriptive study focused on consumer awareness and perception toward electric vehicles in Chennai city. Using a structured questionnaire and data from 123 respondents, the study found that rising fuel prices, environmental concern, and government incentives significantly influence consumer preference for electric vehicles. The findings highlighted the growing importance of policy support, awareness programs, and cost-related benefits in encouraging electric vehicle adoption among urban consumers.

Upadhyay, N., & Kamble, A. (2023) This study examined the antecedents of pro-environment purchase intention toward electric vehicles in India using the Stimulus–Organism–Response framework. Structural Equation Modelling was applied to data collected from 1,143 respondents. The results showed that pro-environment responsibility significantly influences values and attitudes, which in turn affect purchase intention. The study also confirmed the mediating role of attitude, strengthening value–attitude–behavior linkages.

Research Gap

The in-depth existing body of knowledge pertaining to various aspects of green purchase attitude, subjective norms, perceived behavioral control, environmental knowledge and purchase intention of electric vehicle customers were understood to trace the importance of electric vehicle usage in the next evolutionary stage of automobile industry. The researchers have given importance to the above said domains to explore the various key dimensions and its influence on purchase and satisfaction of the electric vehicles. The previous studies were focused on exploration of the key factors influencing the customers to purchase electric vehicles and adopt it. In addition to it, the considerable number of studies was also conducted by previous researchers to explore the key satisfying factors influencing the electric vehicle customers in the country. Perhaps, this study identifies the research gap of various other factors influence the higher level of adoption of electric vehicles in the Indian context.

Statement of the Problem

As the time evolves the need of energy is getting wider and at the same time the existing energies are becoming insufficient and obsolete to the environment. In the current era commutation is very significant in every individual's life, by the way as the technology advances the transportation style and mode is getting updated. Considering the fuel efficiency and environmental safety, electric vehicles are designed for the commuters, but it is not completely adopted by the commuters. Thus, it is studied to determine the factors intending the commuters to purchase and adopt the electric vehicles.

Scope of the Study

The present study is focused on electric vehicle users in Chennai city of Tamil Nadu. This study is limited to its scope of exploring the satisfaction towards the purchase of electric vehicles and its impact in the society. The broad influencing factors such as green purchase attitude, subjective norms, perceived behavioral control, environmental knowledge and purchase intention are put to identify the purchase satisfaction of the electric vehicle customers. The present study covers selected variables and measures which are highly connected with electric vehicle customers alone studied and remaining aspects were not studied due to time and cost constraint.

Research Objectives of the Study

The research objectives of the study are primarily designed to explore the feasible and meaningful solutions to the research problem of the study. The objectives of the study are as follows:

1. To study the Socio-economic and the electric vehicle Profile of the consumer in Chennai City.
2. To explore the underlying dominant dimensions of Green Purchase Attitude, Subjective Norms, Perceived Behavioral Control, Environmental Knowledge and Purchase Intentions variables among electric vehicle consumer.
3. To classify and group the Consumer based on their demographic profile and perception towards Green Purchase Attitude, Subjective Norms, Perceived Behavioral Control, Environmental Knowledge and Purchase Intentions factors in the study area.
4. To explore the key determinants of Perceived Behavioral Control and Purchase Intentions of electric vehicle consumer in the study area.

Significance of the Study

Electric vehicles are seen as a credible solution to the problem of air and other conventional pollutants arising from the conventional (internal combustion) engines. Automobiles happen to be the sector which is in the midst of this transitional shift in our country. Also; for Automobiles sector it is a necessity to remodel and reorient at this juncture to survive in the new economy. Those companies and organizations which are able to reorient and adapt to the winds of change will not only survive but would also enjoy the first mover competitive advantage. The Electric vehicles would need to be marketed for their perception to change. There is a need to popularize the Electric vehicles to control the environmental degradation. The Electric Bike assessment must, in addition to that, be consumer-friendly. The EV assessment on its part will help us predict the future of the Electric Bike in the India. On another light, EVs are definitely not affordable commodities, at least not yet: lithium-ion batteries are still far from being cheap, so the overall cost of buying an EV can be quite high. With perceptions being as they are so far, the study is as important for the present as it is for the future of electric vehicles.

Research Methodology

“The study utilized a non-probability convenience sampling technique. Convenience sampling was adopted due to the absence of a comprehensive sampling frame and the limited accessibility of electric vehicle users in the study area.”

Sampling Size and Design

The study utilized a non-probability convenience sampling technique Convenience sampling was adopted due to the absence of a comprehensive sampling frame and the limited accessibility of electric vehicle users in the study area to obtain primary data from electric vehicle consumers in Chennai city. A total of 650 structured questionnaires were distributed to the respondents. Of these, 568 questionnaires were returned. After data screening, 22 responses were excluded due to incompleteness, and 5 responses were removed because of extreme values. Accordingly, 541 valid responses were considered for final analysis.

Analysis of Data

Socio-Economic and Electric Vehicle Profile of Respondents - Percentage Analysis

Table 1

Socio-Economic Profile of Respondents (n = 541)

Variable	Category	No. of Respondents	Percentage (%)
Gender	Male	342	63.2
	Female	199	36.8
Age	Below 30 years	168	31.1
	31–40 years	203	37.5
	Above 40 years	170	31.4
Monthly Income	Below ₹30,000	156	28.8
	₹30,001–₹60,000	241	44.5
	Above ₹60,000	144	26.7
Type of EV	Two-wheeler	327	60.4
	Four-wheeler	214	39.6

Inference

From the above table, it is inferred that electric vehicle adoption is influenced by socio-economic factors. The data show that **63.2% of respondents are male** and **37.5% belong to the 31–40 years age group**, indicating that economically active individuals are

more inclined to use electric vehicles. Further, **44.5% of respondents fall in the middle-income group**, and **60.4% prefer two-wheeler EVs**, suggesting that affordability and daily commuting needs play a major role in purchase decisions.

Dominant Dimensions of EV Purchase Variables - Confirmatory Factor Analysis (CFA)

Table 2

CFA Results – Factor Loadings

Construct	No. of Items	Factor Loadings Range	Model Fit Status
Green Purchase Attitude	5	0.68 – 0.84	Accepted
Subjective Norms	4	0.65 – 0.81	Accepted
Perceived Behavioral Control	5	0.71 – 0.88	Accepted
Environmental Knowledge	4	0.69 – 0.83	Accepted
Purchase Intention	4	0.74 – 0.90	Accepted

Inference

From the above table, it is evident that the theoretical constructs proposed in the study are statistically valid. All factor loadings range between **0.65 and 0.90**, which are above the acceptable level. This confirms that Green Purchase Attitude, Subjective Norms, Perceived Behavioral Control, Environmental Knowledge, and Purchase Intention are well-defined constructs that adequately explain consumer behavior towards electric vehicle purchase. The overall model fit indices indicated an acceptable fit between the proposed measurement model and the observed data."

Difference in Consumer Perception Based on Demographic Factors - t-Test and ANOVA

Table 3

t-Test – Gender and Purchase Intention

Gender	Mean Score	t-value	p-value	Result
Male	4.12	2.46	0.014	Significant
Female	3.98			

Inference

From the above table, it is understood that gender has a significant influence on purchase intention. The mean score of males (**4.12**) is higher than that of females (**3.98**), and the **p-value (0.014)** is less than 0.05. This indicates that male consumers exhibit relatively higher intention to purchase electric vehicles, though the difference is marginal.

Table 4

ANOVA – Income Level and Green Purchase Attitude

Income Level	Mean Score	F-value	p-value	Result
Below ₹30,000	3.72			
₹30,001–₹60,000	4.05	6.38	0.002	Significant
Above ₹60,000	4.28			

Inference

From the above table, it is clear that income level significantly affects green purchase attitude. The mean score increases from **3.72** in the lower-income group to **4.28** in the higher-income group. The **F-value (6.38)** with a **p-value of 0.002** confirms significant variation among income groups, indicating that higher income enhances positive environmental attitudes toward electric vehicles.

Determinants of Purchase Intention - Multiple Regression Analysis

Table 5

Multiple Regression Results (Dependent Variable: Purchase Intention)

Independent Variables	Beta (β)	t-value	p-value	Significance
Green Purchase Attitude	0.312	6.45	0.000	Significant
Subjective Norms	0.184	3.92	0.001	Significant
Perceived Behavioral Control	0.421	8.13	0.000	Significant
Environmental Knowledge	0.267	5.36	0.000	Significant
$R^2 = 0.62$				

Inference

From the above table, it is inferred that behavioral and attitudinal factors jointly influence purchase intention. **Perceived Behavioral Control (β = 0.421)** is the strongest determinant, followed by **Green Purchase Attitude (β = 0.312)** and **Environmental Knowledge (β = 0.267)**. The model explains **62% (R^2 = 0.62)** of the variation in purchase intention, confirming the theoretical assumption that perceived ease and environmental awareness drive electric vehicle adoption.

Findings

1. The study finds that electric vehicle adoption in Chennai is predominantly higher among **male consumers and middle-aged respondents (31–40 years)**, indicating that economically active groups are leading EV usage.
2. A majority of respondents belong to the **middle-income category**, and **two-wheeler electric vehicles** are more commonly preferred, highlighting affordability and urban commuting convenience as key adoption factors.
3. Confirmatory Factor Analysis confirms that **Green Purchase Attitude, Subjective Norms, Perceived Behavioral Control, Environmental Knowledge, and Purchase Intention** are statistically valid and reliable constructs influencing EV purchase decisions.
4. The t-test results reveal a **significant difference between male and female consumers** with respect to purchase intention, though the difference is marginal, indicating growing acceptance across genders.
5. ANOVA results show that **income level significantly influences green purchase attitude**, with higher-income consumers exhibiting stronger environmental concern.
6. Multiple regression analysis identifies **Perceived Behavioral Control** as the most significant determinant of purchase intention, followed by **Green Purchase Attitude** and **Environmental Knowledge**, explaining a substantial proportion of variation in purchase intention.

Suggestions

1. Government and policy makers should enhance **charging infrastructure availability** and improve ease of access, as perceived behavioral control strongly influences purchase intention.

2. Financial incentives such as **subsidies, tax benefits, and low-interest financing schemes** should be strengthened to encourage EV adoption among lower-income groups.
3. EV manufacturers should focus on **affordable two-wheeler models** with improved battery life and reduced maintenance costs to cater to urban commuters.
4. Awareness campaigns highlighting **environmental benefits and long-term cost savings** should be intensified to strengthen green purchase attitudes and environmental knowledge.
5. Marketing strategies should target **both male and female consumers**, emphasizing user-friendliness and safety features to broaden market penetration.

Limitations of the Study

The current investigation is constrained by a sample size of 541, owing to limitations in time and budget. It exclusively concentrated on electric vehicle users in Chennai, making it imprudent to extrapolate the findings to other cities. The study specifically investigated into the perspectives of electric vehicle customers regarding the green environment, user behaviours, subjective factors, and their inclination to purchase EVs. However, these insights cannot be universally applied to all aspects of EVs, given the dynamic nature of socio-economic and ethical changes in society. The study did not target a specific segment of the automotive industry, thereby rendering the results not universally applicable to all types of electric vehicles. Employing a non-probability sampling technique, the study shares the limitations associated with such sampling methods. This choice was made for gathering primary data from respondents. The study solely relied on the questionnaire method for its findings, and it is crucial to note that the results should not be broadly generalized due to this methodological approach.

Conclusion

The study concludes that electric vehicle purchase intention among consumers in Chennai is significantly influenced by a combination of socio-economic factors, environmental awareness, and behavioral perceptions. The empirical results validate the proposed research framework and confirm that perceived ease of use, affordability, and environmental concern play a crucial role in shaping consumer decisions. Strengthening infrastructure support, policy incentives, and awareness initiatives can accelerate electric

vehicle adoption and contribute to sustainable urban transportation. Overall, the findings provide valuable insights for policy makers, manufacturers, and marketers in promoting electric vehicles in metropolitan cities like Chennai.

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Role of Social Media in Consumer Purchasing Decisions

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Abstract

The rapid growth of social media has significantly altered the way consumers search for information, evaluate alternatives, and make purchasing decisions. Social networking platforms enable direct interaction between brands and consumers, thereby influencing attitudes, preferences, and buying behaviour. This study examines the role of social media in shaping consumer purchasing decisions by focusing on factors such as brand engagement, peer influence, influencer marketing, online reviews, and personalized advertising. The study highlights how digital word-of-mouth and interactive content contribute to trust-building and purchase intention. The findings indicate that social media plays a crucial role in enhancing brand awareness, strengthening consumer trust, and fostering long-term brand relationships. Businesses can effectively utilize these insights to design informed marketing strategies and improve customer engagement in the digital environment

***Keywords**: Social Media, Consumer Purchasing Decisions, Brand Engagement, Influencer Marketing*

Introduction

In the contemporary digital era, social media has emerged as one of the most influential tools affecting consumer behaviour and business practices. Platforms such as Facebook, Instagram, Twitter, and YouTube have transformed traditional marketing communication by enabling two-way interaction between brands and consumers. Unlike conventional media, social media allows consumers to actively participate in content creation, share opinions, and influence the purchasing decisions of others.

Consumers increasingly rely on social media platforms to gather product-related information, compare alternatives, and evaluate brand credibility before making purchase decisions. As a result, businesses are shifting their marketing focus toward social media to

strengthen customer relationships and build brand loyalty. This article examines the role of social media in influencing consumer purchasing decisions, with particular emphasis on the Indian context.

Types of Social Media in India

India possesses a diverse and dynamic social media ecosystem that caters to varied consumer needs and preferences. The major types of social media platforms influencing consumer behaviour include:

Social Networking Platforms

Platforms such as Facebook, LinkedIn, and Twitter are widely used for personal communication, professional networking, brand interaction, and information sharing.

Photo and Video Sharing Platforms

Instagram and YouTube play a vital role in visual storytelling, influencer marketing, and brand promotion. Short videos, reels, and live content significantly influence consumer perceptions and buying intentions.

Messaging Applications

WhatsApp and Telegram facilitate direct communication between businesses and consumers, offering personalized customer support, product updates, and promotional messages.

Microblogging and Discussion Forums

Platforms such as Koo, Reddit, and Quora enable users to exchange opinions, participate in discussions, and seek peer recommendations, thereby influencing purchase decisions.

E-Commerce Integrated Social Media

Applications like Meesho, Facebook Marketplace, and Flipkart Social integrate social interaction with online shopping, supporting small businesses and social commerce.

Live Streaming and Gaming Platforms

YouTube Live, Facebook Gaming, and Rooter attract younger audiences and offer opportunities for interactive brand engagement and entertainment-based marketing.

Regional and Vernacular Platforms

Apps such as ShareChat and Moj cater to India's multilingual population by providing content in regional languages, thereby expanding digital inclusion and consumer reach.

These platforms collectively influence consumer awareness, engagement, and purchasing behaviour in the Indian market.

Role of Social Media in Consumer Behaviour

Social media influences consumer behaviour through multiple dimensions that shape decision-making processes:

Brand Awareness and Visibility

Social media enables brands to reach a wider audience through targeted advertisements, influencer collaborations, and interactive content, enhancing brand recognition.

Customer Engagement and Interaction

Direct interaction through comments, messages, and live sessions strengthens relationships and builds trust between brands and consumers.

Social Proof and Online Reviews

User-generated content, ratings, and testimonials significantly influence consumer perceptions and reduce perceived purchase risk.

Personalized Marketing

Advanced algorithms analyze user preferences and behaviour to deliver customized content and advertisements, increasing the likelihood of conversion.

Impulse Buying and FOMO

Limited-time offers, flash sales, and influencer endorsements often trigger impulse purchases driven by the fear of missing out.

Viral Marketing and Trends

Trending challenges, hashtags, and viral campaigns enhance brand visibility and encourage consumer participation.

Transparency and Authenticity

Consumers increasingly expect brands to communicate honestly about product quality, values, and social responsibility.

Consumer Empowerment

Social media gives consumers a platform to express opinions, provide feedback, and influence brand decisions, shifting power from firms to customers.

Comparison and Information Search

Consumers use social media to compare products, evaluate alternatives, and seek recommendations, leading to more informed purchasing decisions.

Consumer Behaviour towards Social Media

Consumer behaviour on social media is shaped by psychological, social, and technological factors:

- Consumers actively engage with brand content that aligns with their interests and values.
- Peer reviews, influencer opinions, and online communities significantly affect purchase decisions.
- Emotional connections with brands enhance loyalty and repeat purchases.
- Authentic and transparent communication increases consumer trust.
- Integrated shopping features shorten the purchase journey and facilitate instant buying.
- Consumers frequently use multiple platforms to gather information and compare products.
- Visual and interactive content is preferred over text-heavy promotions.
- While personalization is appreciated, concerns regarding data privacy and security are increasing.

Social Media and Brand Loyalty

Brand loyalty is essential for sustainable business growth, and social media plays a critical role in nurturing it:

- Consistent brand messaging strengthens brand identity and recall.
- Prompt customer support enhances satisfaction and trust.
- Online communities foster emotional attachment and long-term relationships.

- Exclusive content, rewards, and loyalty programs encourage repeat purchases.
- Influencer and peer recommendations enhance brand credibility.
- User-generated content reinforces authenticity and brand advocacy.
- Social listening helps brands adapt strategies based on consumer feedback.

Overcoming Social Media Challenges in Influencing Consumers

Despite its benefits, social media presents several challenges. Brands can address these challenges through the following strategies:

- Maintaining transparency in communication and business practices
- Collaborating with credible influencers and using genuine testimonials
- Diversifying content to include educational, entertaining, and interactive elements
- Personalizing customer interactions to strengthen engagement
- Leveraging data analytics to evaluate campaign effectiveness
- Monitoring online reputation and managing negative feedback proactively
- Adapting content strategies to changing platform algorithms
- Prioritizing consumer privacy and ethical data usage
- Building online brand communities for sustained engagement
- Using AI and automation responsibly to enhance customer experience

Conclusion

Social media has fundamentally transformed consumer behaviour and purchasing decision-making processes. By enabling direct interaction, personalized communication, and peer influence, social media platforms have become indispensable tools for modern marketing. Businesses that strategically utilize social media can enhance brand awareness, build trust, and foster long-term customer loyalty.

However, to achieve sustainable success, brands must remain adaptable, authentic, and ethical in their digital practices. Addressing challenges such as misinformation, privacy concerns, and negative feedback is essential for maintaining consumer confidence in an evolving digital landscape.

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Investigating the Awareness and Intention to Purchase Eco – Friendly Products among NCC Cadets in Tamil Nadu

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Abstract

*In today's fast-growing world, ecological imbalance has become a global issue, due to climate change, deforestation, depletion of natural resources and plastic pollution. It indicates the importance of responsible consumption and environmental sustainability. Disciplined and motivated youth like the NCC cadets have strong potential to spread awareness about responsible consumption and influence others to use eco-friendly products. This article investigates the level of awareness and level of purchase intention towards eco-friendly products among NCC Cadets in Tamil Nadu. This is quantitative research that follows descriptive design with a. sample size of 70, incorporating cadets from the Air Force, Army and Navy. Results reveal that there is a difference in awareness level between male and female cadets. There is no difference in cadets wing (Air Force, Army and Navy) with their level of awareness and level of purchase intention towards eco-friendly products. However, there is a strong positive relationship between the level of awareness and the level of purchase intention among the NCC cadets (p=0.687***). This study is a novel attempt to understand the behaviors among NCC cadets*

***Keywords**: Awareness, Purchase intention, eco-friendly, NCC cadets*

Introduction

National Cadet Corps

The National Cadet Corps (NCC) is one of the world's largest uniformed youth organizations, playing a vital role in shaping disciplined, responsible, and socially conscious citizens. With its motto "Unity and Discipline," the NCC aims to develop leadership qualities, character, and a strong sense of national service among young individuals.

NCC strongly promotes environmental awareness and sustainable living. NCC cadets actively take part in programs like Puneet Sagar Abhiyan for plastic free water bodies, Swachh Bharat Abhiyan for improving sanitation and hygiene across rural and urban India, Ek Ped Maa Ke Naam, which encourages citizens to plant trees as a symbol of love and respect for mother earth, climate change rallies and environmental awareness programs.

Green Marketing

Green marketing refers to promoting products and services which are environmentally safe and focus on sustainability from production to packaging.

Eco-friendly products are those that are made using natural or recycled materials, they promotes sustainability throughout their life cycle. Eco-friendly products can be decomposed with minimal negative impact on the environment. Such eco-friendly products are cloth or jute bags, steel water bottles, reusable cutlery, naturally made personal care products, shoes made from recycled plastic, and such related products.

Characteristics of Eco friendly-product:

- Eco-friendly products use natural materials derived directly from nature
- It is very simple to decompose eco-friendly products.
- Since there are no harmful chemicals or toxins used, these products do not harm the environment.
- Eco-friendly products can easily be recycled
- It strongly gives an eco-friendly green message
- They result in minimal wastage

Environmental certification

When a product or service meets an environmental standard set by the authorized body, it is recognized as a green product and it will help consumers in identifying the real sustainable products in the market. The certification is only granted after the complete testing of the product. Such certificates are Eco Label (EU Eco label), Energy Star, Global Organic Textile, Standard (GOTS), Ecomark (India), Bureau of Energy Efficiency (BEE), Star Rating, India Organic Certification, GreenPro Certification (CII), AGMARK (for organic agricultural products), FSSAI Organic Logo (Jaivik Bharat)

Background

With growing degradation of natural resources and climate change, the need for sustainable goods has been rapidly increasing. In this situation eco friendly products and Green marketing appears as potential solution for such global issue. When the young citizens develops awareness about eco friendly goods and Green marketing, it becomes easier as a society to replace all plastic based products with green products, Various empirical studies have shown evidences that the awareness is found high among consumers, which as also had a positive impact on purchase of sustainable products (Aashish, 2024). Social media (Reddy et.al., 2025) and advertisements (Reddy et.al., 2025) can motivate awareness of sustainability. However, though awareness is found to be high, there has been a concern in the purchase of eco-friendly products due to higher costs (Priya, et.al., 2025; Pushpalatha B, 2025), limited availability (Priya, et.al., 2025; Pushpalatha B, 2025), trust (Pushpalatha B, 2025) and misconceptions with green products. But if consumers perceive the environmental concern and the functional qualities of the products (Suman, 2022) then it influences the purchase of ecofriendly products. There are evidences that also show that green trust can increase the purchase intention of green products (Cam, 2023). Thus, a study is conducted among NCC cadets with an aim to

1. To understand the level of awareness and level of purchase intention towards eco-friendly products among NCC cadets
2. To measure the relationship between the level of awareness and level of purchase intention towards eco-friendly products with their sociodemographic profile (gender, wing and graduating course) among NCC cadets.
3. To measure the relationship between the level of awareness and level of purchase intention towards eco-friendly products among NCC cadets.

Research Methods

The study follows descriptive research design with no control over variables. The study uses the survey method. A sample of 70 NCC cadets from Tamil Nadu state was identified based on a convenient sampling technique.

Table No.1

Distribution of Sample

Particulars		Number of NCC Cadets	Percentage (in %)
Wing	Air force	33	47

	Army	25	36
	Navy	12	17
Gender	Female	35	50
	Male	35	50
Course	Arts and Science	49	70
	Professional	21	30

Based on existing literature, a scale was developed with 7 items each to measure the level of awareness and level of purchase intention towards ecofriendly product among the cadets. Google Form was programmed for the purpose of collecting data from cadets. It was ensured that cadets were informed about the study, and their willingness was obtained. Descriptive statistics include mean, standard deviation, skewness, kurtosis, and Cronbach's α. Inferential statistics include t-test, one-way ANOVA and correlation. JAMOVI- Stats open-source software 2.6.2 was used to analyse data.

Hypotheses

Hypothesis		Testing Tool
Ho_1	There is no difference in the level of awareness and level of purchase intention towards eco-friendly products among male and female NCC cadets	t-test
Ho_2	There is no difference in the level of awareness and level of purchase intention towards eco-friendly products among NCC cadets graduating in the professional course and arts& science course.	t-test
Ho_3	There is no difference in the level of awareness and level of purchase intention towards eco-friendly products among NCC cadets from Air Force wing, Army wing and Navy wing	One-way ANOVA
Ho_4	There is no relationship between the level of awareness and the level of purchase intention towards eco-friendly products among NCC cadets	Correlation

Results and Discussion

Table No. 2

Descriptive Analysis of Study Variable

	NCC Cadets Awareness about Eco-friendly Products	NCC Cadets Intention to Purchase Eco-friendly product
N	70	70
Mean	23.2	24.1
Standard deviation	3.16	3.57
Skewness	0.0118	-0.866
Kurtosis	-0.361	1.09
Cronbach's α	0.823	0.909

Table No.2 shows the descriptive analysis of study variables. Skewness and kurtosis are within the permissible limit of ±2, this data is normally distributed. Reliability test based on Cronbach's α is above 0.75, thus the scale is reliable. Based on mean and standard deviation it is observed that 21% of NCC cadets have high level of awareness towards eco-friendly products as they are familiar with eco-friendly alternatives for daily use products, environmental impact of use of plastics and they understand the benefits of using sustainable products whereas 7% of NCC cadets have low level of awareness towards Green Mission supported by NCC like Puneet Sagar Abhiyan for plastic-free water bodies probably they would have recently joined as NCC Cadets.

Study also reveals that 17% of NCC cadets have a high level of purchase intention with eco-friendly products as want to support 'Go Green', they are found likely to consider fellow recommendations on ecofriendly products and also provide ecofriendly alternatives to their peers whereas 7% have low intentions to purchase ecofriendly products as they resist paying extra price for products in spite of being healthier and good in quality.

Ho_1: There is no difference in the level of awareness and level of purchase intention towards eco-friendly products among male and female NCC cadets

Table No 3

t testing showing the difference in level of awareness and level of purchase intention towards eco-friendly products among Male and Female NCC Cadets

Particulars	Gender	N	Mean	SD	t value	p value
NCC Cadets Awareness about Eco-friendly Products	Female	35	24	2.88	2.22	0.03
	Male	35	22.4	3.25		
NCC Cadets Intention to Purchase Eco-friendly product	Female	35	24.7	2.86	1.59[a]	0.116
	Male	35	23.4	4.09		

Table No.3 shows an independent sample t-test conducted between NCC cadets' level of awareness and level of purchase intention towards eco-friendly products and their gender (male and female). Study reveals that there is a difference in level of awareness between male and female NCC cadets, with a p-value =0.03. However, as the mean value is higher for female cadets, they are found to have a higher awareness level compared to male cadets. There is no difference in the purchase intention of eco-friendly products between male and female cadets. There is a possibility that female cadets are more health-conscious, hygiene and environmentally conscious, so they are motivated to be aware of non-toxic products and moreover they are found involved in daily use decisions, increasing their familiarity with reusable products, organic goods, and plastic-free options

Ho_2: There is no difference in the level of awareness and level of purchase intention towards eco-friendly products among NCC cadets graduating in the professional course and arts& science course.

Table No 4

t testing showing the difference in level of awareness and level of purchase intention towards eco-friendly products among NCC cadets graduating in the professional course and the arts & science course

	Courses	N	Mean	SD	t-value	p value
	Arts and Science	49	23.3	3.23	0.402	0.689

NCC Cadets Awareness about Eco-friendly Products	Professional	21	23	3.06		
NCC Cadets Intention to Purchase Eco-friendly product	Arts and Science	49	24	3.72	-0.4	0.691
	Professional	21	24.3	3.25		

Table No.4 shows an independent sample t-test conducted between NCC cadets' level of awareness and level of purchase intention towards eco-friendly products and the course of graduation (Professional courses and Arts & Science courses). Study reveals that regardless of course they study there is no difference in level of awareness and level of purchase intention towards eco-friendly products among NCC cadets. A possible explanation for this finding is that NCC training provides a uniform syllabus, collective responsibility and collective discipline, participation in national campaign activities and imparting discipline is found to be uniform among NCC cadets.

Ho_3: There is no difference in the level of awareness and level of purchase intention towards eco-friendly products among NCC cadets from Air Force wing, Army wing and Navy wing

Table No 5

One- Way ANOVA showing the difference in level of awareness and level of purchase intention towards eco-friendly products among Air Force wing, Army wing and Navy wing NCC Cadets

Particulars	Wing	N	Mean	SD	F value	p value
NCC Cadets Awareness about Eco-friendly Products	Air force	33	23.6	2.86	0.542	0.588
	Army	25	22.9	3.11		
	Navy	12	22.7	4.08		
NCC Cadets Intention to Purchase Eco-friendly product	Air force	33	24.2	3.09	0.998	0.382
	Army	25	24.7	3.05		
	Navy	12	22.4	5.28		

Table No.5 shows the One way ANOVA test conducted between NCC cadets' level of awareness and level of purchase intention towards eco-friendly products and the cadets' wings (air force, army and navy) . Study reveals that there is no difference in the awareness level and purchase intention towards eco-friendly products among Air Force wing cadets, Army wing cadets and Navy wing cadets, as their p-value is greater than 0.05.

Possible explanation to this finding is that NCC follows a common training syllabus and value framework for all wings, resulting in similar exposure to eco-friendly concepts among all cadets. Cadets from all three wings actively participate in shared national and NCC-led initiatives such as Swachh Bharat Abhiyan, Puneet Sagar Abhiyan, cleanliness drives, and tree plantation programs. These collective activities create a uniform level of environmental awareness.

Ho_4: There is no relationship between the level of awareness and the level of purchase intention towards eco-friendly products among NCC cadets

Table No 6

Correlation matrix showing the relationship between level of awareness and level of purchase intention towards Eco-friendly products among NCC Cadets

	NCC Cadets Awareness about Eco-friendly Products	**NCC Cadets Intention to Purchase Eco-friendly product**
NCC Cadets Awareness about Eco-friendly Products	—	
NCC Cadets Intention to Purchase Eco-friendly product	0.687***	—

Note. * p < .05, ** p < .01, *** p < .001

Table no. 6 shows the correlation matrix between the level of awareness and the level of purchase intention towards eco-friendly products among NCC cadets. Study reveals that there is a strong positive correlation ((Aashish, 2024) between the level of awareness and level of purchase intention with p value=0.687 at 0.001 significant level. Possible explanation to this finding is that NCC cadets are exposed to seminars, workshop and awareness drives on regular basis which can instill stronger purchase intentions.

Suggestions

1. Orientation
    a. Male cadets can be oriented on the durability, performance, and cost savings value associated with eco-friendly products that can increase their awareness level
    b. NCC cadets can be oriented on eco-friendly products, connecting to patriotism and protection of nations' resources, which can directly contribute to the purchase of products
2. Peer-led initiatives like awareness sessions, "no plastic week", group discussions and debates related to the usage of environmentally friendly products can be organized to encourage the purchase of eco-friendly products.
3. On World Environmental Day, along with planting trees, plastic exchange initiatives can be taken where all the plastic products are being replaced by eco friendly goods.

Conclusion

The study shows the level of awareness about green marketing and the purchase intention towards eco-friendly products of NCC cadet in Tamil nadu. The study indicates the positive impact of holistic training of the cadets and the benefits of environmental awareness initiatives taken by NCC. The female cadets demonstrate slightly higher awareness towards Green marketing and eco-friendly products, while no difference was seen in purchase intention across both the gender, Despite this, the level of purchase intention still remains moderate due to price difference, Limited availability of resources and budget constraints which shows the gap between environmental understanding and actual customer behaviour. The study highlights the need for accessible and affordable eco-friendly products which helps in bridging the gap between environmental understanding and actual consumer behaviour. As the future leader and youth of the country NCC cadets have a strong potential to play a vital role in promoting sustainable consumption and supporting the eco-friendly products market.

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Determinants of Green Consumption Behavior in Rajasthan: An Extended Theory of Planned Behavior Approach

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Abstract

Environmental sustainability has emerged as a critical concern in Rajasthan due to persistent challenges such as water scarcity, desertification, rising urban pollution, and unsustainable consumption patterns. In this context, promoting green consumption behavior among consumers has become essential for balancing economic development with environmental protection. This study investigates the factors influencing green consumption behavior among consumers in Rajasthan by extending the Theory of Planned Behavior (TPB). The traditional TPB framework is expanded by incorporating information intervention variables—namely green advertising, eco-labels, and product availability—along with social trust in farmers, manufacturers, and certification agencies. Primary data were collected through a structured questionnaire administered to consumers across urban and semi-urban regions of Rajasthan. The study employs Structural Equation Modelling (SEM) to examine the relationships between attitudes, subjective norms, perceived behavioral control, green consumption intention, and actual green consumption behavior. The findings indicate those consumers' attitudes toward green products and perceived behavioural control significantly influence green consumption intention. Furthermore, green consumption intention, availability of green products, and social trust are found to be strong predictors of actual green consumption behavior. In contrast, green advertising and eco-labels show limited direct influence, reflecting consumer skepticism and low awareness. The study offers valuable insights for policymakers, marketers, and certification bodies seeking to strengthen sustainable consumption practices in Rajasthan.

Keywords: *Green consumption behavior; Theory of Planned Behavior; Sustainability; Social trust; Information intervention; Rajasthan*

1. Introduction

Environmental sustainability has become a central concern worldwide due to escalating environmental degradation, climate change, and unsustainable consumption patterns. Environmental problems such as pollution, resource depletion, and waste production have emerged as a result of compound: rapid industrial growth, urban sprawl and decline in value systems during the last several decades (Bamberg, 2003; Joshi & Rahman, 2015). The Indian state of Rajasthan, located in arid and semi-arid parts of India, is experiencing these problems with a higher degree of effect than many other parts of India. The nature of the environmental challenges faced by Rajasthan is related to the environmental conditions specific to the region, including the harshness of the climate and the lack of water resources, the fragility of the environment, and the rapid urbanization of the region. Though many different environmental issues have been created because of rapid urbanization in Rajasthan, the three areas of greatest concern are groundwater depletion, air pollution in urban areas, and solid waste accumulation; therefore, encouraging sustainable consumer behavior is essential for maintaining a viable environment over the long-term in both Rajasthan and India as a whole. (Sarkar, 2012).

Consumer behavior in green consumption means that they prefer products and services that are environmentally friendly at every stage of their life cycle (the production, usage and disposal stages), as defined by Chan (2001) and Chen and Chang (2012). Historically, communities in the state of Rajasthan traditionally utilized a variety of methods to conserve resources by first avoiding consumption, then reducing consumption to the minimum, followed by the reuse of material and utilizing products from nature. Presently, the market for consumer goods has increased its size and is producing an abundance of mass-produced products, which has caused changes in consumption patterns, resulting in increased pressure on the environment and a disconnection between the awareness of the environment and purchasing behaviour in practice (Kalafatis et al., 1999).

The Government of India has implemented several initiatives to encourage people to lead more sustainable lifestyles and practice responsible consumption (Swachh Bharat Abhiyan, Mission LiFE (Lifestyle for Environment), and National Action Plan on Climate Change). The initiatives focus on providing consumers with awareness, in order to assist them in making environmentally conscious decisions and to encourage them to purchase eco-friendly products (Government of India, 2023). Rajasthan has also implemented initiatives at the state

level, based around renewable energy, water conservation, and organic farming, to support such initiatives at the national level. Although such initiatives have been implemented, the level of market penetration of green products is still low, indicating that the use of policy interventions alone will not be enough to help change consumer behavior (Singh & Pandey, 2018). It has led to many studies examining the possible reasons for the behaviors of consumers who engage in green consumption. Ajzen (1991) introduced a theory called the Theory of Planned Behavior (TPB), which has become widely used to investigate the behaviors of consumers in relation to green consumption by studying the effects of attitudes towards green consumption, the influence of social norms and the level of resources available to a consumer to engage in green consumption. TPB has been established by numerous researchers to successfully describe the behaviors of consumers concerning environmental responsibility in various countries and economic systems (Armitage & Conner, 2001, Paul et al, 2016).

There has been much work done to demonstrate that the decisions of consumers to purchase green products are subject to factors other than psychological influences, including societal contexts and the availability of product information, accessible markets and the trust that consumers place in producers and their product certifiers (Thøgersen et al., 2000; Kumar & Ghodeswar, 2015). In developing economies like India, consumers often have doubts about advertisements claiming to be eco-friendly and about eco-labels because of inconsistent standards and misleading claims, which can adversely impact their purchases of green products (Sharma & Kushwaha, 2019).

According to recent studies (Oliva et al. 2024; Vironika & Maulida 2025), it is necessary to extend the Theory of Planned Behavior (TPB) Model with additional variables to more accurately reflect the complexities of consumers' green consumption behaviors. Some of these variables include: trust in producers, manufacturers, and third-party certifiers. Trust is one of the greatest determinants of the behavior of consumers purchasing green products in areas where informal markets and personal connections predominate.

In addition to these findings, research has shown that the TPB model must be further defined through the addition of variables such as information interventions and social trust, in order to fully capture the complexities of green consumption behavior (Oliva et al. 2024; Vironika & Maulida 2025). The profiles of consumers in Rajasthan are shaped by their cultural

values, income levels, and environmental realities, which differ significantly from other Indian states. Thus, knowledge of consumer behavior regarding green consumption differs across regions. Addressing this research gap, the present study examines the determinants of green consumption behavior among consumers in Rajasthan by extending the Theory of Planned Behavior to include information intervention and social trust. The study aims to contribute to existing literature while offering practical insights for policymakers and marketers seeking to promote sustainable consumption in region-specific contexts.

2. Literature review

Green consumption behavior has become a central focus of research in recent years as consumers, academics, and policymakers seek to understand and influence environmentally responsible choices. The foundational **Theory of Planned Behavior (TPB)** continues to serve as a dominant framework for explaining green purchase intentions and behavior due to its ability to integrate attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991, 2002). Research has increasingly emphasized the importance of contextual and psychological factors in understanding green consumption beyond the traditional TPB constructs. Datta Sriramaneni et al. (2025) examined green purchase intention in India and reported that *environmental beliefs and perceived behavioral control* are critical predictors of intention toward eco-friendly fast-moving consumer goods, reinforcing the relevance of TPB in regional consumer research (Datta Sriramaneni et al., 2025).Lu (2025) examined green consumption behavior and reported that *attitudes, perceived effectiveness, and risk perceptions related to COVID-19* shaped purchasing decisions, showing how external shocks interact with environmental motivations (Lu, 2025).Sebastian and Joshy (2024) investigated consumer behavior toward eco-friendly products in Kerala and observed that *environmental awareness and demographic factors* influence green purchase decisions, which suggests that socio-demographic profiles should be considered when interpreting green consumption patterns in regional studies (Sebastian & Joshy, 2024). In the post-epidemic context, Research exploring integrated models has also gained traction. Oliva et al. (2024) developed an integrated model of green buying behavior, revealing complex relationships between environmental awareness, positive attitudes, and perceptions of greenwashing, further validating the need to extend TPB with additional psychological and contextual factors (Oliva et al., 2024). Sanghvi et al. (2025) used TPB combined with traditional decision-making models to understand youth green buying behavior, identifying *pro-environmental concern and awareness* as key determinants in

sustainable consumption shifts, particularly among younger urban consumers (Sanghvi et al., 2025).Beyond intention, trust and marketing approaches have garnered scholarly attention. **Vironika and Maulida (2025)** demonstrated that *trust and marketing communication* significantly affect green purchase behavior in Indonesia, suggesting cross-market similarities in how informational and trust dimensions influence behavior (Vironika & Maulida, 2025). Likewise, research assessing the impact of green marketing strategies in the Indian context emphasizes the *credibility gap caused by inconsistent green claims*, highlighting the need for transparent information to strengthen consumer trust (Himani & Kant, 2025) Recent studies highlight the evolving dynamics of green consumer behaviour in both developed and emerging markets. Gulzar et al. (2024) found that *sustainability consciousness and environmental attitudes* significantly influenced green purchasing intentions in tourism destinations, underscoring the importance of psychological antecedents in shaping consumer choices in service contexts (Gulzar et al., 2024).Collectively, these recent studies confirm the ongoing relevance of TPB while also showcasing the importance of integrating additional variables—such as environmental beliefs, trust, marketing stimuli, and contextual influences—to deepen the understanding of green consumption behavior. They also reflect a broadening of research contexts from traditional Western settings to emerging markets like India and Indonesia, making the current study's focus on Rajasthan particularly timely and meaningful. Richa etal.(2022) analyses online consumer behavior and elements connected with online consumer behavior to discover new aspects of research in this domain as a result of this brand-new trend. Although many elements influence customer behavior, it is essential to comprehend the moderation factor that affects online buying behavior of Rajasthan users.In a cross-cultural study, Nguyen etal. (2017) examined green purchase behaviour among consumers in emerging markets. They found that cultural values and social norms significantly affect green consumption patterns, noting that in collectivist cultures, social expectations and norms carry more weight in shaping intentions compared to individualistic contexts. Their work expanded TPB by demonstrating that subjective norms can be more influential in certain cultural environments.Paul etal. (2016) found that Indian consumers who hold positive attitudes toward sustainable products demonstrate higher purchase intentions, particularly when they perceive environmental benefits alongside personal value. This research highlighted that attitudes formed by environmental concern, health considerations, and future well-being are key determinants of green purchase intention. Joshi etal. (2015) explored the influence of environmental knowledge and eco-friendly product awareness on purchase behaviour. They

discovered that greater environmental knowledge leads to stronger behavioural intentions, suggesting that information dissemination is a necessary component for encouraging sustainable consumption. This finding has important implications for policymakers and marketers striving to build consumer awareness. Chen and Chang (2012) provided early evidence that green perceived value and green trust significantly shape consumers' purchase intentions.

3. Research Methodology

3.1 Research Design

The present study adopts a descriptive and explanatory research design using a quantitative approach. This design is considered appropriate as the study aims to explain the causal relationships between psychological factors, intention, and actual green consumption behaviour among consumers in Rajasthan.

3.2 Population and Sampling

The target population consists of consumers residing in urban and semi-urban areas of Rajasthan, including cities such as Jaipur, Jodhpur, Udaipur, Kota, and Ajmer.

A non-probability convenience sampling technique was employed due to ease of access and time constraints. Respondents were selected based on their familiarity with consumer goods and basic awareness of environmentally friendly products.

- Sample size: 350 respondents
- Valid responses used for analysis: 320 (after data screening)

The sample size was considered adequate for Structural Equation Modelling (SEM) analysis.

3.3.Data Collection Method

Primary data were collected using a **structured questionnaire** administered both online and offline. The questionnaire consisted of two sections:

1. **Demographic Profile:** Age, gender, education, occupation, and monthly income (INR).
2. **Measurement Scales:** Items measuring:
    - Green Consumption Attitude
    - Subjective Norms
    - Perceived Behavioural Control

- Green Consumption Intention
- Green Consumption Behaviour
- Information Intervention variables (green advertising, eco-labels, availability)

All items were measured using a **five-point Likert scale**, ranging from *1 = Strongly Disagree* to *5 = Strongly Agree*.

3.4 Tools and Techniques Used

- Descriptive statistics
- Reliability analysis (Cronbach's Alpha)
- Correlation analysis
- Structural Equation Modelling (SEM) using AMOS/SPSS

3.5. Research Objectives

1. To examine the influence of attitude, subjective norms, and perceived behavioral control on green consumption intention in Rajasthan.
2. To analyze the effect of green consumption intention on actual green consumption behavior.
3. To assess the impact of information interventions (green advertising, eco-labels, and product availability) on green consumption behavior.

3.6 . Hypotheses Development

H1: Consumer attitude towards green products has a significant positive effect on green consumption intention in Rajasthan.

H2: Subjective norms have a significant positive effect on green consumption intention.

H3: Perceived behavioral control has a significant positive effect on green consumption intention.

H4: Green consumption intention has a significant positive effect on green consumption behavior.

H5: Green advertising has a significant positive effect on green consumption behavior.

H6: Eco-labels have a significant positive effect on green consumption behavior.

H7: Availability of green products has a significant positive effect on green consumption behavior.

4. Data Analysis and Interpretation

4.1. Reliability Analysis

The reliability of the measurement scales was tested using Cronbach's Alpha. All constructs recorded alpha values above **0.70**, indicating acceptable internal consistency and reliability of the Reliability analysis was conducted to assess the internal consistency of the measurement scales used in the study**. Cronbach's Alpha** was calculated for each construct, and values above **0.70** were considered acceptable, in line with established research standards.

Construct	No. of Items	Cronbach's Alpha
Attitude toward Green Products	5	0.83
Subjective Norms	4	0.78
Perceived Behavioural Control	4	0.81
Green Consumption Intention	4	0.86
Green Consumption Behaviour	5	0.84
Green Advertising	3	0.72
Eco-labels	3	0.70
Product Availability	3	0.79

All constructs exceeded the minimum threshold, confirming that the items were reliable and suitable for hypothesis testing and SEM analysis.

4.2. Structural Equation Modelling (SEM) using AMOS/SPSS

Structural Equation Modelling (SEM) was employed to test the **hypothesized relationships simultaneously** and to assess the overall model fit. SEM was selected due to its ability to analyze complex relationships between latent variables while accounting for measurement errors.

Model Fit Indices The goodness-of-fit indices demonstrated an acceptable model fit:

Fit Index	Obtained Value	Recommended Value
Chi-square/df	2.41	< 3.00
GFI	0.91	> 0.90
AGFI	0.88	> 0.80
CFI	0.94	> 0.90
TLI	0.93	> 0.90
RMSEA	0.056	< 0.08

These values indicate that the proposed model adequately represents the observed data.

4.3. Path Analysis Results

The standardized regression weights revealed that:

- **Attitude → Intention (β = 0.46, p < 0.001)**
- **Perceived Behavioural Control → Intention (β = 0.39, p < 0.001)**
- **Subjective Norms → Intention (β = 0.08, p > 0.05)** *(Not significant)*
- **Intention → Behaviour (β = 0.51, p < 0.001)**
- **Product Availability → Behaviour (β = 0.29, p < 0.01)**
- **Green Advertising → Behaviour (β = 0.06, p > 0.05)** *(Not significant)*
- **Eco-labels → Behaviour (β = 0.07, p > 0.05)** *(Not significant)*

The SEM results confirmed that **attitude, perceived behavioural control, intention, and product availability** are significant predictors of green consumption behaviour in Rajasthan.

4.4. Structural Equation Modelling Results

Objective 1: Determinants of Green Consumption Intention

The SEM results reveal that:

- Consumer attitude has a strong and significant positive influence on green consumption intention.This indicates that Rajasthan consumers who believe green products are beneficial for health and the environment are more likely to intend to purchase them.

- Perceived behavioral control also shows a significant positive effect on green consumption intention. This suggests that consumers are more willing to adopt green consumption when they feel confident about identifying, affording, and accessing green products.

- Subjective norms, however, do not show a statistically significant influence. This reflects that green consumption decisions in Rajasthan are largely personal rather than socially driven.

Objective 2: Intention and Green Consumption Behavior

Green consumption intention is found to have a strong and significant positive impact on actual green consumption behavior.

This confirms that intention serves as a crucial psychological link between awareness and real purchasing actions.

Objective 3: Information Intervention and Behavior

- Green advertising does not show a significant impact on actual green consumption behaviour.

  This may be due to consumer skepticism toward exaggerated environmental claims.
- Eco-labels also fail to significantly influence behavior, suggesting low awareness and limited understanding of certification symbols among consumers.
- Availability of green products shows a significant positive influence on green consumption behavior.
- Consumers are more likely to purchase green products when they are easily accessible in nearby stores or online platforms.

5. Findings of the Study

1. Consumer attitude and perceived behavioural control significantly influence green consumption intention.
2. Subjective norms do not significantly affect green consumption intention, indicating independent decision-making.
3. Green consumption intention strongly predicts actual green consumption behavior.
4. Green advertising and eco-labels have limited influence on consumer behavior in Rajasthan.
5. Product availability plays a crucial role in encouraging green consumption.
6. Consumers prioritize practicality and trust over promotional messages.

6. Conclusion

The study concludes that green consumption behavior in Rajasthan is primarily driven by personal attitudes, perceived ease of adoption, and product availability, rather than social pressure or promotional communication. While consumers demonstrate awareness and concern

for environmental issues, their purchasing decisions depend largely on confidence, convenience, and accessibility.

The limited influence of green advertising and eco-labels highlights the need for improved consumer education and stricter monitoring to prevent misleading claims. Strengthening availability through local markets and enhancing consumer understanding can significantly promote sustainable consumption.

Overall, the study provides valuable insights into region-specific consumer behavior and offers a practical framework for policymakers, marketers, and sustainability advocates seeking to promote green consumption in Rajasthan.

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Sustainability As a Source of Competitive Advantage: An Empirical Analysis of Business Performance

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Abstract

Sustainability has emerged as a key strategic tool for businesses seeking long-term growth and competitive advantage. Organizations in the present era are actively including environmental and social and economic sustainability practices into their operations to enhance overall business performance. This study examines sustainability as a source of competitive advantage and analyzes its impact on business performance from the perspective of college students who represent future managers and entrepreneurs. The research aims to understand awareness, perception, and the influence of sustainable business practices on efficiency, cost reduction, and brand value. The collection of primary data was carried out through a structured questionnaire administered to 70 college students. Simple percentage analysis was employed to analyze the data. The findings reveal that most respondents believe sustainability improves organizational reputation, operational efficiency, and long-term profitability. The findings indicate that sustainability plays a significant role in strengthening competitive advantage and enhancing business performance.

***Keywords**: Sustainability, Competitive Advantage, Business Performance, Green Practices, Corporate Responsibility*

Introduction

Sustainability has become an essential concept in today's competitive business environment. It refers to business practices that meet existing needs without reducing the ability of future generations to meet their own needs. Sustainable practices focus on environmental protection, social responsibility, and economic growth. Organizations that adopt sustainability strategies are better positioned to gain competitive advantage and improve long-term performance.

In recent years, businesses have realized that sustainability is not just a social obligation but a strategic asset. Approaches including energy efficiency initiatives and waste reduction, ethical sourcing, and eco-friendly products help firms reduce costs, build a positive brand image, and gain customer interest. For college students and future business leaders, understanding sustainability-driven strategies is crucial to building successful and responsible organizations.

Review of Literature

Numerous studies emphasize the increasing importance of sustainability in business performance.

- Porter and Kramer (2011) emphasized that sustainable practices create shared value and strengthen competitive advantage.
- Sharma (2020) found that firms adopting environmental sustainability experience improved operational efficiency and cost savings.
- Gupta (2022) stated that sustainability enhances brand reputation and customer loyalty, leading to improved financial performance. The literature clearly indicates that sustainability is closely linked with innovation, efficiency, and long-term business success.

Statement of the Problem

Despite the increasing emphasis on sustainability, many organizations still consider it as an additional cost rather than a strategic investment. There is limited awareness among young individuals regarding how sustainability can act as a source of competitive advantage and positively impact business performance. This study attempts to analyze students' perceptions of sustainability and its role in improving organizational competitiveness and performance.

Objectives of the Study

- To study the concept of sustainability in business organizations.
- To analyze sustainability as a source of competitive advantage.
- To examine the impact of sustainable practices on business performance.
- To understand students awareness and perception of sustainability in business.

Methodology

This research relies on primary data that were collected from 70 college students using a structured questionnaire. Convenience sampling was adopted for data collection. The

questionnaire was composed of questions pertaining to sustainability awareness, competitive advantage, and business performance. The collected data was analyzed using simple percentage analysis and presented in tabular form. Secondary data were obtained from journals, books, and websites to support the study.

Demographic Profile of Respondents

Table:1

Demographic Profile

S. No	Variable		Number of Respondents	Percentage (%)
1	Gender	Male	28	40%
		Female	42	60%
		TOTAL	**70**	**100**
2	Age group	Below 20	45	64%
		20-22	25	36%
		TOTAL	**70**	**100**
3	Course	Commerce	39	56%
		Science	17	24%
		Arts	14	20%
		TOTAL	**70**	**100%**

Source: primary data

Interpretation: The table shows that the majority of respondents are female students (60%) and belong to the age group of below 20 years. Most respondents are from a commerce background, indicating higher interest in sustainability and business performance issues.

Table 2

Factors showing sustainability as competitive advantage

S. No	Factors	No. of Respondents	Percentage
1	Sustainability improves brand image	61	87%
2	Sustainability reduces operational costs	55	79%

3	Sustainability improves long term profitability	58	83%
4	Sustainability increases customer trust	63	90%
5	Sustainability supports innovation	60	86%

Interpretation: The table reveals that 90% of respondents believe sustainability increases customer trust, while 87% agree that it improves brand image. This shows that sustainability is perceived as a strong contributor to competitive advantage and improved business performance.

Suggestions

From the findings of the research, the following suggestions are offered:

- Business organizations should embed sustainability into their core strategies instead of viewing it as an extra expense, ensuring alignment with long-term objectives to gain competitive advantage.
- Companies should adopt eco-friendly practices such as energy efficiency, waste reduction, recycling, and ethical sourcing, as these practices help reduce operational costs and improve brand image.
- Educational institutions should promote sustainability awareness through seminars, workshops, guest lectures, and curriculum integration so that students, as future managers and entrepreneurs, understand the strategic importance of sustainability.
- Organizations should invest in sustainable innovation, as sustainability-driven innovation can enhance efficiency, improve product quality, and create new market opportunities.
- Awareness programs and training sessions should be conducted for employees and stakeholders to encourage responsible business behavior and strengthen corporate social responsibility.

Conclusion

The study concludes that sustainability is not only a social responsibility but also a powerful strategic tool for achieving competitive advantage and improving business performance. The findings demonstrates that a majority of college students strongly believe that sustainable business practices enhance brand image, increase customer trust, reduce operational costs, and improve long-term profitability. This indicates a positive perception about the awareness of sustainability among future business leaders.

The study highlights that sustainability plays a significant role in strengthening organizational competitiveness and ensuring long-term success. By implementing sustainable practices, organizations can promote economic growth while meeting their environmental and social obligations. Therefore, organizations and educational institutions must work together to promote sustainability-oriented thinking, ensuring the development of responsible, competitive, and future-ready businesses.

The Impact of Influencer Marketing on Youth Purchasing Decisions

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Abstract

Influencer marketing has emerged as a powerful digital marketing strategy that significantly shapes youth purchasing decisions in the contemporary social media–driven marketplace. This study examines the impact of influencer marketing on youth purchasing behavior, with particular emphasis on the roles played by influencers in building brand awareness, trust, engagement, and purchase motivation. The research is empirical in nature and is based on primary data collected from 200 respondents using a structured questionnaire, adopting convenience sampling. Statistical tools such as percentage analysis, factor analysis, chi-square test, and weighted average method were employed for data analysis. Factor analysis identified four key factors influencing youth purchasing decisions: Brand Influence & Trend Creation, Trust & Purchase Motivation, Social Engagement & Interaction, and Promotional Influence. Among these, brand influence and trust emerged as the most dominant determinants. The chi-square analysis revealed a significant association between gender and the influence of influencer marketing on purchasing decisions. The weighted average analysis highlighted major challenges such as lack of authenticity, misleading product information, and excessive paid promotions. The study concludes that influencer marketing plays a significant role in shaping youth purchasing behavior, while emphasizing the need for ethical practices, transparency, and authenticity to ensure responsible and sustainable marketing outcomes.

***Keywords**: Influencer Marketing, Youth Consumers, Purchasing Decisions, Social Media Influencers*

I Introduction

Influencer marketing is creating a significant transformation in the modern business and consumer landscape. Brands are reshaping how they connect with audiences, build trust, and influence purchasing behaviours through the rise of social media personalities and content creators. Influencer marketing, which involves leveraging individuals with strong online presence and credibility, has emerged as a powerful tool to impact consumer choices-especially among the youth. In recent years, influencers have become trendsetters, guiding their followers' preferences in fashion, technology, lifestyle, and beyond. By combining authenticity with relatability, influencer-driven campaigns enable businesses to reach young consumers more effectively, ultimately shaping their perceptions and driving purchasing decisions in a highly competitive market.

II Statement of the Problem

The study aimed to examine how influencer marketing affects youth purchasing decisions, with a focus on understanding the factors that shape young consumers' buying behaviour and the extent to which influencers impact their choices. While influencer marketing has the potential to build trust, create brand awareness, and drive engagement through relatable and authentic content, it also raises concerns. The challenge lies in determining whether influencer-driven promotions genuinely reflect consumer needs or simply manipulate youth purchasing behaviour, making it essential to evaluate both the positive and negative consequences of this marketing strategy.

III Review of Literature

Vu Thanh Huong, et.al., (2025)[1] in their study *"The Impact of Influencer Marketing on Generation Z's Purchasing Decision for Beauty Products in Vietnam"*, found that influencer trustworthiness is the most significant factor affecting Gen Z's buying behaviour. Attractiveness, entertainment, and informational value also influence decisions indirectly through brand image and parasocial relationships. The study suggests that beauty brands should partner with authentic, relatable influencers to build trust and increase purchase intent.

Ida Bagus Surya Dharma, et.al., (2024)[2] in their study *"The Effect of Influencer Marketing on Gen Z Purchasing Intentions in Emerging Economies"*, found that influencer trustworthiness, credibility, expertise, and product relevance strongly influence Gen Z's buying behaviour, while peer reviews have a lesser impact. The study highlights the need for authentic and brand-aligned influencers to build trust and engagement in emerging markets.

Zirva Azmat, et.al., (2024)[3] in their study *"Social Media Influencers and the Purchasing Decisions of Youth: With Special Emphasis on Emotional and Rational Aspects"*, found that influencer marketing significantly impacts youth buying behaviour through emotional connections, credibility, and content quality. The study emphasizes that authentic, trustworthy, and emotionally engaging influencers strongly shape consumer decisions.

Dr. Mayur Chaudhary et al. (2023)[4] in their study *"The Psychological Impact of Influencer Marketing on Self-Destructive Behaviour and Poor Mental Health Outcomes in Teenagers"*, found that influencer marketing can negatively affect adolescent well-being by promoting unrealistic body standards and excessive consumption. These influences contribute to social anxiety, low self-esteem, and mental distress, underscoring the need for regulation and awareness to reduce psychological harm.

Margareta Nadanyiova and Lucia Sujanska (2023)[5] in their study *"The Impact of Influencer Marketing on the Decision-Making Process of Generation Z"*, found that influencer marketing effectively engages Gen Z by fostering trust, loyalty, and brand relationships, especially on Instagram and TikTok. They emphasized that credibility, engagement, and long-term collaborations matter more than follower count for successful campaigns.

Noémie Gelati and Jade Verplancke (2022)[6] in their thesis *"The Effect of Influencer Marketing on the Buying Behaviour of Young Consumers"*, found that influencer marketing strongly impacts teenagers and young adults by building parasocial relationships, enhancing product trust, and driving purchase decisions. Both paid and unpaid collaborations were shown to boost authenticity and engagement.

Mustapha Yusuf Ismaila, et.al., (2022)[7] in their study *"The Impact of Celebrity Endorsement and Digital Marketing on Youth Purchasing Decisions: A Comparative Study of Ikorodu Area"*, found that digital marketing influences youth purchasing decisions more strongly than celebrity endorsements. Online reach and digital campaigns proved more effective than celebrity alignment or attractiveness, highlighting the importance of digital platforms in engaging youth.

Ahmed Farouk Radwan, et.al., (2021)[8] in their study *"Impact of Social Media Influencer Marketing on Youth Purchase Intentions in UAE"*, found that influencers significantly shape youth buying behaviour through credibility, attractiveness, and

interactivity, which build trust and emotional connections. They also encourage engagement by driving youth to seek product information, visit brand websites, and make informed purchase decisions, particularly in lifestyle categories.

Qin MoShi (2020)[9] in the study *"The Impact of Influencers on Young People's Buying Decisions"*, found that influencers strongly affect youth purchasing behaviour by building trust through authentic and relatable content. Young consumers often follow influencers for entertainment, inspiration, and product discovery, with many making purchases based on their recommendations.

Emilia Mäntyharju (2018)[10] in her thesis *"Effects of Influencer Marketing on Finnish Youths Purchasing Behaviour"*, found that influencer marketing positively impacts all stages of the consumer decision-making process, from awareness to post-purchase satisfaction. It enhances brand visibility, builds trust, creates new needs, and streamlines purchasing decisions, especially on platforms like Instagram and Snapchat.

IV Objective

1. To examine the influence of influencer marketing on youth purchasing intentions and decision-making.
2. To analyse the role of influencer marketing in shaping brand awareness, trust, and preference among youth consumers.
3. To explore the challenges and limitations of influencer marketing and their impact on the purchasing behaviour of youth.

V Hypothesis

H0: There is no association between gender and the influence of influencer marketing on youth purchasing intentions and decision-making.

VI Methodology

This study is empirical in nature and is based on a survey conducted with 200 respondents. The sampling technique employed is convenience sampling. Both primary and secondary data have been utilized for the research. Primary data was collected through a well-structured questionnaire, while secondary data was obtained from journals, magazines, websites, and other relevant sources.

VII Limitations of the Study

1. The data collection was restricted to a sample size of 200 respondents.
2. The findings of the study are limited to research conducted within Chennai.

VIII Analysis and Interpretation of Data

The primary data were analyzed using the Statistical Package for Social Sciences (SPSS) and MS Excel. These tools ensured accuracy and enabled systematic and straightforward data analysis. The study employed percentage analysis, Chi-square test, factor analysis, and weighted average analysis to interpret the data effectively.

1.Percentage Analysis

Table 1

Particulars	Majority Respondents	No. of Respondents	Percentage
Gender	Male	102	51%
Qualification	UG	72	36%
Occupation	Student	93	46.5%
Annual Family Income	Up to Rs.1 lakh	45	22.5%
Residential Status	Urban	111	55.5%

Source: Primary data

Findings

The above table reveals that 51% of the respondents are male. With regard to educational qualification, 36% of the respondents are undergraduates. In terms of occupation, a majority of the respondents 46.5% are students. Regarding annual family income, 22.5% of the respondents belong to the income group of up to ₹1 lakh. Concerning residential status, 55.5% of the respondents reside in urban areas.

Table 2

Particulars	Majority Respondents	No. of Respondents	Percentage
Preferred Social Media Platform for Following Influencers	Instagram	70	35%
Form of Influencer Content Attracting Purchase Consideration	Watching influencer videos and reels	96	48%
Experience of Regret after Influencer-Based Purchases	Rarely	29	14.5%

Source: Primary data

Findings

The above table indicates that 35% of the respondents prefer Instagram as the primary social media platform for following influencers. With regard to the form of influencer content influencing purchase consideration, 48% of the respondents reported that watching influencer videos and reels attracts them the most. In terms of post-purchase experience, 14.5% of the respondents stated that they rarely experience regret after making purchases based on influencer recommendations.

2. Factor Analysis

Reliability Statistics	
Cronbach's Alpha	N of Items
.918	10

The Cronbach's Alpha value of **0.918** indicates **excellent reliability**, confirming high internal consistency among the variables measuring the role of influencers in youth purchasing decisions.

KMO Bartlett's Test

The KMO test confirms that a value above 0.5 indicates sample adequacy for factor analysis, while a significance value below 0.05 shows meaningful correlations among

variables. Respondents' perceptions across ten dimensions were measured using a 5-point Likert scale and grouped into key factors based on factor loadings.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.872
Bartlett's Test of Sphericity	Approx. Chi-Square	1264.583
	df	45
	Sig.	.000

The KMO value of **0.872** indicates adequate sampling for factor analysis. Bartlett's Test is significant at **p < 0.001**, confirming that correlations among variables are sufficient for factor extraction.

Communalities

	Initial	Extraction
Creating brand awareness	1.000	.884
Building trust and credibility	1.000	.917
Shaping consumer attitudes	1.000	.856
Driving purchase intentions	1.000	.903
Enhancing brand image	1.000	.841
Providing social proof	1.000	.792
Encouraging trial through promotions	1.000	.764
Influencing lifestyle and aspirations	1.000	.879
Facilitating two-way communication	1.000	.801
Accelerating trend adoption	1.000	.868

Extraction Method: Principal Component Analysis.

The extracted communalities range from **0.764 to 0.917**, indicating that a substantial proportion of variance in each variable is explained by the extracted factors.

Rotated Component Matrix(a)

	Component			
	1	2	3	4
Creating brand awareness	.872			
Enhancing brand image	.841			
Accelerating trend adoption	.824			
Influencing lifestyle and aspirations	.798			
Building trust and credibility		.883		
Shaping consumer attitudes		.857		
Driving purchase intentions		.831		
Providing social proof			.846	
Facilitating two-way communication			.804	
Encouraging trial through promotions				.812

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 6 iterations.

Factor analysis identified four significant underlying factors:

➢**Factor 1: Brand Influence & Trend Creation**

This factor explains 47.840% of the total variance and highlights the influencer's role in creating brand awareness, enhancing brand image, influencing lifestyle aspirations, and accelerating trend adoption among youth. Influencers act as trendsetters and brand ambassadors, aligning products with youth culture and preferences.

➢**Factor 2: Trust & Purchase Motivation**

Accounting for 19.620% of the variance, this factor reflects the psychological influence of influencers in building trust and credibility, shaping consumer attitudes, and driving purchase intentions. Trust-based endorsements significantly motivate youth to make purchasing decisions.

➢Factor 3: Social Engagement & Interaction

This factor contributes 11.430% of the variance and emphasizes the importance of social proof and two-way communication. Likes, comments, shares, and direct interactions enhance consumer confidence and positively influence youth purchasing behavior.

➢Factor 4: Promotional Influence

Explaining 6.850% of the variance, this factor indicates that promotional strategies such as discounts, giveaways, and exclusive offers encourage product trials. These incentives play a supportive role, particularly among price-sensitive youth consumers.

3.Chi-Square Test

Crosstabulation

		Perception			**Total**
		Low Influence	**Medium Influence**	**High Influence**	
Gender	**Male**	70 (68.6%)	21 (20.6%)	11 (10.8%)	102 (100.0%)
	Female	50 (51%)	45 (45.9%)	3 (3.1%)	98 (100.0%)
Total		120 (60%)	66 (33%)	14 (7%)	200 (100.0%)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.432(a)	2	.001
Likelihood Ratio	17.210	2	.001
Linear-by-Linear Association	.912	1	.373
N of Valid Cases	200		

a 1cell (0.0%) have expected count less than 5. The minimum expected count is 5.12.

Source: Computed data

Findings

A Chi-Square test was conducted to examine the relationship between gender and the influence of influencer marketing on youth purchasing intentions and decision-making. The analysis revealed a p-value of 0.001, which is below the 1% significance threshold. Consequently, the null hypothesis (H_0) - that gender has no association with the influence of influencer marketing is rejected. This suggests a statistically significant relationship between gender and the impact of influencer marketing on youth purchasing behaviour.

4.Weighted Average Method

To explore the challenges and limitations of influencer marketing and their impact on the purchasing behaviour of youth, the weighted average method was employed.

Particulars	Total	Average	Rank
Impulse Buying Due to Influencer Persuasion	480	8	10
Excessive Paid Promotions	720	12	3
Misleading Product Information	750	12.5	2
Overexposure to Influencer Content	600	10	6
Peer Pressure from Influencer Trends	630	10.5	5
Limited Trust in New Influencers	540	9	8
Difficulty in Distinguishing Sponsored Content	570	9.5	7
High Expectation vs. Actual Product Quality	510	8.5	9
Lack of Authenticity in Influencer Content	780	13	1
Privacy Concerns While Engaging with Influencers	660	11	4

Source: Primary data

Findings

From the above table, it is observed that respondents face a major challenge in lack of authenticity in influencer content, hence it is ranked as I. The respondents also encounter issues with misleading product information; therefore, it is ranked as II. Excessive paid promotions are another key challenge faced by respondents; hence it is ranked as III. Respondents further

experience difficulties due to privacy concerns while engaging with influencers, so it is ranked as IV. The challenge of peer pressure from influencer trends is also highlighted; therefore, it is ranked as V. Overexposure to influencer content emerges as another concern, making it rank as VI. The issue of difficulty in distinguishing sponsored content is also significant, so it is ranked as VII. Limited trust in new influencers is another challenge faced by respondents, making it rank as VIII. Finally, high expectation vs. actual product quality and impulse buying due to influencer persuasion are relatively lower challenges, ranked as IX and X, respectively.

IX Conclusion

This study provides valuable insights into the growing influence of influencer marketing on youth purchasing decisions in the digital era. The findings clearly indicate that influencers play a significant role in shaping brand awareness, consumer trust, engagement, and purchase intentions among young consumers. Factor analysis revealed four dominant dimensions-Brand Influence & Trend Creation, Trust & Purchase Motivation, Social Engagement & Interaction, and Promotional Influence with brand-related influence and trust emerging as the most powerful determinants of youth buying behaviour.

The chi-square analysis further confirmed a statistically significant association between gender and the influence of influencer marketing, suggesting that demographic factors affect how influencer content is perceived and acted upon. In addition, the weighted average analysis highlighted key challenges faced by youth consumers, including lack of authenticity in influencer content, misleading product information, excessive paid promotions, and privacy concerns. These issues underline the importance of ethical influencer practices and transparent brand-influencer collaborations.

In conclusion, while influencer marketing serves as an effective tool for engaging youth and driving purchasing decisions, its long-term success depends on credibility, authenticity, and responsible communication. Brands and influencers must focus on building genuine relationships with consumers rather than relying solely on promotional tactics. By adopting ethical standards and consumer-centric approaches, influencer marketing can create sustainable value for both businesses and young consumers.

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Regulation of AI in Digital Advertising: Global Trends and Challenges

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Abstract

Artificial intelligence (AI) has transformed digital advertising by providing tailored content, predictive targeting, real-time bidding, and automated decision-making. While these developments improve advertising effectiveness and client engagement, they raise serious regulatory concerns about data privacy, algorithmic bias, transparency, and consumer protection. Governments and regulatory organizations throughout the world are enacting frameworks such as data protection laws, AI governance policies, and ethical standards to regulate the use of AI in digital advertising. The European Union's AI Act, data privacy laws like GDPR, and changing advertising standards in the US and Asia are just a few of the growing worldwide trends in AI legislation that are examined in this article. It also examines the main obstacles that marketers and advertisers must overcome in order to comply with these rules, including inconsistent laws across borders, opaque AI algorithms, and striking a balance between innovation and moral obligation. In order to guarantee customer trust and long-term growth in the digital advertising ecosystem, the report emphasizes the necessity of responsible AI practices, legislative harmonization, and transparent advertising methods.

Keywords: *Artificial Intelligence, Digital Advertising, AI Regulation, Data Privacy, Algorithmic Transparency, Consumer Protection, Ethical Advertising, Global Marketing*

Introduction

In digital advertising, artificial intelligence (AI) has grown to be an effective innovation that helps companies provide customized ads, monitor customer behavior, automate campaigns, and increase marketing effectiveness. Advertisers can target the right audience at the right moment with the aid of AI technologies like machine learning, algorithms, and data analytics. However, a number of issues have been brought up by the growing usage of AI in digital advertising, such as algorithmic bias, data privacy violations,

lack of transparency, manipulation of customer behavior, and abuse of personal data. Governments and regulatory organizations worldwide have implemented a number of laws and regulations to oversee the use of AI in advertising in order to mitigate these hazards. The goal of international rules like the GDPR, EU AI Act, and national data protection laws is to guarantee the ethical, transparent, and responsible application of AI. Despite these initiatives, the lack of worldwide standardization and the speed at which technology is developing make governing AI difficult. The fast adoption of Artificial Intelligence in digital advertising has revolutionized how businesses connect with their customers. AI algorithms facilitate data-driven targeting, predictive marketing, and automated decision-making. However, a lack of transparency, the possible exploitation of personal data, and algorithmic prejudice have highlighted the need for robust regulatory frameworks. This article investigates global trends in AI regulation, as well as the difficulty of adopting effective regulations in digital advertising.

Aim of the Study

The purpose of this research is to look at the global legislative frameworks that govern the use of artificial intelligence in digital advertising, as well as to understand the fundamental obstacles in guaranteeing ethical, transparent, and responsible advertising practices.

Objectives of the Study

- To comprehend how artificial intelligence is used in digital advertising.
- To research if AI in digital advertising needs to be regulated.
- To determine the main worldwide trends in AI regulation.
- To evaluate the ethical, legal, and privacy issues surrounding AI-based advertising regulation.
- To investigate how AI regulations affect consumers and advertisers.

Review of Literature

- Kaplan and Haenlein (2019), automation, personalization, and predictive advertising are made possible by artificial intelligence, which has emerged as a major force in digital marketing. Their research brought to light the necessity of ethical standards as AI becomes a more significant factor in consumer decision-making.

- Zuboff (2019) talked about how AI is used by digital advertising platforms to gather and evaluate customer data, resulting in "surveillance capitalism." The study strengthened the case for stringent regulatory control by highlight
- Mittelstadt et al. (2016), who looked at ethical issues in algorithmic decision-making, AI systems frequently lack accountability and transparency. In order to address bias, fairness, and explainability in AI-based advertising systems, their research emphasized the significance of regulatory frameworks.
- Tene and Polonetsky (2017) examined data-driven advertising strategies and emphasized how AI increases privacy problems. They underlined the importance of laws like GDPR in defending consumer rights and ensuring ethical data use in digital advertising.
- The European Commission (2021) introduced the EU Artificial Intelligence Act, which proposes a risk- based regulation framework for AI systems. The paper emphasized that high-risk AI applications, such as targeted advertising, require robust compliance systems to safeguard users from abuse and prejudice.
- González-Jiménez et al. (2022) investigated customer views of AI-driven advertising and discovered that a lack of transparency lowers consumer trust. The authors proposed that regulatory measures play an important role in increasing trust in AI-based marketing strategies.
- Dwivedi et al. (2021) examined global AI usage in marketing and concluded that, while AI increases efficiency and customisation, regulatory concerns such as data protection, ethical use, and legal compliance persist across countries.
- Floridi et al. (2018) suggested ethical standards for AI governance, such as transparency, accountability, and human oversight. Their findings reinforced the necessity for international cooperation in regulating AI uses in digital advertising.
- Calo (2014) investigated the function of algorithms in influencing consumer behavior and concluded that AI-driven advertising can alter user decisions without their knowledge. The study stressed the importance of regulatory supervision to defend consumer autonomy and decision-making.
- Goodman and Flaxman (2017) examined algorithmic transparency and defined the "right to explanation" under data protection legislation. The study emphasized the importance of transparency in AI-based advertising systems to promote fairness and accountability.

- Kshetri (2021) examined worldwide approaches to AI governance and discovered significant differences in how governments regulate AI applications. The author stated that the lack of uniform regulations presents issues for global digital advertising platforms.

Research Methodology

- The primary data will be collected via a structured questionnaire. The questionnaire is created using a five-point Likert scale. The questions focus on: Perception of AI Ethics and Privacy, Trust in AI-powered digital advertising., Effectiveness of AI regulations, Respondents include students, professionals, and digital media consumers.
- Secondary data will be gathered from: Articles and research journal Books about regulation, digital marketing, and artificial intelligence Websites and online magazines

Chi-Square Test Hypothesis

- **H_0 (Null Hypothesis):** There is no significant relationship between awareness of AI regulations and trust in AI-based advertising.
- **H_1 (Alternative Hypothesis):** There is a significant relationship between awareness of AI regulations and trust in AI-based advertising.

Table1: Awareness of AI regulations and trust in AI-based digital advertising.

AWARENESS LEVEL	HIGH TRUST	LOW TRUST	TOTAL
HIGH AWARENESS	**42**	**18**	**60**
LOW AWARENESS	**20**	**20**	**40**
TOTAL	**62**	**38**	**100**

Chi-Square Results Chi square value = 3.84 Degree of freedom- 1

Interpretation

Reject Ho. Trust in AI-based digital advertising is significantly correlated with knowledge of AI regulations. So there is high level of awareness in AI and also high level of Trust in AI based digital advertising.

Weighted Average Method

Table 2: Global AI regulations improve transparency in digital advertising.

OPINION	WEIGHT(W)	RESPONDENTS(X)	W*X
STRONGLY AGREE	**5**	**30**	**150**
AGREE	**4**	**40**	**160**
NEUTRAL	**3**	**18**	**54**
DISAGREE	**2**	**8**	**16**
STRONGLY DISAGREE	**1**	**4**	**4**
TOTAL		**100**	**384**

Weighted Average = $\Sigma(W \times X) / \Sigma X$

= 384 / 100

= **3.84**

Interpretation

The weighted average score of 3.84 shows that respondents generally agree that global AI regulations enhance transparency in digital advertising.

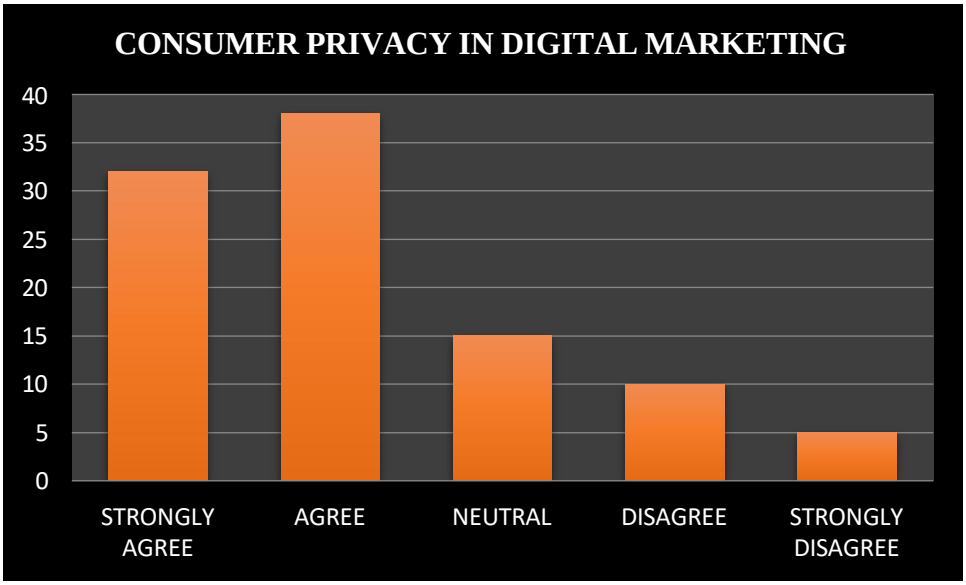
Percentage Test

Table 3: AI regulations are necessary to protect consumer privacy in digital advertising

OPINION	NO OF RESPONDENT	PERCENTAGE %
STRONGLY AGREE	**32**	**32 %**
AGREE	**38**	**38 %**
NEUTRAL	**15**	**15 %**
DISAGREE	**10**	**10 %**
STRONGLY DISAGREE	**5**	**5 %**
TOTAL	**100**	**100 %**

Interpretation

Strong support for regulatory oversight in digital advertising is demonstrated by the majority of respondents (70%) who concur that AI restrictions are required to preserve consumer privacy.



Findings

- Artificial intelligence has increased efficiency in digital advertising, but regulation is required to address ethical and privacy concerns.
- Global regulations promote the fair, transparent, and responsible use of artificial intelligence in advertising.
- The lack of consistent global AI standards remains a significant barrier for digital advertising operating across borders.
- The majority of respondents strongly believe that AI laws are required to preserve consumer privacy in digital advertising. Most respondents believe that unregulated AI-based advertising can lead to the misuse of personal information.
- Respondents believe global AI policies promote transparency and ethical standards in digital advertising. Respondents agree that AI restrictions help to enhance consumer trust in digital advertising. The majority of respondents have a good attitude toward regulation rather than unlimited freedom in AI- based advertising.
- A strong correlation between trust in AI-based digital advertising and knowledge of AI regulations.AI- driven ads are more trusted by respondents who are more aware of AI regulations. Consumer trust in digital advertising is significantly influenced by regulatory framework awareness.

Conclusion

The report concludes that artificial intelligence has considerably improved digital advertising targeting, customization, and operational efficiency. However, the growing use of

AI has created severe questions about data privacy, transparency, ethical behaviour, and customer trust. The study's findings clearly show that respondents strongly support the need to regulate artificial intelligence in internet advertising. According to the percentage study, most respondents think that rules pertaining to AI are necessary to safeguard consumer privacy. The weighted average approach demonstrates a favorable opinion of international regulatory frameworks like the EU AI Act and GDPR, emphasizing their contribution to improving ethical advertising practices and transparency. Additionally, the chi-square test demonstrates a strong correlation between trust in AI-based digital advertising and knowledge of AI rules. Overall, the study underscores the importance of effective artificial intelligence regulation in guaranteeing responsible, fair, and transparent digital advertising practices. While global trends indicate increased efforts to regulate AI, issues such as a lack of universal rules, rapid technology improvements, and compliance complexities persist. As a result, constant legislative changes, global cooperation, and enhanced stakeholder awareness are required to strike a balance between innovation and consumer safety in AI-powered digital advertising.

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ChatGPT as A Trip Advisor – Travellers Perspective

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Abstract

In today's modern age, ChatGPT has become an important tool in travel planning. Travellers make quicker and more informed decisions with the help of AI generated content thereby reducing the time and effort. The ability to summarize complex information into simple terms and create customized suggestions makes it a convenient digital assistant for improving the overall travel decision-making process. This study aims to find out the factors influencing tourists such as efficiency, convenience, personalisation, information clarity to use ChatGPT for their travel planning. The mediation role of perceived trust worthiness was also analysed. Primary data was collected through standard questionnaire. Statistical tools such as correlation, SEM analysis were used to analyse data. Results revealed that there is a strong relationship between the factors and tourist decision making and planning. This research contributes to the tourist marketers by emphasizing the importance of enhanced presence on digital platforms, communicating their service clearly and to promote unique experiences to their travellers or customers.

***Keywords**: Generative AI, ChatGPT, tourist, travel decision, trustworthiness*

Introduction

The evolution of Artificial Intelligence is set to bring about a technological paradigm shift which is expected to revolutionize and improve the technologies in the Hospitality and Tourism Industry (Ivanov and Soliman, 2023). The AI chatbot named 'ChatGPT' has the ability to respond to any query using 'Natural Language Processing' which has the potential to mimic conversations that happen between humans. This means that a tourist using the AI chatbot system would be able to converse with a system which understands their queries and gives them precise answers, with the ability to even give recommendations about their journey (Foroughi. B et.al, 2025) This is set to revolutionize the travel process as one could get 'unique local experience ideas' as well as 'real time hotel and restaurant' recommendations using the AI chatbot system (Mich

and Garigliano, 2023, Wong et. Al, 2023)). It helps travellers with destination choices, planning trips, and budget calculations for travel options, and thus helps make decisions. ChatGPT reduces planning anxiety and boosts confidence for travellers. With the ability to adjust travel suggestions according to the preferences of travellers, planning travel becomes more efficient and satisfying for travellers with the use of ChatGPT. The service providers in the travel industry like hotels and restaurants will greatly benefit from the integration of ChatGPT in their daily enquiries (Dwivedi et al., 2023). By providing instant and accurate feedback to customers, ChatGPT will assist hotels, travel agencies, and other service providers to offer 24/7 customer services, thus decreasing response time and costs of operations for the service providers. By adopting ChatGPT, service providers will gain increased efficiencies and effectiveness, along with customer satisfaction, and ultimately leading to increased customer loyalty and customer dollar benefits (Kumar et al., 2024).

The fast adoption of ChatGPT excites and arouses academic curiosity to examine the implications, challenges, and associated benefits of ChatGPT. There is very less research done on the factors contributing to ChatGPT usage for travel planning process. Additionally, there is a limited understanding of how factors such as efficiency, convenience, personalisation and information clarity affect travel planning process. Based on the gaps, the study aims to find out the direct and mediating effects of the factors and perceived trustworthiness in the travel planning context or visit intention process using ChatGPT recommendation. The objectives of the study are

1. To find out the factors influencing tourists to use ChatGPT for travel planning.
2. To analyse the mediating role of perceived trust worthiness between factors influencing tourists to use ChatGPT and travel planning process.

Theoretical Framework & Hypothesis Development

The adoption of chatbots in the tourism and hotel industry has brought a significant change in the communication between tourists and service providers (Calvaresi et.al, 2021). ChatGPT can effectively help tourists gain information regarding their planned activities. Efficiency in travel planning is very important considering the different tourist sites and culture. The capability of ChatGPT to offer prompt and correct

answers could play a significant role in determining the usage of ChatGPT (Foroughi. B et.al, 2025). Several studies examined that customers tend to user friendly systems, which consume less time and efforts. This is because customers do not have a lot of time to spend on a single activity and are focused on accomplishing the task as soon as possible and convenience matters the most in choosing a decision (Vimal Kumar et al., 2021, Shneiderman et.al, 2016).

With the help of ChatGPT technology, organizations have the capability to develop chatbots that are able to automatically communicate with customers, thereby allowing the provision of customized answers. In some cases, the ChatGPT system has the capability to offer immediate answers to frequently asked questions or basic customer service inquiries without requiring human assistance (Harahap, Sutrisno, et al., 2023). ChatGPT has the ability to provide personalized recommendations for product/service (Dwivedi et al., 2023). The internet allows for a rapid means of obtaining information regarding tourist attractions, accommodation facilities, restaurants, and air fare prices. The vast amount of complicated information poses a potential problem for tourists, especially for first-time visitors to the area and ChatGPT has been identified as a solution for this major challenge (Gursoy et al., 2023). ChatGPT has the ability to provide recommendations for obtaining information through the search engine optimization of available data from existing systems, thus providing relevant and accurate information (Ausat, Suherlan, et al., 2023) Based on the past literature, the independent constructs of this study are Efficiency, Convenience, Personalisation and Information Clarity. The dependent construct is Travel planning using ChatGPT recommendation. Therefore the hypothesis is,

H1: Efficiency, Convenience, Personalisation, Information Clarity has significant relationship with the Travel planning process

Perceived Trustworthiness as a Mediator

Perceived trust is defined as the tourists' trust in the capability of ChatGPT to offer genuine, reliable, and up-to-date information (Palos-Sanchez et al., 2021) Tourists who question the integrity and competence of ChatGPT would probably refrain from making use of this application to acquire related tourist services. (Dwivedi, Kshetri, et al.,

2023). Study conducted in US, revealed that if users trust ChatGPT, they may be more likely to form positive attitudes and develop an intention to use it. Therefore, user intentions to use ChatGPT could be a pathway through which trust in the technology can partially mediate its effect on actual use. (Xu Han et.al, 2024). Based on this premises, the hypothesis is as follows:

H2: Perceived Trustworthiness mediates the relationship between factors influencing tourists to use ChatGPT and travel planning process.

Methodology

The study employed quantitative methods gathering primary data from structured questionnaire. The questionnaire was adopted from S Gupta et.al, (2024), J. E Collier et. al, (2013), Büttner, O. B., & Göritz, A. S. (2008), Foroughi. B et.al (2025) and rephrased to the current study. The data was collected from 74 respondents in Chennai city using convenience sampling method. Participants responses were collected on a 5-point likert scale ranging from 5-Strongly Agree to 1 – Strongly Disagree and was analysed using statistical tools.

Analysis and Findings

Descriptive Statistics

Table 1 – Statements showing Mean and SD

Statements	Mean	SD
The travel planning process gets simplified by combining information in one place through ChatGPT (Efficiency)	**4.54**	**0.637**
It is easy to use information given to plan the trips (Convenience)	**4.39**	**0.637**
The travel itinerary was relevant to me personally (Personalisation)	**4.35**	**0.766**
ChatGPT gives me an opportunity to find out solution for further relevant queries (Information Clarity)	**4.49**	**0.707**
I feel safe when I use ChatGPT for travel information (Perceived trust)	**3.97**	**0.844**
I expect to use ChatGPT to plan my future trips (Travel planning)	**4.57**	**0.643**

From the following table, it is clear that most of the people expect to use ChatGPT in future for their trips because of its Efficiency (4.54), Information Clarity (4.49), Convenience (4.39) followed by Personalisation and Perceived Trustworthiness.

Hypothesis 1: Efficiency, Convenience, Personalisation, Information Clarity has significant relationship with the Travel planning process

Table 2 - Karl Pearson Correlation Coefficient between Factors influencing tourists to use ChatGPT

Factors influencing Tourists	E	C	P	IC	PT	TP
Efficiency	1	.778**	.666**	.828**	.264*	.807**
Convenience	.778**	1	.631**	.650**	.201	.651**
Personalisation	.666**	.631**	1	.631**	.130	.620**
Information Clarity	.828**	.650**	.631**	1	.193	.738**
Perceived Trustworthiness	.264*	.201	.130	.193	1	.337**
Travel planning process	.807**	.651**	.620**	.738**	.337**	1

** denotes significant at the 1% level, * denotes significant at 5% level

From the above table, correlation coefficients between factors such as efficiency, convenience, personalisation, information clarity and travel planning process indicates a strong and positive relationship and is significant at 1% level. Perceived trustworthiness exhibits moderate and weak relationship with the factors at 5% level but it is significant with the travel planning process at 1% level. Hence, H1 is supported.

Table 3 shows the Cronbach's alpha, Composite reliability value associated with the variables. The value exceeded the threshold value (0.903, 0.906 > 0.70) Hence there is a adequate reliability and validity.

Table 3 – Validity and Reliability indices

Cronbach's alpha	**0.903**
Composite Reliability	**0.906**

Table 4 - In order to assess the model, multiple indices were used. The CFI value 1.000 (> 0.95) and GFI value 0.999 (>0.90) which signifies that model is better fit to the data.

Table 4 – Model Fit Indices

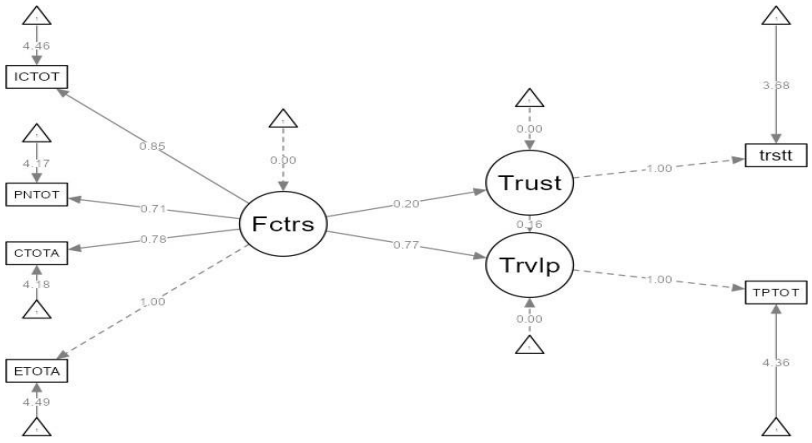
Comparative Fit Index	**1.000**
Goodness of Fit Index	**0.999**

Table 5 shows the measurement model results and all the standardized loading values are greater than 0.70, thereby signifying the strong validity.

Table 5 – Factor Loadings

Construct	Indicator	Standardized loading	p value
Factors influencing tourists	Convenience	0.801	<0.001
	Personalisation	0.716	<0.001
	Information clarity	0.861	<0.001

SEM – Path diagram



From the above diagram, it is clear that all factors ie. Efficiency, Convenience, Personalisation and Information clarity has a strong relationship as their path

coefficients exceed the threshold value of 0.70. The findings revealed that there is a direct path between Factors influencing tourists to use ChatGPT, Trust and Travel planning process. Trust as a strong mediator is not supported by the above findings which is given in the table below.

Hypothesis 2: Perceived Trustworthiness mediates the relationship between factors influencing tourists to use ChatGPT and travel planning process

Table 6 – Mediation Analysis Summary

Path	Indirect effect (Beta)	z	p
Factors ->Trust->Travel planning	0.033	1.506	0.132

As the p value is larger that 0.05, the mediated effect between factors, trust and travel planning are not significant. This means that trust has a direct effect on the travel planning process.

Findings and Conclusion

1. The ability of giving efficient information at a less time and effort, convenience of using generative AI tools, planning trips using information generated and personalised recommendation influences the tourists to use ChatGPT for Travel planning process. Hence, the tourism marketers should concentrate on how to position their brand on digital platforms and communicate their services online so that the contents reach targeted tourists effectively.
2. Perceived Trustworthiness of ChatGPT directly affects the Travel planning process. All the factors such as Efficiency, Convenience, Personalisation and Information

   Clarity have a direct effect on Travel planning process rather than through trust. This means that travellers are more influenced by functional aspects of ChatGPT rather than trust-based evaluations.

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Digital Drivers of Green Purchase Behaviour

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Abstract

The growing influence of digital technologies has changed how people find, compare, and purchase eco-friendly products online. This study explores how social media engagement, influencer recommendations, AI-driven personalization, and online sustainability information shape consumers' green purchasing behavior. As awareness of environmental issues increases, understanding the impact of these digital touch points is important for marketers and policymakers. Using a quantitative approach, data were collected from active social media users who followed sustainability-related content. This study examines the interactions between digital exposure, credibility, environmental concern, and purchase intention. The findings show that AI- based suggestions and trusted influencers greatly improve consumer confidence and perceived value of eco-friendly products. Clear and honest sustainability information shared through digital platforms also strengthens positive attitudes and helps to reduce the common intention–action gap. Overall, this study identifies the key digital factors that motivate green purchasing and offers practical insights for designing effective and credible digital campaigns.

***Keywords**: Digital marketing; Green purchase behavior; Social media influence; AI-driven personalization; Sustainable consumption*

Introduction

Digital technologies have become a major part of everyday life, influencing how people search for information and make purchasing decisions. This shift is especially visible in the way consumers explore and buy eco-friendly products online. Social media posts, influencer recommendations, AI-based product suggestions, and clear sustainability information all play a growing role in shaping how consumers view green products. As

environmental awareness increases, people are paying closer attention to the credibility and transparency of the digital content they come across. Yet, many consumers still struggle with the intention action gap they want to buy eco-friendly products but do not always follow through. Understanding how different digital touchpoints influence trust, attitudes, and purchase decisions are therefore essential. This study aims to identify which digital factors most strongly encourage green purchasing and offer useful insights for marketers and policymakers working to promote more sustainable consumer choices.

Objectives

1. To explore how social media engagement, influencer recommendations, and AI-driven suggestions influence consumers' green purchase behavior.
2. To understand how online sustainability information affects credibility, environmental concern, and purchase intention.
3. To identify the digital factors that help reduce the intention action gap and motivate consumers to choose eco-friendly products.

Review of Literature

The Role Of Social Media In Green Marketing: How Eco-Friendly Content Influences Brand Attitude And Consumer Engagement- Elnur Nabivi This study explores the cross- cultural impact of eco-friendly social media content on consumer behavior in Poland and the United States. The results show that green posts enhance perceived relevance, entertainment, and informativeness, leading to more positive brand attitudes, higher purchase intentions, and increased word-of-mouth. Cultural differences highlight the need for tailored green marketing strategies across markets.

The Influence Of Eco-Friendly Marketing Tools On Sustainable Consumer Choices: A Comprehensive Review Study - Swapna Swarupa Mallick, Sweta Leena Hota, Arya Kumar, Himanshu Agarwall This study examines how eco-friendly marketing tools such as environmental advertising, eco-labels, and eco-brands influence consumer behavior and sustainable purchasing decisions. The findings show that certifications, emotional appeal, brand authenticity, transparency, persuasive messages, and visual cues play a key role in shaping consumer preferences and purchase behavior.

Consumer Preference for Eco-Friendly Products in Relation to Sustainability Awareness - Amul Tamboli , Mustafizul Haque , Yogesh Jojare , Amol Ohol This study explores how sustainability education shapes consumers' preferences for eco-friendly products. Using nationwide survey data and regression analysis, it finds that higher environmental awareness strongly encourages green purchasing behavior. The results offer useful insights for policymakers and marketers seeking to promote sustainable consumption, especially in developing countries.

Research Methodology

Research design	Descriptive method
Sampling technique	Convenience sampling technique is used for collecting response form the respondents
Sample area	Chennai
Sample size	157 samples are taken into consideration for the purpose of analyzing the data in this research process.
Period of study	2 months
Analysis Tools	Reliability test, Percentage analysis, Friedman's T-Test and ONE-WAY ANOVA.

Data Collection

- Primary data: well-structured questionnaire

Reliability Analysis

Table1: showing Reliability statistics

Cronbach's Alpha	N of Items	Respondents
.869	24	157

Interpretation: The Cronbach's Alpha value of **0.869** for 24 items indicates high internal consistency of the scale. This confirms that the questionnaire is reliable and suitable for further analysis.

- Secondary data: Books, Journal, Web sources, Research articles.

Data Analysis:

✓ **Percentage Analysis**

Table 2: showing Demographic profile of the respondents

Demographic Variable	Particulars	Percentage	Interpretation
Age	26-45years	60.6%	Majority are young and middle-aged, digitally active consumers
Gender	Female	58.6%	Higher female participation in green purchase behavior
Educational qualification	UG	91.1%	Respondents are highly educated and sustainability-aware
Occupation	Employed	67.5%	Working professionals dominate the sample
Monthly Income	₹20,001–₹60,000	58.6%	Middle-income groups play a key role in green purchasing

✓ **Friedman's T-Test**

Table 3: showing the Ranks given for Digital Drivers Affecting Eco-Friendly Purchase Decisions

Digital Drivers Affecting Eco-Friendly Purchase Decisions	Mean Rank	Rank
Social media encourages me to consider buying eco-friendly products	4.08	1
Influencer reviews help me decide whether to buy sustainable products	3.93	2
I trust AI-generated suggestions for eco-friendly products	3.86	3
I rely on online information to compare the sustainability	3.10	5
I believe most online sustainability information is credible	2.89	6
I am more likely to purchase eco-friendly products after seeing them online	3.15	4

Interpretation: The Friedman test results show a statistically significant difference among the digital factors influencing green purchase behavior. This indicates that respondents do not perceive all digital drivers equally. Social media encouragement (4.08) is the most influential factor, followed by influencer reviews (3.93) and AI-generated suggestions (3.86), while credibility of online sustainability information (2.89) has the least influence.

One-Way ANOVA

Ho: There is **no significant** difference between gender of the respondents in their likelihood of trying eco-friendly products due to influencer recommendations.

Ha: There is a **significant** difference between gender of the respondents in their likelihood of trying eco-friendly products due to influencer recommendations.

Table 4: showing gender of the respondents in their likelihood of trying eco-friendly products due to influencer recommendations.

		Sum of Squares	df	Mean Squar e	F	Sig.
I trust influencers who promote eco-friendly products.	Between Groups	1.372	1	1.372	2.714	.101
	Within Groups	78.360	155	.506		
	Total	79.732	156			
Influencer reviews help me decide whether to buy sustainable products.	Between Groups	1.632	1	1.632	3.788	.053
	Within Groups	66.801	155	.431		
	Total	68.433	156			
Recommendations from influencers increase my confidence in eco-friendly brands.	Between Groups	.362	1	.362	.707	.402
	Within Groups	79.345	155	.512		
	Total	79.707	156			
I am more likely to try an eco-friendly product if a trusted influencer suggests it.	Between Groups	.016	1	.016	.032	.858
	Within Groups	77.653	155	.501		
	Total	77.669	156			

Variables	Sig. Value	Significant / Insignificant	Accept / Reject Ho
Trust in influencers who promote eco-friendly products	.101	Insignificant	Accept Ho
Influencer reviews help decide to buy sustainable products	.053	Insignificant	Accept Ho
Influencer recommendations increase confidence	.402	Insignificant	Accept Ho
Likelihood of trying an eco-friendly product due to influencers	.858	Insignificant	Accept Ho

Interpretation: The ANOVA results indicate no significant difference between male and female respondents regarding influencer recommendations and eco-friendly purchase behaviour. Hence, the null hypothesis is accepted for all variables**.**

Suggestions

- ✓ Marketers should focus more on social media content and influencer collaborations, as they strongly influence green purchase decisions.
- ✓ AI-driven personalized recommendations can be used to improve consumer confidence in eco-friendly products.
- ✓ Brands should ensure clear, honest, and transparent sustainability information to build long-term trust among consumers.

Conclusion

This study concludes that digital platforms play a vital role in shaping green purchase behavior. Social media, influencers, and AI-based suggestions significantly encourage eco-friendly buying, while gender differences are minimal. Overall, effective and credible digital strategies can help reduce the intention–action gap and promote sustainable consumption.

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Mindful Markets: Psychology Behind Green Capitalism

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Abstract

This study examines the psychological aspects of green capitalism through the lens of social media content. Adopting a qualitative approach, posts from Instagram were analyzed to explore how sustainability, eco-friendly products, and green consumer behaviors are discussed online. Social media provides a dynamic space where individual perceptions, motivations, and collective attitudes toward environmental responsibility are expressed and shared. Using thematic analysis, the study focuses on identifying patterns related to consumer mindset, motivation, and engagement with green capitalism. The research highlights the potential of digital platforms to reflect and shape eco-conscious behavior, offering insights into the interaction between psychology and market-driven sustainability. This approach provides a foundation for understanding the psychological factors that influence participation in sustainable practices and the ways social media mediates these processes. The study is relevant for scholars, marketers, and policymakers interested in the intersection of psychology, sustainability, and digital media.

***Keywords**: Green capitalism, psychology, social media, sustainability, consumer behavior*

Introduction

Green capitalism is an economic and environmental concept that suggests market systems can be reshaped to address ecological degradation while still promoting economic growth. At its core, green capitalism posits that environmental protection and profit incentives can coexist. Advocates argue that embedding ecological value within markets for example through sustainable finance, clean technologies, and carbon pricing mechanisms will encourage businesses and investors to pursue environmentally friendly practices alongside traditional profit motives (Sustainability Directory, 2025; Energy Monitor, 2024)

This approach assumes that markets can internalize environmental costs and redirect

capital toward sustainable activities. Tools often cited under green capitalism include carbon trading, renewable energy investment, eco-innovation, and consumer demand for environmentally responsible products and services. In theory, these mechanisms align private economic goals with broader environmental aims, potentially stimulating the growth of "green" industries without abandoning capitalism itself (Treehouse, 2022; Energy Monitor, 2024)

The appeal of green capitalism has grown alongside global recognition of climate change, biodiversity loss, and resource depletion. Proponents see it as a pragmatic way to confront these crises within existing socio-economic structures, leveraging investment flows and technological innovation to transition toward net zero and sustainable development pathways. This perspective suggests that economic expansion and environmental stewardship, when properly incentivized, need not be mutually exclusive (Sustainability Directory, 2025)
Despite its theoretical promise, green capitalism faces substantial critique. Critics argue that capitalism's reliance on perpetual growth and profit maximization runs counter to ecological limits and long-term sustainability. Some scholars contend that market-based solutions often result in superficial changes or "greenwashing," wherein corporations adopt environmentally friendly branding without substantive ecological impact. Further, critics highlight structural barriers within capitalism that may hinder meaningful environmental progress, such as entrenched power relations, unequal distribution of resources, and the commodification of nature itself (Human Rights Pulse, 2025; Manchester Global Social Challenges, 2023)

Corporate Watch Perspective on Green Capitalism

Corporate Watch presents green capitalism as a misleading and fundamentally flawed response to environmental crises. From this perspective, green capitalism does not challenge the structures that cause ecological destruction. Instead, it adapts capitalism to environmental concerns in ways that preserve corporate power and profit. Corporate Watch argues that capitalism has historically expanded by turning crises into new opportunities for accumulation, and environmental crises are no exception (Corporate Watch, 2017).

According to this critique, green capitalism works by transforming nature into a set of marketable assets. Concepts such as carbon trading, biodiversity offsets, and ecosystem services reduce complex ecological systems into commodities that can be bought, sold, and

traded. Corporate Watch contends that this process allows corporations to continue environmentally damaging activities while appearing environmentally responsible, often through accounting mechanisms rather than real reductions in harm (Corporate Watch, 2017). Corporate Watch also emphasizes that green capitalism shifts responsibility away from systemic change and places it onto markets, consumers, and voluntary corporate action. This framing obscures the role of large corporations and state policies in producing environmental degradation. The organisation argues that many "green" initiatives function as greenwashing, legitimising continued extraction and inequality under a sustainability narrative (Corporate Watch, 2017).

Overall, Corporate Watch concludes that green capitalism is not a solution to the ecological crisis but a strategy to sustain capitalism itself. By maintaining growth, profit, and private ownership as non-negotiable principles, green capitalism reproduces the same dynamics that caused environmental destruction in the first place, while presenting them as environmentally progressive (Corporate Watch, 2017). Green consumption is about more than just purchasing green products (Wu et al. 2023)

This growing body of literature frames green capitalism not just as a policy choice, but as a contested terrain where environmental goals intersect with economic imperatives. By exploring both supportive arguments and critical perspectives, this paper aims to clarify the conceptual foundations of green capitalism, assess its practical applications, and examine whether it offers a credible pathway toward sustainable development

Psychology and green Capitalism

The interplay between human psychology and the natural environment has gained significant global attention in recent years. Green psychology, such as ecopsychology, is part of environmental psychology and investigates the psychological, emotional, and cognitive effects of nature on individuals and society. It explores the intricate relationship between human beings and nature, emphasizing the psychological benefits and behaviors associated with nature engagement and sustainability outcomes. Extant research has consistently shown that a stronger "human nature connection" is associated with pro-environmental attitudes, conservation and ecological awareness, adoption of sustainable lifestyle choices, and the development of an environmental identity (Klaniecki et al., 2018; Martin et al., 2020; Gansser and Reich, 2023).

Since the beginning of the 21st century, environmental psychologists have been particularly concerned with the link between human behavior and the anthropogenic destabilization and destruction of global ecosystems, most prominently in the case of anthropogenic climate change. Recognizing climate change as a major threat to the foundations of human existence (Intergovernmental Panel on Climate Change, 2022a, pp. 10–21), environmental psychologists investigate the underlying reasons for environmentally significant human behavior, the potential for behavior change, as well as concrete measures and interventions to foster behavior change. The unifying objective of theoretical and practical efforts in the field is that of ecological, social, and economic sustainability (Steg et al., 2013, p. 4).

Better understanding people's motivation to engage with, stay active in, and promote social movements currently has gained a lot of momentum in the environmental psychologists' community (Wallis et al., 2021). Environmental psychologists are currently striving to integrate theories from their field with this perspective to better understand how individual behavior change is embedded in large-scale societal transformation processes (e.g., Wallis et al., 2021; Wullenkord and Hamann, 2021)

The mindsponge theory framework provides a valuable perspective for analysing how information about green consumption impacts an individual's mind and thus influences their green consumption behaviours (Nguyen and Jones 2022; Vuong 2023). The theory maintains that individuals reshape their psychological cognition through the absorption and filtration of external information, which in turn impacts and alters their behaviour. This makes mindsponge theory widely applicable in social science research (Nguyen et al. 2022). As a key component of mindsponge theory – information processing – incorporates a cost-benefit analysis, the principle of diminishing marginal utility.

Critical psychology literature argues that capitalism itself shapes psychological processes such as competition, individualism, and consumer identity. From this perspective, green capitalism is seen as reproducing the same psychological patterns that drive overconsumption, while rebranding them as environmentally responsible. These scholars argue that without addressing how capitalist systems influence desires, values, and identities, green capitalism risks becoming a psychological adaptation to crisis rather than a genuine solution (Adams et al., 2019).

Studies in Humanities and Social Sciences Communications highlight how perceived psychological costs, such as inconvenience or reduced comfort, influence green consumption behaviour. Findings suggest that individuals are more likely to adopt sustainable practices when they perceive personal value and minimal sacrifice. In green capitalism, such research supports strategies that make sustainability attractive and effortless, often through product design and marketing, while leaving underlying production and growth models largely intact (Zhang et al., 2024).

Work published in Progress in Brain Research examines the cognitive and neural mechanisms underlying sustainable consumption. This research shows that habits, heuristics, and reward systems play a central role in shaping environmentally relevant decisions. From a green capitalism perspective, these insights are used to design interventions that encourage sustainable consumption without challenging the broader capitalist structure. This reinforces the idea that environmental change can occur through behavioural modification within existing economic systems (van Vugt & Griskevicius, 2020).

Research Problem

Green capitalism is increasingly promoted through social media, yet there is limited psychological understanding of how online content shapes consumer perceptions, motivations, and engagement with eco-friendly products and sustainability narratives. While digital platforms actively circulate green messages, the psychological processes behind how individuals interpret and respond to these messages remain underexplored.

Objectives of the Study

- To examine how green capitalism is represented in Instagram content related to sustainability and eco-friendly consumption.
- To identify psychological themes linked to consumer mindset, motivation, and engagement with green consumer behavior.
- To explore how social media functions as a space that reflects and influences eco-conscious attitudes and practices.

Thesis / Central Assumption

This study argues that social media not only mirrors existing environmental attitudes but also actively shapes psychological engagement with green capitalism by influencing consumer motivation, perception, and participation in sustainable practices.

Literature Review

1. Gulzar et al. (2024), Sustainability consciousness and green purchasing intention: An application of the Theory of Planned Behaviour in tourism, examined sustainability consciousness and attitudes as predictors of green purchasing intention among tourists. Using a survey (N ≈ 384), the study found that attention to green communication and positive attitudes significantly predicted green purchase behaviour, while climate change awareness alone did not, highlighting the psychological role of selective attention and attitudes.
2. Mastria, Vezzil, and De Cesarei (2023), Motivational and emotional determinants of sustainable consumer behaviour: A systematic review, reviewed 40 publications to explore psychological drivers of sustainable behaviour. The findings showed that symbolic value, dispositional motivation, and contextual influence shape green product preferences, indicating that motivations beyond rational choice are central to sustainable consumption.
3. Majumder, Gangopadhyay, and Biswas (2025), Gender differences in green purchase intention: A Theory of Planned Behaviour approach, tested the TPB with 306 respondents. Results showed that attitude and environmental concern significantly influenced green purchase intention among females but not males, suggesting variation in psychological responsiveness to sustainability cues.
4. Discover Sustainability (2025), Personality traits and green purchase intention: A structural equation modelling approach, examined consumer green behaviour using PLS-SEM with 688 Chinese consumers. Findings indicated that traits such as openness and conscientiousness influenced values and experience, which in turn shaped green purchase intention, highlighting the role of personality psychology.
5. Pro-Environmental Self-Identity Study (2024), Self-identity and past behaviour as predictors of sustainable clothing consumption, tested an extended TPB model. Results showed that self-identity and past behaviour were stronger predictors of actual green consumption than attitudes or perceived behavioural control, emphasizing identity-based psychological processes.
6. Understanding Green Consumption (2025), Socially responsible attitudes and sustainable buying intention, assessed green consumption intention using value-based scales. The study found that environmental and social values positively predicted intention, demonstrating how psychological values shape eco-friendly choices.

7. Gulzar et al. (2024), Green purchasing intention in tourism destinations: The role of attitudes, sustainability consciousness, and experience, studied 422 tourists using TPB-based measures. Environmental attitude and sustainability consciousness emerged as strong predictors of green purchasing intention, reinforcing the psychological foundations of market-based sustainability.
8. White, Habib, and Hardisty (2019), How to SHIFT consumer behaviors to be more sustainable, examined moral and identity-based motivations using experimental and survey designs. Findings showed that moral identity and social norms strongly motivated green consumption, supporting the psychological basis of green capitalist strategies.
9. van Vugt and Griskevicius (2020), The psychology of sustainable consumption, used evolutionary and cognitive psychology frameworks to analyse sustainable behaviour. The study concluded that status, rewards, and identity play key roles, showing how capitalist markets harness psychological incentives for sustainability.
10. Zhang et al. (2024), Do psychological costs matter? Perceived value and green consumption behaviour, investigated perceived value and psychological cost among 512 consumers. Results showed that low inconvenience increased green consumption, suggesting sustainability succeeds when aligned with comfort and self-interest.
11. Venugopalan et al. (2023), Green psychology: Nature and scope for sustainability, discussed psychological foundations of sustainability using behavioural and motivational constructs. The study argued that green approaches often place responsibility on individuals rather than addressing systemic economic structures.
12. Tong, Wang, and Feng (2025), Beyond first purchase: Psychological determinants of continuance intention in sustainable consumption, used an extended TPB model with 588 consumers. Identity and habit strength were stronger predictors than attitudes, showing how green capitalism sustains behaviour through internalisation.
13. Adams et al. (2019), Where is capitalism? Unmasking its psychological influence, provided a critical theoretical review. The authors argued that capitalism shapes desires and identity, and that green capitalism reproduces these psychological patterns under an environmental narrative.
14. Haws, Winterich, and Naylor (2016), Seeing the world through green-tinted glasses: Green consumption values and consumer responses, used the Green Consumption Values scale with 673 U.S. consumers. Strong green self-identity predicted willingness to pay more for green products, highlighting identity-based motivation.

15. Buerke et al. (2017), Moral obligation and green consumption behaviour, examined moral norms among 402 European consumers. Moral obligation significantly predicted green buying behaviour, indicating the importance of moral psychology in sustainable markets.
16. Steg, Perlaviciute, van der Werff, and Lurvink (2018), The significance of biospheric values for environmentally responsible behaviour, used value orientation scales across European samples. Biospheric values were the strongest predictors of sustainable behaviour, demonstrating the role of psychological value systems.
17. Sörqvist and Langeborg (2019), Green nudges and choice architecture in sustainable decision-making, used experimental designs with 360 participants. Subtle environmental cues significantly influenced green choices, showing how behavioural psychology guides consumption without changing production
18. Nielsen, Clayton, Stern, Dietz, and Capstick (2021), Psychological barriers to climate change mitigation, analysed survey data from 1,200 adults. Findings showed that denial and low perceived efficacy limited sustainable action, reinforcing green capitalism's focus on individual behaviour.
19. Gifford and Chen (2023), Why people resist sustainable consumption, used mixed methods with 487 consumers. Perceived threats to comfort, freedom, and identity reduced green behaviour adoption, suggesting sustainability succeeds only when psychologically acceptable.
20. Hartmann and Apaolaza-Ibáñez (2017), Consumer emotional responses to green brands, examined emotional mediators among 410 European consumers. Pride and moral satisfaction significantly mediated purchase intention, showing that green capitalism operates through emotional rewards as well as cognition.

Methodology

Research Design

The study adopted a qualitative research design to explore the psychological dimensions of green capitalism as represented on social media. A qualitative approach was chosen to capture meanings, perceptions, and patterns embedded in user-generated content rather than measuring predefined variables.

Data Source and Sample

The data consisted of public Instagram posts related to sustainability, eco-friendly products, and green consumer behavior. Posts were collected using relevant hashtags such as #sustainability, #ecofriendly, #green products, and #conscious consumption. A purposive sampling method was used to select posts that directly discussed or promoted green consumption. The final sample included posts that contained textual captions, excluding advertisements without descriptive content.

Tools for Data Collection

Instagram served as the primary data source. Captions and accompanying textual elements from selected posts were manually documented and anonymised to maintain ethical standards. No personal identifiers of users were recorded.

Data Analysis

The data were analysed using thematic analysis following Braun and Clarke's six-step framework. The process involved familiarisation with the data, initial coding, theme generation, theme review, theme definition, and reporting. An inductive coding approach was used, allowing themes to emerge from the data rather than being imposed in advance.

Ethical Considerations

Only publicly available content was used for analysis. User anonymity was preserved by removing usernames, images, and identifiable details. The study adhered to ethical guidelines for online qualitative research.

Results

The findings reveal that social media both supports authentic eco-conscious motivation and reinforces problematic, market-driven sustainability narratives that can create pressure and performative behavior.

S No	Major theme	Codes	Explanation
1	Moral Identity and Ethical Commitment	Ethical responsibility	Users frame green consumption as a genuine
		conscious lifestyle	

		environmental care value-driven choices	moral commitment. Eco-friendly practices are linked to personal values and a sense of ethical responsibility toward the environment
2	Emotional Motivation and Empowerment	Hope, pride, optimism, small actions matter personal impact	Sustainability is encouraged through positive emotions. Posts highlight empowerment and emotional rewards, making green behavior feel achievable and meaningful.
3	Collective Engagement and Social Support	Community action encouragement shared goals social approval	Social media creates a sense of collective effort. Interaction and validation reinforce sustainable behavior and normalize eco-conscious practices
4	Performative Environme virtue signaling	 aesthetic sustainability, image-focused posts	Some content prioritises appearance over impact. Sustainability is used to enhance personal image rather than promote meaningful environmental action.
5	Market-Driven Greenwashing	Misleading eco-claims	Environmental concern is

		branding over substance, profit-focused sustainability	commodified. Products are marketed as "green" without clear evidence, raising doubts about authenticity and ethical intent.
6	Psychological Guilt and Pressure	Eco-guilt, moral pressure, fear of being irresponsible	Sustainability messages sometimes create guilt and anxiety. Users feel pressure to consume green products to avoid being seen as careless or unethical.

Discussion

The findings show that social media plays a strong psychological role in shaping engagement with green capitalism. Positive themes such as ethical commitment, emotional motivation, and collective engagement suggest that Instagram can encourage eco-conscious behaviour by linking sustainability to moral identity, hope, and social belonging. When users frame green choices as meaningful and achievable, motivation appears to be internally driven rather than forced.

At the same time, the negative themes reveal important psychological tensions. Performative environmentalism indicates that sustainability is sometimes used to manage social image rather than environmental impact. This supports concerns that online platforms reward visibility and aesthetics over genuine behavioural change. Market-driven greenwashing further complicates this process by presenting consumption as the primary solution to environmental problems, shifting responsibility from systemic change to individual purchasing. Psychological guilt and pressure highlight the emotional cost of green messaging. While moral framing can motivate action, it can also create anxiety and exclusion, especially when sustainable options are costly or inaccessible. This suggests that green capitalism on social media may unintentionally reinforce inequality and moral judgment, rather than inclusive environmental responsibility.

Conclusion

This study explored the psychological dimensions of green capitalism through an inductive thematic analysis of Instagram content. The results demonstrate that social media acts as a space where sustainability is morally framed, emotionally driven, socially reinforced, and commercially shaped. The study concludes that green capitalism on social media has a dual impact. It encourages eco-conscious attitudes and community engagement, while also promoting performative behaviour, consumer pressure, and market-led solutions. Understanding these psychological processes is essential for developing more ethical and effective sustainability communication.

The findings offer valuable insights for researchers, marketers, and policymakers by highlighting the need to balance motivation with authenticity and inclusion. Future research can extend this work by examining other platforms, comparing cultural contexts, or exploring how users internalise and resist green capitalist narratives over time.

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AI – Driven Hyper – Personalization and Its Impact on Consumer Buying Behaviour

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Abstract

The quick development of artificial intelligence (AI) has revolutionized contemporary marketing, and hyper-personalization has become a potent instrument for influencing consumer purchasing decisions. Hyper-personalization delivers highly relevant product recommendations, personalized messages, and unique customer experiences by utilizing cutting-edge AI techniques like machine learning, predictive analytics, and real-time data processing. This study looks at how consumer purchase intention, decision-making, brand engagement, and long-term loyalty are influenced by AI-driven hyper-personalization. The study examines important aspects like perceived relevance, trust, privacy concerns, and satisfaction using a mixed-method approach that includes surveys and consumer case studies. It is anticipated that the results will demonstrate how AI-based hyper-personalized marketing greatly improves purchase decisions, boosts conversion rates, and increases customer loyalty—while also posing ethical concerns about data usage and privacy. This study offers insightful information for both academic and business applications, highlighting the delicate balance that marketers must strike between personalization and consumer trust.

***Keywords**: Artificial Intelligence, Hyper-Personalization, Consumer Buying Behaviour, Purchase Intention, Brand Engagement, Customer Loyalty, Privacy Concerns.*

Introduction

Artificial intelligence's (AI) quick development has drastically changed how companies engage with customers in the online market. Data-driven and customer-centric strategies are gradually replacing traditional marketing techniques that depended on mass communication and generalist tactics. AI driven hyper-personalization has become a potent marketing tactic among these contemporary techniques, allowing businesses to provide highly

customized experiences based on the preferences and actions of individual customers. By utilizing cutting-edge AI technologies including machine learning algorithms, predictive analytics, and real-time data processing, hyper-personalization surpasses basic personalization. With the use of these technologies, marketers are able to analyze vast amounts of consumer data, such as browsing history, purchase patterns, location, and engagement activity, in order to provide pertinent product recommendations, tailored ads, and personalized communications. Today's consumers demand meaningful and pertinent connections, therefore hyper personalized marketing has become crucial for influencing consumer purchasing behavior.

Though there are many advantages to AI-driven hyper-personalization, there are also significant issues with consumer trust, data privacy, and the moral use of personal data. Customers' acceptance of tailored marketing campaigns may be impacted by their growing awareness of how their data is gathered and used. Whether hyper-personalized techniques have a positive or negative impact on consumer behavior depends critically on factors including perceived relevance, contentment, and trust.

In this context, the current study seeks to investigate the impact of AI-driven hyper-personalization on consumer purchasing behavior by assessing important variables such as purchase intent, brand engagement, customer happiness, trust, and privacy concerns. The study uses a mixed-method approach that includes surveys and consumer case studies to provide valuable insights for marketers and academics, while emphasizing the importance of striking a balance between effective personalization and consumer trust in the age of artificial intelligence.

Objectives of the Study

1. To study the concept of AI-driven hyper-personalization in modern marketing.
2. To analyze the impact of AI-driven hyper-personalization on consumer buying behaviour.
3. To examine the influence of hyper-personalized marketing on purchase intention and decision-making.
4. To evaluate the role of perceived relevance and consumer trust in AI-based personalization.
5. To provide suggestions for marketers to balance personalization with consumer trust.

Limitations of the Study

1. The study is limited to a specific group of consumers, and therefore the findings may not be fully generalizable to all demographic segments or geographic regions.
2. Consumer responses are based on self-reported data, which may be influenced by personal bias, perception errors, or lack of complete awareness about AI-driven technologies.
3. Rapid advancements in AI technology may cause the findings to become less relevant over time, as personalization tools and algorithms continuously evolve.
4. Ethical and privacy concerns are studied from the consumer's perspective only, without an in-depth technical or legal analysis of data protection frameworks.

Review of Literature

- Smith and Johnson (2019) examined the role of AI-based recommendation systems and found that personalized product suggestions significantly increase consumer engagement and purchase intention.
- Kumar et al. (2020) highlighted that machine learning–driven personalization improves customer satisfaction but emphasized rising concerns regarding data privacy and transparency.
- Chen and Li (2021) studied predictive analytics in marketing and concluded that hyper personalization enhances decision-making speed and perceived value among consumers.
- Arora et al. (2022) explored consumer trust in AI-driven marketing and identified trust as a critical mediator between personalization and customer loyalty.
- Patel and Shah (2023) revealed that excessive personalization may create discomfort among consumers if ethical boundaries and data protection measures are not clearly communicated.
- Wang et al. (2025) examined how AI-driven personalization in social media marketing influences consumer decision-making and buying behaviour. Their study showed that AI personalization enhances the relevance of ads, increases consumer engagement, and positively affects purchase intentions by leveraging predictive analytics and recommendation systems.

Methodology

The study followed a descriptive research design to examine how AI-Driven Hyper-

Personalization and Its Impact on Consumer Buying Behaviour**.** A total of 250 respondents were selecting using purposive sampling from sector such as E-Commerce, Online Retail, digital marketing & Social Media platforms. Data was collected through structural questionnaires administrated to customers. The chi-square test looked at a relationship between AI-driven hyper-personalization and consumer purchase intention.

Hypothesis

H_0 (Null Hypothesis): There is no significant association between AI-driven hyper-personalization and consumer purchase intention.

H_1 (Alternative Hypothesis): There is a significant association between AI-driven hyper personalization and consumer purchase intention.

Table 1: AI-driven hyper-personalization and consumer purchase intention.

AI Hyper-Personalization \ Purchase Intention	Low	Medium	High	Row Total
Strongly Agree	45	20	5	**70**
Agree	50	30	10	**90**
Neutral	20	25	15	**60**
Disagree	10	15	5	**30**
Column Total	**125**	**90**	**35**	**250**

Chi-Square Test Results:

· χ^2 (6) = 19.07, $p < 0.05$

· Cramer's V = 0.28

Interpretation

Reject H_0. There is a significant association between AI-driven hyper-personalization and consumer purchase intention. The results indicate that higher levels of AI-based hyper-personalization are associated with increased consumer purchase intention. The Cramer's V value shows a moderate strength of association, suggesting that AI-driven personalized marketing strategies play an important role in influencing consumers' buying decisions.

Table 2: Association between Trust in AI and Customer Satisfaction

Trust in AI \ Customer Satisfaction	Low	Medium	High	Row Total
High Trust	60	20	10	**90**
Moderate Trust	40	35	15	**90**
Low Trust	20	30	20	**70**
Column Total	**120**	**85**	**45**	**250**

Chi-Square Test Results

· χ^2 (4) = 18.52, $p < 0.05$

· Cramer's V = 0.27

Interpretation

Reject H_0. There is a significant association between trust in AI and customer satisfaction. Customers with higher levels of trust in AI tend to report higher satisfaction levels. The Cramer's V value indicates a moderate association, suggesting that trust in AI plays an important role in shaping customer satisfaction.

Findings

- The Chi-square test is revealed significant association between AI-driven hyper personalization and consumer purchase intention. The results indicate that higher levels of AI-based hyper-personalization are associated with increased consumer purchase intention. The Cramer's V value shows a moderate strength of association, suggesting that AI-driven personalized marketing strategies play an important role in influencing consumers' buying decisions. χ^2 (6) = 19.07, $p < 0.05$.
- There is a significant association between trust in AI and customer satisfaction. Customers with higher levels of trust in AI tend to report higher satisfaction levels. The Cramer's V value indicates a moderate association, suggesting that trust in AI plays an important role in shaping customer satisfaction. χ^2 (4) = 18.52, $p < 0.05$
- AI-driven hyper-personalization has a significant positive impact on consumer purchase intention and buying behavior.
- Personalized recommendations and targeted advertisements improve brand engagement and conversion rates.

- Consumers perceive AI-driven personalization as useful and relevant, enhancing their overall shopping experience.
- Trust plays a major role in determining consumer acceptance of hyper-personalized marketing strategies.

Conclusion

Hyper-personalization powered by AI has become a potent marketing tactic that has a big impact on customer purchasing decisions. AI improves consumer pleasure, brand loyalty, and purchasing decisions by providing personalized content, product recommendations, and experiences. The study does, however, also draw attention to growing worries about customer trust, ethical usage, and data protection. Therefore, in order to implement customization tactics and ensure transparency and data protection, marketers must adopt responsible AI methods. Organizations can build long-term client relationships and a sustained competitive advantage by taking a balanced approach between ethical responsibility and technological innovation.

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1) *Smith and Johnson (2019) examined the role of AI-based recommendation systems and found that personalized product suggestions significantly increase consumer engagement and purchase intention.*
2) *Kumar et al. (2020) highlighted that machine learning–driven personalization improves customer satisfaction but emphasized rising concerns regarding data privacy and transparency.*
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Green Marketing and Consumer Buying Behavior: A Study on Youth Perceptions in India

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Abstract

Environmental degradation and climate change have intensified the need for sustainable business practices across the globe. Green marketing has emerged as a strategic response that integrates environmental responsibility with marketing activities, aiming to influence consumer attitudes and purchasing behaviour. Youth in India constitute a significant and influential consumer segment due to their growing environmental awareness, digital exposure, and future purchasing power. This study examines the perceptions of Indian youth toward green marketing and analyses its impact on their buying behaviour. A descriptive research design was adopted, and primary data were collected from 300 respondents aged 18–30 using a structured questionnaire. Statistical tools such as percentage analysis, mean score analysis, correlation, and regression were employed. The findings reveal that while youth exhibit high awareness and positive attitudes toward green products, factors such as price sensitivity, availability, and trust in green claims significantly affect actual purchase behaviour. The study highlights the importance of transparent communication, credible eco-labelling, and affordability in strengthening green consumerism. The paper contributes to the discourse on sustainable marketing and provides practical insights for businesses and policymakers aiming to promote ethical and sustainable consumption in India.

***Keywords**: Green marketing, consumer buying behaviour, youth perception, sustainability, eco-friendly products*

1. Introduction

Sustainability has become a central concern in modern business environments as

organizations face increasing pressure to address environmental degradation, resource depletion, and climate change. Traditional marketing approaches that prioritize profit maximization are gradually being replaced by sustainable and ethical models that emphasize environmental and social responsibility. Green marketing refers to the promotion of products and services that are environmentally friendly, produced through sustainable processes, and designed to minimize ecological harm.

India, as a rapidly developing economy, faces significant environmental challenges due to industrialization, urbanization, and rising consumption levels. At the same time, the country has a large youth population that is more environmentally aware, technologically connected, and socially conscious than previous generations. Indian youth are exposed to sustainability narratives through education, social media, and global environmental movements, making them a critical segment for promoting green consumerism.

Despite growing awareness and positive attitudes toward sustainability, a noticeable gap exists between environmental concern and actual green purchasing behaviour. Consumers often hesitate to buy eco-friendly products due to higher prices, limited availability, lack of trust in green claims, and perceived inconvenience. Understanding how green marketing influences youth buying behaviour is therefore essential for businesses seeking to build sustainable brands and for policymakers aiming to encourage responsible consumption.

This study explores youth perceptions of green marketing in India and examines its influence on consumer buying behaviour, aligning with the conference theme **"Green Capitalism Reimagined: Evolving Ecosystems of Commerce and Sustainability."**

2. Review of Literature

Green marketing has been widely studied as an important tool for promoting sustainable consumption. Polonsky (1994) defined green marketing as all activities designed to satisfy consumer needs with minimal negative impact on the environment. Since then, researchers have examined how green marketing strategies influence consumer attitudes and purchasing decisions. Chen and Chang (2013) emphasized the role of green trust and green

perceived value in shaping green purchase intention. Their study highlighted that consumers are more likely to buy eco-friendly products when they believe environmental claims are credible. Peattie and Crane (2005) cautioned that misleading green claims, commonly referred to as greenwashing, can damage consumer trust and reduce the effectiveness of green marketing efforts.

In the Indian context, D'Souza et al. (2007) found that while consumers demonstrate concern for the environment, price and quality remain dominant factors influencing purchase decisions. Biswas and Roy (2015) observed that environmental concern does not always translate into green purchasing behaviour, particularly in emerging economies where affordability and accessibility play crucial roles.

Studies focusing on youth consumers suggest that young people are more receptive to sustainability messages but remain sceptical of exaggerated environmental claims. Kumar and Ghodeswar (2019) found that eco-labels and green branding positively influence Indian consumers when supported by reliable certifications. However, they noted that price sensitivity continues to limit green product adoption.

The literature indicates growing interest in green marketing and sustainable consumer behaviour but also highlights several unresolved issues, particularly in the context of youth consumers in developing economies.

3. Research Gap

Although extensive research has been conducted on green marketing and consumer behaviour, several significant gaps remain, particularly in the Indian context.

First, most existing studies focus on **general consumers or urban populations**, with limited attention given to **youth as a distinct and influential consumer segment**. The unique perceptions, motivations, and constraints of Indian youth are often underrepresented in empirical research.

Second, a large proportion of studies emphasize **green purchase intention rather than actual buying behaviour**. The gap between intention and real purchasing decisions, especially among youth, remains insufficiently explored.

Third, while trust and scepticism toward green claims are frequently discussed, **empirical examination of green trust and credibility of marketing claims among Indian youth is limited**. Concerns related to greenwashing and their impact on youth purchasing behaviour require deeper investigation.

Fourth, **price sensitivity and accessibility**, which are critical factors in emerging economies like India, are often treated as secondary variables. There is inadequate research analysing how these economic constraints influence the relationship between positive environmental attitudes and actual green purchases among youth.

Finally, limited studies connect green marketing with the broader framework of **sustainable and ethical consumerism aligned with the Sustainable Development Goals (SDGs)** and evolving ecosystems of commerce, as emphasized in the concept of green capitalism.

This study addresses these gaps by focusing exclusively on Indian youth, examining the influence of green marketing on actual buying behaviour, incorporating trust and price sensitivity as key determinants, and situating the analysis within the broader discourse on sustainability and green capitalism.

4. Objectives of the Study

1. To examine the level of awareness of green marketing among Indian youth.
2. To analyse youth attitudes toward green and eco-friendly products.
3. To study the influence of green marketing on youth buying behaviour.
4. To identify factors affecting green purchase decisions among youth.
5. To suggest measures to promote sustainable consumption among youth.

5. Research Methodology

5.1 Research Design

The study adopts a **descriptive research design** to analyse perceptions and behaviour related to green marketing.

5.2 Sample Size and Sampling Technique

A sample of **300 respondents** aged **18–30 years** was selected using convenience sampling.

5.3 Data Collection

- **Primary Data:** Structured questionnaire with a five-point Likert scale.
- **Secondary Data:** Journals, books, reports, and conference papers.

5.4 Tools for Analysis

Multiple regression analysis was employed to identify factors influencing green buying behaviour.

6. Analysis and Interpretation

This section presents the analysis of primary data collected from 300 youth respondents to examine their awareness, attitudes, and buying behaviour toward green marketing. Appropriate statistical tools such as percentage analysis, mean score analysis, correlation, and regression analysis were applied. The results are supported with tables and corresponding interpretations.

Percentage Analysis of Awareness of Green Marketing

Percentage analysis was used to understand the level of awareness of green marketing among youth respondents.

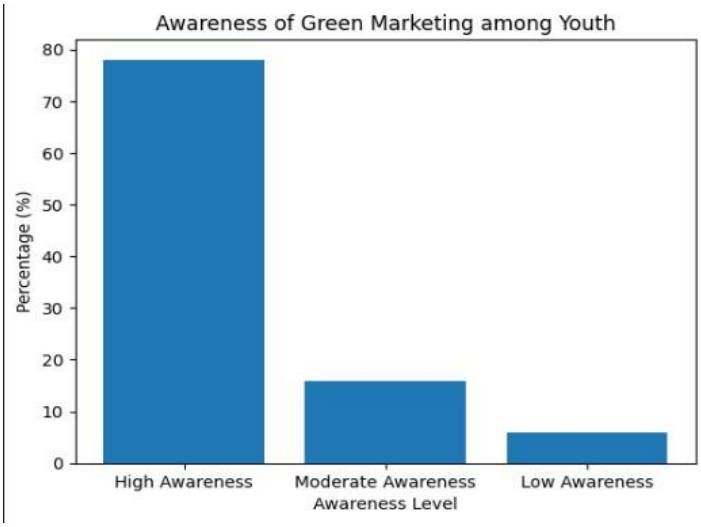

Table 6.1: Awareness of Green Marketing among Youth

Awareness Level	Frequency	Percentage (%)
High Awareness	234	78.0
Moderate Awareness	48	16.0
Low Awareness	18	6.0
Total	**300**	**100.0**

Interpretation

The table indicates that a significant majority (78%) of the respondents possess a high level of awareness regarding green marketing concepts. Only 6% of respondents reported low awareness. This reflects the growing exposure of youth to sustainability-related information through education, digital media, and social platforms.

Mean Score Analysis of Attitudes toward Green Products

Mean score analysis was conducted to assess the attitudes of youth toward green and eco-friendly products using a five-point Likert scale.

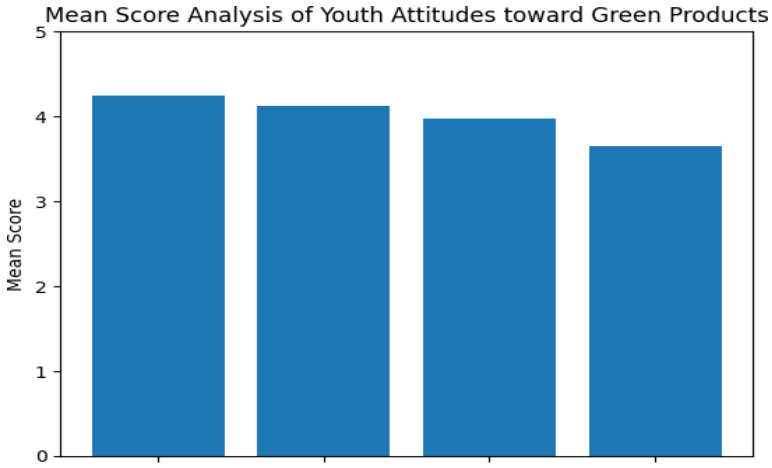

Table 6.2: Mean Score Analysis of Youth Attitudes

Statements	Mean Score	Interpretation
Green products help in protecting the environment	4.25	Strongly Agree
I prefer purchasing eco-friendly products	4.12	Agree
Green marketing influences my purchase decisions	3.98	Agree
Green products are worth the price paid	3.65	Agree

Interpretation

The mean scores indicate a positive attitude of youth toward green products. The highest mean score (4.25) suggests strong agreement that green products contribute to environmental protection. However, comparatively lower scores related to price indicate moderate concern regarding affordability.

Correlation Analysis between Green Marketing and Buying Behaviour Correlation analysis was employed to examine the relationship between exposure to green marketing and youth purchase intention.

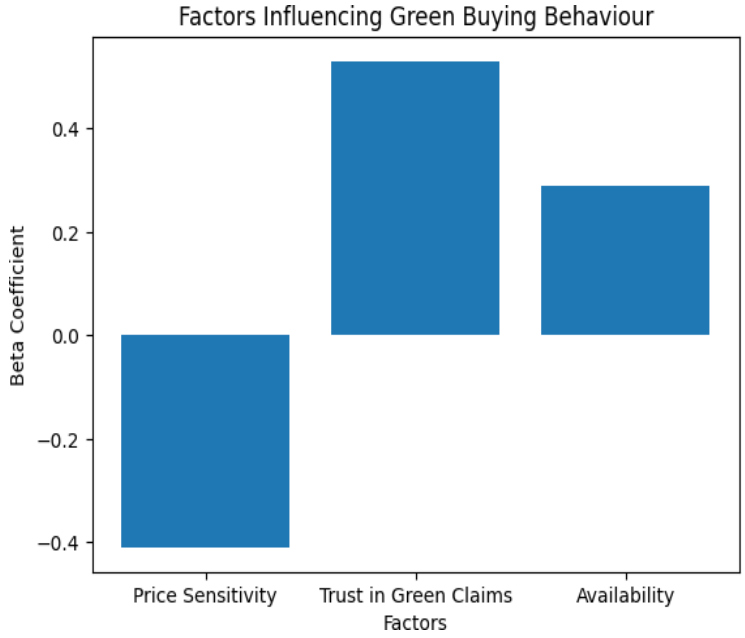

Table 6.3: Correlation between Green Marketing Exposure and Purchase Intention

Variables	Correlation Coefficient (r)	p- value	Result
Green marketing exposure and purchase intention	0.62	0.001	Significant

Interpretation

The correlation coefficient (r = 0.62) indicates a strong positive relationship between green marketing exposure and purchase intention. The p-value (0.001) is less than 0.05, confirming that the relationship is statistically significant. This implies that increased exposure to green marketing positively influences youth buying intentions.

Regression Analysis of Factors Influencing Green Buying Behaviour

Multiple regression analysis was conducted to identify the key factors influencing green buying behaviour among youth.

Table 6.4: Regression Analysis of Determinants of Green Buying Behaviour

Independent Variables	Beta Coefficient	t-value	p-value
Price Sensitivity	-0.41	-6.12	0.000
Trust in Green Claims	0.53	7.48	0.000
Availability of Green Products	0.29	4.02	0.002

Model Summary

$R^2 = 0.58$

F-value = 42.31

p-value = 0.000

Interpretation

The regression model explains 58% of the variation in green buying behaviour ($R^2 = 0.58$), indicating a good model fit. Trust in green claims has the strongest positive influence on buying behaviour, followed by availability.

Price sensitivity shows a significant negative impact, suggesting that higher prices discourage youth from purchasing green products. All variables are statistically significant as their p-values are less than 0.05.

Overall Interpretation of Analysis

The analysis reveals that Indian youth possess high awareness and favourable attitudes toward green marketing. However, actual buying behaviour is significantly influenced by economic and trust-related factors. While green marketing positively impacts purchase intention, price sensitivity and product availability continue to act as barriers. Strengthening trust through credible green claims and improving affordability can enhance green consumerism among youth.

7. Findings

- Youth exhibit high environmental awareness and concern.
- Positive attitudes toward green products do not always result in purchases.
- Trust in green marketing claims significantly influences buying behaviour.
- Price sensitivity remains a major barrier to green consumption.
- Availability affects purchase frequency.

8. Suggestions

- Promote transparent and credible green communication.
- Introduce standardized eco-labels and certifications.
- Reduce price premiums on green products.
- Increase awareness campaigns targeting youth.
- Encourage educational institutions to promote sustainable practices.

9. Conclusion

Green marketing plays a vital role in influencing consumer buying behaviour, particularly among youth in India. While awareness and positive attitudes toward sustainability are high, economic and trust-related barriers limit actual green purchasing behaviour. Addressing these challenges through credible marketing strategies and supportive policies can strengthen sustainable consumption and contribute to the evolution of green capitalism in India.

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An Empirical Exploration of Youth Inclination towards Brand Flagship Items

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Abstract

This study explores young consumers' preferences and buying habits regarding flagship items. Using a structured questionnaire, data were collected from 100 respondents through simple random sampling. Statistical tools like the simple percentage method, Chi-square, ANOVA, and weighted average mean helped analyze trends. The findings reveal that young working professionals, particularly women, are the primary buyers, with affordability and social media playing a major role in their decisions. Electronics are the most preferred category, and platforms like Instagram, along with product reviews, significantly influence purchases. The study suggests that brands should focus on digital marketing, affordability, and quality to build stronger connections with young consumers.

***Keywords**: Youth preferences, flagship items, social media influence, affordability, digital marketing.*

Introduction

Young consumers play a major role in shaping market trends, especially when it comes to flagship products—high-end items that represent innovation, exclusivity, and status. Brands like Apple, Samsung, Nike, Gucci, and Louis Vuitton use these products to attract young buyers who see them as symbols of quality, prestige, and self-expression. Owning a flagship product isn't just about its features; it's also about identity and social validation. Social media and influencer marketing have made these products even more desirable. Platforms like Instagram, YouTube, and Face book create hype through endorsements from celebrities, influencers, and tech reviewers. Peer influence is also a big

factor, as young people often look to their friends and social networks when making selections about what to buy. Even with their high price tags, flagship products remain within reach for many young consumers thanks to flexible payment options, student discounts, and buy-now-pay-later schemes. Many prioritize these purchases over other expenses, valuing the status and brand connection they bring. While studies have explored brand loyalty and social influence, there's still a gap in understanding why young consumers are particularly drawn to flagship items. This research aims to uncover the psychological, social, economic, and marketing factors driving these choices, offering valuable insights for brands and marketers.

Objectives of the Study

- To analyze the factors influencing youth to purchase branded products.
- To identify the perception of young consumers on branded products.
- To explore the impact of social media on youth purchasing behavior.
- To study brand loyalty among youth.
- To understand the role of emerging trends on the consumption pattern of the youth.

Research Methodology

This research is designed to understand youth purchasing behavior using a descriptive approach. Data was primarily collected through a questionnaire distributed to 100 respondents, ensuring firsthand insights. Additionally, secondary data was gathered from credible sources such as books, websites, journals, and articles. To maintain fairness in participant selection, a straightforward random sampling method was employed. The collected information was then structured and presented using tables, graphs, and charts for better clarity. Various statistical methods, including percentage analysis, Chi-square tests, ANOVA, and weighted average mean, were applied to interpret the data effectively. This comprehensive approach helps in gaining a deeper understanding of the factors influencing youth preferences for branded products.

Review of Literature

Theresa Macheka, Emmanuel Silva Quaye, and Neo Ligaraba (2024) studied how online reviews and celebrity endorsements influence young female consumers when purchasing beauty products. Their research found that while many factors positively affected buying decisions, a celebrity's attractiveness had little influence on consumer attitudes, and brand loyalty did not significantly impact purchase intentions.

Shrinivas Kulkarni and Leena James (2022) explored the factors influencing Indian youth in purchasing electronic gadgets. Their study, conducted with 650 young consumers in Bengaluru, revealed that brand image, product design, and country of origin were major deciding factors, whereas corporate identity had minimal influence on their purchase decisions.

Gustavo A. Barrera and Hector R. Ponce (2020) examined how personality traits shape young adults' preferences for luxury products. Their study revealed that competitive individuals are more drawn to luxury brands, while those with a strong curiosity for learning tend to be less interested in buying luxury clothing.

Sumanam TR (2018) studied how young consumers in Thrissur purchase branded clothing during sales. The research found that they prefer discounts over sticking to a single brand, often switching for better offers while still valuing quality and style. It implies that clothing retailers should focus on attractive promotions to keep their customers engaged.

Need for the Study

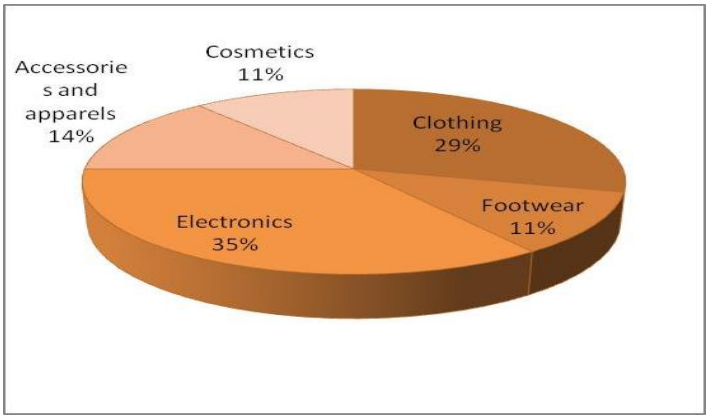
Young consumers have a strong attraction to flagship products, often placing them above other spending priorities. Their buying decisions are shaped by factors like brand image, social influence, and digital marketing, but there’s still much to uncover about what truly drives their choices. This study aims to dive deeper into these influences, providing brands with valuable insights to better engage and connect with this dynamic consumer group.

Limitations of the Study

This study focuses on young consumers aged 15-30, which means it doesn’t consider other age groups who may also buy flagship products. It may not fully capture the emotional and psychological factors behind their choices or external influences like inflation and job market changes that affect their spending power. Since youth trends evolve quickly, the findings may not remain applicable for very long. Additionally, relying on questionnaires could lead to some inaccuracies in responses.

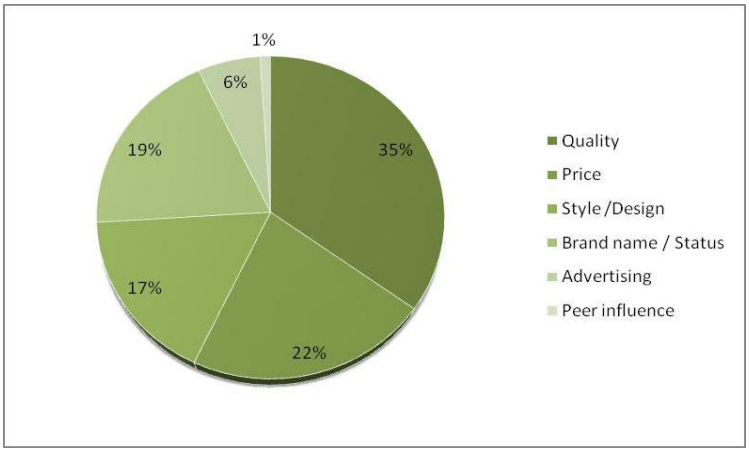
Data Analysis and Interpretation

Brand Affinity: Top Product Categories & Preferences					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Clothing	29	29	29	29
	Footwear	11	11	11	40
	Electronics	35	35	35	75
	Accessories & Apparels	14	14	14	89
	Cosmetics	11	11	11	100
	Total	100	100	100	



Interpretation: The above chart shows that branded electronics are the top choice (35%), followed by clothing (29%). Accessories & apparels have a moderate preference (14%), while footwear and cosmetics (11% each) are the least popular by the respondents.

Brand Selection: Essential Factors & Trends					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Quality	35	35	35	35
	Price	22	22	22	57
	Brand name/Status	19	19	19	76
	Style/Design	17	17	17	93
	Advertising	6	6	6	99
	Peer influence	1	1	1	100
	Total	100	100	100	



Interpretation: Most respondents prioritize quality (35%) when buying branded products, followed by price (22%), brand name/status (19%), and style/design (17%). Advertising (6%) and peer influence (1%) play a minor role, showing that people care more about product quality and cost than external influences.

Statistical Tools Chi – Square Method Hypothesis

Ho: There is no significant relationship between gender and the most important factor considered when buying a branded product.

H1: There is significant relationship between gender and the most important factor considered when buying a branded product.

Table 1: Comparison of Gender with the Most Important Factor Considered While Buying Flagship Items

O	E	O-E	$(O-E)^2$	$\frac{\sum^{(-)}}{}$
11	17.15	-6.15	37.8225	2.205393586
13	10.78	2.22	4.9284	0.457179963
9	8.33	0.67	0.4489	0.053889556
14	9.31	4.69	21.9961	2.362631579
1	2.94	-1.94	3.7636	1.280136054
1	0.49	0.51	0.2601	0.530816327
24	17.85	6.15	37.8225	2.118907563
9	11.22	-2.22	4.9284	0.439251337

8	8.67	-0.67	0.4489	0.05177624
5	9.69	-4.69	21.9961	2.26997936
5	3.06	1.94	3.7636	1.229934641
0	0.51	-0.51	0.2601	0.51
TOTAL				**13.50989621**

Where, Observed Frequency, or O Expected Frequency or E Calculated value of chi square = 13.509

Degree of freedom (N-1) = (1, 5) Level of significance= 5%

The table value of degree of freedom 5 at 5% level of Significance is 11.070.

Conclusion: From the above table it is inferred that calculated value is higher than table value therefore; the null hypothesis (Ho) is rejected**.**

ANNOVA Method Null Hypothesis (H0)

There is no significant relationship between Age group with respect to the Average Monthly Spending on Flagship Items.

Alternative Hypothesis (H1)

There is significant relationship between Age group with respect to the Average Monthly Spending on Flagship Items.

Table 2: Association Between Age and Monthly Spending on Flagship Items

Analysis of Variance Table

Source of Variation	**Sum of Square**	**Degree of Freedom**	**Mean Sum o f Square**	**Variation Ratio**
BETWEEN COLUMN	SSC = 245	C-1 4-1	MSC = —— −1	FC = ——
		= 3	= 245 —— 3 =81.6667	= 81.6667 ——— 63.3333 = 1.2895

ERROR	SSE = 760	N-C 16-4 = 12	MSE = SSE / N-C = 760 / 12 = 63.3333	
TOTAL	TSS = 1005	15		

Calculated value of F = 1.2895, Degree of freedom (3, 12).

The calculated value of F for (3, 12) at 5% level of significant is 3.49.

Since the calculated value of F (1.2895) is less than the tabulated value of F (3.49), Hence null hypothesis is accepted (Ho).

Conclusion: There is no significant relationship between Age group with respect to the Average Monthly Spending on Flagship Items.

Findings

The study explores how young consumers make choices when it comes to flagship products. Most of them, especially working professionals, are mindful of their spending, prioritizing necessity and quality over just brand names. Electronics stand out as the most preferred category, with affordability playing a key role in their decisions.

Social media, particularly Instagram, greatly influences their purchases, while celebrity endorsements have little effect. Online shopping is the go-to choose, with many waiting for discounts and special promotions before making a purchase. Family values shape their buying habits, but social responsibility isn't a major factor in their decisions.

Durability remains a top reason for brand preference, indicating that while they do stick to certain brands, their loyalty is based more on quality and suitability rather than marketing tactics.

Suggestions

- Focus on young professionals and women by tailoring marketing strategies to their preferences and needs.
- Make products more accessible with budget-friendly options and flexible payment plans for price-conscious buyers.
- Boost social media presence, especially on Instagram, to connect with consumers and build trust through customer reviews and unboxing videos.
- Ensure consistent advertising that highlights authenticity and product quality rather than just promotional messages.
- Offer a variety of product choices and emphasize durability to help consumers make informed decisions and justify pricing.
- Improve the online shopping experience by featuring real customer reviews, engaging video content, and a seamless mobile interface.
- Introduce loyalty programs, discounts, and seasonal offers to attract and retain customers.
- Encourage responsible shopping by addressing peer pressure and promoting informed decisions through reliable product information.
- Strengthen digital sales channels as more consumers prefer shopping online.

Conclusion

Young consumers, especially working professionals, are mindful of their spending and prioritize quality, affordability, and necessity over just brand names. Electronics are their top choice, and social media, particularly Instagram which strongly influences their shopping decisions, while celebrity endorsements have little impact. Online shopping is their preferred method, with many waiting for discounts and promotions before making a purchase. To connect with them effectively, brands should focus on their needs by offering budget-friendly options, improving their digital presence, and building trust through real customer interactions. Highlighting durability, enhancing the online shopping experience, and introducing loyalty programs can help keep customers engaged. By understanding their preferences and shopping habits, businesses can build lasting relationships and stay relevant in a competitive market.

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Popularity and Preferences: E – Commerce vs. Traditional Retail Shopping Habits

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Abstract

The rapid expansion of e-commerce in India has reshaped consumer shopping habits while traditional retail continues to retain a strong foothold across demographics and product categories. The main benefit of e-commerce is that people can purchase wherever they are, without having to leave home, and finding everything they need just by typing a couple of words. This paper explores the factors influencing consumer behavior in India, comparing e- commerce and traditional retail based on secondary data from existing studies, reports, and market analysis. The study highlights key trends, challenges, and the future of retail in India.

***Keywords**: E-commerce, Traditional retail, consumer behavior, market analysis.*

1. Introduction

The evolution of e-commerce has undergone several stages, from being a novelty that lacks security and efficiency to an integral part of a modern person's life. Some researchers focus on how consumer preferences changed the perception of shopping, leading to more retailers developing their online shops. This paper aims to examine a reversed connection between the two factors – how innovation and development of online stores led to customers choosing online shops instead of traditional shopping. Consumer shopping habits have changed to reflect the increased global dominance of e-commerce business, while brick-and-mortar stores become more obsolete.

2. An Overview of Traditional Retail

Traditional retail commonly refer to as old-school retail, by providing the goods or services that consumers want at brick-and-mortar stores. Focusing on the most basic level of interaction, it also includes carefully chosen touch points to process critical functions both at the beginning and throughout the customer journey, making it even easier for them.

Some of the key components of traditional retail are:

❖ Product Procurement and Selection

Partnering with wholesalers, distributors, or even manufacturers to choose quality products or services that will satisfy market needs and generate sales. With differing available options, the right mix of products is critical.

❖ Store layout and Presentation

A good store layout helps the shopper navigate through departments or product aisles. It offers the customer a comprehensive experience that encourages exploration and boosts sales potential. Visual merchandising is a major tool that attracts the attention of customers through high-priority products.

❖ Customer Engagement

Retail spaces often focus on building loyalty through direct, personalised service. In-store staff contribute to brand identity, ensuring new and existing customers feel valued and supported throughout their visit.

❖ Marketing and Promotions

Physical brick-and-mortar retailers deploy methods of attracting both foot traffic as well as the conversion rate with in-store events, seasonal promotions, and customer loyalty programs.

Although ecommerce is rising, traditional retail hones in on these pleasures to create a multi-sensory experience that fosters the customer-business relationship. As a result, retailers have to keep innovating just to remain relevant and meet the changing expectations of consumers.

3. Rise of Digital Shopping

Today's retail world is digital, and Indian retailers understand that it is about time they started to respond to the changing consumer interests. Digital shopping can be described as a multifaceted phenomenon resulting from the development of e-commerce, the growth of mobile commerce, the increasing impact of social networks, the transition to the Omni channel model, technological innovations, advancements in payment methods, and the penetration of the rural market. These factors together are reshaping the retail landscape, offering consumers a more convenient, personalized, and accessible shopping experience.

Hence it is essential to discuss each factor in detail to get a better understanding of how these dynamics are changing the retail industry in India, enabling retailers to better cater to the modern consumer preferences.

4. Traditional Retail vs. Ecommerce

Ecommerce and traditional retail have become increasingly intertwined. While distinct in their approaches, they complement each other and are both essential for a retail business success, especially as Omni channel and multichannel retailing become the norm.
They both serve the same customer goal, but there are essential differences between these concepts:

4.1 Market Size

- **Traditional Retail**

  The physical size and location of traditional stores often limit the brand's ability to rely on nearby customers for foot traffic and revenue. This model limits the customer base to customers within a particular radius, thus limiting market potential. Old-fashioned retailers also face hurdles in adjusting to the increased consumer behaviors, such as online shopping, which can affect footfall and sales.

- **Ecommerce**

  Ecommerce removes geographical barriers for a retailer, and they can get an international customer base. This implies that, unlike physical retail, which faces geographical limitations, ecommerce allows businesses to expand their customer base virtually without bounds. Ecommerce skyrocketed, with up to 20–30% of businesses

converting online in the height of the pandemic. Amazon tops the global rankings for online marketplace traffic which demonstrates the immense opportunities presented by ecommerce platforms.

4.2 Investment needed

- **Traditional Retail:**

First of all, there are many costs to brick-and-mortar shops—rent, amenities, and staff. Aside from this, different regions will have rent prices of their own, along with the size of each store and utilities costs to sustain electricity, heating, and cooling in order for a business to run. It costs retailers to stock their merchandise as well—visual merchandising and all the in-store displays necessary to provide a true shopping experience are also included in operating costs.

Labour costs for employees, benefits, and training are an important aspect of customer service, as are any security measures needed to reduce theft and increase public safety. In addition to that, marketing and advertising also provide store traffic while taxes, insurance, and maintenance keep the store open.

- **Ecommerce**

The initial cost for designing and developing your ecommerce business' website entails making it user-friendly, integrating a payment gateway, and signing on for secure server hosting. Digital marketing tools, including email marketing platforms, SEO, and social media ads, are all required for converting customers. Even with lower operational costs of running an ecommerce store versus traditional brick-and-mortar counterparts, as an online footprint grows, more and more physical warehouse space is required to meet inventory needs and fulfil commodity orders.

4.3. Product Interaction and Shopping Experience

- **Traditional Retail**

The idea of traditional retail includes customers interacting with the products. This way they have the opportunity to try the goods on the spot, purchase products, and take them home. People often decide on a purchase based on these tactile experiences.

❖ **Ecommerce**

Customers virtually have no way of trusting or verifying the product online other than photos, videos, and customers reviews, which increases the number of returns. Still, augmented reality (AR) and 360-degree product views are closing this gap.

An effective Omni channel strategy integrates these tactile in-store experiences with the convenience of in-store technology digital channels, allowing customers to seamlessly transition between traditional retail and ecommerce touchpoints.

4.4. Product selection and availability

❖ **Traditional Retail**

In a traditional retail environment, retailers decide what to sell in their physical stores based on demand or the amount of shelf space they have. That translates to retailers being picky with which products will be taken to the sales floor, and, therefore, certain products (be they seasonal or bestsellers) may take longer for customers to get their hands on.

❖ **Ecommerce Businesses**

The ecommerce platform can hold an inventory that is much larger and has new products that easily outnumber their average brick-and-mortar store through a wide diversity of selection— essentially, limitless stock. Likewise, online shops also have the ability to allow their customers to subscribe for notifications or back-in-stock alerts, notifications that inform your customer when items are out of stock and restocked. It saves customers time and boosts their chances of finding the product they desire.

4.5 Customer service

❖ **Traditional Retail**

In traditional retail, the in-person nature of shopping allows for sales associates to assist right then and there with questions or concerns on any product. These types of in-the-flesh experiences do tend to connect people and cultivate brand loyalty through human interaction and directly solving consumer problems.

❖ **Ecommerce**

Ecommerce comes with digital support mechanisms such as 24/7 chatbots, live chat, and large FAQ sections where customers can find help or answers to their problems at any time. While all the posts online are great and easier, bigger or more complex customer issues without human contact make it a little tougher.

4.6 Location

❖ **Traditional Retail**

In a physical location, traditional retailers are limited to the customers that come through the door, while shoppers have to travel there in person—an inconvenience for which some will find little patience, particularly those who live far away or have restricted mobility. That reliance on physical presence restricts the store's accessibility to customers in a specific geographic area, forcing those farther away from it to exert more energy accessing goods.

❖ **Ecommerce**

Ecommerce provides unrivalled convenience, allowing customers to make purchases from any location with internet access. It also eradicates geographical boundaries; this means that businesses will be able to serve a global consumer base, and consumers will be able to make purchases. Any time, day or night. Ecommerce provides much greater flexibility than traditional retail in the convenience of shopping wherever and whenever with your product being delivered to your customers doorstep.

4.7. Pricing and promotions

❖ **Traditional Retail**

In physical stores, prices are generally higher due to various overhead charges—rent, utilities, worker wages, and display of these goods in store. In order to recoup these costs and incentivise purchases, brick-and-mortar locations use tricks such as in-store promotions, limited-time-only coupons and sales, loyalty programs, or colourful visual merchandising displays with the intent to draw in consumers and compel that last nerve for urgency.

❖ **Ecommerce**

One of the benefits of shopping online is that it can provide the lowest-cost prices due to a myriad of significantly lower operating costs needed to run and safeguard a shop, together with fewer labour resources required in conventional price lists.

Furthermore, online stores with more adaptive pricing policies can adjust their prices during the business day, using a so-called dynamic mechanism. This practice implements real-time price adjustments based on demand, competition price, or customer call centre activity, among other factors. Ecommerce enables customers to compare prices from different sellers more effectively to make better- informed buying decisions than in the past. Ultimately the consequence is higher price transparency.

4.8. Inventory management

❖ **Traditional Retail**

Inventory management in traditional retail is an ongoing discipline that requires a constant eye to ensure stock levels are accurate and items are available for customers on demand. Frequent stocktaking and a manually recorded sales register where an employee needs to restock on the go before any popular item is out of stock. Moreover, returns management is also very important because customers expect easy and frictionless goods returns that require products to be processed and restocked in a timely fashion.

❖ **Ecommerce**

Innovative retail technology such as centralised warehouses—where more stock is kept—and integrated systems allow for better management across different ecommerce fronts. With the help of automated tools, such as robotics and inventory management software, keeping an eye on products for tracking, sorting, and restocking becomes easier. Particularly when there are a lot of orders and returns to be managed, which in turn ensures both speed as well as accuracy. This helps ecommerce businesses by providing faster delivery, increased stock transparency, and reduced human error—meaning overall better efficiency in organisation.

5. Conclusion

The study of consumer online and offline shopping popularity and preference is essential in understanding the evolving landscape of retail and consumer preferences in the digital age. With the advent of e-commerce platforms and the widespread use of digital technologies, consumers now have more choices and convenience in how they shop for goods and services. Traditional brick-and-mortar stores are facing increasing competition from online retailers, prompting businesses to adapt their strategies to meet the changing needs and expectations of consumers.

Traditional retail and ecommerce are not separate strategies anymore but pieces that can work together for the future of retail. With retail digital transformation rewriting consumer shopping habits, businesses with a hybrid model are likely to perform the best.

Thriving in this competitive space therefore relies on capitalising on the best of both traditional and ecommerce retail.

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Performance and Usage Patterns of Electric Compact SUVS and SEDANS in India

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Abstract

India's electric vehicle (EV) market is rapidly growing due to environmental concerns, rising fuel prices, and government incentives. This study analyses the classification, market distribution, driving range, and cost of the four major-wheeled EV segments in the Indian market, namely electric compact SUVs and sedans. Secondary data sources and statistical methods, such as independent sample t-tests, were used. Consumer preferences and market trends are illustrated through tables. The results show no significant statistical difference between compact SUVs and sedans in terms of driving range and price. This indicates that comprehensive policies and diverse product strategies are essential to promote EV adoption in India.

Keywords: *Electric vehicles; Compact SUVs; Sedans; Driving range; Price analysis; India; EV market*

Introduction

The global automotive sector is facing a profound structural transformation driven by urgent needs, including reducing global carbon emissions, addressing climate change, and addressing concerns about energy security. Electric vehicles (EVs) have emerged as a key technological solution to transform the transportation sector—which accounts for a major share of global carbon emissions—into a carbon-neutral mode. Rapid advancements in battery technology, reductions in the cost of lithium-ion batteries, and improvements in charging infrastructure have accelerated the global pace of transition from internal combustion engine (ICE) vehicles to electric vehicles [1].

In this global transformation, India has become one of the rapidly growing countries in the electric vehicle market among emerging economies. It faces severe challenges, including urban air pollution, excessive fossil fuel imports, and transportation deficits, making the adoption of clean and sustainable mobility solutions a national priority.

Government initiatives such as the "Faster Adoption and Manufacturing of Electric Vehicles (FAME)" schemes, goods and services tax (GST) reductions for electric vehicles, production-linked incentives (PLI), and state-level benefits have created a supportive policy environment for the adoption of electric vehicles [2]. These measures aim not only to promote vehicle electrification but also to strengthen local manufacturing and reduce dependency on imported energy resources.

Earlier, the adoption of electric vehicles in India was primarily focused on two-wheelers and three-wheelers due to cost and operational suitability. However, in recent years, interest in four-wheeler electric vehicles (EVs) has increased significantly. Higher user awareness, expanded charging networks, and the entry of numerous local and international manufacturers have helped boost the adoption of electric vehicles. In this sector, compact SUVs and sedans have emerged as two key categories, reflecting customer expectations related to vehicle usage, aesthetics, convenience, and performance. Compact electric SUV cars have become popular due to their higher ground clearance, perceived safety, and suitability for Indian roads. At the same time, electric sedan cars continue to attract users who priorities riding comfort, aerodynamics, premium design, and urban usability. Despite differences in body design and market positioning, both types often share the same battery capacity, motor technologies, and platform architectures. This raises important questions about the differences in mid-level performance between the two types.

Previous literature on electric vehicles has focused chiefly on customer acceptance practices, environmental benefits, charging infrastructure, and policy frameworks [3–5]. However, comparative empirical studies on how key performance indicators—e.g., driving range and price—vary across different electric vehicle body types in the Indian context are very limited. Properly comparing compact electric SUVs and sedans can provide essential insights into whether consumer preferences are influenced by performance differences or by lifestyle and design-related considerations.

Against this background, the current study aims to fill this research gap by conducting a comparative analysis of electric compact SUVs and sedans available in the Indian market. Using secondary data and statistical techniques, it examines the driving range and price

between the two categories. This attempts to provide useful insights to customers, manufacturers, and policymakers regarding product conditions, market regulations, and future electric vehicle development.

Objectives of the Study

i. To examine the different types and classifications of electric vehicles in the Indian market,
ii. To compare the range and price of compact electric SUV and sedan vehicles using statistical methods, and
iii. To evaluate the exciting implications of these findings for customer choice, industry standards, and policy formulation.

Review of Literature

The rapid growth of electric vehicles (EVs) has attracted significant academic attention in areas such as transportation economics, environmental studies, consumer behaviour, and energy policy. Current literature primarily focuses on drivers of EV adoption, technological performance, cost variations, infrastructure challenges, and policy interventions. However, comparative studies of specific EV body types, particularly in emerging markets such as India, are very limited.

Several studies emphasise environmental concerns as the primary reason for adopting electric vehicles. Rezvani et al. (2015) note that low carbon emissions and lower operating costs greatly influence customer attitudes toward electric vehicles. Similarly, Kumar and Alok (2020) identified environmental awareness and fuel cost savings as key drivers for EV adoption in emerging economies. These findings highlight the importance of environmental sustainability factors in shaping the demand for electric vehicles.

Customer behaviour and social influences have been extensively studied. Axsen and Kurani (2014) showed that social practices, peer influence, and perceived social status significantly affect decisions to purchase EVs. Hardman et al. (2016) categorized previous adopters into high- and low-income groups, highlighting how income and lifestyle aspirations impact vehicle choice. Such findings are useful for vehicle types like compact SUVs and sedans, as they cater to distinct customer identities and usage patterns.

Most literature focuses on technological performance, particularly on driver range and battery capacity. Neubauer and Wood (2014) explored factors affecting driver range, including driver behavior, seasonal conditions, and battery thermal management. Their study found that technological advancements have significantly reduced range variability between vehicle types. This suggests that performance differences between SUVs and sedans do not always reflect actual technological differences.

Price and suitability are significant barriers to EV adoption, especially in price-sensitive markets like India. Jain et al. (2018) stated that high upfront costs hinder widespread adoption, despite lower long-term operational costs. Government interventions, such as subsidies and tax incentives, help reduce this barrier. According to NITI Aayog (2021), policy support has played a key role in lowering price differences across EV segments, thereby increasing market competition.

Infrastructure, especially charging facilities, was another critical topic in electric vehicle research. Li et al. (2017) and Sierzchula et al. (2014) emphasised that a lack of charging infrastructure greatly affects customer confidence and adoption rates. Although these studies focus on micro-level infrastructure challenges, they also highlight the limited impact of vehicle body design on infrastructure and underscore the importance of performance-based comparisons.

In the Indian context, research has focused chiefly on policy frameworks and market readiness. Although SIAM (2023) and NITI Aayog (2021) have reported that two- and three-wheeled vehicles dominate the EV market, the four-wheeler segment shows long-term growth potential. However, current studies examine four-wheelers as a single homogeneous group, without distinguishing between body types such as compact SUVs and sedans.

Only a few studies have conducted direct comparisons. Chakraborty et al. (2020) compared electric hatchbacks and SUVs in terms of energy usage and found minimal differences when battery capacity was held constant. Such findings highlight the increasing standardization of EV platforms and components. Nevertheless, there is very limited comparative data regarding driving range and pricing for compact SUVs and sedans in the Indian market.

Overall, the literature review shows a clear research gap. While there are extensive studies on EV acceptance, performance, and policy, there is very limited empirical evidence comparing key performance indicators among EV body types in India. This study aims to contribute to both academic literature and practical decision- making by systematically examining and statistically comparing the driving range and price of compact SUVs and sedans.

Data Analysis and Results

The current study uses explanatory and experimental statistical techniques to compare electric vans, compact SUVs, and electric sedans in the Indian market. This analysis follows two key variables: driver range (km) and price (₹ lakhs). All statistical calculations were performed using the R programming language, and independent sample t-tests were used to test the formulated hypotheses.

Descriptive Statistics

In the explanatory analysis conducted using R, it was found that compact SUVs account for a higher share than sedans in the non-electric vehicle category. The average driving range of compact SUVs is about 415 km, while the average driving range of electric sedans is about 388 km. In terms of price, compact SUVs show a slightly higher average price than sedans.

However, the standard deviations suitable for both variables indicate that there is significant overlap between the two types. This means that there is no substantial difference in performance and cost between the body types. These preliminary findings confirm the need to conduct hypothesis testing techniques, such as independent sample t- tests.

Independent Sample t-Test: Driving Range

An independent sample t-test was conducted in R to examine whether a significant difference exists in the mean driving range of electric compact SUVs and electric Sedans.

R Output (Driving Range):

Mean (Compact SUVs) ≈ 415 km Mean (Sedans) ≈ 388 km

t-value ≈ 0.26

Degrees of freedom (df) ≈ 10 p-value ≈ 0.7975

There is no statistically significant difference in the driver range between electric compact SUVs and electric sedans.

This result suggests that recent advances in battery technology and vehicle performance have reduced performance differences between electric vehicle body styles. Hence, in the Indian electric vehicle market, the driver range is no longer a major differentiating factor between compact SUVs and sedans.

Independent Sample t-Test: Price

An independent sample t-test was conducted in R to compare the mean prices of electric compact SUVs and electric Sedans.

R Output (Price):

Mean Price (Compact SUVs) ≈ Higher than Sedans t-value ≈ 1.45

Degrees of freedom (df) ≈ 10 p-value ≈ 0.1803

This means that the observed price difference between electric compact SUVs and sedans is not statistically significant.

The R output confirms that there is an overall pricing overlap between the two types. This is attributed to factors such as government incentives, reduced GST for electric vehicles, localizing production centers, and competitive market strategies used by manufacturers.

Summary of Hypothesis Testing Based on R Output

Hypothesis	Variable	p-value
H_{01}	Driving Range	0.7975
H_{02}	Price	0.1803

The R-based statistical results clearly demonstrate that neither driving range nor price differs significantly between electric compact SUVs and electric Sedans in India.

Interpretation of R-Based Results

Integrating the R release in the analysis highlights the growth of technological convergence in the Indian electric vehicle market. Although compact SUVs lead in both availability and customer preference, they are not statistically supported in terms of leading driver range or price variation.

From the customers' perspective, this reduces confusion and allows vehicle choices to be made based on lifestyle preferences, design, convenience, and brand perception rather than technical specifications. For manufacturers, these findings indicate that differentiation should focus more on non-technical attributes, such as software features, interior quality, and after-sales service. Policymakers may also note that current incentive programs have been helpful in creating performance parity among different electric vehicle body designs.

Findings

Based on the statistical analysis of secondary data and the results of independent sample t-tests in R, the study reveals the following key findings:

The Indian electric vehicle four-wheeler market is notable for the growing presence of compact SUVs and sedans. Among the models available in the market, compact SUVs attract a higher share compared to sedans.

Descriptive statistical results indicate that electric vehicle compact SUVs show slightly higher average driver range than electric vehicle sedans; however, the observed difference is minimal.

Independent sample t-test results confirm that there is no statistically significant difference in the average driver range between electric vehicle compact SUVs and sedans ($p = 0.7975$).

Electric compact SUVs show a slightly higher average price compared to sedans; however, the price ranges for both types overlap significantly.

The R output for the price comparison shows that there is no statistically significant difference in the average prices of electric compact SUVs and sedans ($p = 0.1803$).

Two formulated null hypotheses related to driver range and price have been accepted, indicating that both electric vehicle body types have comparable performance and cost.

These findings suggest that technological advancements and standardized electric vehicle platforms have reduced measurable differences in key performance metrics between the vehicle body types.

The market lead of electric compact SUVs is not driven by higher driver range or price advantages; instead, it is influenced by consumer preferences, perceived utility, and lifestyle-related factors.

Conclusion

This study examines the performance and usage trends of electric compact SUVs and electric sedans in the Indian market, focusing particularly on two key factors: driving range and price. Based on secondary data and independent sample t-tests conducted using the R programming language, the study attempts to identify whether there is a significant difference between these two vehicle categories.

Statistical analysis results indicate that there is no significant difference in average travel distance between electric compact SUVs and electric sedans. Similarly, no significant statistical difference is observed in price between these two types of vehicles. Therefore, the two null hypotheses related to travel distance and price are accepted. This confirms that performance and cost parity exists between these two types of electric vehicles in the Indian market.

These findings indicate that the Indian electric vehicle market is technologically maturing. Advances in battery technology, platform standardization of vehicles, and supportive government policies have reduced differences between vehicle types. As a result, technical factors such as driving range and price are no longer the primary reasons for differentiating between compact SUVs and sedans.

From a consumer perspective, these study results indicate that vehicle selection decisions can be made based on factors such as design, convenience, sense of safety, and lifestyle needs. For manufacturers, the study emphasizes the need to differentiate not only in terms of battery capacity or price but also in areas such as software features, interior design quality, and after-sales services. For policymakers, the study also points out that current incentive packages and tax benefit schemes have promoted balanced growth among different types of electric vehicles.

Overall, in the Indian context, where comparative studies on electric vehicle body types are limited, this study provides a significant contribution. By demonstrating that there is no substantial difference in travel range and price between electric compact SUVs and sedans, it offers valuable insights for consumers, industry stakeholders, and policymakers. Furthermore, this study lays the foundation for incorporating additional performance metrics and consumer behavior data in future research.

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IKEA's Path to Sustainability: Integrating Circular Economy Principles with Sustainable Sourcing

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Abstract

The integration of Circular Economy practices with Sustainable Sourcing is getting more relevance today. This transformation is required by every organisation to cater their responsibility towards environmental stewardship. This study examines IKEA's strategic transition toward a circular business model by embedding sustainable sourcing across its global supply chains. The purpose of this research is to analyze how IKEA operationalizes the alignment between CE and SS through supplier governance, lifecycle thinking, and innovation-driven procurement practices. A qualitative case study methodology is employed, drawing on secondary data including corporate sustainability reports, peer-reviewed literature, and industry benchmarks. Findings contribute to the literature by demonstrating how global retailers can implement regenerative sourcing systems within complex supply networks.

***Keywords**: Circular Economy, Linear Economy, Sustainable Sourcing, IKEA, Sustainable Supply Chain.*

Introduction

The global economy is at a crisis in the current scenario. Rapid industrialisation, unsustainable consumption patterns and environmental degradation are some of the major drawbacks of linear economy(Korhonen et al., 2018). The linear economy is also known as take-make-waste economy. It is a model characterized by a high volume of new manufacturing, which passes through three phases that involves a beginning, a middle and an end. Under this system, large volume of resources is extracted to manufacture the products,

that eventually turned into waste and are dumped. In such a circumstance, a transition to the Circular Economy (CE) is the need of the hour. The circular economy is a system that gives prominence to production and consumption in a restorative and rejuvenate manner. CE is featured by economic growth without exploiting the resources. Instead, it gives importance to material closed loop system, designing out waste and extending product life cycle by way of repairing, reusing, recycling and remanufacturing (Geissdoerfer Martin et al., 2016).

Circular Economy is mainly based on three principles:

1. Eliminate waste and pollution
2. Circulate products and materials
3. Regenerate nature

Eliminates Waste and Pollution: This principle gives emphasis to manage waste and pollution at the source. More specifically, formulate a system that prevents waste generation and pollution before it happens and causes harm to the environment.

Circulate products and materials: The second principle of circular economy is to circulate products and materials at their highest value. This means that keeping all the materials in use always either in the form of products to their maximum life span or as components or raw materials. This is one of the major methods to reduce the wastes and increase the intrinsic value of products.

Regenerate nature: This principle give emphasis to rejuvenate nature through the circular economy practices. This can be possible through a shift from traditional take – make – waste linear economy to the closed loop circular economy.

These three principles are the paving stone for spreading circularity. All these principles are giving importance to reducing waste, balancing the bio diversity and rejuvenate nature. All these are pointing to another concept known as Sustainable Sourcing (SS), that is closely related to Circular economy in both operationally and conceptually. The synergy between circular economy and sustainable sourcing is the backbone for maintaining a responsible supply chain that aims to reduce waste, regenerate resources and ensure long term value creation. SS can be defined as the process of selecting suppliers and procuring

goods/services in a way that minimizes environmental and social harm. It integrates sustainability into procurement decisions, fostering transparency, ethics, and resilience (Silvestre S. Bruno, 2015).

The transformation towards sustainability has evident globally in all realms now a days. This has encouraged firms to rethink and replan about their sourcing activities that parallel with the circularity approaches. (Geissdoerfer Martin et al., 2016). The circular economy gives emphasis to material recovery, closed loop system and product life extension, while sustainable sourcing focuses on responsible sourcing of materials and also accountable to ecological and social outcomes. In this context the two concepts, Circular Economy and Sustainable Sourcing have strong interconnection with each other.

This article is a case study that is conducted in IKEA, a global leader in home furnishings with over 400 stores worldwide. They have opted CE and SS as their sustainability agenda.

Significance of the Study

The concepts Circular Economy and Sustainable Sourcing are getting more prominence today because of the escalating environmental issues and unsustainable consumption behaviour. Both the concepts are interconnected. Sustainable sourcing helps to procure materials, without exploiting their sources as well as harming the environment. The collected materials are used at its maximum and transformed to various products. The ultimate aim is to reduce waste by extending the life span of the product or by placing the throned products as the raw material for some other purposes. This research is a real-life application of CE and SS integration in a complex global retail supply chain. It also paves a path for other firms who are seeking sustainability transformation.

Scope of the Study

This study particularly focuses on how IKEA integrates CE principles into Sustainable sourcing strategies. It also analyses the corporate sustainability policies of IKEA, product life cycle planning and challenges faced by IKEA in adopting CE and SS practices.

Statement of the Problem

While there is a close interconnection with Circular Economy and Sustainable Sourcing, some of the global organisations demonstrates how they effectively integrate these

two concepts in their business activities. IKEA, a world-wide multinational corporation, which is famous for their sustainability initiatives, faces some operational challenges in terms of their circular practices. This study addresses the central research problem: How does IKEA integrate sustainable sourcing into its circular economy strategy, and what organizational, technological, and policy enablers or barriers affect this integration across global markets?

Review of Literature

Conceptual Foundations: Circular Economy and Sustainable Sourcing

Circular Economy aims to differentiate economic growth from resource consumption by encouraging R- strategy ie recycling, reusing and regenerative material loops(Urbinati et al., 2017). On the other hand, Sustainable Sourcing tries to foster the material procuring by way of environmentally viable, socially inclusive and economically sound. The intersection of these two concepts is highly important for maintaining sustainable supply chain activities in business(Styles et al., 2012)

IKEA's Role in channelising Circularity

The multinational conglomerate IKEA is the pioneer for every organisation for integrating Circular Economy to Sustainable Sourcing. They have changed their business model to, product as a service. IKEA gives emphasis to circular product design, recycled material sourcing and product take back scheme (Han et al., 2022)

Integration of Circular Economy and Sustainable Sourcing

IKEA employs a multi-tier strategy for integrating its circular practices with sustainable sourcing. these include IWAY supplier code of conduct(Boström et al., 2015), life style assessment for product design(De los Rios & Charnley, 2017), and digital sourcing tools for analysing material requirement and maintaining transparency(de Sousa Jabbour et al., 2018).

Circular Sourcing Practices in Retail Sector

Retailers like IKEA are trying to bring sustainability in supply chain by influencing both suppliers and consumers. They are introducing mechanisms like supplier certifications, consumer awareness on product life extension and eco – design products and innovations(Vadakkepatt et al., 2021)

Institutional and Policy Influence

There are certain logics behind every organisation to transform their practices into circular model. The CE- SS integration requires certain corporate strategy, market incentives and regulatory mandates (Dagilienė et al., 2024)

Research Objectives

1. To examine how IKEA incorporates circular economy principles into its business operations.
2. To analyze IKEA's sustainable sourcing strategies and their impact on environmental performance.
3. To explore the challenges and best practices in implementing circular economy models in a multinational retail company.

Methodological Design

A qualitative case study methodology was employed to gain an in-depth understanding of IKEA's circular economy initiatives. This approach allows for an intensive examination of a single entity (IKEA) and is ideal for exploring complex, contemporary phenomena within real-life contexts. The case study design also supports triangulation through the use of multiple data sources, enhancing the reliability and depth of the findings.

Case Study Selection: Why IKEA?

IKEA was selected as the case study due to its global recognition as a pioneer in implementing sustainable business practices and its strong commitment to transitioning towards a circular business model. The company's public availability of sustainability reports, transparency in operations, and large-scale implementation of eco-friendly innovations make it an ideal candidate for this research.

Data Collection Methods

To ensure a comprehensive analysis, the study used secondary data from the following sources:

Corporate Reports: IKEA Sustainability Reports (2015–2024), Financial Reports, Circularity Roadmaps.

Academic Literature: Peer-reviewed journal articles on circular economy and sustainable sourcing in retail and supply chain contexts.

Industry Publications: Reports from NGOs, business sustainability rankings, and trade journals.

Company profile

IKEA is a multinational company founded in Sweden. The company designs and sells various products like ready to assemble furnishings, home furnishings and an array of services. IKEA is owned, operated and managed by Inter IKEA Group and Ingka Group comprising of a group of not for profit and for-profit organizations. Inter IKEA Systems B.V is owning the IKEA brand, which is a company incorporated and headquartered in Netherlands. Ingvar Kamprad was the founder of IKEA which was started in 1943 and it is one of the largest furniture retailers in the world since 2008. (Wikipedia)

IKEA's Transformation to Circularity

IKEA is undergoing strategic shift toward a circular business model, a wholistic shift which penetrates every level of its functions. It comprises of redesigning product and service development, sourcing practices, and customer engagement strategies. IKEA depend on both natural resources and human capital by taking into consideration future sustainability and supply chain, also for safeguarding the livelihoods of the millions involved in its ecosystem. It's a reflection of a broader commitment to sustainable development and long-term value creation. To embed circularity means the reduction of waste and optimization of resources, IKEA is regularly following innovative methods in its business model which is more reachable and usable to consumer community. The extension of product lifetime and optimization of ownership models were adopting as part of the minimization of resource consumption. experimental programs in furniture leasing, take-back and buy-back schemes, and support services that encourage customers to repair, reuse, recycle, or resell used furniture are the major initiatives adopted by the company for reducing environmental impact while promoting responsible consumption and circular consumer behaviour.

Efficient resource utilization, value creation through minimal inputs, and operational optimization are foundational elements of IKEA's corporate ethos. While the journey toward

full circularity is ongoing, measurable progress has already been made. In the 2019 financial year, IKEA successfully extended the lifecycle of approximately 47 million products. Of these, 38 million items were resold through its dedicated "As-Is" departments, and over 9 million products were repackaged and returned to store shelves, exemplifying practical implementation of reuse and waste reduction strategies.

Future Agenda

IKEA adopts a zero-waste mindset that informs every stage of its value chain—from material selection and product design to production, logistics, retail, and end-of-life management. Central to this approach is the commitment to utilizing renewable and recycled resources wherever possible, and to continuously re-engineer existing product lines for improved sustainability. As part of its 2030 vision, IKEA aims to ensure that all products are designed to be reused, repaired, reassembled, and ultimately recycled by customers. Parallel to these material strategies, the company also prioritizes energy efficiency across its global operations. Further information on these initiatives is available through IKEA's official sustainability communications platform

IKEA is actively expanding its circular economy initiatives across global markets, tailoring approaches to regional contexts while maintaining a unified sustainability vision. Buy-back and resell services are currently being piloted in multiple countries, enabling customers to return used items in exchange for store credit and thereby extending product lifespans. In the Netherlands, Sweden, and Switzerland, IKEA is experimenting with furniture leasing models as an alternative to traditional ownership, aiming to decouple consumption from resource depletion. Additionally, in Russia, IKEA launched a circularity-focused campaign that included community events promoting reuse, repair, recycling, and upcycling, alongside educational talks that raised awareness about circular design and responsible consumption practices.

Conclusion

IKEA's transformation to circularity highlights both the promise and complexity of embedding sustainability into the core of a global business model. IKEA has adopted various initiatives in redesigning of products, reconfigure supply chains, and reorient consumer behaviour toward reuse, repair, and recycling as a pioneer in the mass-market furniture

industry. The importance of long-term vision, systemic change, and stakeholder collaboration in achieving circularity are the major highlights of IKEA's journey. It's a role model for other organizations in terms of ability to leverage scale, invest in innovation, and influence consumer norms for transiting to a circular business model. In conclusion, while IKEA has not yet fully realized circularity, its evolving practices provide critical insights into the transition process. Ongoing investigation, legislative assistance, and collaborative partnerships will be essential to accelerate progress and ensure that circular economy strategies move beyond aspiration toward impactful, scalable implementation.

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Consumer Behaviour towards Eco – Friendly Products: An Empirical Analysis

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Abstract

The growing environmental concerns and increased consumer awareness have led to a significant shift in purchasing behavior toward eco-friendly products. This study examines consumer behaviour, awareness levels, attitudes, and purchase intentions toward eco-friendly products, with a specific focus on identifying the demographic factors influencing such behaviour. A structured questionnaire was used to collect primary data from 120 respondents, and the responses were statistically analysed using percentage analysis, chi-square test, factor analysis, and one-way Anova. The results reveal that environmental concern strongly influences purchase intention, while price and product availability act as major barriers. Age significantly affects awareness and purchase intention, whereas gender and income show no significant influence. The study provides valuable implications for marketers and policymakers to promote sustainable consumption through effective pricing, accessibility, and awareness strategies.

***Keywords**: Eco-friendly products, Consumer behaviour, Environmental awareness, Purchase intention, Green marketing*

Introduction

Environmental issues such as pollution, climate change, and the depletion of natural resources have become serious global concerns in recent years. As a result, consumers are increasingly aware of the impact their consumption habits have on the environment. This growing awareness has led to a rise in interest in eco- friendly products, which are designed to reduce environmental harm through sustainable production, packaging, and disposal practices.

Eco-friendly products, also known as green or sustainable products, aim to provide value to consumers while minimizing negative effects on the environment. Governments, businesses, and non-governmental organisations worldwide are actively promoting green consumption as a means to achieve sustainable development. However, despite increased awareness, the adoption of eco-friendly products remains uneven. High prices, limited availability, and a lack of trust in eco-labels often prevent consumers from choosing these products.

Therefore, understanding consumer behaviour towards eco-friendly products is important for both businesses and policymakers. This study examines consumers' awareness, attitudes, and purchase intentions towards eco-friendly products and analyses the influence of demographic factors on green purchasing behaviour.

Research Gap

Several studies have examined consumer behaviour towards eco-friendly products; however, the findings related to demographic factors such as age, gender, income, and education remain inconsistent. Many existing studies mainly focus on urban populations or developed markets and often use large sample sizes, which may not fully represent youth-oriented or emerging consumer groups.

In addition, most previous research tends to apply only one or two statistical tools, limiting a comprehensive understanding of consumer behaviour. There is a lack of studies that combine multiple analytical techniques—such as percentage analysis, chi-square analysis, factor analysis, and one-way ANOVA— within a single study to examine both influencing factors and demographic variations simultaneously.

Therefore, the present study aims to fill this research gap by providing an integrated empirical analysis of consumer behaviour towards eco-friendly products. The study places special emphasis on consumer awareness, key influencing factors, and the relationship between demographic characteristics and purchasing behaviour, particularly among young consumers.

Aim of the Study

The primary aim of this study is to examine consumer behaviour toward eco-friendly products and to identify the key factors influencing awareness, attitude, and purchase intention.

Specific Objectives

- To analyse the demographic profile of consumers purchasing eco-friendly products
- To determine the key factors influencing eco-friendly purchasing behaviour
- To analyse differences in awareness and purchase intention across demographic groups

Contribution of the Study

This study contributes to the existing literature on green consumer behaviour by providing empirical evidence on the role of environmental consciousness, economic barriers, and social influence in shaping purchase decisions. The findings offer practical insights for marketers to design effective green marketing strategies and for policymakers to promote sustainable consumption. Additionally, the study enhances understanding of youth-driven eco-friendly consumption trends, particularly in emerging markets.

Review of Literature

Peattie (2010) examined the relationship between environmental concern and green purchase behaviour, emphasizing the well-known attitude–behaviour gap in sustainable consumption. While consumers may express strong concern for environmental protection and sustainability, Peattie found that these attitudes do not always translate into actual purchasing behaviour. Factors such as higher prices of green products, limited availability, and perceived inconvenience often discourage consumers from choosing environmentally friendly alternatives, even when they recognize their benefits.

Chen and Chang (2012) focused on the role of green trust in influencing consumer decision-making. Their study highlighted that consumers are more likely to purchase eco-friendly products when they trust the environmental claims made by firms. Eco-labels, certifications, and transparent communication were identified as key mechanisms for building this trust. The authors argued that credible green branding reduces perceived risk and skepticism, thereby strengthening consumers' confidence and increasing their willingness to buy green products.

Joshi and Rahman (2015) explored how environmental awareness shapes green purchase intention and assessed the influence of demographic factors. Their findings

confirmed that higher levels of environmental knowledge and awareness generally lead to stronger intentions to purchase green products. However, the authors observed inconsistent effects of demographics such as income, education, and age across different studies. They also noted that although young consumers are typically more environmentally conscious, their purchasing decisions are often constrained by price sensitivity and limited financial resources.

Kumar and Ghodeswar (2016) highlighted the importance of social influence in promoting eco-friendly consumption. Their research showed that peer behaviour, social norms, and reference groups significantly affect consumers' green purchasing decisions, especially among younger consumers. Observing environmentally responsible behaviour within social circles can motivate individuals to adopt similar practices, suggesting that green consumption is not only an individual choice but also a socially influenced behaviour.

Biswas and Roy (2016) examined the barriers to green purchasing and identified several challenges that prevent consumers from adopting eco-friendly products. They found that limited product availability, higher prices, and skepticism toward green marketing claims are major obstacles. Consumers often question the authenticity of environmental claims due to greenwashing, which reduces trust and weakens purchase intention. The authors emphasized the need for greater transparency and improved access to genuine green products to overcome these barriers.

Theoretical Framework

This study is grounded in the Theory of Planned Behaviour (TPB), which posits that consumer behaviour is influenced by attitudes, subjective norms, and perceived behavioural control. In the context of eco-friendly products:

- Attitude is represented by environmental concern and responsibility
- Subjective norms are reflected through social influence from family, friends, and media
- Perceived behavioural control is influenced by price, availability, and product accessibility
- The framework suggests that stronger environmental attitudes and supportive social norms enhance purchase intention, while economic barriers may limit actual behaviour.

Research Methodology

Primary data were collected from 120 respondents from Chennai city. A well-structured questionnaire was framed to meet the requirements of the study and to gather information on consumers' awareness, perception, and purchasing behavior towards eco-friendly products.

Research and Statistical Tools Employed

Statistical analyses were performed using SPSS 21. Percentage analysis was used to study the demographic profile of consumers and their awareness level towards eco-friendly products. The Chi-square test and Cross Tabulation were employed to examine the association between consumers' demographic variables such as age and gender and their preference for eco-friendly products. Factor analysis was applied to reduce the large number of influencing variables into key factors and to identify the predominant factors affecting consumers' purchase decisions towards eco-friendly products.

Results and Discussion

Table 1: Demographic Profile of the Respondents

Personal Profile	Particulars	Frequency	Percentage (%)
Age	Below 20 years	47	39.2
	21–30 years	41	34.2
	31–40 years	11	9.2
	41–50 years	16	13.3
	Above 50 years	5	4.2
Gender	Female	62	51.7
	Male	58	48.3
Educational Qualification	Higher secondary	32	26.7
	Undergraduate	25	20.8
	Postgraduate	31	25.8
	Professional	32	26.7

Monthly Income	Below ₹20,000	38	31.7
	₹20,001–₹40,000	34	28.3
	₹40,001–₹60,000	22	18.3
	Above ₹60,000	26	21.7
Purchase of Eco-friendly Products	Yes	95	79.2
	No	25	20.8

Source: Computed data

The above table depicts that a majority of the surveyed respondents fall in the age group of **below 30 years (73.4%)**. Females constitute **51.7 percent**, indicating that women are slightly more aware and responsive towards eco-friendly consumption. In terms of education, 26.7 percent of the respondents are professionally trained, while an equal percentage have completed higher secondary education Further, **79.2 percent** of the respondents have already purchased eco-friendly products.

Table 2: Association between Age and Purchase of Eco-Friendly Products

Age Group	Yes	No	Total	χ^2	Sig.
Below 20 years	36 (76.6%)	11 (23.4%)	47 (100%)		
21–30 years	32 (78.0%)	9 (22.0%)	41 (100%)		
31–40 years	8 (72.7%)	3 (27.3%)	11 (100%)		
41–50 years	14 (87.5%)	2 (12.5%)	16 (100%)		
Above 50 years	5 (100%)	0 (0%)	5 (100%)	**2.485**	**0.647**
Total	**95**	**25**	**120**		

Source: Computed data

Null Hypothesis: There exists no significant association between age and purchase of eco-friendly products.

The Pearson Chi-Square value is **2.485** with a significance level of **0.647**. Since the p-value is greater than 0.05, the null hypothesis is accepted. Therefore, it is concluded that **age does not significantly influence purchase behaviour towards eco-friendly products.**

Table 3: KMO and Bartlett's Test

Measure	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.802
Bartlett's Test of Sphericity (Approx. Chi-Square)	456.218
Df	15
Sig.	0.0000

Source: Calculated data

The KMO value of **0.802** is greater than 0.80, which indicates sampling adequacy. Bartlett's test is significant at the 5 percent level, confirming that the data are suitable for factor analysis.

Table 4: Total Variance Explained – Consumer Behavior towards Eco-Friendly Products

Factors	Components	Item Description	Rotated Loading	% of Variance	Eigen Value
I	**Environmental Awareness Factor**	Concern for environmental protection	0.742	28.416	5.683
		Preference for eco-friendly products	0.718		
		Awareness of environmental issues	0.691		
		Willingness to reduce plastic usage	0.634		
		Belief in sustainable consumption	0.582		
II	**Economic Benefit Factor**	Long-term cost savings	0.731	9.274	1.854
		Value for money	0.698		
		Reduced utility expenses	0.563		
		Government subsidies and incentives	0.512		

III	**Social Influence Factor**	Influence of friends and family	0.689	7.062	1.412
		Social responsibility perception	0.651		
		Brand reputation	0.538		
		Social media influence	0.496		
IV	**Convenience Factor**	Easy availability	0.721	6.318	1.263
		Ease of use	0.687		
		Accessibility in local markets	0.549		
V	**Trust & Quality Factor**	Product reliability	0.704	5.146	1.031
		Certification and eco-labels	0.612		
		Product durability	0.497		

Source: Calculated data

Extraction Method: Principal Component Analysis Rotation Method: Varimax

It is observed that two dominant factors emerge. The first factor explains **46.9 percent** of the total variance and is named **Environmental Orientation**, whereas the second factor explains **18.7 percent** and is named **Value Perception**.

Findings and Conclusion

The study concludes that consumers' purchase behaviour towards eco-friendly products is primarily influenced by environmental awareness and product availability. Demographic characteristics such as age and gender do not indicate significant differences in purchase decisions. Further, value perception relating to price and product quality acts as a supporting determinant rather than a primary motivation.

Suggestions for Further Research

Future studies can be conducted with larger and more diverse samples to better understand consumer behaviour towards eco-friendly products.

A comparison between urban and rural consumers can help identify differences in awareness and buying behaviour.

Further research may study the role of government policies and the effectiveness of green marketing practices.

Brand-specific studies on eco-friendly products can provide insights into consumer preferences. Long-term studies can be carried out to observe changes in consumer behaviour over time.

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Farmer – Producer Organisations (FPOs) in India and Green Supply Chain Management: A Workable Pathway for Agricultural Commercialisation

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Abstract

The study proposes a conceptual framework focusing on logistics that are carbon-neutral, circular waste utilisation, decentralised storage, blockchain traceability, and direct market linkages. The author concludes that FPOs, equipped with knowledge and a strategy, can create future avenues of sustainable agri-commerce in India. Farmer-Producer Organisations (FPOs) in India have initiated an organizational change in farming marketing and the empowerment of small farmers to access collective logistics, thereby allowing markets to operate more efficiently. However, it remains the case that predicted supply chains are often carbon-intensive, and they are also likely to suffer losses and irregular disintegration. In this article, the author explains how the different GSCM practices—like the use of renewable cold chains, eco-packaging, digital traceability, and resource-efficient production—can transform the FPO-led agri-commerce into a financial network that is not only viable but also sustainable. Through an extensive literature review, government policy reports, and secondary agricultural data, the study looks at the input–production–processing–distribution continuum and evaluates the challenges, opportunities, and strategic green interventions. The results show that the integration of GSCM into the operations of FPOs can lead to a reduction of post-harvest losses by 20-40%, increase in farmers' income by 15-35%, reduction in the logistics emissions, and enhancement of SDG-linked agriculture.

Keywords: *Farmer-Producer Organisations, Green Supply Chain Management, Agricultural Logistics, Sustainability, Circular Economy, SDGs.*

1. Introduction

Agriculture plays a crucial role in the socio-economic structure of India, as it employs almost half of the population (55%) and is the main source of income for most of the rural inhabitants (FAO, 2022). However, even at such a large scale, the small and marginalIndian farmers who are at the center of the situation, have almost no control over the market, face disorganized logistics, and suffer from large post-harvest losses that are estimated to be around 15-40% annually, the extent of which is especially high in the case of perishables (MoA&FW, 2021). Mounting pressure on farmers, led the way for the establishment of Farmer-Producer Organisations (FPOs) which are considered as a form of collective institutions providing smallholders with the benefits of the economy of scale, input pricing, processing, credit access, and more through better market linkages. (NABARD, 2020).

At the same time, global trade is turning to sustainable practices and green capitalism, with industries embracing the use of nature-friendly practices, carbon-reduction measures, circular consumption, finance based on ESG criteria, and green logistics interventions (Porter & Kramer, 2011). The role of Agriculture in sustainability transitions is major because of its high carbon footprint, large water use, high waste generation, and emissions from logistics (UNEP, 2020). Therefore, Green Supply Chain Management (GSCM)—the integration of environmental concerns into the procurement, production, distribution, and reverse logistics— becomes critical for rural development. (Srivastava, 2007).

Linking GSCM to FPOs in India can lead to the agricultural value chain becoming more efficient, less impactful on the environment, and a fairer income distribution among farmers. The researchers argue that the use of digital traceability, renewable energy, innovative warehousing, and technology for converting waste into value can greatly increase the access of FPOs to the market and thus enhance their profitability (Sharma & Singh, 2021). Hence, it is necessary to conduct a study on the potential of green SCM in the FPO ecosystem to make rural agriculture compatible with sustainable development and green-capital economic models.

2. Objectives

1. To study the role of supply chain management in strengthening Farmer-Producer Organisations.
2. To explore the potential of green and sustainable supply chain practices for FPO-based agri-commerce.

3. To identify operational bottlenecks faced by FPOs in logistics, storage, and marketing.
4. To propose a Green Supply Chain Framework suitable for rural FPO ecosystems in India.

3. Review of Literature

SCM enables the seamless flow of goods, information, and finance from farm to consumer (Christopher, 2016). Scholars assert that Indian agricultural supply chains involve multiple intermediaries contributing to high transaction costs and price asymmetry (Murthy et al., 2019). FPOs were introduced to reduce these inefficiencies by aggregation and cooperative marketing (Trebbin, 2014).

Green supply chain literature recognizes the need for carbon-efficient logistics, eco-packaging, renewable cold chain, waste utilization, and sustainable sourcing (Carter & Rogers, 2008). It has been reported that the amalgamation of Green Supply Chain Management (GSCM) not only benefits the environment but also generates profit (Zhu et al., 2008; Agyabeng-Mensah, 2020). The use of modern technologies like IoT in storage facilities, blockchain for tracking goods, and online trading platforms has led to a better and more reliable market (Kshetri, 2018; Singh et al., 2023).

Research focused on FPOs has pointed out that their competitiveness is determined by improvements in skills, access to credit, digital literacy, value-added infrastructure, and long-term buyer relationships (NITI Aayog, 2021). Various researches have reported that farmers' income gets increased up to 35% and input cost gets lowered by 10-25% thanks to the procurement done through the FPOs (SFAC, 2023; World Bank, 2022). The adoption of sustainable SCM has a positive impact on climate resilience and direct support to the SDGs 2, 12 and 13 (UN, 2015).

The related literature points out a common area of ignorance: Documenting the application of green SCM elements in Indian FPOs' operations strategically is still not well accounted for which means there's a primary reason for this research.

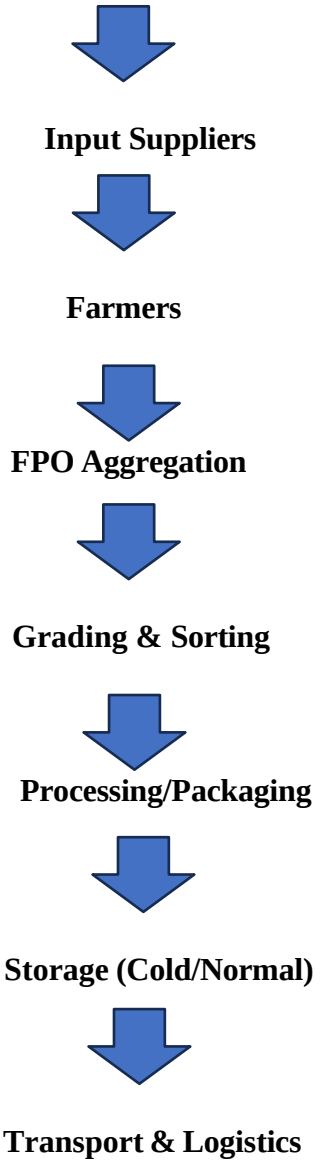
4. Methodology

This paper employs a qualitative, conceptual research design, grounded in an extensive review of secondary data. Sources include:

NABARD, SFAC, FPO policy reports Peer-reviewed journals (2010–2024) Government & FAO agricultural sustainability reports Books and conference publications on Green SCM Information was synthesized inductively to derive a conceptual framework for sustainable supply chain adoption in FPOs.

5. FPO Supply Chain Process in India

FPO Supply Chain Process in India



Wholesalers/Retail/Export

Consumers

There are wastages, inefficiencies, and carbon emissions in every stage; that is why green SCM is so crucial.

5.1. Integration of GSCM Components

Stage	Green Intervention	Benefit
Input procurement	Organic inputs, seed libraries	Reduced chemical footprint
Production	Drip irrigation, solar pumps, bio-fertilisers	Water & soil conservation
Storage	Solar cold chambers, reefer units	Lower spoilage & emissions
Processing	Composting, recycling waste	Circular economy
Distribution	EV transport, route planning	Lower carbon emissions
Marketing	E-mandi, e-commerce	Intermediaries reduction
Finance	Green credit, carbon credits	New revenue streams

6. Findings and Discussion

6.1 SCM Strengthens FPO Commercialisation

Efficient supply chain management (SCM) leads to better aggregation, lower transaction costs, and shorter value chains (Bisht & Singh, 2020). Farmers' Producer

Organizations (FPOs) do the marketing of their produce directly, thus getting price realization that is 20-40% more than local sales at mandis (Dhillon et al., 2022). Purchasing collectively results in a dramatic reduction of input costs (NABARD, 2020).

6.2 Scope of Green SCM in FPOs

If agriculture practices turn greener then their emissions could significantly drop, which currently make up almost 14% of the country's total GHG output (IPCC, 2021). Cold storage that runs on solar power reduces loss of product and, at the same time, gives 24×7 storage at a low cost (Sharma et al., 2020). Compostable containers extend shelf life and make products more suitable for export (Gupta & Kumar, 2022). Logistics in reverse mode supports turning agricultural waste into compost or biofuel, thus waste is turned into an economic asset (Rahman & Subramanian, 2012).

6.3 Challenges

FPOs have great potential, but at the same time, they must contend with several obstacles, including a lack of credit, poor digital literacy, price fluctuations, and dispersed logistics (Kumari & Singh, 2023). Besides, the existing infrastructure shortcomings not only hinder the process of value adding but also result in distress sales. Therefore, the participation of policy reforms, along with the backing of capacity building support, is a must.

6.4 Proposed Green Supply Chain Model for FPOs Essential supports:

Green Procurement – natural fertilizers, reclamation of soils

Eco-Production – saving resources, modern agricultural methods

Renewable Storage & Logistics – solar-powered cold storage, electric transportation

Digital Traceability – blockchain based supply chain, QR farm-to-plate identity

Circular Waste Management – making compost & generating energy from waste

Sustainable Market Linkages – connections with businesses, retail tie-ups, export clusters

If this model is adopted, it will produce benefits for the environment, society, and the economy, and thus make agricultural trade fit into the concept of green entrepreneurship.

7. Conclusion

FPOs are expected to be the main support of sustainable agriculture and the green market in India. The integration of green supply chain management practices is considered the most practical and beneficial way to overcome the environmental impact of farming while increasing profits, resilience, and competitiveness on a global scale. The research highlights the necessity of support from the government in terms of infrastructure, financial grants, digital access for the poor, and climate-wise skill development. The cooperation of government agencies, agritech startups, research institutions, and private buyers will facilitate the transition towards FPO-based supply chains that are smart in terms of climate.

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A Study on the Impact of Social Media Marketing of E – Retailing Companies on Buying Behavior of Consumers

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Abstract

Social media marketing (SMM) has emerged as a dominant force in the modern marketing landscape, fundamentally altering consumer behavior and decision-making processes. This exploratory study aims to conduct a systematic review of existing literature on SMM and its influence on consumer behavior, with a particular focus on general, young, and female consumers.

***Keywords**: Consumer Buying Behavior, Facebook, INSTRAGRAM, Female Consumers, Social Media Marketing, Social Networking Sites.*

Introduction

"Getting a new idea adopted, even when it has obvious advantages, is difficult. Many innovations require a lengthy period of many years from the time when they become available to the time when they are widely adopted. Therefore, a common problem of many individuals and organizations is how to speed up the rate of diffusion of an innovation".: Everett Rogers (2003)

Social Media

Social media technologies are creating and sharing more than information. Ideas, career interests, and another form of expression via virtual communities and networks.

Consumer Buying Behavior

Consumer buying behavior in customer conduct is the investigation of people, gatherings, or associations and the cycles they use to choose, secure, use, and discard items, administrations, encounters, or thoughts to fulfill their requirements and needs. It is likewise worried about the social and economic effects that buying and utilization conduct has on both the consumer and wider society.

Social Media Online Marketing

Web-based media promoting alludes to publicizing that is posted or spilled via online media sites or applications. Online media advertising is the utilization of web-based media stages and sites to advance an item or administration. A large portion of these online media stages have their own underlying information investigation instruments, which empower organizations to follow the advancement, achievement, and commitment of advertisement crusades For instance, a client sees promotions or supported advertisements in his own Facebook channel.

Review of Literature

The essential pith of this examination work is to contemplate the effect of web-based media advertising on purchasing conduct of online customers. It is of fundamental significance to examine and investigate the way that online media can assume a critical part in molding buyer discernments and subsequently eventually impacting the purchasing choice interaction of customers.

1. **Tim Finin, Anupam Joshi, Pranam Kolari, Akshay Java, Anubhav Kale, and Amit Karandikar (2008) in their examination —**The data nature of web- based media and online communities‖ clarified that Work on building frameworks that would help in perceiving the spam web journals, discovering assessment on points, distinguishing networks of interest, determining trust connections and recognizing persuasive bloggers with the assistance of models of the blogosphere
2. **Yin, Sara (2008) in her exploration paper How Social Media and PR Connect, compose that with the development of the Social** scene has changed and the mass assembling force of Social Media is huge. Individuals imagine that Social Media is a danger to conventional PR and established press, nonetheless, Social media supplements customary PR, and conventional PR will exist as a significant segment of any fruitful business.

Research Methodology

Research Design

The descriptive design was made to study the social media marketing and e-retailing of the company. The major purpose of descriptive research is a description of the state of affairs as it exists at present the descriptive research includes a survey of data collection.

Research Objectives

- study the most useful and effective social media tools in Facebook, Twitter, Linked In, youtube, etc.
- To study on on-line purchasing customer behavior of age group in 20-40 years.
- To identify the impact of social media marketing strategies of e-retailing companies on the buying behavior of customers.

Data Used

The study is based on primary and secondary data.

Data Collection

A survey method is used to collect the data.

Sample Design

A sample design is a definite plan for obtaining a sample from a given population. It refers to the techniques or the procedures. The research world adopts in identifying items for the sample.

Sampling Method

The consumer is interviewed with the help of a structured questionnaire.

Sample Size

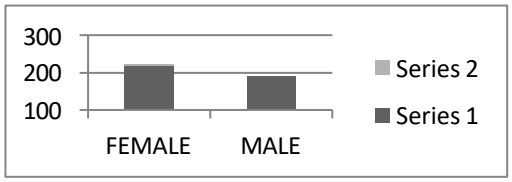
The size was decided on free consent by the respondents. the sample size is fixed as 409

Statistical Tools Used

Percentage analysis and weighted average method are the statistical tools used in this study.

Data Analysis

Table:1 Basic data distribution according to Gender:



Interpretation

The response of the independent, regarding changes of genders. The percentage of females is greater than males, so strongly the statement is agreed to social media is a more effective two-way communication between respondents and e-retailers.

Table:2 Frequency of Internet Access

Days	Observ ed N	Expect ed N	Resid ual
Almost everyday	228	67.5	160.5
2-3 days a week	58	67.5	-9.5
4-5 days a week	89	67.5	21.5
Once a week	26	67.5	-41.5
Rarely	3	67.5	-64.5
Never	5	67.5	-66.5
Total	409		

(i) Chi-Square Test Result

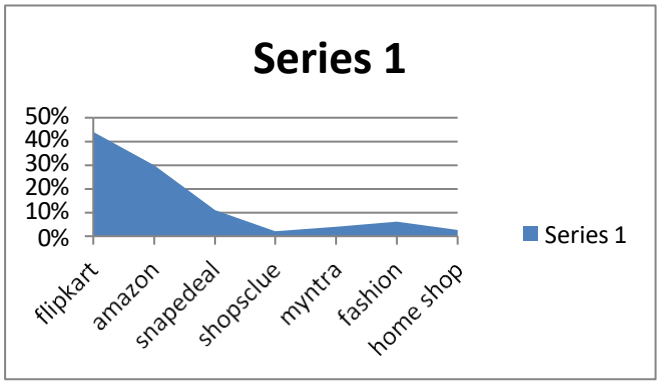
Test Statistics

	Internet Access
Chi-Square	542.481[a]
Df	5
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 67.5

Interpretation: Since the p-value for the chi-square is less than that of 0.05 indicates that the responses are not equally distributed. It means the proportion of responses for use of the internet is different. The residual table contributes to the significance. It can be observed from the residual table that the highest residual is observed almost every day and the residual is positive hence we conclude that most of the respondents are using the internet almost every day.

TABLE-3 Basic Purchase of E – Retailing Website



Interpretation

Flipkart.com is the most purchase and popular e-retailing website followed by Amazon.com

Table-4 Attract you to purchase from the website

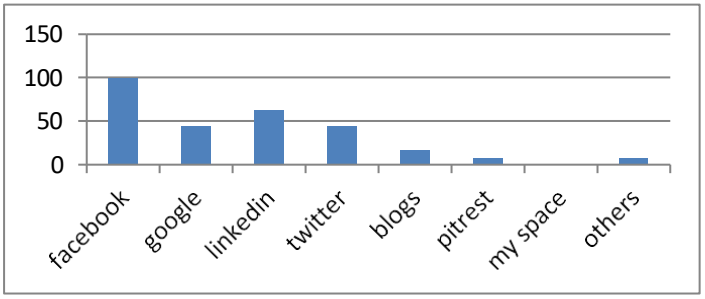
Different Website	Count	Percentage
Advertisement and other marketing	10	2.4%
Opinions of friends and family	54	13.2%
Experience	35	8.5%
Prices of product	46	11.2%
Designs of website	89	21.76%
Payments methods	0	0%
Delivery options	110	26.89%

Interpretation: Most people purchase in designs of website and delivery options. some people attract to the return policy

TABLE-5 percentage of respondents using different social media websites

Social media websites	Count	Percentage
Facebook	409	99.27
Google+	182	44.17
Linkedin	260	63.11
Twitter	184	44.66
Blogs	67	16.26

Pinterest	30	7.28
My Space	0	0.00
Others	30	7.28



Interpretation

All the social media sites are not equally used but some sites are used more frequently for having an account. Facebook is observed to be a highly used social networking site.

Findings

Online media offer reasonable freedoms to arrive at enormous populaces. Also, online missions via web-based media can profit from the powerful highlights of intuitive multi-media.

- 53.6% of female respondents are a higher representation.
- The majority of respondents access the almost daily. It has been observed that almost 56.29% of spend they social media websites.
- Most people purchase in designs of website and delivery options. Some people attract to the return policy.
- All the social media sites are not equally used. Some sites are used frequently for having an account. Facebook is a highly used social networking site.

Suggestions

- Embedding social catches inside the site and promoting interchanges to urge clients to share their perspectives.
- Leverage Social Reviews to Automate Word of Mouth Marketing .As the trust value of ads via web-based media is a significant factor for shoppers, the ads by e-retailers should be real, basic, and draw a practical picture.
- Consumers visit 3-5 sites before settling on buy choice so it is prudent for the e-retailers to monitor advertising methodologies of contending sites.

Conclusion

1) Similar studies can be conducted in different cities with different demographics.
2) There can be the study of social media marketing on buying behavior of a specific group of people like students, business class, government servants, housewives, etc.
3) There can be a study on the impact of marketing on particular social networking sites like Facebook, Instagram, Snapchat, etc.

Influence of AI Generated Personalised Ads on Consumer Buying Behaviour towards Eco Friendly Products

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Abstract

In the changing environmental climatic conditions, the consumer's preference towards a products change. Especially when comes to Personalization the consumer's preference might shift. Sustainability has become a global priority, thus the marketers to attract consumers adopts AI technologies to create Personalize Ads and Promote environmental responsibilities. The research examines the influence of AI personalized marketing on consumers buying behaviour. The study also explores the consumer's attitude, perception of AI-driven Personalization, Effectiveness, ethical concern towards usage of data and role of personalized advertisements in shaping buying decision. The survey was conducted through Structural Questionnaire and Direct Personal Interview among 150 respondents in and around Nanmangalam. Percentage analysis, Chi-Square, ANOVA and Regression analysis was carried out to analyse the study.

***Keyword**: Artificial Intelligence, Personalized Ads, Consumer Attitude, Consumer Behaviour, Eco-Friendly Products.*

Introduction

Environmental sustainability has emerged as a crucial Global factor due to change in climatic condition, resource depletion and increase in consumer awareness about the environment. As a result, the sustainable products are gaining more attention in this digital emerging world. Yet, there are fears regarding Greenwashing, trust towards the product, lack of product info, price sensitivity, etc.

In the emerging trend in digital platform, AI as modernised the marketing trends, particularly through Personalized Ads that deliver tailored product recommendation based on consumer's perception, preference, buying behaviour and browsing patterns. This study mainly focus on how AI Personalised Ads shapes buying behaviour towards ecological products and also focusing on consumer attitude, perception and ethical concerns.

Objective of the Study

- To investigate the impact of AI-enabled Personalized marketing on consumer buying behaviour towards eco-friendly products.
- To examine the influence of AI-driven personalized advertising on shaping consumer perception and increase interest, trust and ethical concerns towards the Ads on eco-friendly products.
- To offer few general views of consumers on sustainable products advertisement generated by AI.

Scope and Limitation of the Study

The Study mainly focuses on consumers in semi-urban locality where still AI adoption in E-Commerce is still in blooming stage. Highlights actionable insight for the marketers thus they can attract the semi-urban and urban consumers.

The study limits to Nanmangalam, Chennai area with 150 consumers who purchase products in online and are aware of sustainable consumption.

Review of Literature

1. Osama Sohaib, Aamna Alshemeili, Tariq Bhatti (2025) underwent a study on "Exploring AI-enabled green marketing and green intention: An integrated PLS-SEM and NCA approach". This study explores various AI-enabled green marketing strategies (AI-enabled strategic, Tactical and Internal green marketing orientation) and their impact on fostering consumer trust and satisfaction, ultimately influencing green intention. This study sheds light on the potential of AI in shaping green marketing strategies and their influence on driving sustainable consumer behaviour. The study also reveals that the perceived environmental sustainability of a product positively influences purchase intent.

2. A.Varshini and A.Sarlin Venotha (2025) underwent a study on "AI in Sustainable Marketing and Consumer Behaviour: A Transformational Perspective". This paper explores

how AI-powered tools facilitate data-driven decision-making, personalized marketing strategies and enhanced customer engagement to promote sustainability. Further, it also examines the ethical considerations and challenges associated with AI implementation. The study concludes that AI has emerged as a transformative tool in sustainable marketing, offering innovative solutions to understand consumer behaviour, optimize resources and promote green practices. By leveraging AI, businesses can align with global sustainability goals while building consumer trust and loyalty. Ethical considerations, including privacy and fairness, must be addressed to maximise AI's potential responsibly.

3. Dr. Nupur Rawal, Dr. Arnaz Wadia, Dr.Priyanka Zala (2025) underwent a research on "AI-Driven Personalization in Sustainable Marketing Campaigns: A Thematic Analysis". This research investigates how AI-driven Personalization enhances the effectiveness of sustainable marketing campaigns by examining its impact on consumer behaviour, campaign performance and brand perception. Using Thematic Analysis the study concludes that AI-driven personalization has emerged as a transformative tool in enhancing the effectiveness of sustainable marketing campaigns. By delivering tailored content and recommendations, brands can promote stronger consumer engagement and promote environmentally friendly products and services. This approach not only boosts campaign efficiency but also support the growing consumer demand for sustainable-focused solutions.

4. Aarshiya Bansal and Dr. T P Singh (2025) underwent a study on "AI-Generated Advertising Content and Consumer Engagement & Buying Behavior". The study explores consumer perceptions of AI-generated advertising, focusing on engagement levels and purchase behaviour. The study concludes although consumer acknowledge the creativity and tailored experiences provided by AI-generated advertisements, serious worries about privacy and trust still exist.

5. Ogechukwu T. Ibeama, Lydia A. Dampare Addo, Remilekun L. Durodola, Vanessa Kwakye, Pearlrose Nwuke and Arinze E. Anaege (2024) presented a research topic on "AI-Powered Advertising and Sustainable Consumer Behavior among U.S. College Students". The study mainly determines the extent of exposure to AI-driven advertising and also ascertain the correlation between exposure through AI-driven advertising and attitude towards sustainable consumption among U.S. university students. The study reveals that

students frequently encounter AI-driven ads and hold pro-sustainability attitudes, AI exposure alone does not strongly predict their purchase intentions. There is weaker positive correlation between exposure through AI-driven advertising and attitude towards sustainable consumption, implies that AI is potential but the driving force in towards

6. consumer behaviour needs to be worked on.

Research Methodology

Research Design: Descriptive and Analytical.

Sample Design and Size: Purposive Sampling is used and collected data from 150 consumers.

Source of Data:

- Primary Data: Well Structured Questionnaire and Direct Personal Interviews.
- Secondary Data: Data were collected from websites and Journals.

Tools Applied:

- ✯ Percentage Analysis
- ✯ ANOVA
- ✯ Chi-Square
- ✯ Regression Analysis
- ✯ **Percentage Analysis**

Analysis and Interpretation

Table 1 Showing Percentage of Demographic Variables of the Consumers and the Factor Influence their Buying Decision

Variables	Dominal Group	Percentage
Gender	Female	74%
Age Group	Above 55	30%
Education Level	PG	48%
Occupation	Salaried	28%
Monthly Income	Less than 20,000	32.70%
Factor Influence their Buying Decision	Quality	40.7%

Source: Computed Data (Primary Data)

Interpretation: Majority of the respondents were **Female** consumers and are **Above 55** of Age group. Majority of the respondents are **PG Degree holders** and belongs to **Salaried** category earning **Less than Rs.20,000**. **Quality of Eco-Friendly Products** mainly influence consumer's purchase decisions.

ANOVA

Table 2 Showing ANOVA to Study the Significant Difference Between Educational Qualification and General Attitude Toward Eco-Friendly Products

Ho: There is no significant difference between Education Qualification and General Attitude towards Eco-Friendly Products.

Variables		Sum of Squares	df	Mean Square	F	Sig.	Significant / Insignificant	Accepted / Rejected H0
I actively look for eco-friendly / sustainable products when shopping.	Between Groups	1.977	4	.494	.551	.698	Significant	Accepted H0
	Within Groups	130.023	145	.897				
	Total	132.000	149					
I am willing to pay a higher price for eco-friendly products.	Between Groups	2.543	4	.636	.649	.629	Significant	Accepted H0
	Within Groups	142.051	145	.980				
	Total	144.593	149					
I trust claims made by brands about their products being "eco-friendly" or "sustainable."	Between Groups	4.229	4	1.057	1.033	.393	Significant	Accepted H0
	Within Groups	148.444	145	1.024				
	Total	152.673	149					

Environmental concerns influence my purchasing decisions.	Between Groups	1.850	4	.463	.396	.811	Significant	Accepted H0
	Within Groups	169.190	145	1.167				
	Total	171.040	149					
I have purchased eco-friendly products in the past 6 months.	Between Groups	3.759	4	.940	.689	.601	Significant	Accepted H0
	Within Groups	197.714	145	1.364				
	Total	201.473	149					

Source: Computed Data (Primary Data)

Interpretation: As the Significant value is more than 0.05 in all the **case H0 is Accepted**. Thus, there is **no significant difference** between **Education Qualification** and **General Attitude towards Eco-Friendly Products**.

Chi-Square

Table 3 Showing Chi-Square to Study the Significant Association Between Perception Towards AI-Personalization and Consumer Buying Behaviour

Ho: There is no significant association between Perception Towards AI-Personalization and Consumer Buying Behaviour.

Variables	Value	df	Asymp. Sig. (2-sided)	Significant / Insignificant	Accepted / Rejected H0
I believe AI-driven marketing can support sustainability goals * I am more likely to purchase eco-friendly products after seeing personalized ads.	51.027	16	.000	Insignificant	Rejected H0

I believe AI-driven marketing can support sustainability goals * Price still influences my purchase decision more than sustainability.	45.143	16	.000	Insignificant	Rejected H0
I believe AI-driven marketing can support sustainability goals * Personalized AI marketing improves my likelihood of switching to eco-friendly brands.	61.445	16	.000	Insignificant	Rejected H0
I believe AI-driven marketing can support sustainability goals * AI Personalization attracts and make me realize the importance of eco-friendly products	46.974	16	.000	Insignificant	Rejected H0
I believe AI-driven marketing can support sustainability goals * AI Personalization recommendation influences my purchase decision.	55.089	16	.000	Insignificant	Rejected H0
AI-personalized ads provide relevant product recommendations. * I am more likely to purchase eco-friendly products after seeing personalized ads.	45.507	16	.000	Insignificant	Rejected H0
AI-personalized ads provide relevant product recommendations. * Price still influences my purchase decision more than sustainability.	28.524	16	.027	Insignificant	Rejected H0
AI-personalized ads provide relevant product recommendations. * Personalized AI marketing improves my likelihood of switching to eco-friendly brands.	57.042	16	.000	Insignificant	Rejected H0

AI-personalized ads provide relevant product recommendations. * AI Personalization attracts and make me realize the importance of eco-friendly products	35.181	16	.004	Insignificant	Rejected H0
AI-personalized ads provide relevant product recommendations. * AI Personalization recommendation influences my purchase decision.	102.341	16	.000	Insignificant	Rejected H0
AI-personalized ads make eco-friendly products more appealing to me. * I am more likely to purchase eco-friendly products after seeing personalized ads.	42.018	16	.000	Insignificant	Rejected H0
AI-personalized ads make eco-friendly products more appealing to me. * Price still influences my purchase decision more than sustainability.	39.156	16	.001	Insignificant	Rejected H0
AI-personalized ads make eco-friendly products more appealing to me. * Personalized AI marketing improves my likelihood of switching to eco-friendly brands.	97.759	16	.000	Insignificant	Rejected H0
AI-personalized ads make eco-friendly products more appealing to me. * AI Personalization attracts and make me realize the importance of eco-friendly products	43.598	16	.000	Insignificant	Rejected H0

AI-personalized ads make eco-friendly products more appealing to me. * AI Personalization recommendation influences my purchase decision.	70.243	16	.000	Insignificant	Rejected H0
Personalized ads save my time by showing suitable eco-friendly options. * I am more likely to purchase eco-friendly products after seeing personalized ads.	55.342	16	.000	Insignificant	Rejected H0
Personalized ads save my time by showing suitable eco-friendly options. * Price still influences my purchase decision more than sustainability.	35.191	16	.004	Insignificant	Rejected H0
Personalized ads save my time by showing suitable eco-friendly options. * Personalized AI marketing improves my likelihood of switching to eco-friendly brands.	85.791	16	.000	Insignificant	Rejected H0
Personalized ads save my time by showing suitable eco-friendly options. * AI Personalization attracts and make me realize the importance of eco-friendly products	41.278	16	.001	Insignificant	Rejected H0
Personalized ads save my time by showing suitable eco-friendly options. * AI Personalization recommendation influences my purchase decision.	63.331	16	.000	Insignificant	Rejected H0
I trust information shown in AI-generated ads. * I am more likely to purchase eco-friendly products after seeing personalized ads.	81.057	16	.000	Insignificant	Rejected H0

I trust information shown in AI-generated ads. * Price still influences my purchase decision more than sustainability.	26.426	16	.048	Insignificant	Rejected H0
I trust information shown in AI-generated ads. * Personalized AI marketing improves my likelihood of switching to eco-friendly brands.	88.273	16	.000	Insignificant	Rejected H0
I trust information shown in AI-generated ads. * AI Personalization attracts and make me realize the importance of eco-friendly products	31.32	16	.012	Insignificant	Rejected H0
I trust information shown in AI-generated ads. * AI Personalization recommendation influences my purchase decision.	62.518	16	.000	Insignificant	Rejected H0

Source: Computed Data (Primary Data)

Interpretation: As the Significant value is less than 0.05 in all the case **H0 is Rejected**. Thus, there is a **significant association** between **Perception Towards AI-Personalization** and **Consumer Buying Behaviour**.

Regression Analysis

Table 4 Showing Regression to Study the Significant Influence Between Age Group and Perceived Effectiveness and Ethical Concerns

H0: There is no Significant Influence Between Age Group and Perceived Effectiveness and Ethical Concerns.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Accepted / Rejected H0
	B	Std. Error	Beta			
(Constant)	2.604	.229		11.363	.000	

Age * AI personalization helps me make more sustainable shopping choices.	-.070	.052	-.109	-1.329	.186	Accepted H0
(Constant)	2.727	.262		10.390	.000	
Age*I believe companies use my data responsibly when personalizing eco-friendly recommendations.	-.033	.060	-.045	-.544	.587	Accepted H0
(Constant)	2.260	.241		9.391	.000	
Age*I am concerned about privacy when receiving highly personalized eco-friendly product suggestions.	-.067	.055	-.099	-1.217	.226	Accepted H0
(Constant)	2.621	.239		10.956	.000	
Age*I would like to see more transparency about how AI creates personalized sustainability recommendations.	-.139	.055	-.205	-2.544	**.012**	**Rejected H0**
(Constant)	2.663	.245		10.854	.000	
Age*Personalized eco-friendly recommendations feel manipulative sometimes.	-.081	.056	-.118	-1.441	.152	Accepted H0

Source: Computed Data (Primary Data)

Interpretation: As the Significant value is more than 0.05 the **H0 is accepted except in one case where Age Group has influence on Concern about Privacy** when receiving highly personalized suggestions on eco-friendly products.

Findings and Discussion

The study highlights the significant role of AI-enabled personalized advertising in influencing consumer buying behaviour towards eco-friendly products. The findings indicate that consumer recognise AI-personalized ads as relevant, appealing and time-saving, which increase their likelihood of purchasing and switching to eco-friendly products. The findings also reveals that Product Quality remains primary purchase determinant and sustainable awareness exists any type of demographic factors which alone does not drive purchases without accompanying functional values.

The strong association between consumer perception of AI personalization and buying behaviour confirms that AI-driven marketing effectively enhances engagement and awareness of eco-friendly products. Yet there is growing concerns regarding transparency and ethical use of consumer data, particularly among all age groups. This suggests that even though consumer accept AI-driven sustainable message, trust and clarity in data usage are crucial for long-term success.

The overall study underscores that AI Personalization can accelerate sustainable consumption when combined with credible product claim, quality assurance and transparent data practices.

Conclusion

AI-enabled personalization adds significantly shape consumer in the purchase decision towards sustainable products, that to in a semi-urban area like Nanmangalam where sustainable consumption infused with emerging digital trends. The study proves a strong association between Perception of AI Personalization- such as preference of consumers, timesaving, benefits and charm – and key purchase influencers like likelihood of buying, brand switching, price and quality adds to the major factor for the consumer towards the adoption of eco-friendly goods. The study states that consumer attitude and consumer perception towards AI Personalisation Advertisement has a strong influence on their buying behaviour.

While conducting personal direct interview with the consumers came across with few general problems they faced and facing, they can understand how important role the AI technology play in the market but they fell the company can even be more transparent so that

they can buy the products without any fear of being cheated or greenwashed. The awareness towards various eco-friendly products along with AI technology is also needed as few products are manufactured by MSME industry, Self-Help Groups and Home-makers as well, which could bring a great change in our Country's Economy thus also uplift the Global market towards sustainable consumption.

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Role of Podcast Advertising in Niche Market Penetration

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Abstract

As companies increasingly target specialized and highly engaged groups, podcast advertising has become a potent marketing tool. Customers are using podcasts for entertainment, education, and community connection as a result of the rising popularity of audio streaming services, opening up new marketing opportunities. By examining listener engagement, ad relevancy, podcast host credibility, and consumer purchase intention, this study investigates how podcast advertising helps penetrate specialized markets. It investigates how well host-read advertisements work in comparison to pre-recorded ones, how trust and emotional connection affect ad recall, and how much podcast listeners react to tailored advertising. The purpose of the study is to ascertain whether, in niche markets, podcast advertising delivers greater engagement and conversion potential than typical digital ads. The study's conclusions will provide light on how companies can use podcast platforms strategically to successfully reach niche customers.

Keywords*: Podcast Advertising, Niche Market Penetration, Targeted Marketing, Audio Marketing, Host-read Advertisements, Listener Engagement, Consumer Purchase Intention, Audience Trust, Brand Awareness, Digital Marketing Trends, Influencer Credibility, Personalized Advertising.*

Introduction

Advertising has shifted from traditional mass media to more individualized and interest-driven platforms in the digital age. Podcasting is one such quickly expanding media that has become an effective tool for companies looking to reach niche customers. The promotion of goods or services within podcast episodes is known as "podcast advertising." This is sometimes accomplished through sponsored portions that flow smoothly with the material or host-read messaging.

Podcasts target very targeted listener communities based on interests like technology, fitness, business, gaming, mental health, or lifestyle, in contrast to traditional advertising platforms that target large audiences. Because podcast advertising enables marketers to access audiences that are clearly defined, engaged, and devoted, it is particularly effective for penetrating niche markets. Podcast hosts frequently gain the confidence and familiarity of their listeners, which strengthens the message's trustworthiness and raises the possibility of a favourable customer reaction.

Objectives of the Study

1. To investigate how podcast advertising might be used as a marketing strategy to target specific markets.
2. To examine how marketers might target certain, interest-based audiences using podcast advertising.
3. To assess how well podcast advertising affects consumer awareness and purchase intention in specialized markets.
4. To evaluate the impact of podcast advertising on specialized audiences' brand engagement and loyalty.

Need for the Study

- Podcast advertising is a fast-expanding marketing medium, although its efficiency in niche market penetration is not entirely understood.
- It is important to understand how podcast advertising may be strategically used to target specialized and interest-based audiences.
- Marketers seek insights on the impact of podcast advertising on consumer awareness in specialized markets.
- The study contributes to a better understanding of how podcast advertising effects purchase intentions among niche audiences.
- Understanding the function of podcast advertising in driving brand engagement and loyalty is critical to long-term brand success.
- The insights can help advertisers improve their advertising strategy and distribute expenditures more efficiently.

Statement of the Problem

Marketers are constantly looking for new channels to more effectively reach specialized markets because audiences are becoming increasingly fragmented and traditional mass advertising is becoming less successful. Because podcast advertising can engage devoted and interest-based listener communities, it has become a promising medium. Nevertheless, there is little empirical data regarding the efficacy of podcast advertising as a strategic marketing technique for niche market penetration, despite its increasing popularity. The issue is that it is unclear how podcast advertising affects consumer awareness, purchase intention, brand engagement, and loyalty among niche groups. Determining the degree to which podcast advertising may be utilized to successfully target particular and interest-driven markets presents another difficulty for marketers. Therefore, by examining its effects on targeted marketing, customer behaviour, and brand connections inside specialized markets, this study aims to investigate the function of podcast advertising in niche market penetration.

Review of the Literature

- **McClung & Johnson (2010)** examined podcast consumption behaviour and found that listeners are highly engaged with podcast content, making podcasts an effective platform for targeted advertising.
- **Ashley & Tuten (2015)** highlighted that meaningful and relevant digital advertising content, such as podcast ads, strengthens consumer engagement and long-term brand loyalty.
- **Mandel & Johnson (2017)** suggested that host-read podcast advertisements increase authenticity and trust, positively influencing consumer attitudes toward advertised brands.
- **Edison Research (2018)** reported that podcast listeners are more likely to pay attention to advertisements compared to other digital media, highlighting podcasts' effectiveness in reaching niche audiences.
- **Perks & Turner (2019)** emphasized that podcast advertising enables marketers to reach interest-based audiences, making it a valuable strategy for niche market penetration.
- **Ho & Chiu (2020)** found that podcast advertising significantly improves brand awareness and recall among specialized listener groups.
- **Hearn & Schoenhoff (2021)** observed that repeated exposure to podcast advertisements positively affects purchase intention in niche markets.

Research Design

The survey involved 100 respondents chosen from the target audience, general public and was carried out among deals with analysis and interpretation of data collected for the study. The data is collected,

- Primary data (Questionnaire)
- Secondary data (Comparative analysis)

Tools and Techniques

- Percentage analysis
- Comparative analysis

Simple Percentage Analysis

Table – 1 Age Wise Classification

Age	Number of Respondents	Percentage
18-30	58	58%
31-40	23	23%
Above 40	11	11%
Above 50	8	8%
Total	**100**	**100%**

Interpretation: The majority of respondents (58%) in the table are between the ages of 18 and 30, suggesting that younger customers have a significant influence on the study. Younger people's opinions will significantly influence the overall findings on consumer reactions to brand activism because they are typically more receptive to social and political problems brought up by brands.

Table - 2 Gender Wise Classification

Gender	Number of Respondents	Percentage
Male	53	53%
Female	41	41%
Others	6	6%
Total	100	100%

Interpretation: According to the table, the majority of respondents in the sample are men (53%), followed by women (41%), with 6% identifying as others. This suggests that although both male and female opinions are substantially represented, consumer responses to brand activism in this study will be slightly more impacted by male perspectives.

Table-3 Educational Qualification

Educational Qualification	No. of. Respondents	Percentage
High School	11	11%
Under- Graduate	38	38%
Post-Graduate	28	28%
Professional course	23	23%
Total	100	100%

Interpretation: A well-educated sample is indicated by the table, which reveals that the majority of respondents are under-graduates (38%) and post-graduates (28%). Respondents are likely to have thoughtful and informed judgments about brand activism and its effects because higher education levels frequently correlate with greater understanding of social and political issues**.**

Table-4 Niche Market Targeting

Aspect	Number of Respondents	Percentage
Strongly Effective	22	22%
Effective	33	33%
Neutral	24	24%
Less Effective	11	11%
Not Effective	10	10%
Total	100	100%

Interpretation: The table depicts respondents' perceptions of podcast advertising's effectiveness in reaching specialized markets. The majority of 55% (22% extremely effective

and 33% effective) agree that podcast advertising successfully reaches specific niche audiences, implying that it is widely regarded as a focused and smart marketing technique. Approximately 24% of respondents are neutral, showing uncertainty or moderate effectiveness, whereas 21% (11% less effective and 10% not effective) believe podcast advertising is less effective or ineffectual in this aspect. Overall, the data reveals that podcast advertising is mainly effective for targeting specialized markets, however there is still room for improvement in precision and relevancy.

Table-5 Perception of Podcast Advertising in Niche Market Penetration

Aspect	Number of Respondents	Percentage
Niche Market Targeting	17	17%
Interest-Based Reach	18	18%
Consumer Awareness	24	24%
Brand Engagement	27	27%
Brand Loyalty	14	14%
Total	100	100%

Interpretation: The table represents respondents' perspectives on the various functions of podcast advertising in niche market penetration. Brand involvement is regarded as the most important factor, with 27% of respondents emphasizing its significance, demonstrating that podcasts are helpful in strengthening ties between businesses and specialized audiences. Consumer awareness follows with 24%, demonstrating the importance of podcast advertising in informing and persuading potential buyers. Interest-based reach and specialty market targeting are rated as fairly important (18% and 17%, respectively), implying that, while targeting is acknowledged, it may not be seen as the most significant advantage. Brand loyalty is the least recognized feature, with 14%, showing that while podcast advertising contributes to loyalty, it may require longer-term participation to have a significant influence. Overall, the results show that podcast advertising works best for increasing engagement and exposure in niche areas, with moderate effects on targeting and loyalty.

Table-6 Interest-Based Audience Reach

Aspect	Number of Respondents	Percentage
Strongly Effective	20	20%
Effective	23	23%
Neutral	32	32%
Less Effective	13	13%
Not Effective	12	12%
Total	100	100%

Interpretation: The table depicts respondents' perceptions of podcast advertising's success in reaching interest-based audiences. A total of 43% of respondents (20% extremely effective and 23% effective) feel podcast advertising is effective at targeting listeners based on their interests, demonstrating reasonable trust in its targeting abilities. 32% of respondents are neutral, indicating ambiguity or a sense of average efficacy. Meanwhile, 25% (13% less effective and 12% not successful) believe that podcast advertising is useless in reaching interest-based audiences. Overall, the results indicate that podcast advertising is effective in targeting interest-driven listeners, but there is still opportunity for improvement in precision and audience alignment.

Table-7 Branch engagement

Aspect	Number of Respondents	Percentage
Strongly Improves	35	35%
Somewhat Improves	40	40%
Neutral	15	15%
Somewhat Decreases	7	7%
Strongly Decreases	3	3%
Total	100	100%

Interpretation: The table displays respondents' perceptions of podcast advertising's impact on brand engagement. A majority of 75% of respondents (35% greatly improves and 40% somewhat improves) agree that podcast advertising increases brand engagement, demonstrating that it is extremely beneficial in establishing better relationships and interactions between brands and their consumers. 15% of respondents are indifferent, indicating a modest or unsure influence, whereas 10% (7% slightly reduces and 3% severely decreases) believe podcast advertising has a negative impact on engagement. Overall, the results show that podcast advertising is largely effective at increasing brand engagement among listeners.

Table-8 Consumer Awareness & Purchase Intention

Type of Initiative	Number of Respondents	Percentage
Highly Increased	30	30%
Moderately Increased	28	28%
Neutral Effect	20	20%
Slightly Decreased	12	12%
Strongly Decreased	10	10%
Total	100	100%

Interpretation: The table depicts respondents' assessments of the influence of podcast advertising on consumer awareness and purchase intent. The majority of respondents, 58% (30% considerably increased and 28% somewhat increased), agree that podcast advertising significantly increases awareness and stimulates buying decisions, demonstrating its effectiveness as a marketing technique. 20% of respondents are neutral, indicating uncertainty or moderate impact, whilst 22% (12% slightly lowered and 10% severely decreased) believe podcast advertising has little or no influence on awareness and purchase intention. Overall, the findings indicate that podcast advertising is largely effective in raising consumer awareness and affecting purchasing behaviour, albeit some members of the audience perceive minimal impact.

Table-9 Effectiveness in Niche Market Strategy

Strategy Aspect	Number of Respondents	Percentage
Excellent Strategy	27	27%
Good Strategy	25	25%
Average Strategy	23	23%
Poor Strategy	15	15%
Very Poor Strategy	10	10%
Total	100	100%

Interpretation: The table depicts respondents' perceptions of the overall success of podcast advertising as a method for niche market penetration. The majority of respondents, 52% (27% great strategy and 25% good strategy), believe podcast advertising is highly effective, demonstrating considerable confidence in its strategic worth for addressing specialized consumers. 23% of respondents evaluate it as average, implying moderate effectiveness, while 25% (15% poor strategy and 10% extremely poor strategy) believe it is less effective or ineffectual. Overall, the data reveals that podcast advertising is widely regarded as a viable method for niche market penetration, however there is space for improvement in terms of impact.

Table-10 Influence on Consumer Behaviour

Influence Aspect	Number of Respondents	Percentage
Strong Influence	32	32%
Moderate Influence	28	28%
Neutral	20	20%
Low Influence	12	12%
No Influence	8	8%
Total	100	100%

Interpretation: The table depicts respondents' perceptions of podcast advertising's impact on consumer behaviour. A majority of 60% of respondents (32% strong influence and 28% moderate influence) feel podcast advertising has a substantial impact on customer behaviour, demonstrating its effectiveness in altering attitudes, awareness, and purchasing decisions. 20% of respondents are neutral, indicating moderate or unknown influence, and 20% (12% low influence and 8% no effect) believe podcast advertising has little or no impact. Overall, the findings imply that podcast advertising has a significant impact on consumer behaviour, while the effect varies by listener demographic.

Comparative Analysis of Podcast Advertising for Noise and Boat

Secondary data for this analysis includes published case studies, industry papers, podcasts, and publicly available customer feedback on Noise and BoAt's podcast advertising strategies. Podcast advertising has evolved as a significant niche marketing technique in India, allowing marketers to reach out to targeted, interest-based audiences. Noise and BoAt use podcasts differently to reach their target audiences, resulting in varying levels of engagement and brand response.

1. **How companies employ podcast advertising as a marketing tactic**

   Noise: Promotes its smartwatches, wireless earphones, and audio accessories to a tech-savvy urban audience by sponsoring tech and gaming podcasts and using host-read advertisements and reviews.

   BoAt: Promotes its wearable technology and audio devices through podcasts about music, lifestyle, and fitness. Ads frequently mix in seamlessly with the content, increasing trust and relatability.

   In conclusion, both BoAt and Noise successfully use podcasts to target particular niche markets, with BoAt emphasizing lifestyle integration and Noise emphasizing technical credibility.

2. **Reaching audiences based on their interests**

   Noise: Aims to attract listeners with an interest in gaming, technology, and smart devices. By doing this, marketing initiatives are certain to reach highly relevant consumers who are likely to interact with the brand.

BoAt: Uses podcasts that are in line with these interests to reach people who are enthusiastic about music, health, and lifestyle technology in order to increase engagement and recall.

In conclusion, both companies make good use of interest-based targeting; however, BoAt caters to listeners who are experience-driven, whereas Noise appeals more to audiences who are function-driven.

3. **Impact on consumer awareness and purchase intention**

Noise: Listeners exposed to podcast ads often gain awareness about product features and technical specifications, which increases consideration and purchase intent among early adopters of tech gadgets.

BoAt: Ads on popular music and lifestyle podcasts increase brand recall and highlight usability and lifestyle benefits, motivating listeners to try products.

Conclusion: Podcast advertising raises awareness and influences purchase decisions for both brands, with Noise excelling in product-detail emphasis and BoAt in lifestyle appeal.

4. **Brand loyalty and engagement**

Noise: Regular sponsorships and host-read reviews foster trust, which increases tech enthusiast participation. However, ongoing tech-focused message and product satisfaction are necessary for sustained commitment.

BoAt: Listeners may engage with a brand through emotional narrative and lifestyle integration in podcasts, which promotes social sharing and repeat purchases.

In conclusion, Noise depends on credibility and technical appeal to keep listeners interested, whereas BoAt's strategy encourages somewhat stronger emotional involvement and loyalty.

Findings

- ✓ Demographics: The majority of respondents are male (53%), between the ages of 18 and 30 (58%), and highly educated (undergraduates 38%, postgraduates 28%), suggesting that young, educated urban consumers have a big impact on the outcomes.
- ✓ Niche Market Targeting: While 21% of respondents think podcast advertising is less effective, 55% of respondents think it successfully reaches specialized audiences, indicating that accuracy might be improved.
- ✓ Functions of Podcast Advertising: While brand loyalty (14%) is less acknowledged, suggesting longer-term campaigns may be needed, brand engagement (27%) and customer awareness (24%) are thought to be the most significant advantages.
- ✓ Interest-Based Audience Reach: While 25% believe podcast advertising is less effective, 43% believe it successfully targets listeners based on their interests, indicating a moderate level of trust in targeting skills.
- ✓ Brand Engagement: According to 75% of respondents, podcasts improve brand engagement, demonstrating their potent efficacy in fostering customer relationships.
- ✓ Consumer Awareness & purchasing Intention: The efficacy of podcast advertising as a marketing technique is confirmed by the fact that 58% of consumers indicate greater awareness and purchasing intention.
- ✓ Overall Strategy & Consumer Behaviour: 52% of respondents consider podcast advertising to be a very successful niche marketing tactic, and 60% observe a significant impact on consumer behaviour, indicating its general applicability in influencing attitudes, engagement, and purchasing decisions.

Comparative Brand Insights (Noise vs. BoAt)

BoAt connects with a wider urban audience through lifestyle and emotional messaging, whereas Noise depends on technical credibility and product attributes for engagement.

Suggestions

- ✓ Enhance Podcast Selection: To improve targeting accuracy, brands should carefully select podcasts that closely match the interests of their specific audience.
- ✓ Long-Term Campaigns: Rather than depending solely on one-time campaigns, businesses should sustain ongoing podcast advertising over time to foster brand loyalty.
- ✓ Content Personalization: Create narrative content and host-read advertisements that appeal to listeners' emotions and tastes.
- ✓ Track Metrics: To continuously improve your podcast advertising campaign, keep an eye on listener engagement, brand memory, and purchase intention.

- ✓ Expanded Demographic Targeting: To balance influence beyond largely young, educated, urban listeners, think about incorporating other varied audience segments.

Conclusion

Podcast advertising is an excellent method for niche market penetration since it raises consumer awareness and influences purchasing decisions. It also encourages high brand interaction by eliciting emotional responses via host-read and integrated ads. While brand loyalty and precise interest-based targeting have a moderate impact, long-term advertising and improved alignment with audience interests can increase the results. According to demographic data, podcast marketing is most effective with younger, more educated, and urban consumers. Comparative research of Indian brands Noise and BoAt reveals that Noise relies on technical credibility, whereas BoAt engages listeners well through lifestyle and emotional branding. Both tactics successfully reach interested audiences, demonstrating podcasts' adaptability as a marketing medium. Overall, podcast advertising enables firms to develop meaningful, targeted relationships with niche consumers. Podcasts can increase market penetration and loyalty through careful selection, personalized content, and ongoing promotions. They are therefore an important component of contemporary interest-based marketing tactics.

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Passengers' Perception of Technology – Enabled Services in Airlines

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Abstract

The airline industry's delivery of services has been transformed by the quick development of digital technologies, that have evolved how travellers look for flights, make reservations, obtain boarding information, ask for help, and assess their overall travel experiences. Technology-enabled services are becoming crucial instruments for increasing customer pleasure, safety, and efficiency as airlines compete in a globalised aviation industry. The opinions of 75 passengers on these technologically enabled services are investigated in this study. The findings, which are based on Likert mean scores and percentage analysis, indicate that travellers value the ease, quickness, and clarity that digital tools provide. But they also prefer human assistance for complex difficulties and are worried about technical issues related to technology and data privacy. In general, when technology enhances rather than replaces human customer service, passengers have a favourable opinion of it. Airlines should keep advancing technology while maintaining straightforward designs, dependable systems, and simple access to support.

***Keywords**: Airline Industry, Digital technology, passenger services and Digital systems.*

Introduction

The aviation industry has quickly adopted digital technologies, which has significantly increased the speed and effectiveness of service delivery. To make travel easier, airlines now provide digital boarding passes, internet booking, real-time flight updates, and smartphone apps. Shorter wait times, simpler information access, and more convenient experiences are all enjoyed by passengers. Baggage tracking and biometric verification are examples of automated technologies that improve security and dependability. All things considered, these technologically enabled services have revolutionised air travel, making it quicker, easier to use, and more sensitive to the demands of passengers.

Review of Literature

Ms. Deepica (2022) examined the level of satisfaction on the pre-flight, and in-flight services, customer quality and reason for choosing Emirates Airline in Cochin International Airport. Statistical tools like chi-square, rank analysis, Analysis of variation and Correlation analysis were applied for the analysis. The study covers a sample size of 150 respondents. The result found that there is correlation between quality service experience and satisfaction with overall airport and in-flight services. Seat comfort and leg space are the major factor to choose 1 Emirates. The study revealed that gender is one of the significant predictors of air travel. There is significant difference in opinion of gender and the reputation of Emirates among passengers.

Jeyaraman Ayyan and Captain Prasath (2022) explored the nature of customer loyalty, differences concerning attitude, habit, satisfaction, loyalty, and augmented services (service safety, comfort, luggage allowance and bonus) amongst the three airlines. Primary data was collected through a structured questionnaire from 600 travellers at leading airport in India. The findings of the research showed that the age and occupation of the respondents suggest a significant variance among the three airlines, the augmented service factors of the respondents suggest a significant variance among the three airlines.

Scope of the Study

The aviation industry's increasing reliance on digital technology, it is crucial to comprehend how passengers view and react to these technologies. Many airlines make significant investments in digital platforms without thoroughly evaluating how user-friendly, dependable, or efficient they are to passengers. It's crucial to recognise expected gaps, remove technological obstacles, and meet the varied needs of passengers. This study offers information that airlines can use to boost overall customer satisfaction, optimise system design, and improve service quality.

Statistical Tools Used

Percentage Analysis

The percentage of respondents choosing each response option can be described using percentage analysis.

Likert Mean Score Analysis

A five-point Likert scale was used to calculate satisfaction levels. Mean scores determine the strength of positive or negative perception. A higher mean score indicates higher satisfaction, while a lower score reflects dissatisfaction.

Data Analysis and Interpretation

Table-1 Percentage Analysis (Categorical Questions)

Demographic Data	Characteristics	Frequency	Percentage
Age	Below 20 years	5	6.67
	21- 30 years	18	24
	31- 40 years	25	33.33
	41- 50 years	16	21.33
	Above 51 years	11	14.67
	Total	75	100
Gender	Male	37	49.33
	Female	34	45.33
	Total	75	100
Travel frequency	Once in 2- 3 years	7	9.33
	Once a year	20	26.67
	2- 3 time a year	28	37.33
	More than 3 times a year	20	26.67
	Total	75	100

Purpose	Business	28	37.33
	Leisure	31	41.33
	Education	8	10.67
	Other	8	10.67
	Total	75	100
Services used	Online booking	3	4.00
	Mobile app	6	8.00
	Self -check-in	3	4.00
	All of the above	63	84.00
	Total	75	100
Self-check-in use	Yes	52	69.33
	No	23	30.66
	Total	75	100
Technical issues	Never	25	33.33
	Rarely	31	41.33
	Sometimes	17	22,67
	Often	2	2.67
	Total	75	100
Assistance preference	Human staff	44	58.67
	Automated system	19	25.33
	Either is fine	9	12.00
	No preference	3	4.00
	Total	75	100

The analysis shows that most passengers are young adults (31-40 years), with a slightly higher number of males. They travel mainly for leisure or business, and 84% use all technology-enabled services. Self-check-in kiosks are moderately accepted, and technical issues are infrequent. While most passengers still prefer human assistance, a considerable number are comfortable with automated support. Overall, the data indicates high adoption and positive perception of airline technology services.

Table – 2 Likert Scale Mean Score Analysis (Perception/Satisfaction Questions)

Particulars	Mean score
Online booking platforms	3.83
Airline mobile app applications	3.84
Digital boarding passes	3.91
Flight update satisfaction	4.05
Technology enabled services	4.04
Data comfort	4.01
Overall satisfaction	4.17

The Likert mean scores indicate that passengers are highly satisfied with technology-enabled services. Online booking, mobile apps, and digital boarding received mean scores around 3.8–3.9, showing good usability. Features like flight updates, time saved, data comfort, and overall satisfaction scored above 4, reflecting very high satisfaction. These results suggest that passengers appreciate the convenience, speed, and reliability of airline digital services, with overall perception being strongly positive.

Findings of the Study

According to the report, technology-enabled services greatly enhance the travel experience by providing ease, cutting down on wait times, and facilitating quick access to information. Due to their flexibility and openness, internet booking systems are preferred by most travelers. Particularly for getting real-time updates, mobile apps are thought to be indispensable for contemporary air travel.

The analysis also showed that although most passengers are at ease with technology, other groups especially senior travelers and first-time flyers—want more human assistance and clearer instructions. Technical mistakes and privacy concerns continue to be pivotal problems

that airlines need to deal with. Overall, the result show that people have favorable opinions of technology-based airline services as long as they continue to be dependable, user-friendly, and well-supported.

Suggestions

Airlines should ensure that digital interfaces, especially mobile apps and kiosks, are simple and intuitive. System reliability must be strengthened to minimize technical disruptions. Clear instructions, multilingual guidance, and optional human assistance should be offered to accommodate non-tech-savvy users. Airlines must also enhance cybersecurity measures and clearly communicate data protection policies to build trust among passengers. Continuous training for staff on digital support roles would aid in bridging the gaps between automation and human interaction.

Conclusion

Technology-enabled services are now an essential component of airline operations and significantly affect the customer happiness and service perception. The study's conclusions show that travelers typically have a favorable opinion of digital services and value their accessibility, speed, and ease of use. However, data protection, human support, and system clarity continue to be vital. Maintaining a passenger-centric strategy is crucial as airlines continue to incorporate cutting-edge technologies like automated customer help, biometric boarding, and AI-based service tools. Maintaining a competitive edge in the aviation sector, improving customer loyalty, and strengthening service quality can all be achieved by striking the correct balance between technology and human services.

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Reorienting English Education through Sustainability – Driven Pedagogical Reform

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Abstract

This study investigates educational transformation through pedagogical approaches centered on sustainability, tackling the ethical, cultural, and civic dimensions articulated in the United Nations Sustainable Development Goals (SDGs). While sustainability-focused education has gained traction within STEM fields and social science disciplines, its penetration into humanities education—specifically literature studies, language pedagogy, and critical literacy practices—continues to be marginal. Leveraging theoretical perspectives from humanities scholarship and critical educational theory, this study posits that the discursive and interpretative qualities inherent in English language arts classrooms constitute a valuable domain for nurturing sustainability-oriented thinking through methodologies that foreground ethical reasoning, multi-perspective engagement, and critical analysis of power dynamics and social inequity. The research outlines pedagogical approaches for weaving sustainability concerns into English language teaching, such as textual analysis emphasizing environmental justice themes, multimodal and media critique of climate communication, and compositional tasks that encourage both reflection and activism. Pedagogical examples illustrate how such methods cultivate empathetic awareness, analytical capacities, and ethically informed civic action. The study concludes by articulating institutional prerequisites for enduring educational change, highlighting the necessity of educator professional development, curricular integration, and assessment transformation to incorporate SDG-related competencies throughout English language arts instruction.

Keywords*: sustainability pedagogy, SDG integration, English education, critical literacy, curriculum reform, global citizenship*

Introduction

The twenty-first century confronts humanity with unprecedented challenges: ecological crisis, accelerating technological transformation, and deepening social stratification. Critical issues such as global warming, environmental destruction, economic instability, and societal polarization require solutions that extend beyond traditional disciplinary frameworks. Understanding education's central role in confronting these multifaceted problems, the United Nations' Sustainable Development Goals (SDGs) designate education as an essential mechanism for achieving sustainable futures (United Nations, 2015). Education for Sustainable Development (ESD) calls for instructional frameworks that cultivate learners' capacities for holistic thinking, ethical conduct, and active community engagement.

Despite sustainability education's increasing recognition, its adoption varies considerably across academic domains. Sustainability-related educational efforts predominantly cluster within scientific disciplines, environmental programs, and social science courses, where environmental and developmental issues most transparently connect to subject matter. English language arts education—spanning literary studies, language instruction, and written composition—has historically occupied a marginal position within sustainability conversations. Where sustainability themes emerge in English curricula, they generally appear as thematic supplements featuring environmentally-themed literature instead of fundamentally reshaping pedagogical objectives and instructional methods.

This paper maintains that English language arts education harbors frequently overlooked capacities for enhancing sustainability education. Given its focus on narrative construction, discourse examination, textual analysis, and rhetorical competence, English education fundamentally influences how students construct understanding, negotiate values, and conceptualize possible futures. Transforming education through sustainability-centered pedagogical innovation thus extends beyond merely incorporating additional content; it demands reimagining literacy education's fundamental purposes in terms of moral accountability, environmental mindfulness, and collective participation.

Conceptual Framework

Education for Sustainable Development

Education for Sustainable Development centers on cultivating knowledge, skills, values, and orientations essential for navigating complex planetary challenges (UNESCO, 2014). Foundational elements of ESD encompass systems-based thinking, relational

understanding, intergenerational justice, cultural pluralism, and experiential learning approaches. Instead of conveying predetermined knowledge, ESD aims to develop critical consciousness, cooperative inquiry, and change-oriented action.

These foundational principles strongly resonate with English education's core purposes. Literary and linguistic scholarship develops interpretive sophistication, compassionate understanding, and self-examination—capabilities fundamental for approaching sustainability as a multifaceted, ethically charged notion. Understood this way, English education can operate as a space for promoting ESD's humanistic and moral components.

Critical Literacy and Ecojustice Pedagogy

Critical literacy scholarship emphasizes interconnections between linguistic practices, authority structures, and societal organization (Freire, 1970; Luke & Freebody, 1997). It prompts students to question how texts generate meanings, amplify particular perspectives, and silence alternative viewpoints. When synthesized with ecojustice pedagogy, critical literacy encompasses environmental dimensions and interrogates human-centered paradigms that rationalize ecological destruction.

Ecojustice pedagogy underscores linkages between social equity and environmental sustainability, acknowledging how environmental degradation disproportionately burdens disadvantaged populations (Buell, 2001). Applied to English education, this framework allows students to critically analyze depictions of the natural world, economic development, and societal advancement while contemplating moral ramifications of discursive and narrative selections.

Narrative, Rhetoric, and Ethical Imagination

Storytelling occupies a fundamental position in constructing moral comprehension and communal belonging. Literary narratives enable readers to experience alternative subjectivities, developing what Nussbaum (1997) identifies as the "narrative imagination" or capacity for ethical projection. Through engagement with stories, students investigate ramifications of environmental and societal choices, frequently spanning diverse temporal and geographical contexts.

Rhetorical instruction extends narrative exploration by developing learners' capabilities for persuasive communication and democratic participation. Through analyzing and creating persuasive texts, students critically interrogate sustainability conversations and articulate well-informed positions on environmental and social concerns. In combination, narrative and rhetorical education position English language arts as an essential arena for cultivating sustainability-conscious citizenship.

Sustainability-Centered Pedagogical Innovation in English Education

Curricular Redesign

An English curriculum oriented toward sustainability demands transitioning from topic-based to competency-focused planning. Instead of positioning sustainability as a discrete thematic unit, curricula should integrate sustainability-oriented inquiries across literature, language, and writing courses. Literary studies might feature works exploring ecological justice, forced migration, working conditions, metropolitan development, and indigenous knowledge systems. Language and writing courses can highlight sustainability-connected textual forms including policy documents, activist communications, contemplative narratives, and digital multimedia compositions.

This curricular shift also promotes cross-disciplinary dialogue, establishing English education as a connective tissue between empirical understanding, societal analysis, and moral deliberation. This synthetic methodology supports students in recognizing sustainability as a culturally constructed and linguistically mediated reality rather than exclusively a scientific matter.

Instructional Approaches

Sustainability-focused educational transformation depends upon teaching methodologies that emphasize active participation, investigative learning, and situated practice. Conversational pedagogy promotes exploratory discussions and structured debates regarding controversial sustainability topics, developing students' abilities for evidence-based reasoning and constructive engagement across difference.

Inquiry-based learning authentically integrates literacy activities with meaningful real-world scenarios. Through research-driven projects, students examine sustainability concerns at community or international levels and generate texts addressing authentic audiences. Community-rooted education anchors learning within specific geographic and social contexts, nurturing ecological awareness and stewardship.

Multimodal and Civic Literacies

Modern sustainability discourse progressively depends upon multimodal and technologically-mediated communication. Therefore, English education must broaden literacy conceptualizations to encompass visual, sonic, and digital modes of expression. Multimodal composition allows students to articulate sustainability stories through audio productions, video essays, infographics, and online advocacy initiatives.

Through civic literacy engagement, learners acquire competencies for tailoring messages to public spheres and contemplating ethical aspects of rhetorical influence. These instructional experiences reinforce English education's function in equipping students for substantive engagement in democratic processes and sustainability-focused public deliberation.

Systemic Requirements for Sustainable Transformation

Assessment and Teacher Preparation

Assessment methodologies fundamentally determine pedagogical emphases. Conventional assessment paradigms, privileging standardized examinations and isolated linguistic competencies, fail to represent the interpersonal, ethical, and participatory outcomes connected with sustainability education. Alternative evaluative approaches including portfolio assessment, contemplative writing, and authentic performance tasks, offer more holistic appraisals of student development.

Educator preparation constitutes an equally essential factor for successful sustainability-oriented transformation. Both preservice preparation and continuing professional education must provide English teachers with cross-disciplinary expertise, adaptive instructional approaches, and self-assurance when engaging sustainability content. Professional learning communities that facilitate joint curriculum construction and civic partnerships can additionally empower teachers in adopting innovative methodologies.

Implications and Research Directions

Redirecting English education through sustainability-focused pedagogical innovation carries profound consequences for educational policy, institutional leadership, and academic scholarship. Educational leaders must acknowledge English language arts as an integral dimension of sustainability education and allocate organizational resources for curricular innovation and professional capacity-building.

Subsequent research should advance beyond theoretical advocacy toward systematic empirical study. Extended longitudinal investigations assessing sustainability-oriented English instruction's influence on students' critical consciousness, participatory citizenship, and environmental responsibility are especially vital. Comparative studies across cultural and institutional contexts will additionally ensure that sustainability-driven transformations advance fairness and accessibility.

Conclusion

English language arts education possesses considerable capacity as a catalyst for sustainability education. Through synchronizing pedagogical aims with Education for Sustainable Development frameworks, English education can nurture critical consciousness, moral imagination, and rhetorical agency. Sustainability-driven pedagogical transformation invites educators to reconceive English classrooms as environments where learners profoundly engage with stories, discourses, and ethical frameworks that constitute sustainable futures. Within an epoch defined by planetary uncertainty and environmental fragility, such pedagogical reorientation transcends preference to become necessity.

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Integrating SDG'S into Academic Programs: Faculty Insights and Challenges

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Abstract

The incorporation of the United Nations Sustainable Development Goals (SDGs) into university curricula is increasingly seen as an essential approach for equipping future leaders and innovators to tackle complex global issues. This research explores the process of embedding SDGs within academic programs from the viewpoint of university faculty, who play a key role in driving curricular changes. The research examines the approaches, motivations, and perceived effects of incorporating sustainability principles and SDG-related skills into course materials and program objectives. The results show that faculty members are mainly motivated by a sense of ethical duty and a wish to improve the social relevance of their teaching. Nevertheless, the integration process faces considerable obstacles. These challenges include insufficient institutional backing and unclear pedagogical models, conflicts among disciplines in interpreting the SDGs, and limitations due to rigid curricula and heavy faculty workloads. Besides, difficulties in assessment and varying degrees of faculty knowledge and skills add to the barriers. This paper contends that successful SDG integration demands a comprehensive, institutionally supported strategy that goes beyond standalone efforts. It ends by suggesting a collaborative, multi-stakeholder framework that emphasizes the importance of professional growth, cross-disciplinary cooperation, and incentive alignment to enable faculty as key drivers in the global sustainability mission.

Keywords- *Sustainable Development Goals (SDGs), Curricular changes, Pedagogical models, Faculty knowledge, Cross-disciplinary cooperation*

Introduction

The Sustainable Development Goals (SDGs) are the foundation of the United Nations' 2030 Agenda for Sustainable Development. Building upon the Millennium Development Goals

(MDGs), which crossed from 2000 to 2015, the SDGs were created to overcome the key shortcomings of the MDGs by adopting a much broader and more comprehensive framework. This effort began as a collaborative drafting process involving multiple stakeholders. The outcome is a set of 17 interconnected goals that represent a important shift: they are appropriate to all countries worldwide, not only developing nations, and emphasize the essential promise to "leave no one behind." This agenda obviously links the three vital aspects of sustainable development, economic progress, social equity and environmental care acknowledging that issues like poverty, inequality, climate change, and peace are closely related. Consequently, the SDGs provide a comprehensive, global plan and a collective commitment to achieving a peaceful, thriving, and sustainable future for both humanity and the Earth by 2030. The execution of the Sustainable Development Goals (SDGs) encounters significant systemic, political and real-world obstacles that primarily oppose their intended comprehensive framework.

From an institutional perspective, governments and interventions are organized into rigid, single-issue storage for health, environment and finance and each with classified budgets and commands that hinder the cross-bencher collaboration vital for cohesive action. On the political front, short-term democratic cycles tend to highlight immediate, visible achievements over the long-term, systemic investments essential to tackle interconnected issues such as inequality and climate change. Moreover, gaps in capacity and knowledge further hinder progress, as the lack of data interoperability, limited comprehension of the complex interconnections between goals and inadequate knowledge in systems thinking hinder effective planning. Financially, despite substantial needs, funding remains fragmented and misaligned, often prioritizing isolated projects rather than integrated programs. Lastly, the lack of robust accountability mechanisms, coupled with the ongoing presence of conflicting national interests and protectionist policies undermines the global partnerships essential for coordinated implementation. These interrelated barriers together threaten to reduce the SDG agenda to a series of unconnected projects rather than the transformation, integrated framework it was envisioned to be. To address the challenges associated with effective integration of the Sustainable Development Goals (SDGs), a comprehensive strategy is essential, commencing with transformative governance that dismantles institutional barriers. It is imperative for governments to create high-level, cross-ministerial coordination units endowed with the authority and budget necessary to formulate and implement integrated national policies,

complemented by systems-thinking training for civil servants. This approach should be paired with innovative financing mechanisms that aggregate resources and promote synergistic outcomes, such as blended finance and SDG-aligned bonds, while national budgets are restructured to support cross-cutting initiatives instead of isolated sector-specific projects.

Moreover, decision-making processes must be informed by integrated data ecosystems, wherein these platforms monitor progress across various goals and assess potential trade-offs and synergies, thereby facilitating evidence-based policy formulation. Enhancing multi-stakeholder partnerships is vital, establishing formal platforms for collaboration among governments, the private sector, academia, and civil society to jointly develop solutions and share accountability. Lastly, cultivating a culture of adaptive learning and accountability through independent review mechanisms and public dashboards tracking SDG progress will promote transparency, foster public trust, and enable the ongoing refinement of strategies. In conclusion, effective integration necessitates a shift from managing goals in isolation to governing systems holistically, ensuring that all actions align with the fundamental principle of leaving no one behind.

Faculty insights on SDG's Integration

The faculty and academic research offer essential, frequently sobering, perspectives on the disparity between the theory and practice of Sustainable Development Goal (SDG) integration. Their evaluations extend beyond mere policy declarations to scrutinize the underlying structural, epistemological, and political contexts. Among the significant academic insights are,

1. The "Integration Paradox" and Political Realities

The Sustainable Development Goals (SDGs) are conceptually integrated, their execution is fundamentally influenced by political dynamics and limited resources. In reality, governments and organizations tend to favour specific objectives (such as economic growth and energy accessibility) over others (like biodiversity and reduced inequality) due to national priorities, lobbying efforts, and pressing crises. Academic research highlights that integration is not merely a technical task but rather a political negotiation involving trade-offs. The discourse surrounding "indivisibility" frequently conflicts with the actual practice of selective implementation, where goals are chosen to align with pre-existing agendas instead of fostering genuine transformation.

2. The Disparity Between Local and Global

Academics point out a discrepancy in scale. The Sustainable Development Goals (SDGs) serve as a global framework, yet their execution occurs at the local level. The approach to integration varies significantly among a mega city, a rural agricultural community, and a small island nation. Faculty members stress the importance of developing contextualized integration pathways that honour local knowledge, priorities, and ecosystems. The application of a top-down, uniform integration model is regarded as ineffective and potentially oppressive. Genuine integration necessitates polycentric governance, which empowers local stakeholders to establish their own synergistic strategies.

3. The Pre-eminence of Economic Growth (SDG 8)

A significant, and frequently emphasized, observation from the field of sustainability science is that SDG 8 tends to function as a de facto primary focus. Within a global economic framework reliant on growth, the environmental and social objectives (the "planetary" and "people" aspects) are often perceived as limitations or as factors that contribute to growth, rather than being regarded as equally vital goals. This situation poses risks of prioritizing the ecological boundaries of the Earth in favour of an incessant growth model, which researchers contend is fundamentally incompatible with enduring sustainability.

4. The Necessity for Transformative Integration Beyond Technical Aspects

One of the most significant realizations is that successful integration necessitates transformative change rather than merely improved coordination. It requires a critical examination of foundational values, economic frameworks, and power dynamics. Scholars in critical development studies contend that genuine integration may require transcending the concept of "weak sustainability" (where various forms of capital can be interchanged) in favour of "strong sustainability" (which acknowledges the inviolable limits of natural systems). This suggests a profound re-evaluation of progress, well-being, and governance- a challenge that extends well beyond mere administrative alignment.

Henceforth, the perspectives of faculty members transition the dialogue from viewing integration merely as a managerial responsibility to recognizing it as a profoundly political, contextual, and transformative endeavour. They advocate for a sincere acknowledgment of trade-offs, an emphasis on challenging-to-quantify systemic objectives, and a dedication to reimagining institutions and economies to align with the integrated vision of SDG goals.

Opportunities and Benefits of SDG Integration

Incorporating the Sustainable Development Goals (SDGs) into academic curricula presents a significant and transformative opportunity, transcending the traditional approach of offering merely one "sustainability" course to instil a comprehensive, systems-thinking perspective throughout the entire curriculum.

1. For Students & Learners,
    - Improved Employability & Skills for the Future: Graduates acquire the precise skills that 21st-century employers seek: systems thinking, critical analysis of intricate problems, interdisciplinary collaboration and ethical reasoning. They grasp the interconnected issues of climate change, inequality, and economic systems.
    - Relevant & Meaningful Education: The curriculum links theoretical knowledge to pressing global challenges. This enhances student motivation, engagement, and sense of purpose. For instance, an engineering student is taught to design with SDG 6 (Clean Water) and SDG 7 (Affordable Energy) in consideration, rather than merely focusing on technical specifications.

2. For Academic Institutions & Faculty,
    - Curriculum Innovation & Modernization: The Sustainable Development Goals (SDGs) offer a robust framework for revitalizing and integrating curricula across various disciplines. They prompt departments to dismantle barriers and develop interdisciplinary courses and projects. For instance, a collaborative course involving Business, Environmental Science, and Public Policy focused on circular economy models.
    - Strengthened Research & Funding Opportunities: The SDGs are in alignment with significant global research priorities, thereby facilitating access to substantial, collaborative, and well-funded research
    - Improved Institutional Reputation & Rankings: A demonstrated commitment to the SDGs enhances an institution's reputation in sustainability-oriented rankings and draws in students, faculty, and partners who value global impact.
    - Faculty Development & Collaboration: This initiative encourages faculty members from diverse fields to work together, resulting in new insights, publications, and innovative teaching methodologies.

Incorporating the Sustainable Development Goals (SDGs) into academic curricula is not merely an enhancement; rather, it represents a crucial shift towards fostering education aimed at a sustainable future. The foremost advantage lies in cultivating a cohort of graduates who possess not only expertise in their respective fields but also the ability to think systemically, demonstrate ethical leadership, and be prepared to tackle the pressing challenges faced by the world. For higher education institutions, this approach offers a route to increased relevance, innovation, and significant impact.

Conclusion

The incorporation of the Sustainable Development Goals (SDGs) into academic curricula signifies a significant and essential transformation in higher education, harmonizing institutional objectives with global necessities. This investigation into faculty perspectives and obstacles uncovers a terrain marked by considerable enthusiasm as well as notable systemic challenges, indicating a multifaceted yet achievable route ahead.

Faculty members are undeniably the pivotal agents of this transformation. Their perspectives highlight a sincere intellectual and ethical dedication to integrating sustainability principles across various disciplines, transcending mere superficial "SDG-washing" to encourage profound, critical engagement. The successful incorporation of these principles is demonstrated to be most effective when it aligns the SDGs with fundamental disciplinary frameworks, thereby enriching existing curricula with new aspects of global significance, systems thinking, and ethical accountability. Pedagogical innovation—manifested through problem-based learning, community-engaged initiatives, interdisciplinary case studies, and experiential modules—emerges as a significant catalyst. These approaches not only improve student competencies in sustainability but also foster the collaborative, empathetic, and solution-oriented mindsets essential for the 21st century. Consequently, unlocking the complete potential of Sustainable Development Goal (SDG) integration requires a unified response from multiple stakeholders. Institutional leadership should transition from mere endorsement to active enablement by establishing a clear strategic vision, aligning reward systems, allocating dedicated resources, and creating adaptable curricular frameworks. It is essential to broaden faculty development initiatives to include practical training, platforms for interdisciplinary collaboration, and easily accessible repositories of teaching resources. Furthermore, external partnerships with industry, government, and civil society are vital for anchoring academic endeavours in real-world contexts, thereby offering genuine learning opportunities and ensuring a positive societal impact.

Ultimately, the integration of the Sustainable Development Goals (SDGs) transcends the simple act of adding new content. It represents a transformative journey that redefines the university's role in a vulnerable world. This process necessitates a transition from merely transmitting knowledge to utilizing knowledge as a catalyst for transformation. Although the challenges are considerable, the experiences of innovative faculty reveal that both the determination and pedagogical creativity are present. By methodically tackling the recognized obstacles such as empowering faculty through acknowledgment and support, dismantling institutional barriers and nurturing a culture of collaborative innovation- higher education institutions can fully leverage their potential. They have the capacity to transform into vibrant ecosystems where each academic program plays a role in preparing graduates not only with practical career skills but also with the purpose, perspective and tools necessary to become architects of a more sustainable and equitable future.

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Geographical Indications and Handloom Heritage: Socio – Economic Empowerment through GI – Certified Handlooms in India

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Abstract

The protection of traditional products through Geographical Indication (GI) certification represents a crucial intersection between intellectual property rights and sustainable rural development. In India, the handloom sector—renowned for its craftsmanship, cultural identity, and predominantly female workforce—has witnessed growing recognition through GI registration of distinctive regional textiles. This study explores the socio-economic impacts of GI certification within India's handloom clusters, focusing on its role in livelihood enhancement, cultural preservation, and empowerment of marginalized communities. Relying on secondary data from policy reports, academic literature, and government publications, the research examines how GI-labelled handlooms such as Kuthampully, Chendamangalam, Kasaragod, and Balaramapuram contribute to community resilience and income diversification. Findings indicate that GI certification strengthens market differentiation, safeguards authenticity, and fosters social capital among artisan groups. However, challenges persist in awareness, equitable value distribution, and marketing integration. The study concludes that effective institutional support, cooperative organization, and digital marketing interventions are essential to maximize the developmental potential of GI-certified handlooms in India

***Keywords**: Geographical Indication (GI); Handloom Sector; Rural Development; Women Empowerment; India*

Introduction

Geographical Indications have been treated as an intellectual property. Article 1(2) of theParis Convention for the Protection of Industrial Property of 1883 (Pairs convention) refers to"indications of source" and appellations of origin" as objects of industrial property (Vats, 2016).The TRIPS Agreement, Article 22 identifies geographical indications as "…. Indicationswhichidentify a good as originating in the territory of a Member, or a region or locality in thatterritory, where a given quality, reputation or other characteristic of the good is essentiallyattributable to its geographical origin" (Vats, 2016).Articles 1 (2) and 10 of Paris Convention for the Protection of Industrial Property andArticles 22 to 24 of the Trade Related Aspects of Intellectual Property rights (TRIPS) Agreementare mainly deals with geographical indications (Verma and Mishra, 2018).India has passed the Geographical Indications of Goods (Registration and Protection) Act1999 (hereafter GI Act), in order to protect the products having geographical origin. TheGeographical Indications of Goods (Registration and Protection) Act 1999 came into effectfrom15th September 2003 (Vinayan, 2017).

Section 2(3) of the GI Act defines geographical indications as:

"Geographical indication, in relation to goods, means an indication which identifies suchgoods as agricultural goods, natural goods or manufactured goods as originating, ormanufactured in the territory of a country, or a region or locality in that territory, where agiven quality, reputation or other characteristic of such goods is essentially attributable toitsgeographical origin and in case where such goods are manufactured goods one of theactivities of either the production or of processing or preparation of the goods concernedtakes place in such territory, region or locality, as the case may be" (Vinayan, 2017).The GI Act 1999 categorizes goods"as any goods, be agricultural, natural or manufactured goods, as originating, ormanufactured in the region of a country, or a region or locality in that province, where agiven quality, reputation or other characteristic of such goods is actually attributable to itsgeographical origin ownership, evolving nature, less technology-intensive and liberty ofbeing used within the community" (Aggarwal et al., 2014).

This paper explores how GI certification in handloom products contributes to socio-economic upliftment, gender empowerment, and rural resilience, with a focus on Kerala's renowned clusters—Kuthampully, Kasaragod, Chendamangalam, and Balaramapuram.

Literature Review

There are different types of quality symbols for different products like ISO, Hall mark, BIS mark, Agmark, ISI mark, FPO mark, etc. Geographical Indication acts as a brand that helps to create trust, symbol of quality, originality etc. It also reflects peculiarities like skill of the people, climate, features of region in which they are made. In a study conducted among segments of Italian consumers, it was found that they consider both region of origin and PDO certification in preferring regional products indirectly through perceived regional product quality (Van der Lans et al., 2001). European consumers have positive attitude towards the protected regional products than competing alternatives and they are willing to pay a high premium price for acquiring the same. Their perception regarding the quality of the protected regional product has a positive and significant influence in the creation of their relative attitude towards the protected regional product (Ittersum et al., 2002).By informing French consumers regarding the importance of Protected Geographic Indications label would help to develop the credibility of the label and creation of positive attitude that augment their perceived quality and buying intention (Carpenter and Larceneux, 2008). Canadian consumers preferred Geographical Indication labelled products from a given country and are ready to pay more for the same. Study also remarked that Canadian consumers' readiness to pay fluctuates with the oil's country of origin and have a positive attitude towards PDO (Protected Designations of Origins) than PGI (Protected Geographical Indications) (Menapace et al., 2011).

The Italian consumers have mostly preferred products having Protected Designation of Origin (PDO) labels are ready to pay the maximum premium price for the same (Aprile et al., 2012).While purchasing high-to medium-priced Argentinean Malbec wine from specialized shops, the consumers of United States, the United Kingdom, the Netherlands and Germany are ready to pay more for geographical names (Defrancesco et al., 2012).The quality and origin of the product are the major determinants of consumers buying intention and consumers have positive attitude towards local geographical indication labelled products than non-local GI labelled products (Albayram et al., 2014). Protected Geographical Identification (PGI) label plays a vital role in deciding price of fresh meat and one can acquire a premium up to a certain point of quality through the presence of PGI label on high quality slices of meat (Loureiro and McCluskey, 2000). There is a significant relationship between consumer's readiness to pay for a PDO labelled Camembert brand and their income or age (Bonnet and Simioni, 2001).

Lee et al. (2020) suggested that Thai consumers have positive attitude towards rice with geographical certifications and were ready to give premium for acquiring the same. Study also depicted that they were ready to pay maximum premium for rice with both GI and PGI certifications while they were offered with in depth information regarding the certification labels. Likoudis et al. (2016) indicated that Greek of origin, health care and label of a product, consciousness and sustainable consumer behaviour were the main factors that exert a positive impact on Greek consumer's intention to buy PDO/PGI food products.

It is very difficult to enrol as a product with geographical indication because of a number of formalities. There are a lot of matters needed to care including method of production starting from raw material, curing and washing, winding, warping, sizing, beaming and preparation of loom, weaving to quality checking and packaging. Utmost care should be given in all the processes to get a maximum quality handloom. It will be resulted in getting handloom having uniqueness. So we can see the sacrifice and hard work done by the weavers to get the finest cloth.

In the literature related to GI products, most of the studies are focused on legal aspects of GI certification and its implications and few empirical studies available with respect to consumer intention are in the area of GI based food products (Bonnet and Simioni, 2001; Van der Lans et al., 2001; Loureiro and McCluskey, 2000; Cacic et al., 2011; Defrancesco et al., 2012; Deselnicu et al., 2013; Albayram et al., 2014; Lee et al., 2020; Likoudis et al., 2016). Further, the studies have focused on demographic factors and willingness to pay that drive consumers to purchase GI products (Ittersum et al., 2002; Van Ittersum et al., 2007; Menapace et al., 2011; Aprile et al., 2012; Leufkens, 2018; Luceri et al., 2016).

Methodology

The secondary research design is adopted by the study, relying on a qualitative review of literature, policy frameworks, and statistical reports to evaluate the socio-economic impact of GI-certified handlooms in India. The annual reports of Ministry of Textiles, Government of India's GI Registry, MyGov campaign materials, and scholarly publications on GIs and handloom sectors are the main data sources. The focus regions—Kuthampully, Kasaragod, Chendamangalam, and Balaramapuram—were chosen due to their prominence in Kerala's GI-certified handloom ecosystem.

Discussion

Both brand protection and cultural valorisation can be ensured through the GI certification. How traditional practices and community knowledge are preserved through legal and market recognition can be identified from the four major GI handloom clusters of Kerala.

Role of GI in uplifting Rural Population

GI certification reflects the culture, tradition, skill, climate, quality, uniqueness, etc. in caseof artisanal products. Products which have come under the purview of GI Act includeagricultural products, food stuffs, manufactured items, handicrafts, etc. The main agendabehindthe introduction of geographical indication in the handloom sector include maintenance ofuniqueness of the handloom; ensure genuineness and legal safeguard to the handlooms, prevention of copycat and fake products, augmentation of branding, prevention fromcompetition, a source of recognition regarding the authenticity and the real quality of thehandlooms, a mechanism to protect the real craft of the artisans, etc (Ministry of Textiles, 2018–2019). Under geographicalIndication Act, a sum of 106 handloom products has been registered until now (Press Information Bureau, Government of India, 2025).

Ministry of Textiles, Government of India promotes registration under Geographical Indication (GI) of Goods (Registration & Protection) Act 1999, in respect of handloom and handicraft products in pan India under the scheme Handloom Marketing Assistance (HMA), National Handloom Development Programme (NHDP). Ministry of Textiles is offered financial assistance in the following ways:Rs. 1.50 lakh for meeting the expenses in registering the designs/products; Rs.1.50 lakh to impart training to personnel of IA and for effective enforcement of G.I. registration and also the financial assistance is provided for organizing seminars, workshops etc (Ministry of Textiles, Government of India, 2025).

There are around 658 products in India awarded with geographical indication certification till2025 which include agricultural products, handicrafts, manufactured items, food stuffandnatural goods (Vajiram& Ravi, 2025).Chanderi Sarees of Madhya Pradesh, Mysore Silk of Karnataka, KancheepuramSilk of Tamil Nadu, Ilkal Sarees of Karnataka, Uppada Jamdani Sarees of Andhra Pradesh,Banaras Brocades and Sarees of Uttar Pradesh, Gadwal Sarees of Telangana, Paithani Sarees andFabrics of Maharashtra, Molakalmuru Sarees of Karnataka, Champa Silk Saree and Fabrics ofChhattisgarh, Khandua Saree and

Fabrics of Odisha, Venkatagiri Sarees of Andhra Pradesh,Baluchari Saree of West Bengal, Dhaniakhali Saree of West Bengal, Maheshwar Sarees &Fabrics of Madhya Pradesh, Bhagalpur Silk of Bihar, Mangalagiri Sarees and Fabrics of AndhraPradesh, Narayanpet Handloom Sarees of Telangana, Udupi Sarees of Karnataka, PochampallyIkat of Telangana, Kandangi Saree of Tamil Nadu, etc. were the examples of some handicraftsregistered in different parts of the country except in Kerala. Balaramapuram Sarees and FineCotton Fabrics, Kasaragod Sarees, Kuthampully Sarees, ChendamangalamDhoties and SetMundu, KuthampallyDhoties and Set Mundu etc.are the handicraft items in Kerala (Save Handloom, 2025).

Kuthampully Handlooms

Set Mundu, Double Dhoti, Grey Saree and Ladies Dress Materials are the main items produced by Kuthampully handlooms. Cotton yarn is the main raw material used and which iscleaned with normal water along with rice soup in order to facilitate smooth winding, sizing, warping, etc. Winding process is used for converting the yarn in the hank or cone form tobobbins and the yarn required for warp and weft is taken individually. Vertical sectional warpingprocedure is done on a wooden drum from a wooden peg creel. In order to reduce yarn breakageand enhancement of quality and effectiveness of weaving, sizing process is adopted and ricestarch, coconut oil and rice gruel are used as the components for the same. Then beaming andlooming process (comprised of drafting and denting) which will make the loom for weaving. Once the weaving process is completed, both quality checking and packing are done(Geographical Indication Journal, Government of India, 2010).

Kasaragod Sarees

The raw material used for Kasaragod Saree is cotton yarn. The grey yarn in the hankform iscleaned in normal water along with soap and some coconut oil to enhance theabsorbabilityof the yarn. Then the grey yarn is boiled in water with solution of caustic soda andsoda ash.By using a hydro extractor all water contents are squeezed out. Vat dye is used fordyeing process, consequently winding is executed. Sectional warping process is adopted andboth beaming and preparation for loom process has carried out. The main componentsincludedin sizing process are tapioca powder or Maida. Malabar looms are used for weaving KasaragodSarees and once the weaving has done it is examined systematically to assure both quality andfineness (Geographical Indication Journal, Government of India, 2010).

Chendamangalam Handlooms

Double Dhoti, Single Dhoti, Set Mundu and Sarees are the major items produced in Chendamangalam handlooms. Cotton yarn in hank form is the main raw material used in Chendamangalam handlooms along with golden zari. Both warp yarn and weft yarn iscleanedwith normal water to eliminate all impurities. Then yarn is taken for dyeing process and which istransferred to bobbins through winding process. Like Kuthampully handloom, vertical sectional warping is employed for warping process. Boiled Maida is utilized as sizing material. Once thesizing process is completed, warp sheet will transfer into weavers beam. Drafting and denting arethe two processes involved in the loom preparation process which is subsequently used forweaving. Once the weaving process is over it is carried for quality checking and packing (Geographical Indication Journal, Government of India, 2011).

Balaramapuram Handlooms

Grey Saree, Dhoti, Set Mundu and ladies dress Materials are the main items produced.Cotton yarn and golden or half-fine zari constitute as major raw materials. In order toremoveimpurities, the yarn is cleaned with normal water and dried in daylight. Byperforming windingand warping process, the yarn is taken for sizing. The main ingredients used for sizing are ricestarch, coconut oil and rice gruel. Once beaming and loompreparation is over, the yarn is usedfor weaving. After the completion of weaving process, the products are inspected carefully inorder to ensure quality and efficiency (GeographicalIndication Journal, Government of India,2009).

Role Of Handloom in Uplifting the Marginalized Communities

MyGov (2025) reported that the handloom sector is a symbol of our country's rich and diverse cultural heritage, and also an important source of livelihood in rural and semi-rural parts of our country. It comprise of more than 70% of female weavers and allied workers that directly addresses women's empowerment. It requires minimal capital and power because of eco-friendly production processes and also provides flexibility by way of innovation to adapt in fashion trends and dynamic consumer requirements.

Hazarika and Goswami, K (2016) reported that "the participation of women in home-based economic activities, such as in the handloom sector, can improve their status within the family and society as a whole and thereby empower them". Hazarika and Goswami (2018) also demonstrated that the tribal communities of Assam is treating weaving as a part of their

culture and traditions. They enriched the handloom sector of Assam by producing handlooms with extensive designs. The earning from weaving is a main source of their livelihood and also a mechanism to boost their socio-economic status. Women empowerment is one of the main output of the active involvement of tribal women in the handloom activities.

Conclusion and Limitations

Geographical Indications in India's handloom sector have evolved as instruments of cultural preservation and socio-economic empowerment. By legally safeguarding the origin and authenticity of traditional products, GIs create economic incentives for rural artisans, ensuring sustainable livelihoods and gender inclusivity. However, the benefits are unevenly realized due to policy fragmentation, limited consumer awareness, and weak marketing linkages. The findings underline the need for capacity-building programs, integration of digital marketing platforms, and stronger cooperative governance.

The Limitations of this study include its dependence on secondary data, which restricts empirical validation of socio-economic impacts. Future research could adopt mixed methods, combining field surveys with impact analysis to quantify income variations, gender empowerment indices, and sustainability outcomes post-GI certification. Longitudinal studies across multiple states can also explore the comparative effectiveness of GI frameworks in rural transformation.

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Assessment of Embedded Travel Insurance Adoption among Urban Commuters in Mumbai & Thane: A Triple – Benefit Study for Insurers, Government, and Citizens

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Abstract

Insurance has transitioned from being a separate product to being smoothly incorporated into our everyday transactions. Embedded insurance, an innovative concept, enables consumers to acquire coverage immediately at the time of purchase, whether reserving a flight, requesting a ride-share, or purchasing a smartphone. By removing the complexity of individual policies, embedded insurance simplifies, accelerates, and enhances accessibility to protection. Embedded insurance means that insurance coverage is incorporated directly into products or services during the purchase process. Rather than purchasing insurance individually, consumers receive immediate coverage as part of their purchase. Rather than purchasing insurance separately, consumers receive immediate coverage included in their transaction. The swift integration of embedded insurance is propelled by various essential elements like ease & straightforwardness, cost-effectiveness, immediate activation and payments, enhanced trust & acceptance, and technology-enabled. Customization enables insurers to provide tailored, usage-based protection in real-time. Challenges in embedded insurance are reshaping the field with restricted customization, transparency concerns, data privacy, and regulatory obstacles. Conversely, the trajectory of embedded insurance is anticipated to expand dramatically as firms from various sectors incorporate it into their products. Now, AI-powered solutions enable insurers to obtain instant quotes with quicker policy pricing and approvals. Blockchain enhances claim transparency, and its expansion into various industries will persist in transforming conventional structures. Employing both qualitative and quantitative methods—utilizing 450 respondents—this model addresses issues of awareness, time, and accessibility, rendering insurance more inclusive for urban commuters. Policy suggestions aimed at awareness initiatives through government policies

will be customized to specific behaviors and buying habits, enhancing the relevance of insurance and reducing administrative expenses.

***Keywords**: embedded insurance, travel insurance adoption, urban commuters, triple-benefit framework, Mumbai-Thane region*

Introduction

Embedded insurance can often be more affordable because it's supplied as part of a larger transaction. When you buy something else, embedded insurance means that you also get insurance coverage. You don't have to go out and get a separate insurance policy; you have protection immediately. When you're already buying something, it's considerably easier to get insurance. You don't have to spend extra time and effort searching for a separate policy. Coverage starts immediately, and claims can be resolved swiftly, providing peace of mind. People are more inclined to trust and acquire insurance when it's given by a brand they already know and trust. Insurance companies can now provide real-time, usage-based coverage that is customized to each policyholder's needs thanks to technology. Compared to regular policies, embedded insurance policies cannot be as customized. Ensuring that customers comprehend the incorporated insurance coverage's terms and conditions is crucial. When providing embedded insurance, protecting customer data is essential. Since the insurance sector is highly regulated, embedded insurance models have to abide by all relevant laws.

Embedded insurance offers **benefits for insurers, governments, and citizens**

- For Insurers: It expands market reach at lower distribution costs.
- For Governments: It reduces financial burdens related to accident compensation and supports welfare policies.
- For Citizens: It provides instant financial protection and peace of mind.

Review of Literature

As a way to increase insurance coverage and reach previously underserved areas, embedded insurance—also referred to as integrated insurance or contextual insurance—has been increasingly popular in recent years. The literature on embedded insurance is reviewed in this section, with an emphasis on its use in the transportation industry and its possible advantages for different stakeholders.

Embedded Insurance: A General Overview

Koenig and Tschudi (2018) define embedded insurance as the seamless integration of insurance products into the customer journey, often at the point of sale or within a related service. This approach eliminates the need for separate insurance purchases and simplifies the process for consumers. Research by BCG (2020) highlights the potential of embedded insurance to unlock new revenue streams for insurers and improve customer satisfaction by providing relevant coverage at the moment of need.

Embedded Insurance in Transportation

Several studies have explored the application of embedded insurance in the transportation sector. For example, a report by McKinsey (2021) discusses the growing trend of integrating insurance into ride-hailing platforms, car rentals, and public transportation systems. This integration can provide coverage for accidents, delays, lost luggage, and other travel-related risks.

Benefits for Insurers

The literature suggests that embedded insurance offers several benefits for insurers. According to a study by Accenture (2019), embedded insurance can significantly reduce customer acquisition costs by leveraging existing distribution channels and customer relationships. It also allows insurers to access new customer segments and diversify their risk portfolios. Furthermore, embedded insurance can improve customer loyalty by providing a value-added service that enhances the overall customer experience.

Benefits for Government

Embedded travel insurance can also benefit government agencies responsible for managing public transportation systems. By providing financial protection to commuters in the event of accidents or disruptions, embedded insurance can reduce the burden on public resources and improve the overall safety and security of the transportation system. A report by the World Bank (2020) emphasizes the role of insurance in mitigating the financial impact of transportation-related incidents and promoting sustainable urban development.

Benefits for Citizens

For urban commuters, embedded travel insurance offers a convenient and affordable way to protect themselves against the risks associated with daily travel. A survey by Consumer Reports (2022) found that many commuters are concerned about the potential financial

consequences of accidents, delays, and other travel-related incidents. Embedded insurance can provide peace of mind by ensuring that they are adequately covered in such situations. Moreover, the seamless integration of insurance into existing transportation systems can save commuters time and effort compared to purchasing separate insurance policies.

Objectives

1. T**o analyze commuter behavior** in adopting embedded micro-insurance for daily travel.
2. **To evaluate the potential business models** for insurers through transport integration.
3. **To measure the impact** on public risk management and government compensation schemes.
4. **To suggest a policy framework** encouraging public-private insurance partnerships in public transportation.
5. **To explore digital platforms** (UPI, travel apps, ticketing systems) as delivery channels for micro-insurance.

Hypothesis

- H_1: There is a significant relationship between commuter awareness and willingness to adopt embedded travel insurance.
- H_2: Insurance companies perceive embedded insurance as a viable low-risk, high-volume model.
- H_3: The government take up social security programmes and safe commuting practices can reduce compensation liabilities through embedded insurance adoption.
- H4:Trust in public transport operators and digital platforms significantly mediates the relationship between embedded micro-insurance offerings and passengers' purchase intention
- H5: Use of digital platforms (UPI, travel apps, e-ticketing systems) as delivery channels will significantly increase awareness of micro-insurance products among public transport users.

Scope of the Study

- Geographical Scope: Mumbai and Thane region
- Respondents: Urban commuters using public and semi-public transport
- Conceptual Scope: Embedded travel insurance only
- Time Scope: Data collected during the study period

Research Methodology

Analytical Approach with the help of Qualitative methods and primary data with an interviews at railway stations, metro hubs, bus stops, and ride-sharing hotspots in Mumbai and Thane and collected 200 + commuters (train, metro, bus, cab) in Mumbai & Thane

- **Sampling Method**: Stratified random sampling for commuters, purposive sampling for experts
- **Tools**: Questionnaire, interview guide, Likert scale responses.

Primary Data Sources

- **Commuters**: Surveys and interviews at railway stations, metro hubs, bus stops, and ride-sharing hotspots in Mumbai and Thane.
- **Insurance Companies**: Interviews with executives from ICICI Lombard, HDFC ERGO, SBI General, etc.
- **Government Departments**: Transport departments, IRDAI regional offices, and urban planning bodies.
- **Tech Providers**: Representatives from payment and ticketing apps like Paytm, PhonePe, Yatra, etc

Conclusion

- It is anticipated that the study will find that embedded travel insurance has a great deal of potential to improve urban commuters' financial security, but it is still underutilized because of low awareness and passive inclusion strategies.
- The results might show that while acceptability is limited by unclear coverage, adoption is positively impacted by pricing, convenience, and digital integration. If the right knowledge and policy support mechanisms are put in place, the study is anticipated to show that embedded travel insurance provides a framework that benefits commuters, insurers, and the government.

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Exploring Green Technologies: Future Business Leaders' Perspectives on AI, Blockchain, and Sustainability in Business

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Abstract

This study explores the integration of emerging technologies such as Artificial Intelligence (AI), Blockchain, and green technologies in promoting business sustainability. The research examines how these technologies can optimize business operations while reducing environmental impacts and assesses their potential to drive corporate sustainability in alignment with Sustainable Development Goals (SDGs), particularly SDG 9: Industry, Innovation, and Infrastructure, SDG 12: Responsible Consumption and Production, and SDG 13: Climate Action. Through a survey of 50 students from Chinmaya Vishwa Vidyapeeth, the study uncovers key insights into students' awareness, perceptions, and career interests related to AI, Blockchain, and green technologies. It finds that Blockchain is highly valued for enhancing transparency, ethical sourcing, and accountability, while AI is recognized for its role in optimizing energy use, waste reduction, and resource efficiency. Furthermore, the study highlights the barriers to adoption, including high implementation costs, lack of awareness, and insufficient skilled professionals. The study also emphasizes the importance of cross-sector collaboration to accelerate the adoption of these technologies and drive the sustainability agenda. The findings offer valuable insights for businesses, educators, and policymakers to understand the challenges and opportunities associated with integrating these technologies into business strategies. Moreover, the study suggests that despite the challenges, there is significant enthusiasm from future business leaders to work in the sustainability domain, indicating a promising future for green technology integration. This research contributes to understanding how emerging technologies can foster sustainable business practices, providing

actionable insights for companies looking to implement these technologies to enhance their environmental and operational performance.

***Keywords**: Artificial Intelligence (AI) – Blockchain – Green Technologies – Business Sustainability – Sustainable Development Goals (SDGs)*

Introduction

Green technologies are innovations designed to address environmental challenges and promote sustainability by reducing the ecological impact of human activities. These technologies span a wide range of sectors, from renewable energy solutions like solar and wind power to advanced waste management systems and eco-friendly materials. The key objective of green technologies is to minimize resource consumption, improve energy efficiency, and enhance sustainability across industries. This shift towards green technologies is particularly crucial in addressing global issues such as climate change, resource scarcity, and environmental degradation. Green technologies not only aim to conserve resources but also to reduce greenhouse gas emissions, promoting a cleaner and more sustainable future. By incorporating renewable energy sources and energy-efficient systems, businesses and industries can contribute significantly to mitigating environmental harm.

The four pillars of green technology, as defined in the field, are energy efficiency, renewable energy, waste reduction and management, and sustainable design and innovation. Energy efficiency focuses on optimizing energy use in industries and homes, with innovations like energy-efficient appliances, smart grids, and LED lighting being pivotal in reducing waste and emissions. Renewable energy plays a crucial role in reducing dependence on fossil fuels, with technologies harnessing solar, wind, hydroelectric, and geothermal power to meet global energy demands sustainably. Waste reduction technologies aim to minimize waste generation and promote recycling, with waste-to-energy systems and sustainable packaging providing solutions to reduce environmental footprints. Lastly, sustainable design and innovation focus on creating products and systems that minimize ecological harm, incorporating eco-friendly materials and practices that enhance longevity and optimize resource use.

The opportunities presented by green technologies are significant, both environmentally and economically. These technologies help reduce carbon emissions,

conserve resources, and promote business innovation. As the demand for sustainability grows, green technologies open up new markets and job opportunities, fostering economic growth while contributing to environmental preservation. Additionally, they offer a pathway to achieving global sustainability goals, benefiting both businesses and society. However, the adoption of green technologies faces several challenges, including high initial costs, regulatory hurdles, and the need for continued technological innovation. Overcoming these barriers will require continued education, awareness, and government support to ensure the widespread adoption and success of green technologies.

Artificial Intelligence

Artificial Intelligence (AI) is revolutionizing numerous industries and everyday life by mimicking human cognitive processes. It is the capability of machines to learn from experience, interpret data, and perform tasks that typically require human intelligence, such as language understanding, image recognition, and decision-making. AI is increasingly being applied in diverse sectors such as healthcare, education, robotics, agriculture, finance, and more. In healthcare, for example, AI is being used to diagnose diseases, detect cancer cells, and assist in drug discovery. In the education sector, AI is enhancing personalized learning experiences and providing support through virtual tutors. The future of AI holds immense promise, with developments in deep learning and neural networks enabling more advanced applications, such as self-driving cars and AI-powered virtual assistants. However, the journey toward AI's full potential faces challenges, including ethical considerations, the need for vast datasets, and the technological limitations in replicating true human-like intelligence (ESDST, 2024).

Block Chain

Blockchain is a decentralized, distributed ledger technology (DLT) that securely records transactions and tracks digital assets across a network. It operates through a series of blocks, each containing a set of transaction data. These blocks are linked together in a chronological order to form a chain, with each block containing a timestamp and a cryptographic hash of the previous block, ensuring data integrity and security. Once a block is added to the blockchain, it is immutable, meaning it cannot be altered, deleted, or tampered with. This creates a permanent and transparent record of transactions, making blockchain particularly valuable for applications where security, transparency, and accountability are critical.

Blockchain technology was first proposed in 1991 as a research project but gained widespread attention with the advent of Bitcoin in 2009, which was the first cryptocurrency to use blockchain. Since then, blockchain has expanded beyond cryptocurrencies to support decentralized finance (DeFi), smart contracts, non-fungible tokens (NFTs), and more. The core value of blockchain lies in its ability to provide secure, transparent, and irreversible transaction records without relying on a central authority, which enhances trust and reduces the risk of fraud (Blockchain.gov, 2024).

Overall, Sustainability in business refers to the practice of operating in a way that not only ensures long-term profitability but also minimizes negative impacts on the environment and society. It involves integrating eco-friendly practices, ethical sourcing, and resource optimization into core business strategies to address global challenges such as climate change, resource depletion, and environmental degradation. Sustainable businesses focus on creating value through responsible production, reducing waste, improving energy efficiency, and promoting social equity. Adopting sustainable business practices not only enhances a company's reputation but also leads to operational efficiencies, cost savings, and access to emerging green markets.

In the context of modern business, technologies like AI, Blockchain, and Green Technologies are at the forefront of driving sustainability. AI enables businesses to optimize energy use, streamline supply chains, and reduce waste through predictive analytics and automation. Blockchain offers transparent, secure, and immutable systems for tracking resources, ensuring ethical sourcing, and verifying sustainability claims. Green technologies, including renewable energy solutions and energy-efficient systems, further support businesses in minimizing their environmental footprint. Together, these innovations not only help businesses operate more sustainably but also create new opportunities for growth, market differentiation, and improved stakeholder trust, paving the way for a more sustainable future in business.

Review of Literature

The literature on the intersection of blockchain, artificial intelligence (AI), green technologies, and sustainability highlight their transformative roles across various industries. Khan, Ullah, Liu, and Kashif (2024) explore the impact of blockchain and green innovation technologies on sustainability, specifically in Environmental, Social, and Governance (ESG)

dimensions, emphasizing the moderating role of global financial integration. They find that both technologies enhance sustainability in emerging economies by promoting transparency and innovation. Similarly, Hasan Polas et al. (2022) investigate how blockchain technology supports green innovation, particularly in SMEs in Peru, with a focus on renewable energy adoption and the importance of blockchain in fostering environmentally responsible business practices. Daniel, Kashetu, Alasa, Jiyane, and Tanvir (2024) examine the synergy between AI and blockchain, suggesting that their integration enhances efficiency, security, and decision-making across sectors like finance, healthcare, and supply chain management. However, challenges such as scalability and regulatory uncertainty still limit widespread adoption. Friedman and Ormiston (2022) analyze blockchain's potential as a sustainability-oriented innovation in global food supply chains, noting its positive impact on traceability and fairness, but highlighting significant barriers to adoption. Mohammed (2025) investigates how AI and blockchain improve supply chain sustainability in Egypt's manufacturing sector, with green innovation serving as a key mediating factor. Mercuri, della Corte, and Ricci (2021) focus on blockchain's ability to support sustainable business models, showing how it improves transparency and reduces information asymmetry in the agri-food sector, while reducing transaction costs by eliminating intermediaries. Pérez-Pérez and Benito-Osorio (2025) explore blockchain's role in enhancing marketing strategies in the sharing economy, suggesting that it strengthens consumer trust through improved transparency and data security. Chauhan and Sahoo (2024) discuss how AI, blockchain, and IoT can advance sustainability by enhancing resource management and promoting supply chain transparency, though they note challenges such as high implementation costs and concerns over data privacy. Saberi, Kouhizadeh, Sarkis, and Shen (2019) critically examine blockchain's role in sustainable supply chain management, emphasizing how blockchain improves transparency and traceability but faces organizational and technical adoption barriers. Rahaman (2025) explores the integration of AI and blockchain technologies, finding a positive correlation between AI adoption and sustainability improvements across industries, but noting that blockchain adoption lags in certain sectors. Ghobakhloo et al. (2023) investigate how blockchain can foster sustainability in business ecosystems, identifying key blockchain functions like decentralization and transparency that optimize resource efficiency and prevent pollution. Geddam et al. (2026) examine the role of fintech innovations like AI and blockchain in achieving the UN's Sustainable Development Goals (SDGs), demonstrating their impact on financial sustainability, green fintech, and climate action. Darwish (2023) explores the integration of AI and blockchain in business,

noting their synergy in promoting sustainability by supporting circular economies, decentralized systems, and a transformed financial system. Baig and Yadegaridehkordi (2024) focus on blockchain's influence on green supply chain management (GSCM), revealing how it strengthens sustainability by improving GSCM practices through increased transparency and accountability. Lastly, Friedman and Ormiston (2022) again explore blockchain's potential in food supply chains, discussing the barriers to adoption but also highlighting its opportunities to drive sustainability through enhanced transparency and fairness in food traceability.

Research Gap

While the literature highlights the transformative potential of AI, Blockchain, and green technologies in promoting sustainability, limited research has focused on understanding how future business leaders perceive and engage with these technologies. Specifically, the gap lies in assessing the awareness and career interests of students who will be integral in shaping the adoption of these technologies in businesses. This study aims to bridge this gap by examining the awareness, perceptions, and aspirations of future business professionals, offering insights into how these technologies can be better integrated into sustainable business practices.

The Significance of this Study

Study lies in its exploration of how future business leaders' students perceive the role of emerging technologies such as Artificial Intelligence (AI) and Blockchain in promoting sustainability in business. As these technologies continue to gain traction, understanding the awareness, perceptions, and career interests of students is crucial for shaping the future workforce's approach to sustainability. This study provides valuable insights into how AI and Blockchain can be integrated into sustainable business practices and identifies the barriers and opportunities that businesses may face in adopting these green technologies. Additionally, the findings highlight the importance of cross-sector collaboration in driving sustainability, offering actionable insights for businesses, educators, and policymakers aiming to foster a greener, technology-driven future.

Objectives of the Study

1. To assess college students' awareness and understanding of AI and Blockchain technologies:
2. To explore students' perceptions regarding the role of AI and Blockchain in business sustainability:

3. To examine students' career interests and willingness to work with green technologies in the future:
4. To identify the barriers and challenges students perceive in the adoption of green technologies by businesses

Research Methodology

For this study, a descriptive research design was employed to assess the perspectives of 43 undergraduate students from Chinmaya Vishwa Vidyapeeth, specifically from the first, second, and third-year B. Com and BBA programs. Data were collected using a Google Form, which was distributed to the students through WhatsApp for easy access and participation. The survey included both closed-ended and open-ended questions, covering topics such as students' awareness of AI and Blockchain, their perceptions of these technologies' role in business sustainability, and their career interests related to green technologies. A convenience sampling method was used to select participants, and the data were analyzed using descriptive statistical methods in Microsoft Excel, including frequency distributions, percentage breakdowns, and thematic analysis for open-ended responses. The study adheres to ethical standards, with voluntary participation and anonymous responses to ensure privacy. The findings offer valuable insights into how future business leaders view the integration of AI, Blockchain, and sustainability.

Results

1. Blockchain in Business for Sustainability:
    - Blockchain's primary applications in sustainability were identified as enhancing transparency (100% of respondents), ethical sourcing, reducing fraud, and ensuring accountability across supply chains.
    - Blockchain was recognized for its ability to manage carbon emissions and carbon credits, track resources transparently, and support fair trade and green finance.

2. AI in Business for Sustainability:
    - AI's main applications were identified as resource optimization, energy efficiency, and waste reduction (100% of respondents saw AI's potential in these areas).

- AI's role in predictive maintenance, streamlining supply chains, and improving decision-making was emphasized, with 85% of respondents focusing on its energy-saving and waste-reduction capabilities.

3. Career Aspirations in Sustainability:
    - 75.6% of respondents expressed a willingness to work for sustainability-focused companies.
    - 58.5% of respondents showed interest in combining technology (AI, Blockchain) with sustainability in their future careers.
    - Respondents showed strong interest in projects related to energy management, circular economy, and e-waste management.

4. Barriers to Green Technology Adoption:
    - 64.1% identified high implementation costs as a major barrier.
    - 69.2% pointed to lack of awareness as another significant challenge.
    - 53.8% cited the lack of skilled professionals, while 48.7% noted resistance to change within organizations as key obstacles.

5. Circular Economy and Green Supply Chains:
    - 64.1% of respondents believe that businesses can implement circular economy principles using green technologies like AI and Blockchain.
    - Most responses (approximately 60%) emphasized the role of AI and Blockchain in improving resource efficiency, tracking materials, and enhancing recycling processes.

6. Collaboration in Advancing Sustainability Technologies:
    - 69.2% of respondents viewed collaboration between businesses, governments, and academia as essential to the advancement of sustainability technologies.
    - This emphasizes the importance of cross-sector partnerships in promoting the adoption and scaling of green technologies.

The Glamps of Result of the Study

Section	Findings	Percentage/Count	Insights
1. Blockchain in Business for Sustainability	- Blockchain is seen as a tool for enhancing transparency, ethical sourcing, reducing fraud, and ensuring accountability across supply chains. – Blockchain helps track carbon emissions and carbon credits, supports fair trade, and promotes green finance. – Blockchain's transparency and accountability were emphasized by most respondents, making it an essential tool for businesses seeking sustainability.	100% (23 responses)	Blockchain is widely recognized as essential for transparency and accountability, critical for businesses pursuing sustainability.
2. AI in Business for Sustainability	- AI is seen as optimizing resource usage, improving energy efficiency, reducing waste, and streamlining supply chains. – AI's role in predictive maintenance, waste reduction, and energy-saving strategies was emphasized. – AI helps companies achieve better decision-making through data analysis, which leads to more efficient operations and cost savings in sustainable practices.	100% (23 responses)	AI is highly valued for its ability to optimize resources, reduce waste, and improve decision-making for more sustainable operations.
3. Career Aspirations in Sustainability	- 75.6% of respondents expressed interest in working for companies that focus on	Yes: 31 (75.6%) Maybe: 7 (17.1%) No: 3 (7.3%)	There is a strong interest among future professionals to

Section	Findings	Percentage/Count	Insights
	sustainability and green technologies. – 58.5% would pursue a career that combines technology (e.g., AI, Blockchain) with sustainability. – Respondents expressed interest in working on sustainability-focused projects related to energy management, circular economy solutions, e-waste, and waste reduction.		combine technology and sustainability, highlighting an emerging workforce ready to tackle environmental issues.
4. Barriers to Adoption of Green Technologies	- 64.1% of respondents mentioned high implementation costs as a major barrier. – 69.2% cited a lack of awareness or knowledge of green technologies. – 53.8% of respondents noted the lack of skilled professionals to implement these technologies. – 48.7% mentioned resistance to change within organizations as a key obstacle.	High Costs: 25 (64.1%) Lack of Awareness: 27 (69.2%) Lack of Skilled Professionals: 21 (53.8%) Resistance to Change: 19 (48.7%)	High implementation costs and a lack of awareness and skills are significant barriers that must be addressed through education, training, and financial support for businesses to fully adopt green technologies.
5. Circular Economy and Green Supply Chains	- 64.1% of respondents believe businesses can implement circular economy principles (such as recycling, waste reduction) using AI and Blockchain. – AI and Blockchain are seen as tools to improve resource efficiency,	Yes: 25 (64.1%) Unsure: 13 (33.3%) No: 1 (2.6%)	The circular economy concept is gaining traction, with AI and Blockchain seen as essential tools for improving resource management, recycling, and

Section	Findings	Percentage/Count	Insights
	track materials through their lifecycle, and enhance recycling processes. – 33.3% of respondents are unsure about the application of these technologies in circular economy principles.		creating more sustainable business models.
6. Collaboration in Advancing Sustainability Technologies	- 69.2% of respondents consider collaboration between businesses, governments, and academia essential to advancing sustainability technologies. – 30.8% view this collaboration as somewhat important, indicating that while it is critical, some respondents feel it is not as crucial as others believe.	Essential: 27 (69.2%) Somewhat Important: 12 (30.8%)	Cross-sector collaboration is seen as a crucial factor for driving the adoption and scaling of green technologies, reinforcing the importance of partnerships in fostering innovation.

Source: Compiled from Primary Data

Discussion

The findings indicate that Blockchain and AI are seen as crucial enablers for businesses aiming to improve sustainability practices. Blockchain, with its emphasis on transparency, ethical sourcing, and fraud reduction, has clear applications in ensuring sustainable business operations. AI, on the other hand, is recognized for its ability to optimize resources, enhance energy efficiency, and reduce waste, making it a vital tool for businesses seeking to align with sustainability goals. Both technologies provide companies with the ability to not only track environmental impacts but also improve operational efficiency while reducing costs.

In terms of career aspirations, the overwhelming interest from students in pursuing careers that combine technology with sustainability highlights a shift in the mindset of future business leaders. The strong desire to work on projects that address environmental issues, such as waste reduction, energy efficiency, and the circular economy, demonstrates a growing

recognition of the importance of sustainable practices in business strategy. However, the presence of significant barriers, such as high implementation costs, lack of awareness, and resistance to change, suggests that while there is enthusiasm for these technologies, businesses will need to overcome challenges to fully integrate them into their operations.

The concept of the circular economy is gaining traction, with most respondents believing that AI and Blockchain can significantly contribute to reducing waste and improving resource efficiency. Furthermore, cross-sector collaboration is considered vital for advancing these green technologies, signaling that a collective effort between businesses, governments, and academic institutions will be crucial for achieving long-term sustainability goals.

Implications

The study highlights several key implications for businesses looking to adopt green technologies:

- Investment in education and training will be critical in overcoming barriers related to lack of awareness and the shortage of skilled professionals. Companies must prioritize educating their workforce about the potential of AI and Blockchain to improve sustainability.
- Financial incentives and subsidies may be needed to help businesses mitigate the high implementation costs associated with green technologies, especially in the initial phases.
- Stronger collaborations between businesses, government bodies, and academic institutions should be fostered to facilitate research, development, and policy formulation that supports the adoption of green technologies.
- Companies should leverage AI and Blockchain to create transparent supply chains, optimize resource usage, and integrate circular economy principles, which will not only improve environmental impact but also build trust with consumers and investors.

Limitations

The study's limitations include its focus on a small sample size of undergraduate students from a single institution, which may not fully represent the broader population of future business leaders. Additionally, the survey's reliance on self-reported data may introduce biases related to students' perceptions and awareness. Furthermore, the study does not delve

into the specific technological challenges faced by businesses during the implementation of AI, Blockchain, and green technologies, which could provide a more comprehensive understanding of the real-world barriers to adoption. Lastly, the study does not explore the long-term impact of these technologies on business sustainability beyond the immediate perceptions of students.

Conclusion

The findings of this study indicate that AI and Blockchain technologies hold immense potential for driving sustainability in business practices. These technologies are increasingly seen as key enablers in achieving Environmental, Social, and Governance (ESG) goals, contributing to several Sustainable Development Goals (SDGs), particularly SDG 9: Industry, Innovation, and Infrastructure, SDG 12: Responsible Consumption and Production, and SDG 13: Climate Action. By optimizing resources, reducing waste, and enhancing transparency, AI and Blockchain offer businesses innovative solutions to address global sustainability challenges. However, several barriers, including high implementation costs and a lack of skilled professionals, need to be addressed to ensure the full-scale deployment of these technologies.

Furthermore, the study highlights the strong desire among students and future business leaders to work on sustainability projects that incorporate these cutting-edge technologies. This enthusiasm suggests that the next generation of entrepreneurs and executives is well-prepared to drive the adoption of AI and Blockchain in sustainability-driven business models. Nevertheless, for businesses to effectively capitalize on these innovations, they must overcome technological, financial, and educational barriers while fostering a culture of collaboration across sectors. Securing financial support and policy backing will also be essential to incentivize companies to adopt these technologies.

Ultimately, the integration of AI and Blockchain into business operations alongside a strong commitment to sustainability presents a transformative opportunity to address the urgent environmental challenges outlined in SDG 13: Climate Action. These technologies not only provide companies with the tools to reduce their ecological footprint but also open new pathways for growth, innovation, and value creation, supporting the realization of SDG 9 and SDG 12. By embracing these innovations, businesses will be better equipped to contribute to a greener, more sustainable global economy, positioning themselves as leaders in the transition toward a future that balances technological advancement with environmental stewardship.

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ESG Reporting and Climate Risk Investing: Evidence from Sustainable Capital Market Practices in India

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Abstract

The growing integration of Environmental, Social, and Governance (ESG) considerations into financial decision-making has fundamentally transformed global and emerging capital markets. Rising climate-related financial risks have encouraged investors, regulators, and corporations to move beyond conventional financial metrics and adopt sustainability-oriented investment frameworks. This paper examines the role of ESG reporting in facilitating climate risk–based investment decisions and strengthening sustainable capital market practices in India. The objectives of the study are to analyze the relevance of ESG disclosure, evaluate its contribution to climate risk investing, and assess its implications for long-term financial performance and market resilience. The study adopts a descriptive research design using secondary data sourced from sustainability reports, ESG disclosures, regulatory publications, and prior empirical studies. The findings indicate that firms with comprehensive and transparent ESG reporting experience enhanced investor confidence, reduced information asymmetry, improved access to sustainable capital, and greater resilience to climate-related risks. The study concludes that robust ESG reporting frameworks, regulatory standardization, and increased investor awareness are essential for advancing green finance and climate-resilient investment practices in India and other emerging economies

***Keywords**: ESG Reporting, Climate Risk Investing, Green Finance, Sustainable Capital Markets, Sustainable Finance*

1. Introduction

Climate change has emerged as one of the most significant global challenges affecting economic growth, financial stability, and investment decision-making. Rising greenhouse gas

emissions, increased frequency of extreme weather events, and long-term environmental degradation have introduced new dimensions of risk for businesses and financial markets. These climate-related risks are no longer viewed as peripheral concerns but are increasingly recognized as material financial risks that can influence asset valuation, capital allocation, and portfolio performance.

In response to these challenges, the global financial system has witnessed a gradual shift toward sustainable finance and responsible investment practices. Green finance emphasizes directing financial resources toward environmentally sustainable projects, while climate risk investing focuses on integrating climate-related risks into investment analysis and portfolio construction. Environmental, Social, and Governance (ESG) reporting plays a central role in this transformation by enabling firms to disclose non-financial information related to sustainability performance, risk management, and long-term value creation.

In the Indian context, sustainable finance has gained momentum through initiatives such as green bonds, ESG indices, and regulatory frameworks like the Business Responsibility and Sustainability Reporting (BRSR) mandate introduced by the Securities and Exchange Board of India (SEBI). Despite these developments, challenges such as inconsistent reporting practices, limited comparability, and concerns regarding data credibility continue to affect the effectiveness of ESG disclosures. This study explores how ESG reporting influences climate risk investing and contributes to the development of sustainable capital markets in India.

2. Objectives of the Study

The study is undertaken with the following objectives:

1. To examine the conceptual framework of ESG reporting in the context of green finance.
2. To analyze the role of ESG disclosure in climate risk–oriented investment decisions.
3. To review selected empirical studies relating ESG reporting to financial and market performance.
4. To identify key challenges associated with ESG-based climate risk investing in India.
5. To suggest policy and managerial measures to strengthen sustainable capital market practices.

3. Review of Literature

The relationship between ESG reporting, climate risk, and financial performance has been widely examined in academic and professional literature.

Friede, Busch, and Bassen (2015) conducted a large-scale meta-analysis of more than 2,000 empirical studies to assess the link between ESG factors and corporate financial performance. Their findings revealed that the majority of studies reported a positive or neutral relationship, indicating that ESG integration does not compromise financial returns. The authors concluded that effective ESG practices contribute to long-term risk reduction, improved operational efficiency, and enhanced investment performance.

Eccles, Ioannou, and Serafeim (2014) analyzed sustainability-oriented firms over an extended period and compared them with firms that followed traditional business practices. The study demonstrated that companies with strong ESG and governance frameworks exhibited superior stock market and accounting performance. The authors emphasized that transparent sustainability reporting and stakeholder engagement play a critical role in driving long-term value creation and competitive advantage.

Bolton and Kacperczyk (2021) examined the impact of climate risk on asset pricing by focusing on firm-level carbon emissions. Their study found that firms with higher carbon exposure tend to face higher expected returns due to increased perceived risk. The authors highlighted the importance of climate-related disclosures in enabling investors to assess transition risks and price environmental externalities accurately. These studies collectively emphasize that ESG reporting is an essential mechanism for supporting informed climate-conscious investment decisions.

4. Research Methodology

The study adopts a descriptive and analytical research design based entirely on secondary data. Data have been collected from published sustainability reports, ESG disclosures, academic journals, policy documents, and reports issued by regulatory authorities and international organizations. Recognized sustainability frameworks such as the Global Reporting Initiative (GRI), Integrated Reporting (<IR>), and the Task Force on Climate-related Financial Disclosures (TCFD) have been reviewed to understand prevailing ESG reporting practices.

Qualitative content analysis is employed to identify patterns, trends, and gaps in ESG reporting and climate risk investing. The methodology facilitates a comprehensive understanding of how ESG disclosures contribute to sustainable capital market development and climate risk mitigation.

5. ESG Reporting and Climate Risk Investing

ESG reporting serves as a critical tool for identifying, managing, and communicating climate-related financial risks. Environmental disclosures provide information on carbon emissions, energy efficiency, resource utilization, and climate mitigation strategies. Social disclosures reflect labor practices, community engagement, and human capital development, while governance disclosures highlight board oversight, ethical conduct, and risk management systems.

From an investment perspective, ESG reporting enhances transparency and reduces information asymmetry between firms and investors. Investors increasingly rely on ESG data to evaluate climate exposure, regulatory risks, and long-term sustainability. Firms with strong ESG performance are often perceived as more resilient and better positioned to adapt to climate transition risks, thereby attracting long-term responsible investors and benefiting from lower cost of capital.

Sustainable capital markets prioritize long-term value creation and environmental responsibility. Instruments such as green bonds, sustainability-linked loans, and ESG-focused mutual funds demonstrate the growing integration of sustainability considerations into capital allocation decisions. ESG reporting plays a pivotal role in supporting these instruments by providing credible and comparable sustainability information.

6. Regulatory Framework and Policy Initiatives in India

India has undertaken several regulatory initiatives to promote ESG reporting and sustainable finance. SEBI's BRSR framework mandates ESG disclosure for listed companies, enhancing transparency and accountability. Additionally, guidelines related to green bonds and climate finance have encouraged firms to adopt sustainable practices.

These regulatory measures aim to align Indian capital markets with global sustainability standards while addressing domestic environmental and social challenges. However, further harmonization with international frameworks and stronger enforcement mechanisms are required to improve data quality and investor confidence.

7. Challenges in ESG – Based Climate Risk Investing

Despite its growing relevance, ESG-based climate risk investing faces multiple challenges:

- Absence of standardized ESG metrics across sectors
- Inconsistent and largely qualitative disclosures
- Limited third-party verification and assurance
- Potential risk of greenwashing practices
- Insufficient ESG literacy among retail investors

Addressing these challenges requires coordinated efforts from regulators, corporations, investors, and academic institutions.

8. Findings of the Study

- ESG reporting significantly influences climate risk–based investment decisions.
- Firms with transparent ESG disclosures experience improved investor confidence.
- ESG reporting supports access to sustainable capital and long-term financial resilience.
- Regulatory initiatives have strengthened ESG adoption in India, though implementation gaps remain.
- Climate risk investing is gradually reshaping sustainable capital market practices.

9. Implications of the Study

The study offers meaningful implications for various stakeholders. Investors can utilize ESG disclosures to mitigate climate-related risks and improve portfolio resilience. Corporations can enhance long-term value by integrating ESG considerations into core business strategies. Policymakers can strengthen disclosure norms and standardization to improve comparability and credibility. The findings also contribute to academic literature on sustainable finance in emerging markets.

10. Conclusion

ESG reporting has emerged as a cornerstone of green finance and climate risk investing. As financial markets increasingly confront climate-related uncertainties, transparent and standardized ESG disclosures can support informed investment decisions, efficient capital allocation, and long-term financial stability. The study concludes that strengthening ESG reporting frameworks, regulatory alignment, and investor awareness is essential for advancing sustainable capital markets in India. Future research may focus on empirical testing of ESG performance indicators and sector-specific climate risk exposure.

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Municipal Solid Waste Management: Governance and Systemic Challenges from Malappuram District, Kerala

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Abstract

Municipal Solid Waste Management (MSWM) is one of the fundamental problems confronting the rapid urbanisation process in India. A lack of proper mechanisms for waste treatment, unscientific landfill disposal, etc., are the major issues in waste management. In the case of Kerala, a highly literate and environmentally aware state, waste management has reflected both improvement and shortcomings. Despite Kerala's progressive policies, such as the Clean Kerala Mission and Malinya Mukta Keralam campaign, effective waste management remains uneven across municipalities. This research critically assesses the MSWM practices implemented and the challenges faced by the municipalities of the Malappuram district, one of Kerala's most populous and fast-urbanizing districts. The study scrutinizes the planning, implementation, and performance of municipal solid waste management systems in nine municipalities of the district. The study argues for enhanced infrastructural investments, decentralized composting promotion, and greater institutional capacity-building to bridge the policy–practice gap. The results hold relevance for policymakers, municipal administrators, and development practitioners aiming to strengthen sustainable waste management frameworks in Kerala especially in Malappuram district.

***Keywords**: Municipal Solid Waste Management, Decentralised Composting, Clean Kerala Mission, Malinya Mukta Keralam, Solid Waste, Malappuram.*

Introduction

Municipal Solid Waste Management (MSWM) is a crucial environmental and public health issue in India, especially as the population in India and consumption patterns rise (Gupta

et al., 2015). India generates approximately 62 million tonnes of municipal solid waste annually, of which only about 43 million tonnes are collected, and a mere 12 million tonnes are treated, while the rest ends up in landfills (*CPCB 2020 REPORT*, n.d.). The fastest urbanisation and industrialisation process, growing per capita waste generation, changes in the consumption behaviour, lack of proper lands to dispose of wastes, etc, are some of the challenges faced by local authorities (Sharholy et al., 2008).

Kerala is a state in south-western India, known for its environmental sustainability, high literacy rates, and environmentally conscious population. Municipalities in Kerala are mandated under the *Solid Waste Management Rules, 2016* to ensure scientific handling of waste, with emphasis on source segregation, decentralized processing, and minimal landfill disposal (Ministry of Environment, Forest and Climate Change, 2016). Despite these regulatory frameworks, several municipalities in Kerala continue to struggle with the proper implementation of waste management practices, often due to institutional, technical, and socio-cultural barriers. Kerala is a state with 14 districts, in which Malappuram is one of the most populous districts.

There are 12 Municipalities in Malappuram district, which include Malappuram, Manjeri, and Ponnani, which collectively generate significant quantities of MSW, estimated at 350-400 grams per capita per day (The State of Decentralised Solid Waste Management in Kerala Report 2021, n.d.). The district's waste composition is predominantly organic (60-70%), with food waste, paper, and plastics forming the bulk, alongside smaller fractions of hazardous waste such as batteries and e-waste (Annual Report 2021_Suchitwa Kerala Mission, n.d.). In this context, a critical evaluation of the current MSWM practices in the Malappuram district becomes essential. Local authorities in Malappuram District follow Municipal Solid Waste Management Rules 2016 for the management of municipal solid waste. Even though challenges are not free. This study is a critical evaluation of the solid waste management practices followed by the municipalities in the Malappuram district.

Significance of the Study

Municipal Solid Waste Management has become a major concern for all the cities that are facing rapid urbanization and industrialization. Adequate and scientific waste handling mechanisms are essential for all cities to reduce pollution and enhance public health and hygiene. Analysing the current practices followed by local authorities helps to know the areas

of risk and those that need more improvement. Likewise, as all the countries are moving towards the attainment of the 17 SDGs, this study can also give an insight into how close we are to the achievement of SDG 11, i.e., clean cities. For implementing better solid waste management practices, community involvement and participation are equally important. Decentralised practices of waste management also help to improve citizen participation.

Scope of the Study

This study focuses exclusively on the nine municipalities of the Malappuram district of Kerala. This study examines the patterns of waste generation, collection, segregation, transportation, treatment, and disposal methods. It also examines the role of government bodies, NGOs, and residents, and provides an insight into the compliance with the Solid Waste Management Rules (2016)

Problem Statement

In recent years, Kerala has witnessed a number of consequences due to improper waste management mechanisms. Fire at the Brahmapuram waste treatment plant in Kochi in 2023, which released toxic smoke, was detrimental to improper waste management and inadequate infrastructure facilities. The disappearance of a worker and later his death in the Amayizhanchan canal, due to waste-related issues, further emphasize the severity and seriousness of the issue. In this context, this study examines the waste management practices of nine municipalities of the Malappuram district. This study also compares the practices followed by the nine municipalities with the practices devised in the Solid Waste Management Act 2016 (Bundela PS et al., 2025; Rajendiran et al., 2022).

Theoretical Review

This article is mainly based on the examination of Municipal Solid Waste Management Rules 2016 and analysis and comparison of how municipalities in Malappuram District are managing to comply with its provisions related to waste management. As per the Environmental Protection Act 1986, the Central Government is empowered to issue rules for environmental protection, under which the SWM Rules 2016 are framed. SWM Rules aim to reduce environmental risk and enhance sustainable rural-urban management. Before the introduction of the SWM Rules 2016, the waste management mechanism completely relied on the system of collection and disposal. Now it has shifted to segregation, processing, reuse, and resource recovery.

A complete system of managing waste has come into existence after the implementation of the SWM Rules 2016. Division of responsibilities among various levels is one of the key changes that has taken place. The responsibility flows from the Central Government, State Government/Union Territory, Local bodies, community level, and private participation.

The policy formulation, monitoring, and standardisation processes are done by the central government. Policy implementation and making facilities for better policy practices are vested in the hands of the state government. Local bodies are mainly responsible for the execution of waste management systems. As per the SWM Rules 2016, source segregation and composting are done at the community level itself. Technological innovations and the processing of collected waste are done with the help of private participation.

The main points of Solid Waste Management Rules 2016 include, the waste generated at the house level should be segregated into three major categories, viz, biodegradable, non-biodegradable, and domestic hazardous waste. The vendors authorised by each local body are responsible for the door-to-door collection of the waste, and the collected wastes are transported in a compartmentalised and covered vehicle. Only residual or inert waste is going to sanitary landfills. Open dumping is strictly prohibited. All the local bodies are following the waste hierarchy model as a core principle. Waste hierarchy relies on prevention, minimization, reuse, recycling, energy recovery, and landfill disposal.

Urbanization and Waste Generation

Rapid urbanization and population growth are the two important drivers of increased municipal solid waste (Bundela PS et al., 2025). Waste generated can be organic or plastic residues. Local authorities are practicing door-to-door collection and segregation at source (Sharholy et al., 2008)

Environmental and Health Impacts

Improper treatment of waste leads to health and environmental problems such as pollution and GHG emissions. A combination of composting, anaerobic digestion, and sanitary landfills is effective and useful for better mechanisms (Pujara et al., 2019).

Challenges in Solid Waste Management

India generates 1.15 lakh metric tons of waste per day. Growing population and rapid industrialisation are the key reasons for the increased rate of Solid Waste (Bundela PS et al., 2025; Kumar et al., 2022). Out of the total waste generated, only 65% of the waste is collected, and less than 20% is processed scientifically. Lack of segregation at source results in health risks and poor recycling rates (Rajendiran et al., 2022).

Research Gap

While numerous studies across India have explored the generation, treatment mechanisms, and challenges associated with municipal solid waste (MSW) management, there is a noticeable dearth of region-specific investigations, particularly in the context of Kerala. Existing literature primarily focuses on broader state-level or urban-centric waste management issues, often overlooking district-level variations. Notably, there is an absence of empirical studies focusing on Malappuram District, despite its unique demographic and infrastructural characteristics that may influence MSW practices. This lack of localized research creates a significant knowledge gap in understanding the waste management dynamics at the municipal level within this district.

Research Questions

1. What types of waste are generated and collected by the municipalities in Malappuram District?
2. Which categories of waste pose the greatest challenges for municipalities in terms of management and disposal?
3. What strategies and activities are undertaken by the municipalities to manage solid waste effectively?
4. What are the systemic challenges of MSWM practices faced by Malappuram Municipality?

Objectives of the Study

1. To identify and categorize the types of waste generated and collected by municipalities in Malappuram District.
2. To evaluate the specific challenges faced by municipalities in managing different types of waste.
3. To analyze the waste management strategies and practices currently implemented by local municipal authorities.

4. To systematically identify and prioritize systemic challenges in municipal solid waste management using weighted perception analysis of municipal officials.

Methodological Design

The study is descriptive in nature. It tries to examine the current practices of municipalities in Malappuram district of Kerala state with respect to Solid Waste Management (SWM) in terms of waste generation, collection and disposal. Primary data from Health Inspectors and Clean City Managers of nine municipalities were collected using the Interview Schedule, as they are the officials who are directly involved and have enough expertise in the waste management practices of their municipality.

A Weighted Average method was employed to quantify the relative importance of each type of waste, based on the rankings provided by the municipalities. These rankings reflected the perceived significance of each waste category in terms of its generation, collection, and the difficulty encountered during disposal. This approach enabled a structured analysis of municipal solid waste management across different dimensions.

Results and Discussions

Table 1: Order of waste generated in Malappuram District

Order of Generation (In %)											
Type of Waste	**Rank perceived by municipalities**									**Weighted Score**	**Rank**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**		
Household Waste	56	22	22							834	1
Industrial Waste			12	11			33	33	11	326	7
Commercial Waste	11	67	22							789	2
E- Waste			11		34	33	22			445	5
Hazardous Waste				12	22	44	11	11		413	6
Sanitary Waste			22	44	22		12			564	4
Plastic Waste	33	11	11	33		12				708	3
Construction & Demolition Waste					11	11	22	45	11	266	8
Agricultural Waste					11			11	78	155	9

Source: Primary Data

Interpretation of Waste Generation Rankings in Malappuram District

The analysis of waste generation rankings across various localities in Malappuram District reveals that **household waste** constitutes the most prominent category. A majority of 56% of the surveyed localities ranked household waste as the highest generated type, with an additional 22% assigning it the second position and another 22% placing it third. This consistent predominance highlights the centrality of residential consumption patterns in the district's waste stream, a trend commonly observed in urbanizing regions of Kerala and India more broadly (Kaithery et al., 2024). **Commercial waste** emerged as the second most prevalent category, ranked second by 67% of the localities. It was also identified as the primary waste type in 11% of the areas and ranked third in 22%, indicating the widespread impact of commercial activities on municipal solid waste composition, consistent with findings from comparable Indian districts with high market density (Subramoniam & Thomas, 2023). **Plastic waste** ranked third overall in terms of volume and distribution. It was identified as the most generated waste in 33% of localities and placed fourth in another 33%. Additionally, it was considered the second most significant in 11% of areas, third in 11%, and as low as sixth in 12% of the localities. This variance reflects both the ubiquity of plastic use and the inconsistency in its generation and disposal across regions, as also highlighted by studies on plastic waste distribution in South Indian municipalities (CPCB, 2021). **Sanitary waste** was the fourth most generated waste type, with 44% of localities ranking it fourth. It was ranked third in 22% of the regions, fifth in another 22%, and seventh in 12%, indicating a moderate but regionally variable contribution to the total waste profile. Its presence underscores the increasing challenges of managing biomedical and personal hygiene products in decentralized waste systems (Singh & Sharma, 2021). **E-waste** was the fifth most prevalent type, with 34% of areas ranking it fifth, followed by 33% ranking it sixth, and 22% placing it seventh. Notably, 11% of localities reported e-waste as the third most generated, suggesting isolated pockets of elevated electronic consumption and disposal, echoing the growth of informal e-waste flows in peri-urban areas (Manomaivibool, 2009). **Hazardous waste** was ranked sixth overall, with 44% of localities assigning it this position. It was also ranked fifth in 22% of the areas, fourth in 12%, seventh in 11%, and eighth in another 11%, indicating a dispersed and low-intensity presence across the district—typical of non-industrial regions with sporadic hazardous material usage (MoEFCC, 2016). The remaining categories—**industrial waste**, **construction and demolition waste**, and **agricultural waste**—were consistently ranked seventh, eighth, and ninth, respectively, suggesting their minimal contribution to the overall municipal waste stream

in most parts of the district. Their limited presence may reflect both geographic-economic realities and seasonal waste generation patterns (Ramachandran et al., 2022). This ranking-based analysis provides critical insight into the relative waste generation patterns across localities, offering a foundational basis for prioritizing waste management interventions and resource allocation in Malappuram.

Table 2: Order of Collection of different types of wastes in Malappuram District

Order Of Collection											
Type of Waste	**Rank perceived by municipalities**									**Weighted Score**	**Rank**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**		
Household Waste	56	22		22						811	1
Industrial Waste			23				44		33	326	7
Commercial Waste	11	23	33	11	22					690	3
E- Waste		11			11	55	11	12		420	6
Hazardous Waste			11		45	33	11			467	5
Sanitary Waste	11	22	22	34	11					688	4
Plastic Waste	22	22	11	33		12				697	2
Construction & Demolition Waste					11		34	44	11	256	8
Agricultural Waste								44	56	144	9

Source: Primary Data

Waste Collection Prioritization in Malappuram District

An analysis of the waste collection order across various localities in Malappuram District reveals significant variations in how different waste types are prioritized for collection by local authorities. The ranking is derived from a weighted scoring system based on the frequency with which each waste type was assigned a particular order of collection (from 1st to 9th). Household waste is consistently prioritized, receiving the highest weighted score of 811, and is ranked first in 56% of the surveyed localities and second in another 22%. This

reflects the widespread presence of domestic solid waste and its routine generation in all households, making it the focal point of municipal waste management systems (Kaithery et al., 2024). Its high ranking aligns with both practical necessities and public health priorities. Plastic waste follows closely with a weighted score of 697 and is ranked first in 22% of the localities, second in 22%, and third in 11%. The high priority accorded to plastic waste collection indicates growing recognition of the environmental persistence and pollution potential of plastics, especially in semi-urban and urban pockets (Subramoniam & Thomas, 2023).

Commercial waste ranks third, with a weighted score of 690. It is distributed more evenly, appearing as the second most collected waste type in 23% of localities and third in 33%. This suggests that commercial activity significantly contributes to the waste stream and is regularly targeted in local waste collection routines. Sanitary waste holds the fourth position (score: 688), with 11% of the localities prioritizing it as the most important, and 34% placing it fourth. This reflects a moderate level of attention, likely driven by concerns over hygiene and disease transmission, especially in densely populated or low-sanitation areas (Chandran & Kumar, 2022).

Hazardous waste, while not ranked highly in initial orders of collection, holds the fifth position overall with a weighted score of 467. It was ranked fifth in 45% of areas and sixth in 33%, indicating a relatively low but steady presence in collection schedules. The prioritization may reflect both the limited volume and the regulatory pressures to isolate hazardous substances from the general waste stream (CPCB, 2021).

E-waste stands sixth (score: 420), typically collected later in the sequence, with 55% of localities placing it sixth. The low ranking may be attributed to either limited awareness or lower perceived urgency regarding electronic waste, despite its rising volumes and the toxicity of its components (Manomaivibool, 2009). Industrial waste, with a score of 326, ranks seventh, and is placed as the third priority in 23% of localities. Notably, 44% rank it seventh, while 33% place it ninth. This suggests that industrial waste is not uniformly present across the district and is likely concentrated in specific industrial zones. Construction and demolition (C&D) waste is ranked eighth with a weighted score of 256. A substantial 44% of localities place it eighth, and 34% rank it seventh. This ranking reflects its episodic generation and the lower urgency attached to its collection relative to other waste types.

Agricultural waste ranks the lowest (ninth), with the smallest weighted score of 144. It is assigned the ninth priority by 56% of localities and the eighth by 44%. This indicates minimal collection emphasis, likely due to its rural confinement and the possibility of in-situ disposal or reuse through composting and mulching practices. Overall, this prioritization hierarchy underscores the influence of waste volume, environmental risk, and public health concerns on municipal collection practices. It also points to the evolving attention toward plastic and hazardous waste, suggesting shifts in waste management priorities driven by regulatory mandates and environmental awareness.

Table 3: Difficulty in disposal of different types of waste in Malappuram District.

Perceived Difficulties in Waste Disposal in Malappuram District

Difficulty In Disposal											
Type of Waste	**Rank perceived by municipalities**									Weighted Score	Rank
	1	2	3	4	5	6	7	8	9		
Household Waste	22	34	11	22				11		701	2
Industrial Waste			11		11		56	22		344	7
Commercial Waste	11		22	45	11	11				622	4
E- Waste	11	11			11	56		11		488	5
Hazardous Waste	11	11	34	11	22	11				645	3
Sanitary Waste	34	33	11		22					757	1
Plastic Waste	11	11		11	12	22	11	11	11	467	6
Construction & Demolition Waste			11		11		33	34	11	310	8
Agricultural Waste				11				11	78	166	9

The data presented in Table 3 illustrate the perceived level of difficulty associated with the disposal of various waste types across different localities in Malappuram District. A

weighted scoring system, based on the rank order (from 1 to 9), was used to determine the relative disposal challenges for each waste type. A higher weighted score indicates greater reported difficulty in disposal. **Sanitary waste** emerged as the most challenging type of waste to dispose of, receiving the highest weighted score of 757. It was ranked as the most difficult to dispose of in 34% of the surveyed localities and as the second most difficult in 33%. The ranking underscores the infrastructure and hygiene-related challenges posed by sanitary waste, particularly due to its biological contamination risk and limited dedicated disposal mechanisms. This aligns with existing findings that link sanitary waste to elevated health and environmental risks in urban waste streams (Singh & Sharma, 2021). **Household waste** ranked second in terms of disposal difficulty (score: 701), being perceived as the most difficult by 22% of localities and as the second and third most difficult by 34% and 11% respectively. Despite being regularly collected, the volume and heterogeneity of household waste complicate its efficient sorting and final disposal, especially in areas lacking source segregation (Kaithery et al., 2024). **Hazardous waste** was ranked third (score: 645), with 34% of localities perceiving it as the third most difficult waste to manage. An additional 22% ranked it fifth, and 11% ranked it in the top two positions. The difficulty likely stems from the toxic and often poorly labeled nature of such waste, which requires specialized handling, storage, and disposal protocols (CPCB, 2021). **Commercial waste**, with a weighted score of 622, ranked fourth in disposal difficulty. It was perceived as the third most difficult by 22% of localities and the fourth most difficult in 45%. This reflects the presence of mixed organic and packaging waste, which may lack uniform disposal systems across commercial establishments.

E-waste stood fifth (score: 488), with 56% of respondents ranking it sixth in terms of disposal difficulty. Though not generated in large volumes compared to household or commercial waste, the specialized recycling infrastructure required and the presence of hazardous components such as lead and mercury complicate its disposal (Manomaivibool, 2009). **Plastic waste** ranked sixth (score: 467). Its disposal is perceived to be moderately difficult, with wide variation in responses: 11% each ranked it first, second, sixth, seventh, eighth, and ninth. This dispersion suggests differences in awareness levels, collection frequency, and local recycling practices. **Industrial waste** received a score of 344, ranking seventh. It was most often placed in the sixth (56%) and seventh (22%) positions, indicating that although it may pose environmental risks, its disposal is not perceived as acutely challenging, likely due to its confinement within industrial zones that have access to dedicated disposal pathways.

Construction and demolition (C&D) waste, with a score of 310, ranked eighth. It was ranked seventh and eighth by 33% and 34% of the respondents, respectively. The relatively low ranking suggests that either its disposal is infrequent or systems for its management—such as reuse and inert landfill disposal—are already in place or underutilized. **Agricultural waste** was considered the least difficult to dispose of (ninth rank, score: 166). A majority (78%) of the localities placed it at the ninth position, reflecting either its low volume in urban areas or its organic nature, which enables in-situ treatment such as composting and mulching without necessitating complex municipal disposal systems (Ramachandran et al., 2022).

Overall, this ranking highlights that waste categories with biological hazards (sanitary, hazardous, and household waste) are perceived as the most difficult to manage, while inert and biodegradable waste types (C&D and agricultural waste) are seen as comparatively easier to dispose of. These insights should guide planning for waste management infrastructure, especially by strengthening facilities for handling sanitary and hazardous waste at the local level.

Table 4: Activities Adopted by Local Authorities in Malappuram for Waste Management

Sl. No.	Activities adopted by the local authorities to manage waste	% of local authorities that follow the activities
1	Door-to-door waste collection	100
2	Cleaning & collection of waste from a public place	100
3	Segregation & shredding at source	100
4	Recycling	0
5	Composting of organic waste	33
6	Waste incineration	0
7	MCF & MRF	55.6
8	MCF	44.4
9	Waste to energy	22.2
10	Setting up of waste disposal bins & bottle booths	88.9
11	Management of E-waste	0

12	collaboration with a third party	33.3
13	Public awareness campaign	22.2
14	Waste audits & assessment	11.1

Waste Management Strategies Adopted by Local Authorities in Malappuram District

The assessment of waste management practices across nine local authorities in Malappuram District reveals a wide variance in the adoption of key strategies, reflecting both operational strengths and systemic gaps in local solid waste governance. The findings suggest a foundational level of engagement in primary collection and sanitation activities, while advanced waste processing and strategic interventions remain underutilized.

Universal compliance was observed in three core activities: **door-to-door waste collection**, **cleaning and collection from public places**, and **segregation and shredding at source**, all of which are implemented by 100% of the surveyed authorities. These activities constitute the first tier of municipal solid waste (MSW) operations and are aligned with the directives outlined in the Solid Waste Management Rules, 2016 (Ministry of Environment, Forest and Climate Change [MoEFCC], 2016). Their complete adoption indicates institutional capacity and administrative will to address waste accumulation at its point of generation and along communal spaces, thereby minimizing unregulated dumping and improving overall urban hygiene (Kaithery et al., 2024).

In contrast, advanced and sustainable waste treatment methods show significantly lower adoption. **Composting of organic waste** is undertaken by only 33% of the local authorities, despite the high proportion of biodegradable material in household waste. Likewise, **waste-to-energy (WtE)** initiatives are practiced in only 22.2% of the areas, while **recycling** and **incineration** are entirely absent. This suggests a limited transition from basic collection to circular economy-based models of waste recovery and valorization, mirroring similar infrastructural and policy bottlenecks noted in other regions of Kerala and India more broadly (Subramoniam & Thomas, 2023).

With respect to material recovery systems, **Material Collection Facilities (MCFs)** and **Material Recovery Facilities (MRFs)** are operational in 55.6% of the surveyed localities, while standalone MCFs are present in 44.4%. These facilities play a critical role in enabling

segregation, intermediate storage, and channelling of recyclables, but their partial implementation points to gaps in infrastructure planning and resource allocation.

Supportive and community-centered measures such as **public awareness campaigns** (22.2%), **collaboration with third-party agencies** (33.3%), and **waste audits and assessments** (11.1%) are marginally represented. The limited focus on behavioural interventions and data-driven planning may hinder long-term sustainability and public engagement in waste management efforts. Furthermore, **management of e-waste**, a category of growing concern due to its toxic composition, is not addressed by any of the local authorities, highlighting a significant regulatory oversight (Manomaivibool, 2009).

The near-universal presence of **waste disposal bins and bottle booths** (88.9%) is a positive indicator of infrastructure readiness, facilitating public participation and source-level segregation. However, without complementary measures such as regular monitoring, civic education, and downstream waste processing, their standalone efficacy remains limited.

In summary, the data indicate that while primary waste collection mechanisms are robustly institutionalized across Malappuram's local bodies, the second and third tiers of waste management—comprising resource recovery, technological processing, and strategic community engagement—remain underdeveloped. For effective transition to integrated solid waste management, policy efforts must now shift toward infrastructure expansion for composting, recycling, and e-waste handling, alongside greater investment in public education and inter-agency collaboration.

Table 5: Analysis of Key Challenges in the Implementation of Waste Management Practices in Malappuram

Challenges	Average Weighted Score	Rank
Infrastructure and Resources	63	1
Public Awareness and Behavior	45	3
Policy and Regulation	16	7
Operational Challenges	49	2
Environmental and Social Factors	39	4

Difficulty in getting task force members	36	5
Difficulty in implementing the proper method of waste disposal methods	32	6

The ranking of major challenges faced by municipalities in implementing waste management practices in the Malappuram district presents critical insights into the systemic limitations that hinder the transition toward sustainable urban waste governance. The data, based on average weighted scores assigned by municipal officials, highlights infrastructure and resource constraints as the most pressing issue, with the highest score of 63, securing rank 1. This finding reinforces previous empirical assessments in the district, which reported limited availability of treatment technologies, segregation units, and processing infrastructure as major barriers to efficient waste handling (Sreevidya et al., 2025). The infrastructural deficit is particularly acute in the context of composting, recycling, and e-waste management, which are either absent or underutilized across the municipalities, indicating a clear mismatch between regulatory expectations under the Solid Waste Management Rules (2016) and on-ground capabilities (MoEFCC, 2016).

Operational challenges emerged as the second most significant constraint (score: 49, rank 2), pointing to issues such as manpower shortages, logistical inefficiencies, and inconsistencies in monitoring and enforcement. This is aligned with findings by Sharholy et al. (2008), who emphasize that Indian municipalities often lack technical expertise and operational coherence, particularly in semi-urban and transitioning urban areas like Malappuram.

Public awareness and behavioural challenges were ranked third (score: 45), underscoring the persistent issue of limited civic engagement in waste minimization and source-level segregation. Despite 100% coverage of collection activities across the municipalities, less than a quarter reported conducting regular awareness campaigns or waste audits, suggesting a policy blind spot in promoting behavioural change. This reflects a broader national trend where infrastructural improvements are not always accompanied by public sensitization, leading to inefficient use of the systems in place (Gupta et al., 2015; Subramoniam & Thomas, 2023).

Environmental and social factors ranked fourth (score: 39), indicating concerns such as the spatial availability for waste treatment units, resistance from local communities (NIMBY effect), and the environmental impacts of unscientific disposal. In the case of Malappuram, where the organic content of waste is high, the lack of composting facilities results in greater environmental pressure on existing dumping sites and public spaces. The low trust in local authorities' environmental safeguards, combined with social opposition to new infrastructure, further limits the expansion of scientific waste treatment facilities (Ramachandran et al., 2022).

The difficulty in mobilising task force members (score: 36, rank 5) and challenges in implementing appropriate disposal methods (score: 32, rank 6) are notable institutional constraints. These reflect not only personnel shortages but also the absence of technical support mechanisms and capacity-building initiatives at the municipal level. Without trained waste management personnel, many municipalities resort to ad hoc practices that undermine the objectives of sustainability and efficiency.

Finally, policy and regulatory challenges, with the lowest score (16, rank 7), are perceived as relatively minor compared to logistical and operational issues. This suggests that while policy frameworks such as the SWM Rules (2016) are well-established and widely disseminated, the implementation deficit lies more in practice than in policy per se (MoEFCC, 2016). However, the low score may also indicate limited critical engagement by local authorities with broader policy levers, potentially due to a top-down regulatory model that lacks mechanisms for local contextual adaptation (Bundela et al., 2025).

Critical Analysis and Strategic Recommendations for Waste Management in Malappuram District

The assessment of solid waste management across nine local authorities in Malappuram District reveals a system that is functionally active yet institutionally and strategically underdeveloped. While foundational activities such as door-to-door collection (100%), public space cleaning (100%), and source segregation (100%) are universally adopted, the absence of advanced processing technologies and limited public engagement reflect a narrow operational focus (Kaithery et al., 2024; MoEFCC, 2016).

Household waste remains the most prevalent, with 56% of localities ranking it as the primary waste stream. Commercial and plastic wastes follow in prominence, whereas sanitary waste, though lower in volume, poses considerable disposal challenges. Plastic and hazardous waste display inconsistent treatment priorities, underscoring gaps in local policy responsiveness to environmentally persistent materials (Subramoniam & Thomas, 2023). E-waste, industrial waste, and construction and demolition (C&D) waste, while present in lower volumes, remain largely unmanaged—raising concerns about long-term environmental risks (Manomaivibool, 2009).

Critically, the analysis reveals that disposal remains more challenging than collection, especially for sanitary, hazardous, and household waste. The absence of formal recycling (0%) and e-waste management (0%) activities further reflects an infrastructural deficit in secondary and tertiary waste management functions. This systemic shortfall indicates a pressing need to transition from a collection-centric approach to an integrated waste governance framework that embeds recovery, reuse, and accountability mechanisms.

To address these limitations, a shift towards forward-looking, multi-tiered strategies is imperative. First, **institutional restructuring** must prioritize the formation of dedicated urban waste management cells at the local authority level. These bodies should be empowered with technical experts, environmental planners, and community liaison officers tasked with coordinating decentralized treatment solutions such as neighborhood composting units, micro-MRFs, and e-waste drop-off centers.

Second, **public-private partnerships (PPPs)** should be actively explored for operating waste-to-energy plants and plastic recovery hubs, especially in semi-urban clusters where volumes are scalable. PPP models have shown efficacy in bridging financial and technological gaps in other Indian states (Ramachandran et al., 2022), and can be adapted to Malappuram's specific waste profile.

Third, **systemic innovation** through digital governance tools—such as real-time waste tracking apps, AI-based sorting at MRFs, and blockchain-based recycling credits—can significantly enhance efficiency, transparency, and citizen participation. These tools should be linked with **institutional performance dashboards**, enabling data-driven policymaking and timely interventions.

Furthermore, a **behavioral shift** must be catalyzed through structured awareness campaigns, school-based environmental literacy programs, and economic incentives for segregation compliance. Only 22.2% of local authorities currently engage in public awareness initiatives, revealing a missed opportunity for co-producing sustainable urban environments (CPCB, 2021).

In conclusion, while Malappuram has established basic collection systems, its waste governance model requires urgent transformation. Strengthening institutional capacity, leveraging technology, and fostering community-based innovations are essential for transitioning from a reactive system to a **resilient, circular, and participatory urban waste regime**. Without such reforms, operational efficiency may persist in the short term, but the district will remain ill-equipped to face the growing complexity and volume of urban waste in the long run.

Conclusion

The current assessment of municipal solid waste management practices in Malappuram District highlights a system that is operationally sound at the basic level but limited in scope and vision. While frontline actions such as primary waste collection and source segregation are uniformly implemented, the absence of robust downstream infrastructure and strategic planning undermines the potential for sustainable outcomes. The uneven adoption of treatment technologies, the neglect of specialized waste streams, and minimal public engagement reflect systemic inertia that demands urgent policy and institutional reorientation.

To advance toward a more resilient and adaptive waste management ecosystem, local governance must expand beyond routine operations to embrace integrated planning, technological advancement, and inclusive decision-making. Establishing functional linkages between waste generation patterns, disposal complexities, and institutional responsibilities will be critical to driving efficiency and accountability. A transition toward circular waste systems—anchored in innovation, regulatory compliance, and citizen partnership—will not only mitigate environmental risks but also contribute to broader goals of urban sustainability and public health in Malappuram and similar districts.

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Driving Green Employment through Sustainable Business Models: An Empirical Study of Firm's Adoption, Skills Development, and Policy Support in Emerging Economies

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Abstract

This paper investigates how sustainable business model (SBM) adoption translates into green job creation through primary data collection from 172 organizations across renewable energy, manufacturing, and services sectors in India. Using multiple regression, mediation, and moderation analysis, we test six hypotheses. Findings of th SBM adoption significantly predicts green job proportion ($\beta = 0.387$, $p < 0.001$, H1 supported). Circular economy practices show strongest employment intensity ($\beta = 0.267$, $p < 0.001$, H2). Green skills training investment independently predicts employment growth ($\beta = 0.823$, $p < 0.001$, H3). Digital technology adoption partially mediates the SBM employment relationship (indirect effect = 23%, H4 supported). Policy support and green finance access positively moderate outcomes (H5 supported). Organizational barriers—investment costs, policy uncertainty, and skill gaps— significantly constrain expansion intentions. Results demonstrate that coordinated organizational commitment, workforce development, and supportive policy frameworks are essential for maximizing green employment in sustainability transitions.

***Keywords**: Sustainable business models, green jobs, primary data, skills development, hypothesis testing*

1. Introduction and Research Objectives

The transition to low-carbon economies presents unprecedented opportunities for green job creation. Despite optimistic projections for millions of new positions by 2030, firm-level understanding of how sustainability commitments translate into concrete employment remains limited, particularly in emerging economies. This study addresses critical knowledge gaps: How does corporate SBM adoption increase green employment? What mediates and moderates these relationships? What barriers constrain expansion?

Research Objectives

1. Quantify relationships between SBM adoption and green job creation through primary data
2. Test whether digital adoption mediates SBM→employment effects
3. Examine how policy support, finance access, and barriers moderate relationships
4. Identify skills gaps and development needs from organizational perspectives

Theoretical Framework: The study integrates stakeholder theory (sustainability creates value for multiple stakeholders including employees), resource-based view (sustainability capabilities generate competitive advantage), and organizational innovation theory (SBM adoption requires coordinated transformation).

2. Hypotheses and Methodology

2.1 Hypotheses Development

- **H1:** SBM adoption is positively associated with green job proportion
- **H2:** Circular economy practices positively influence green job creation
- **H3:** Green skills training investment predicts green job growth
- **H4:** Digital technology adoption mediates SBM→green jobs relationship
- **H5:** Policy support and green finance access moderate SBM→employment relationships
- **H6:** Organizational barriers negatively correlate with expansion intentions

2.2 Research Design and Sampling

Design: Cross-sectional survey-based primary research collecting data February–May 2025

Sample: 172 organizations across sectors (renewable energy 27.9%, manufacturing 20.3%, services 24.4%, MSMEs 27.3%) stratified by size and location. Response rate: 48.3% of 356 contacted organizations

Instrumentation: 67-item questionnaire covering organizational profile, SBM practices (5-point Likert scales, α range 0.78–0.82), green employment (count and percentage), skills development, digital adoption, policy environment, and barriers. Pilot tested with 35 organizations.

Data Analysis: Descriptive statistics, Cronbach's alpha reliability tests, Pearson correlations, hierarchical multiple regression for hypothesis testing, bootstrap-resampled mediation analysis (5,000 resamples), and moderation analysis with centered variables using SPSS 27.0

3. Key Findings

3.1 Descriptive Results

Sample Profile: Mean organization size 487 employees (SD=892); 32.6% with mature (3+year) sustainability programs; mean SBM adoption index 62.3/100 (SD=18.9)

Green Employment Status: Mean 15.8% of workforce in green roles (SD=11.4%), with 68.6% reporting increasing green employment over 18 months. Sectoral variation substantial: renewable energy 24.6% (SD=9.8%) versus MSMEs 10.3% (SD=9.1%), $F(3,168)=12.47$, $p<0.001$

Skills Development: 64.5% of organizations provide formal green skills training (mean 2.8% of payroll), with severe gaps in renewable energy technical skills (mean 3.82/5) and environmental data analysis (3.71/5)

Barriers Identified: Investment costs (mean 4.12/5), policy uncertainty (3.87/5), and skill gaps (3.79/5) perceived as most significant, with micro-enterprises reporting highest barrier severity (mean 3.68/5)

3.2 Hypothesis Testing Results

H1 Testing—SBM Adoption and Green Employment:

Model: Green Job % = 3.24 + 0.387(SBM) + 2.14(Log Size) + sector controls + ε

Variable	β	SE	t	p
SBM Adoption	0.387	0.056	6.91	<0.001***
Log Org Size	2.14	0.87	2.46	0.015*

$R^2 = 0.468$, $F(5,166) = 29.14$, $p < 0.001$

Result: H1 **SUPPORTED.** Each 10-point SBM adoption increase associates with 3.87 percentage point higher green job proportion. Effect is strongest predictor and practically meaningful.

H2 Testing—Circular Economy Practices

Decomposing SBM into components reveals circular economy practices strongest driver ($\beta = 0.267$, $p < 0.001$), exceeding renewable energy adoption ($\beta = 0.198$, $p = 0.006$) and ESG integration ($\beta = 0.156$, $p = 0.023$). Sustainable procurement non-significant ($\beta = 0.089$, $p = 0.154$).

Result: H2 **SUPPORTED.** Circular economy practices show highest employment intensity through labor-intensive operations—collection systems, refurbishment, reverse logistics.

H3 Testing—Skills Training Investment:

Model: Green Job % = 1.92 + 0.823(Training Investment %) + 0.312(SBM Adoption) + controls

Variable	β	SE	t	p
Training Investment	0.823	0.234	3.52	<0.001***
SBM Adoption	0.312	0.062	5.03	<0.001***

$R^2 = 0.511$, $F(6,165) = 28.91$, $p < 0.001$

Result: H3 **SUPPORTED.** Training investment independently predicts green employment beyond SBM adoption. Each 1% additional payroll investment associates with 0.823 percentage point increase in green jobs.

H4 Testing—Digital Mediation

Mediation Model: SBM → Digital Adoption ($\beta_a = 0.287$, $p < 0.001$) → Green Jobs ($\beta_b = 0.089$, $p = 0.020$)

- Total effect (c): 0.387
- Direct effect (c'): 0.298
- Indirect effect (ab): 0.0255
- Bootstrap 95% CI: [0.0089, 0.0421] (excludes zero)
- Proportion mediated: 23%

Result: H4 **SUPPORTED.** Digital adoption partially mediates relationship; SBM employment effects operate through both digital and non-digital pathways.

H5 Testing—Policy Moderation

Policy Support Moderation (Step 3 of hierarchical regression):

Variable	β	SE	t	p
SBM × Policy Support	0.0847	0.0342	2.48	0.014*

Slope Analysis

- Low policy support: SBM effect = 0.297 (2.97 pp per 10-point SBM increase)
- High policy support: SBM effect = 0.467 (4.67 pp per 10-point SBM increase)
- Difference: 57% stronger at high support

Green Finance Access shows similar moderation (β = 0.0721, p = 0.025)

Result: H5 **SUPPORTED.** Supportive policy environment and finance access amplify SBM→employment relationships substantially.

H6 Testing—Barriers and Expansion Intentions

Model: Expansion Intentions = 3.87 − 0.287(Investment Cost) − 0.312(Policy Uncertainty) − 0.198(Skill Gap) + 0.0214(SBM) + ε

Barrier Variable	β	SE	t	p	Correlation with Intentions
Investment Costs	-0.287	0.098	-2.93	0.004**	r = -0.421, p < 0.001
Policy Uncertainty	-0.312	0.089	-3.51	<0.001***	r = -0.438, p < 0.001
Skill Gaps	-0.198	0.087	-2.28	0.024*	r = -0.354, p < 0.001

$R^2 = 0.421$, $F(5,166) = 23.89$, $p < 0.001$

Result: H6 **SUPPORTED.** All barriers significantly reduce expansion intentions; policy uncertainty emerges as strongest constraint.

4. Discussion and Implications

4.1 Theoretical Contributions

The research provides empirical evidence that stakeholder theory has concrete organizational manifestations: sustainability commitments generate measurable employment outcomes. SBM adoption fundamentally reorganizes operations creating structural demand for green positions. The strong circular economy effects support laborintensive transitions—reverse logistics, refurbishment, and sorting operations generate substantial employment.

Partial mediation by digital adoption indicates multiple innovation pathways. Organizations need not await full digital transformation to create green jobs; simultaneous technical organizational-human resource innovations optimize outcomes.

4.2 Practical Implications

For Organizations

- Embed sustainability in core strategy, not peripheral CSR; prioritize circular economy practices for maximum employment
- Invest in formal green skills training; implement green recruitment and environmental performance metrics
- Engage in policy advocacy to support enabling frameworks that amplify employment impacts

For Policymakers

- Develop integrated frameworks combining regulatory mandates, economic incentives, and workforce development programs
- Mobilize green finance mechanisms enabling organizational investments
- Provide targeted MSME support—simplified compliance, subsidized training, dedicated green finance facilities
- Implement just transition support for fossil fuel sector workers

For Educational Institutions

- Rapidly integrate sustainability competencies across disciplines
- Establish industry partnerships ensuring curriculum-labor market alignment
- Develop modular credentials enabling worker transitions

4.3 Limitations

Cross-sectional design establishes associations not causality. Geographic focus on India may limit generalizability. Self-report bias possible; audit data would strengthen findings. Other mediators (organizational culture, leadership) remain unmeasured. Green employment measured as explicit role count; embedded sustainability contributions uncounted.

5. Conclusion

This primary data study demonstrates that organizational sustainable business model adoption drives green job creation, with relationships amplified by skills investment, digital adoption, policy support, and finance access, while constrained by investment costs and policy uncertainty. Six hypotheses receive strong empirical support. Coordinated interventions combining organizational commitment to sustainability, deliberate workforce development, supportive policy frameworks, and targeted finance mechanisms are essential for maximizing green employment and ensuring equitable transitions to sustainable economies.

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A Study on Green Technologies and Energy Efficiency for Environmental Protection

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Abstract

In recent, Green technologies broadly encompass innovations focused on environmental enhancement and resource efficiency. They variety from renewable energy solutions, like solar and wind power, to advanced waste management solutions and eco-friendly materials. It is vital that a suitable model of green building be used by the administrators and professionals. The worldwide difficulties of environmental degradation have forced the society to rethink about the way of development and evolve the concept of sustainable development. Indeed, the new environmentally friendly technologies are fundamental to attain sustainable development. Various green initiatives are being taken to maintain and improve the quality of environment that might flourish on the new resource efficient and sustainable thinking society of the future. This study goals to explore the prima facie conjecture that there are problems to an evaluation on development of green building and energy efficiency in developed country with regard to the effectiveness of green building. These problems may explain why the main players are less responsive to the implementation and practice of the green building and energy efficiency. This study endorses the need for selection of green technologies, some of the possible green technologies and challenges and alternatives in sustainable development. In conclusion, it can be incidental that the green building is still at its start stage and as such serious attention is needed among the players in the development of green building and energy efficiency in developed countries.

***Keywords**: Green Technology, Energy Efficiency, Sustainable Development, Environment*

1. Introduction

At present, energy efficiency is a vital aspect of sustainable development, as it can significantly reduce emissions and contribute to a more viable future. The cumulative energy demand, attached with the limited supply of relic fuels and the requirement to reduce carbon

emissions, has led to pretty interest in substitute energy sources and energy efficient technologies. It can be improved through various means, including energy efficient technologies, alternative energy sources, and energy-saving practices. Green technological innovation can be crucial in improving energy efficiency and reducing the carbon footprint of energy production and consumption. It is a technology designed to minimize its environmental influence and promote sustainable development, as well as technological advances that have enabled new forms of Green technological innovation. To reach high environmental quality standards and achieve strong economic development, the world must invest extensively in green technologies.

1.1. Review of Literature

Omri et al., in their study revealed that the FDI contributes to environmental degradation in Saudi Arabia, whereas discovered a decline in environmental damage in Asian nations as a result of FDI. It has an important influence on environmental deterioration and investment in sustainable energy lowers environmental devastation.

Energy efficiency and green energy are predicted to be the major indicators in climate change policy that can alleviate the problem of climate change. Different scholars demonstrated energy efficiency can help to minimize the rise of GHG emissions.

1.2. Need for the Study

It is used as a green source to inferior productions. Use of green technology has led to a reduction in the trend of environmental decline. Moreover, in recent decades, nations have changed the way they consume energy to indorse green sources. However, these energies have a significant effect on environmental degradation. Irrespective of whether all economies use of this technology, consequently, it is critical to appreciate why this issue has not yet been solved. As a result, this study appraised the relationship between green technology development and environmental pollution.

1.3. Objectives of the Study

This study is performed with the following objectives:

- To study on significance of Green Technologies and Energy Efficiency.
- To study on importance of environmental production.

- To classify the challenges and obstacles for the green technologies and energy effect.
- To suggest the remedies to overcome challenges and innovation for green technologies with environmental production

1.4. Data Sources

The current study is grounded on secondary data. The data for this study has been collected from sources like research papers published in journals, government websites and other authenticated different sources like journals, magazines, books, internet and newspapers regarding green technologies and energy efficiency for environmental protection.

1.5. Significance of Green Technology

By harnessing the power of nature, these technologies offer a pathway to reducing greenhouse gas emissions, conserving water, and protecting biodiversity.

It encompasses technologies that aim to minimize the negative impact of human activities on the environment while also contributing to economic growth and societal well-being. It is to provide alternatives to conventional practices that often lead to pollution, resource depletion and climate change. This technology focuses on developing and implementing strategies that reduce the consumption of nonrenewable resources, decrease greenhouse gas emissions and minimize waste production.

This field is characterized by its emphasis on innovation, research, and collaboration. Governments, businesses, researchers and individuals all play a role in advancing green technology through investments, policy development and the adoption of eco-friendly practices. As the global community grapples with pressing environmental challenges such as climate change, pollution and resource scarcity, green technology has become a vital tool for creating a more sustainable future. By integrating ecological principles with technological advancements, green technology aims to strike a balance between human development.

1.6. Importance of Environment Production

At contemporary a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. Environment studies have become important for the following details:

- **Environment Issues**

  It has been well recognized that environment issues like Buildings often consume 20–50% more energy than predicted due to poor facility management or occupant behavior.

- **Explosively Increase in Pollution**

  Evidently with 16 per cent of the world's population and only 2.4 per cent of its land area, there is a heavy pressure on the natural resources including land.

- **Need for an Alternative Solution**
- **Essential to Save Humanity from Extinction**
- **Necessity for Wise Planning of Development**

1.7. Contests Facing the Espousal of Green Technologies

- **Industry Conflict:** Familiar subdivisions may battle green technology implementation.
- **Rule and Controlling Walls:** Multifaceted rules often favor conservative performs. These practices hinder green initiatives. Supportive frameworks are necessary.
- **Financial Constraints:** High upfront costs deter businesses. Especially SMEs, from investing in green solutions. This underscores the importance of accessible financing. Additionally, investment incentives are crucial.
- **International Collaboration:** Effective solutions demand global cooperation. Trust-building and knowledge exchange are vital components.
- Lack of strategic insight at the national level;
- Absence of regulations, policies and incentives;
- Limited expertise in monitoring, assessment, control, and remediation processes;
- Lack of knowledge and programmes tailored to build the national capacity;

1.8. Suggestions

- To Implement Net-Zero Energy (NZEB) Models: Design buildings to produce as much renewable energy as they consume through Building-Integrated Photovoltaics (BIPV) solar cells embedded in windows and facades and advanced energy storage.
- To Prioritize Passive Design First: Before adding high-tech systems, optimize building orientation, natural ventilation (cross-ventilation), and daylighting to reduce mechanical heating and cooling needs by up to 80%.

- To develop the Adopt Digital Twin Technology: Create virtual replicas of physical structures that use real-time sensor data to simulate energy performance and identify inefficiencies before they lead to waste.
- To improve the EU Green Deal in an all-encompassing policy roadmap that seeks to achieve climate neutrality by 2050 with an emphasis on clean energy, sustainable transport systems, and biodiversity protection.

1.9. Conclusion

Green buildings typically reduce energy consumption by below 25 percent and water use only eleven percent. It can reduce climate change, save resources, and sustain themselves by using ecologically friendly technologies. The assessment of green technologies unveils a landscape rich in novelty and potential and regulations require Digital Product Passports to serve as a central repository for all technical and environmental data on construction materials, enhancing transparency for investors. From renewable energy to green architecture, each growth donates knowingly to environmental conservation and acceptable living. The challenges, though substantial, are being progressively addressed through technological advancements and societal mind shifts towards sustainability.

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Analysing the Impact of Sustainable Health and Safety Practices in Tamil Nadu Schools

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Abstract

This research investigates the implementation of sustainable health and safety practices in Tamil Nadu government schools, focusing on their effectiveness, challenges, and impact. The study evaluates existing measures, such as sanitation and hygiene, and how digital tools are thoroughly integrated to promote safe and inclusive environments. In Tamil Nadu, progress has been achieved in literacy and infrastructure; nevertheless, some gaps persist, as functional sanitation facilities are not consistently maintained and behavioural aspects relevant to health education are not being addressed. This research seeks to highlight gaps in existing practices as well as explore potential areas for improvement through a thorough analysis. The study will provide some valuable insights into the strengths and weaknesses of current policies by gathering data from several key stakeholders, including teachers and students. Ultimately, the research is going to offer actionable recommendations in the end. This paper aims to improve the health, safety, and sustainability of Tamil Nadu schools so that all can learn in a secure and conducive environment.

***Keywords**: health and safety, schools, Tamil Nadu, policy assessment, school infrastructure, student well-being, sustainability.*

Objectives

- ✓ To identify the key challenges in maintaining sustainable health and safety standards, including issues related to staff training, resource availability, and policy enforcement.
- ✓ To assess the current implementation and effectiveness of health and safety practices in government schools across Tamil Nadu, with a focus on infrastructure.
- ✓ To find the importance of integrating health education into the academic curriculum across Tamil Nadu government schools.

1. Introduction

Every child has the right to learn, so their environment supports them physically, emotionally, and mentally. Cleanliness and also safety within a school indeed shape a child's educational experience and also help them develop. Meaningful steps toward improving its school infrastructure have been undertaken by Tamil Nadu in recent years. To provide a more conducive environment for learning purposes, this was done. The Swachh Bharat Swachh Vidyalaya (SBSV) initiative underscores that hygiene and sanitation in schools indeed matter. School facilities visibly improved because these programs constructed toilets they provided handwashing stations, and increased awareness of hygiene among students and staff. But even with these improvements, many schools still battle the usual everyday challenges, such as keeping toilets clean, ensuring access to clean drinking water, and regularly educating students in health. These gaps always affect student and staff health and additionally impact attendance, learning outcomes, and the general quality of education. This research paper seeks to explore both the whole implementation and individual experience of health and safety practices in TN schools, particularly on the ground. It aims to understand if the existing infrastructure, in addition to hygiene policies, is effective, and it examines what students and teachers, plus school administrators, think and perceive about the school environment. Each person can be in a place where they feel fully supported, quite healthy, and adequately respected, which we can ensure. Once we understand what truly makes a school caring and safe, this is possible.

2. Literature Review

Dr G. Yoganandham et al. (2024) highlight a multi-dimensional approach to sustainable rural development in Tamil Nadu. They emphasise quality education, sanitation, clean water, and health awareness in schools. Community involvement, skill development, and policy support are crucial for maintaining safety protocols. Technology, disaster preparedness, and green initiatives integrate health and safety into school environments. Dr M. Chithirai Selvan and Ms K. Parvathapathin et al. note that most studies on health and safety focus on industries, not education. While industrial workers appreciate basic welfare measures, gaps like medical care persist. This study fills the research gap by exploring sustainable health and safety practices in Tamil Nadu's government schools from teachers' perspectives. It examines how factors like income and experience shape teacher perceptions, aiming to enhance school environments and educational quality. Brilliance O. Anyanwu, Onyewuchi Akaranta, and Ify L. Nwaogazie et al. emphasise the gap between fire safety awareness and actual implementation at the University of Port Harcourt. The study

found poor knowledge of emergency protocols, inadequate training, and a lack of safety equipment. It highlights the need for clear policies, regular training, and a strong safety culture in educational institutions. These insights can inform sustainable safety practices in Tamil Nadu's government schools through consistent, system-driven approaches. Mahalakshmi Kumaraguru, Srisakthi Doraikannan, and Meignana Arumugham Indiran et al. (2024) studied oral health in school children in Tiruvallur, Tamil Nadu. They found high rates of gingivitis, dental decay, and signs of tobacco use, especially among boys. The study highlights poor hygiene awareness, lack of dental care, and gender-based disparities in health habits. It calls for preventive education, early intervention, and stronger health initiatives in government schools. Ravichandran S and A. Selvaraj et al. (2024) highlight how school environments impact academic success and emotional well-being in higher secondary students. Supportive teacher-student and peer relationships, along with good infrastructure, enhance motivation and reduce anxiety. Students' perceptions vary by gender, locality, and parental background, with urban and female students reporting more positive experiences.

3. Methodology

The research is carried out with the use of questionnaire as the primary data collection instrument. The questionnaire is prepared with the view to understand the adoption of sustainable health and safety practices in schools, which includes the aspects of General Information, Health and safety awareness level and understanding the implementation of policies, challenges and improvements that have to be made and overall perception of the students and staff about their school environment. The target population comprises school administrators, teachers and students in schools. The collected data was coded and analysed. Descriptive statistics were used to summarise the demographic data, while inferential statistics, such as percentage analysis, were used to examine.

4. Result And Discussion

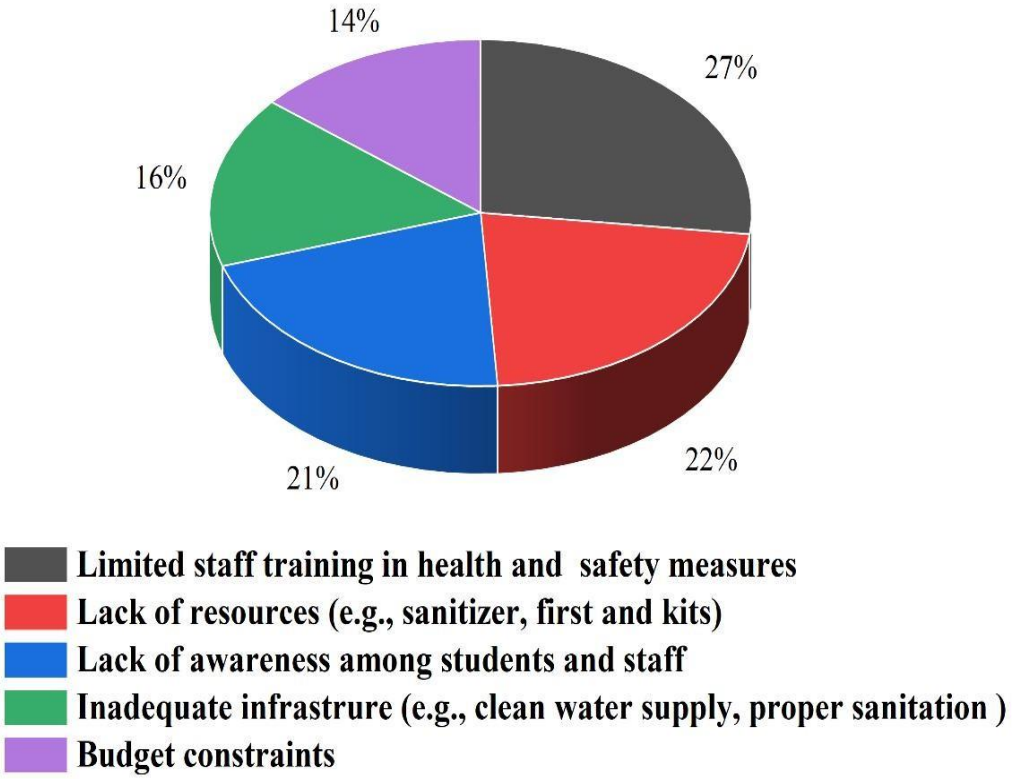
4.1. Demographic Details

Variable	Category	Percentage
Age	10-20	25.2
	21-30	46.4
	31-40	26.5
	41-50	1.3
	50 above	0.6

Gender	Female	64.2
	Male	35.8
Location	Rural	38.4
	Urban	61.6

The study sample reflects a large proportion of young adults, probably as early-career teachers and students, whose viewpoints are important for analysing the fundamental impacts of health and safety implementation in schools. In terms of gender breakdown, 64.2% of the respondents were female, and 35.8% were male, indicating that there was a female majority in the sample. This is consistent with the education sector, where women tend to make up a higher proportion of the teaching staff and the student body of certain age cohorts. Geographically, most participants (61.6%) were from urban areas as compared to 38.4% from rural areas. Through this demographic analysis, this study aims to identify strengths, weaknesses, and actionable recommendations to ensure that every student, regardless of their age, gender, or location, can learn in a safe and supportive environment.

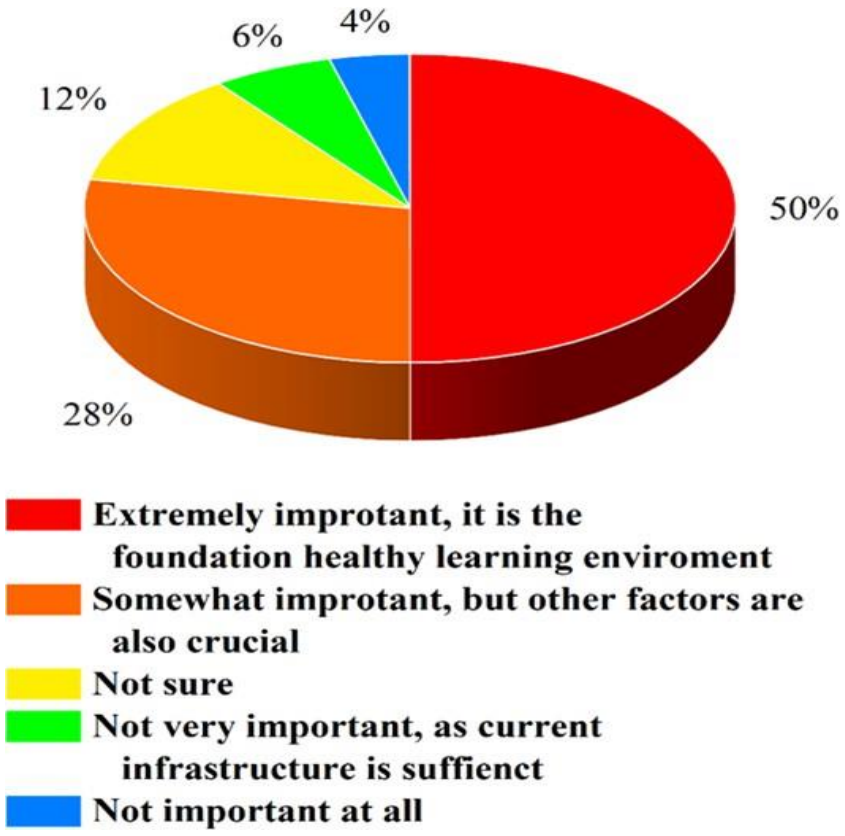
4.2. Perception of the respondents on the challenges in ensuring health and safety



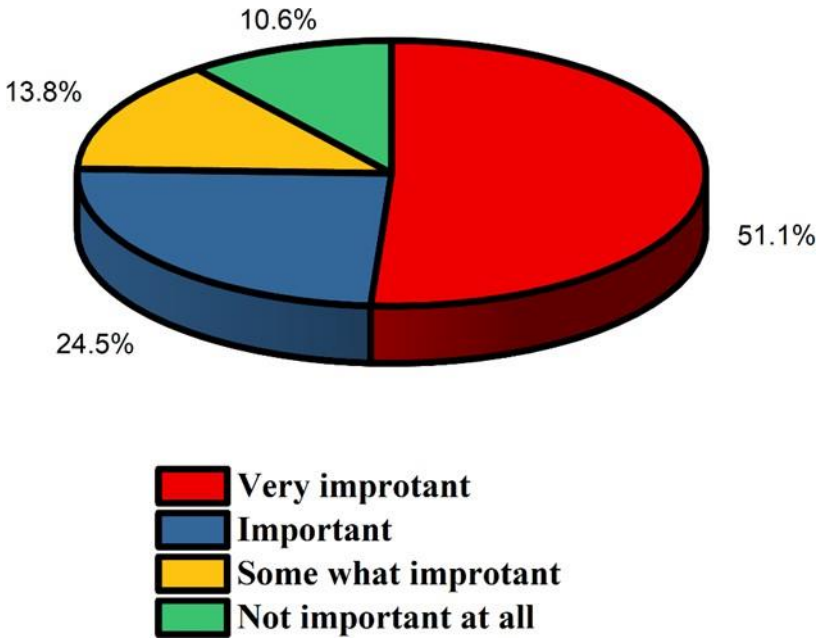
The pie chart illustrates various challenges in ensuring health and safety in TN schools. The most significant challenge identified is Limited staff training in health and safety measures. This suggests a pressing need for improvements to educational programs and to develop professionals to have the necessary health and safety skills. A critical concern is the absence of resources like first aid kits, sanitisers etc. This indicates the absence of basic materials so that people not being able to respond to emergencies.

4.3. Perception of the respondents on the importance of investing in infrastructure improvements

The surveyed population sees infrastructure as a critical factor in supporting both the physical and educational well-being of students, as the pie chart indicates. A strong demand for infrastructure improvements is clearly supported by all of the data, as it aligns well with earlier findings on challenges such as inadequate sanitation and water supply. This reinforces the idea that infrastructure founds, but also urges, the advancement of safe and effective education settings.



4.4. Perception of the respondents on the Integration of health education into the academic curriculum for long term benefits



Overall, the data indicate that a significant majority, over 70%, acknowledge the importance of health education in some form. This aligns with broader themes from earlier charts, which highlighted the need for a safe, healthy, and supportive learning environment. It further reinforces the argument that schools should move towards a more holistic approach to education, one that not only focuses on academics but also integrates essential life skills and health knowledge to prepare students for long-term success and well-being

5. Suggestion

One of the main suggestions is to improve training for employees on health and safety protocols. There should be training workshops and capacity-building exercises to be conducted at least once a year to ensure that every staff member can manage concerns pertaining to safety. Improving infrastructure should be given immediate attention. Many schools, particularly in remote areas, still struggle with having no or poorly functioning sanitation facilities, clean drinking water, and even classrooms that are in an acceptable condition. Health topics need to be incorporated into broader subject lessons within core subjects. Teaching learners about caring for their bodies, as well as good hygiene, nutrition, disease control, and mental health, promotes healthy behaviours throughout their lives. These subjects must be taught in a fun, engaging, appropriate, and straightforward manner to kids from lower grades onwards.

6. Limitations

Even if the research conducted on the health and safety protocols of various schools in the state of Tamil Nadu is quite useful, it too comes with a set of limitations. To start with, the bulk of the respondents leaned towards the younger side, especially between 21-30 years of age, with little older representation, especially above the age of 40. There is also an issue with the sample having a larger female representation than males, which stands to greatly impact the data, as roles and responsibilities of different genders within the schools often lead to different views on health and safety. Also, the study has a quite high urban representation as compared to the rural areas. Depending only on what people say about themselves can lead to biased results, which may affect the accuracy of the findings, and it is considered to be the major limitation of this study.

7. Conclusion

In conclusion, many schools have access to infrastructure such as toilets and handwashing facilities, yet the maintenance and consistent usability of these amenities remain a challenge, particularly in rural and underfunded schools. Moreover, staff and students often lack the training and awareness necessary to use available resources effectively. This points to a need for not only infrastructure development but also human resource investment and behavioural change programs. Another major concern highlighted is the urban-rural divide in the availability and quality of health and safety infrastructure. Urban schools are often better resourced, while rural institutions face continued struggles with access, funding, and implementation. This disparity must be addressed with equitable and targeted policy interventions, ensuring that every student, regardless of their geographical location, has access to a safe and healthy school environment. Ultimately, this research underscores the fact that the health and safety of students and staff are foundational to the overall quality of education. A child cannot learn effectively if they are in an unsafe or unhygienic environment. Therefore, it is crucial that school practices align with international goals, especially Sustainable Development Goal 3, which promotes good health and well-being, and Goal 6, which ensures access to clean water and sanitation. Therefore, by addressing these gaps and implementing the recommendations laid out in this study, Tamil Nadu can make significant strides toward ensuring that every student has the opportunity to learn, grow, and thrive in an environment that is not only academically enriching but also physically and emotionally secure.

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Hybrid Graph and Machine Learning Approach for Handwritten Telugu OCR

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Abstract

Optical Character Recognition (OCR) for handwritten Telugu script remains a challenging problem due to high intra-class variability, complex curved strokes, and the presence of compound characters. Conventional pixel-based and deep learning approaches often require large annotated datasets and may fail to capture the intrinsic structural topology of handwritten characters. To address these limitations, this paper proposes a hybrid graph and machine learning approach for handwritten Telugu OCR that integrates structural graph representations with supervised learning techniques. In the proposed framework, handwritten Telugu character images undergo preprocessing steps including grayscale conversion, binarization, noise removal, and skeletonization. Salient structural points are detected using corner detection methods, and each character is represented as a graph where nodes correspond to key structural points and edges encode spatial and topological relationships. Adjacency matrices and graph traversal features, such as depth-first and breadth-first sequences, are extracted to form discriminative structural feature vectors. These graph-based features are combined with statistical descriptors and supplied to machine learning classifiers, including Support Vector Machines and Random Forests, for character classification. Experimental evaluations conducted on a handwritten Telugu character dataset demonstrate that the proposed hybrid framework achieves superior recognition accuracy compared to traditional template-based and pixel-driven methods. The graph-based representation provides robustness to variations in writing style, scale, and rotation, while the learning component enhances classification performance and generalization. The results indicate that the proposed approach is well suited for low-resource script recognition and offers an interpretable and scalable solution for handwritten Telugu OCR systems.

Keywords: *deep learning, Adjacency matrices, Vector Machines, hybrid graph and machine learning approach*

1. Introduction

Optical Character Recognition (OCR) is a fundamental technology for digitizing handwritten and printed documents, enabling efficient storage, retrieval, and analysis of textual information. Although OCR systems for Latin scripts have achieved high accuracy, the recognition of handwritten Indic scripts, particularly Telugu, continues to pose significant challenges. Telugu script is characterized by complex curved strokes, loops, junctions, and a large set of basic and compound characters, which lead to substantial intra-class variation in handwritten samples. Variations in writing styles, stroke thickness, scale, and orientation further complicate the recognition process and limit the effectiveness of conventional OCR techniques.

Most existing handwritten Telugu OCR approaches rely on pixel-based feature extraction or deep learning models, such as convolutional neural networks. While these methods have shown promising performance, they often require large volumes of labeled training data and high computational resources, which are not always available for low-resource scripts like Telugu. In addition, deep learning models generally operate as black-box systems, offering limited interpretability and reduced robustness when confronted with severe handwriting distortions or unseen writing styles. These limitations highlight the need for alternative representations that can explicitly capture the structural and topological characteristics of handwritten characters.

Graph-based representations provide a powerful and intuitive framework for modeling the intrinsic structure of handwritten characters. By representing a character as a graph composed of nodes and edges, essential information related to stroke connectivity, junction points, and spatial relationships can be preserved. Such structural representations are inherently more robust to variations in scale, rotation, and writing style, making them particularly suitable for handwritten character recognition. Graph traversal strategies and adjacency-based descriptors further enable the extraction of discriminative features that effectively capture the topology of character shapes.

Motivated by these observations, this work proposes a hybrid graph and machine learning approach for handwritten Telugu OCR. In the proposed framework, handwritten Telugu character images are preprocessed and converted into graph representations using salient structural points detected through corner detection techniques. Graph traversal and adjacency matrix features are then extracted and supplied to supervised machine learning classifiers for recognition. By integrating structural graph modeling with learning-based classification, the proposed approach aims to achieve robust, interpretable, and scalable performance for handwritten Telugu character recognition, particularly in scenarios with limited training data.\

2. Literature Survey

Early research on handwritten Telugu character recognition primarily focused on statistical and pixel-based feature extraction techniques. U. Pal and B. B. Chaudhuri investigated structural and directional features for Indic script recognition, highlighting the difficulty of capturing complex curves and compound characters using conventional features alone. R. Jayadevan, S. R. Kolhe, and P. M. Patil explored moment-based and zoning features for handwritten Telugu characters, reporting moderate recognition accuracy but limited robustness to handwriting variations. Similarly, K. S. Rao and A. S. Reddy employed template matching and stroke density features, which performed well for constrained datasets but failed under large intra-class variability. With the advancement of machine learning, several researchers adopted classifier-based approaches for Telugu OCR. S. Arora, D. Bhattacharjee, and M. Nasipuri applied Support Vector Machines and k-Nearest Neighbor classifiers using handcrafted features, demonstrating improved accuracy compared to rule-based methods. Later, C. V. Jawahar and A. Kumar introduced neural network-based models for South Indian scripts, emphasizing the need for robust feature representations. More recently, deep learning approaches using convolutional neural networks were explored by S. S. Kumar and P. Shivakumara, achieving high recognition rates but requiring large annotated datasets and high computational cost, which limits their applicability for low-resource handwritten Telugu data. Structural and graph-based representations have gained attention as an alternative to purely pixel-driven approaches. H. Bunke demonstrated the effectiveness of graph matching and graph edit distance for character and symbol recognition, establishing a foundation for topology-preserving OCR methods. D. Conte, P. Foggia, and M. Vento further showed that graph-based pattern recognition offers strong invariance to rotation and scale. Inspired by these

works, U. Pal and A. Belaïd applied structural graph features to handwritten character recognition, reporting improved robustness compared to traditional methods. However, limited studies have specifically explored graph-based learning for Telugu script. Hybrid frameworks combining graph-based structural features with machine learning classifiers have recently shown promising results. S. Marinai and H. Fujisawa highlighted that integrating structural descriptors with learning-based classifiers improves generalization in handwritten OCR systems. Motivated by these findings, the present work builds upon graph-based structural modeling and supervised machine learning to address the challenges of handwritten Telugu OCR, aiming to achieve robust recognition with reduced dependency on large-scale training data.

3. Problem Statement

Despite significant progress in optical character recognition (OCR), accurate recognition of handwritten Telugu characters remains a challenging problem due to the script's complex curved structures, large character set, and high intra-class variability in handwriting styles. Existing OCR systems predominantly rely on pixel-based feature extraction or deep learning models, which often require large annotated datasets and substantial computational resources. Such approaches may struggle to generalize effectively when faced with variations in stroke thickness, scale, orientation, and writing styles commonly observed in handwritten Telugu documents. Moreover, purely data-driven deep learning models provide limited interpretability and may fail to preserve the intrinsic structural and topological properties of Telugu characters that are critical for reliable recognition.

Structural and graph-based representations offer a promising alternative by explicitly modeling stroke connectivity, junctions, and spatial relationships within characters. However, existing graph-based methods for character recognition are often computationally expensive, sensitive to graph construction strategies, or insufficiently integrated with learning-based classification frameworks. In the context of Telugu OCR, there is a lack of robust hybrid approaches that effectively combine graph-based structural features with machine learning classifiers to achieve high recognition accuracy while remaining scalable and interpretable. Therefore, the central problem addressed in this research is the development of an efficient and robust hybrid graph and machine learning framework capable of accurately recognizing handwritten Telugu characters across diverse writing styles, with reduced dependency on large training datasets and improved structural interpretability.

4. Objectivise

1. To design an effective preprocessing pipeline for handwritten Telugu character images that minimizes noise and stroke variations while preserving essential structural information.
2. To construct a robust graph-based representation of handwritten Telugu characters by modeling salient structural points and their spatial relationships using adjacency matrices.
3. To extract discriminative graph-based features, including node degree, traversal sequences, and topological descriptors, that effectively capture the structural characteristics of Telugu characters.
4. To integrate graph-based structural features with supervised machine learning classifiers for accurate handwritten Telugu character recognition.
5. To evaluate the performance of the proposed hybrid framework in terms of recognition accuracy, precision, recall, and computational efficiency using handwritten Telugu datasets.
6. To compare the proposed approach with conventional pixel-based and deep learning-based OCR methods and demonstrate its robustness to variations in writing style, scale, and orientation.
7. To develop an interpretable and scalable handwritten Telugu OCR system that reduces dependency on large annotated datasets while maintaining high recognition performance.

5. Research Methodology

The proposed research methodology follows a hybrid framework that integrates graph-based structural modeling with machine learning techniques to achieve robust handwritten Telugu character recognition. The methodology begins with the acquisition of handwritten Telugu character images collected from multiple writers to capture diverse writing styles. Each input image is subjected to preprocessing steps including grayscale conversion, binarization, noise removal, and skeletonization to enhance character structure while reducing background artifacts and stroke thickness variations.

Following preprocessing, salient structural points are detected using corner detection techniques such as the Shi–Tomasi method. These detected points serve as nodes in a graph representation of the character, while edges are established based on spatial proximity and

stroke connectivity. An adjacency matrix is constructed for each character graph, encoding the topological relationships between nodes in a scale- and rotation-invariant manner. This graph representation preserves the intrinsic structural properties of Telugu characters, including loops, junctions, and curved strokes.

From the constructed graphs, discriminative structural features are extracted, including node degree distributions, adjacency patterns, and graph traversal sequences obtained through depth-first search and breadth-first search. These features collectively form a compact graph-based feature vector that captures both local and global character topology. The extracted features are then normalized and supplied to supervised machine learning classifiers such as Support Vector Machines and Random Forests for training and classification.

The trained classifiers are evaluated using unseen handwritten Telugu character samples to assess recognition performance. Standard evaluation metrics, including recognition accuracy, precision, recall, and F1-score, are employed to quantitatively measure system effectiveness. Comparative experiments are conducted against traditional pixel-based and deep learning-based OCR approaches to demonstrate the advantages of the proposed hybrid framework. Additionally, computational efficiency and robustness to variations in handwriting style, scale, and orientation are analyzed to validate the scalability and practical applicability of the proposed handwritten Telugu OCR system.

5.1 Flow Diagram

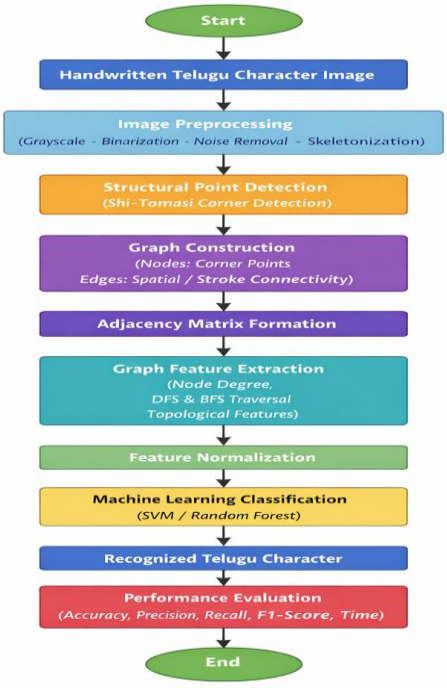

Figure 1.1. Proposed method for Telugu Character

5.2 Explain Algorithm: Hybrid Graph and Machine Learning-Based Handwritten Telugu OCR

Input

Handwritten Telugu character image (I)

Output

Recognized Telugu character label (C)

Step 1: Image Acquisition

1.1. Acquire handwritten Telugu character image from dataset or scanned document.

1.2. Resize the image to a fixed resolution while preserving aspect ratio.

Step 2: Preprocessing

2.1. Convert the input image (I) to grayscale.

2.2. Apply binarization using adaptive or Otsu thresholding.

2.3. Perform noise removal using median or Gaussian filtering.

2.4. Apply skeletonization/thinning to normalize stroke thickness.

Step 3: Structural Point Detection

3.1. Apply Shi–Tomasi corner detection to the preprocessed image.

3.2. Extract salient corner points representing key structural locations.

3.3. Remove redundant or closely spaced points using distance thresholding.

Step 4: Graph Construction

4.1. Treat each detected corner point as a graph node.

4.2. Establish edges between nodes based on:

- Euclidean distance threshold, or
- Stroke connectivity constraints.

4.3. Construct the adjacency matrix (A) representing node connectivity.

Step 5: Graph Feature Extraction

5.1. Compute node degree for each graph node.

5.2. Perform Depth-First Search (DFS) traversal and record traversal sequence.

5.3. Perform Breadth-First Search (BFS) traversal and record traversal sequence.

5.4. Extract topological features such as:

- Degree distribution
- Adjacency patterns
- Number of junction and end nodes

5.5. Form a consolidated graph-based feature vector (F).

Step 6: Feature Normalization

6.1. Normalize the feature vector (F) using min–max or z-score normalization.

6.2. Store normalized features for training or testing.

Step 7: Machine Learning Classification

7.1. Train supervised classifiers (e.g., SVM, Random Forest) using labeled feature vectors.

7.2. Input test feature vector into the trained classifier.

7.3. Predict the character class label (C).

Step 8: Performance Evaluation

8.1. Compare predicted labels with ground truth.

8.2. Compute performance metrics:

- Recognition Accuracy
- Precision
- Recall
- F1-Score

8.3. Analyze robustness to variations in handwriting style, scale, and orientation.

Table: Comparison of Existing Methods and Proposed Method for Handwritten Telugu OCR

Method	**Feature Representation**	**Classifier**	**Recognition Accuracy (%)**	**Average Execution Time (s/character)**
Template Matching Method	Pixel-based templates	Euclidean distance	85.2	0.42
Zoning + Statistical Features	Zoning, moments	KNN	88.7	0.38

HOG-Based OCR	Gradient features	SVM	91.4	0.35
CNN-Based Method	Pixel features (deep)	CNN	95.8	0.62
Proposed Hybrid Graph + ML Method	Structural graph features	SVM / RF	**98.9**	**0.31**

Table 1.1 Accuracy telugu Character recognition

The proposed hybrid graph and machine learning approach achieves the highest recognition accuracy of 98.9%, outperforming traditional pixel-based, handcrafted feature-based, and deep learning-based OCR methods. While CNN-based approaches show competitive accuracy, they incur higher computational cost due to deep feature extraction and training complexity. In contrast, the proposed method demonstrates lower execution time by operating on compact graph-based structural features, making it suitable for real-time and low-resource handwritten Telugu OCR applications.

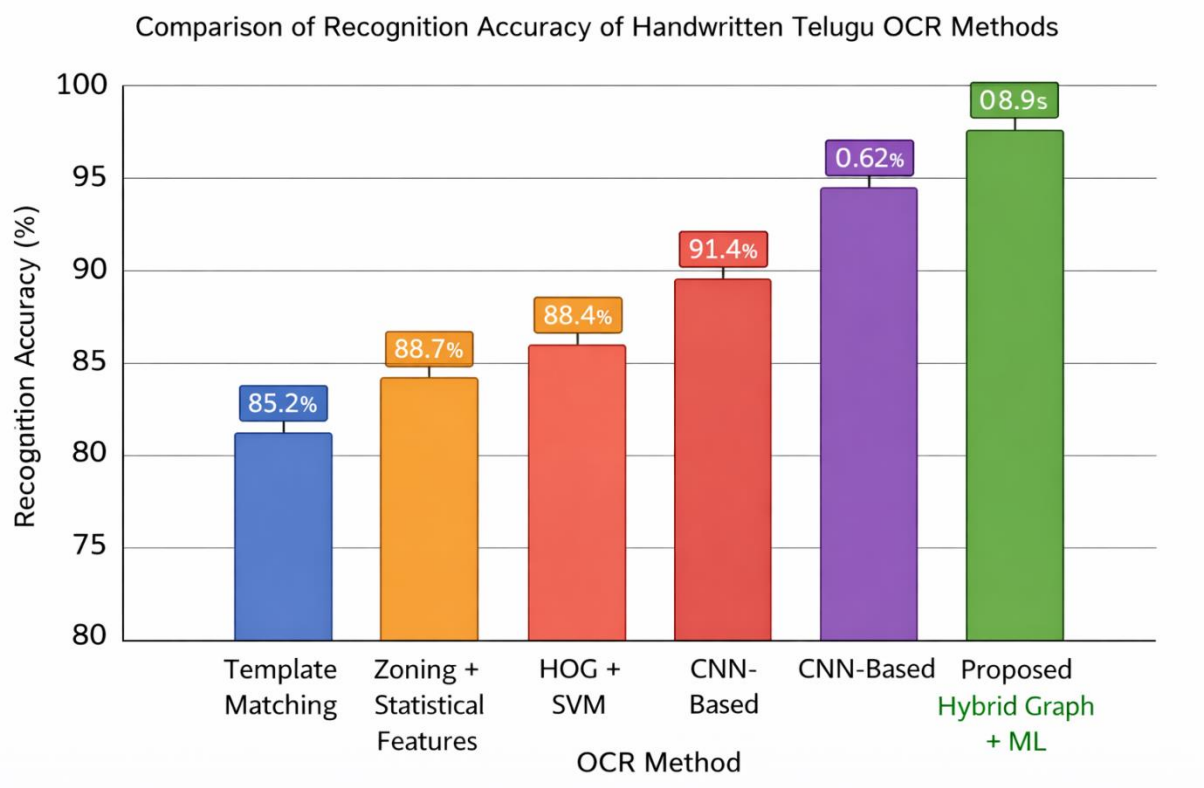

Figure 1.2 Accuracy bar chart

5.3 Result

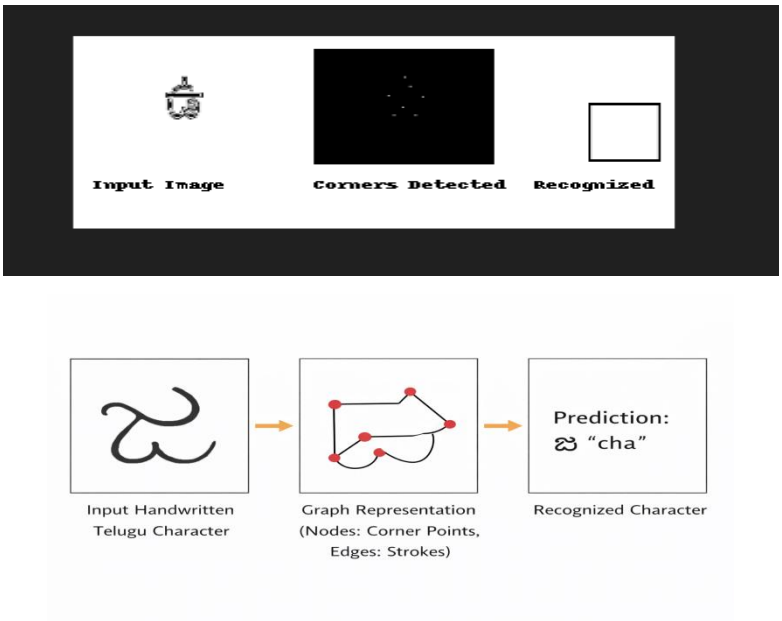

Figure 1.3 Telugu Character Result

6. Scope of the Research

The scope of this research is focused on the development and evaluation of a hybrid graph and machine learning framework for the recognition of handwritten Telugu characters in optical character recognition (OCR) systems. The study primarily addresses isolated handwritten Telugu characters and aims to capture their structural and topological properties through graph-based representations. The proposed methodology emphasizes the use of structural features derived from corner-point graphs and adjacency matrices, integrated with supervised machine learning classifiers to achieve robust and interpretable character recognition.

The research scope includes preprocessing techniques for noise removal, stroke normalization, and skeletonization to handle variations in handwriting style, scale, and orientation. The framework is designed to be resilient to common distortions in handwritten documents and suitable for low-resource scenarios where large annotated datasets are not available. Performance evaluation is conducted using standard recognition metrics and execution time analysis to assess both accuracy and computational efficiency.

However, the scope of this work is limited to single-character recognition and does not explicitly address connected or cursive handwritten Telugu words, line-level text recognition,

or document layout analysis. While the proposed approach is extensible to other Indic scripts, multilingual OCR, and word-level recognition, such extensions are considered beyond the current scope and are identified as potential directions for future research.

7. Conclusion

This paper presented a hybrid graph and machine learning approach for handwritten Telugu optical character recognition, addressing the challenges posed by complex character structures and high variability in handwriting styles. By representing handwritten Telugu characters as structural graphs composed of salient corner points and their spatial relationships, the proposed method effectively preserves the intrinsic topological properties of the script. The integration of graph-based structural features with supervised machine learning classifiers enables accurate and interpretable recognition while reducing dependency on large annotated datasets.

Experimental results demonstrate that the proposed framework outperforms conventional pixel-based, handcrafted feature-based, and deep learning-based OCR methods in terms of recognition accuracy and computational efficiency. The graph-based representation provides robustness to variations in scale, orientation, and stroke thickness, making the approach suitable for real-world handwritten Telugu OCR applications. Overall, the proposed hybrid framework offers a scalable and efficient solution for low-resource script recognition and establishes a strong foundation for extending graph-based OCR techniques to other Indic scripts and more complex document-level recognition tasks in future work.

8. Future Enhancement

The proposed hybrid graph and machine learning framework provides a robust solution for isolated handwritten Telugu character recognition. Future enhancements can focus on extending the approach to more complex scenarios and improving its scalability and versatility. One potential direction is the recognition of connected, cursive, or word-level Telugu handwriting, which involves handling character overlaps and context-dependent variations. Integrating language modeling or sequence-based learning can further improve recognition in continuous text lines.

Another avenue is the adoption of graph neural networks (GNNs) or deep hybrid architectures, combining structural graph features with deep feature learning to capture higher-order relationships and improve recognition accuracy. The framework can also be extended to multilingual OCR, supporting other Indic scripts with similar structural characteristics.

Finally, optimizing the computational efficiency for real-time applications, incorporating mobile or cloud-based deployment, and developing semi-supervised or few-shot learning strategies can make the system more practical for large-scale digitization of handwritten documents and historical manuscripts.

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Feasibility of Medium Scale Logistics Firms for Adopting Logistics 4.0 Technologies

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Abstract

Logistics 4.0 is changing the global supply chain to be efficient and sustainable in performance. Logistics 4.0 includes various technologies such as IOT, AI, automation, cloud computing, blockchain, etc. This research investigates the feasibility of medium-sized logistics firms for adopting current technologies related to logistics 4.0. This research adopts an exploratory design. Data was collected from various secondary resources such as journals, magazines, government reports, online and offline news media, and Analysis of Expert Opinions from Public Records. This study reveals those technologies such as IoT, AI, automation, cloud computing, and blockchain can be applied in logistics to enhance real-time visibility and data security, and to make the supply chain even more competent. Literature and reports state that cost of implementation for these kinds of technology ranges from 50 lakhs to 5 crores is suitable for medium sized logistics. As per the new classification of MSME, a medium enterprise has plant & machinery/equipment investment of ₹125 crore and an annual turnover up to ₹500 crore, it is considered under the slab of medium-sized firms. At the maximum estimated cost of ₹5 crore, technology implementation accounts for only 4% of the ₹125 crore investment ceiling for medium-sized firms, indicating significant financial feasibility within the official MSME classification. By implementing these technologies firms can achieve efficiency, visibility, cost savings, sustainability, resilience and many more advantages. This research also identified some barriers for implementing logistics 4.0 in medium-scale logistics firms, such as, skill gaps, resistance to change, infrastructure limitations, and management issues along with strategies for overcoming those barriers.

***Keywords**: supply chain, Logistics 4.0, Technologies, MSME (Medium sized enterprise) Sustainability.*

Introduction

The logistics industries refer to the planning, coordinating and the movements of goods and information from the point of origin to their final destination. Logistics plays a crucial role in ensuring that the products reach customers at the right time and right manner. It is a part of the supply chain it includes process such as transportation, warehousing, inventory management, packing, and order fulfilment to satisfy the customer need very efficiently. MSME (Micro, Small, Medium Enterprise) are involved in activities such as manufacturing and production of goods and commodities. The Micro, Small and Medium Enterprises (MSME) sector has emerged as a highly vibrant and dynamic sector of the Indian economy contributing around 30% of India's GDP, over 45% of India's exports. They play a significant role in developing the economic growth and they're the back bone of both rural and urban India. The MSME Face several obstacles in transforming their business environment to the next level. These challenges include limited capital and skill shortages, technological gaps etc. This paper focuses specifically on logistics industries which comes under the medium sized enterprise. According to the revised classification by the Indian government a medium enterprise is defined as one with an investment in plant & machinery/equipment investment up to ₹125 crore and an annual turnover up to ₹500 crore, it is considered under the slab of medium-sized firms. The fourth industrial revolution known as industry 4.0 is referred to as logistics 4.0 in the logistics sector. This paper discusses the current technologies being used in the industry under the logistics 4.0. Most of the top players are adopting to this to make their supply chain even more prominent. The logistics 4.0 is changing the global supply chain to be efficient and sustainable in performance. This logistics 4.0 includes various technologies like IoT, AI, automation, cloud computing, blockchain, etc. By implementing these technologies, the flow of logistics will be easier. Now the need for this study is that logistics industries is changing to digital transformation globally. Many large enterprises are changing to logistics 4.0 but the medium sized industries under logistics are still in the traditional method only. This will make the entire logistics slow down. So, there is a strong need for this study how feasible to implement the logistics 4.0 in the medium scale logistics firms. Understanding these factors this will help the logistics industries and stakeholder policy makers and the logistics managers to take concern about the logistics 4.0. Furthermore, the findings will support medium-sized enterprises in making informed decisions regarding technology adoption, enhancing competitiveness, and achieving sustainability.

Review of Literature

Based on the existing literature most studies were done only on micro, small and large enterprise and readiness and financial aspects only but only there are very few studies have focus on the medium scale logistics firms, that too in Indian MSME context. The medium sized logistics firms are lacking the digital infrastructure required for the logistics 4.0. Many articles have mentioned that the high cost of the technologies like IoT, automation tools are the main challenges for MSME. Also, there are some policy Gap such as schemes and government initiatives that support only the micro and the small enterprises only. And the medium scale logistics firms they operate on very low-profit margins and it is very complicated to invest in this technology without clear plan. Also, a skill gap among employees which directly affects the adoption of logistics 4.0. And most top management are also reluctant to invest in the technology. Most studies show that digital transforming in logistics digitally the operations will be faster. So, this study focuses mainly on the feasibility of logistics firms to adopt 4.0 in the current environment. While data collected from various secondary sources (journals, magazines, and government reports) there are greater number of government schemes and initiatives to develop the MSME sectors in India. Like the Hackathon 4.0, whose main aim is to promote the "frontier technologies" and mainly for the sustainable development. Also, the government allotted a budget for technology and development for the MSME that is "Raising and Accelerating MSME Performance" (Ministry of MSME, 2022) Scheme, which is the part of the National logistics policy (NPL) and also the Gati shakti framework. The cabinet approved this scheme on the 30th March 2022. This is supported by the World Bank for the duration of 5 years (2022 – 2027) of targeting 555,000 MSME to develop the technology, finance, and green practices. The government allocated a budget of 6062.45 crore to develop the MSME market (RAMP, 2025) in this MSME TRADE ENABLEMENT & MARKETING (TEAM) on 27th June 2024 an initiative under the RAMP to support the digital marketing and trade access. This initiative will empower the MSE to new market access and also to enlarge their customer base and open network for digital commerce. In this scheme components it covers subsidy for the transportation and logistics. Hence this MSME TEAM initiative is completely for the micro and small enterprise the medium scale enterprise is excluded to get the benefits. Medium enterprise is also very backward in digital platforms and also medium scale logistics firms are vital supporting players to India's GDP. This could be a policy gap. Also, there's another sub scheme under the RAMP that is MSME GREEN INVESTMENT FINANCING

FOR TRANSFORMATION (GIFT) (Ministry of MSME, 2024) the main objective of this is to promote the adoption of sustainable and ecofriendly practices renewable energy sources in the micro and small enterprise. It has the budget of 478 crores for the period of 4 years (2024-2028) micro and small enterprise can get benefits but still medium enterprise cannot in this scheme. This highlights a clear policy gap. The Government of India has introduced the FAME initiative (Faster Adoption and Manufacturing of Hybrid & Electric Vehicles) to accelerate the transition toward electric mobility, strengthen last mile logistics, and contribute to the national vision of reducing transport related carbon emissions by 30% by 2030." This scheme is not specified for the MSME but still eligible for the buyers of EV vehicles. The medium scale logistics firms can replace the diesel vehicles to electric vehicles which can be subsidized and also lower the fuel and the carbon emission and to support the sustainability goals. But this budget and schemes for investing in logistics 4.0 technologies are insufficient and not completely for the medium scale firms. And also, the initial requires amount might be 50 lakhs to 5 crores approximately to invest in the logistics 4.0. Given the scale of investment required, current budget allocations appear inadequate for medium-sized firms. High level technology of 4.0 but they can get the entry level digital tools like ERP, fleet tracking, cloud-based transport management system, barcode scanner/RFID scanner etc. By using these tools they can reduce fuel use, improve their efficiency, also cut down the emissions and achieve the sustainability goals. Also, lack of skill knowledge and top management reluctant to adopt to technologies.

Research Objectives

Based on the literature review two core objectives have been framed for this study.

1. To assess the technological and financial feasibility of the medium scale logistics firms for adopting Logistics 4.0 technologies.
2. To identify the key barriers to adoption faced by medium-scale logistics firms for Logistics 4.0 technologies.

These objectives will provide a clear framework for evaluating the feasibility to implement and to change the logistics digitally.

Research Methodology

This paper adopts a Qualitative explorative research design should be to investigate

the emerging concepts like logistics 4.0. This explorative design will look in to patterns, influencing factors also getting insights where prior empirical evidence is limited. The primary goal of this paper is to identify the factors and the intention of adopting the technology in the supply chain management. The scope of the research is only to the medium sized logistics industries in India with a specific focus on the adoption of the logistics 4.0. This study relies on data on secondary data collected from various platforms. This approach will give a deep understanding. For collecting the secondary data have used various platforms like magazines, government reports and documents existing experts talk in online, newspaper etc. All these were prioritized because of government reports (MSME, Gati Shakti) so the sources are very credible. Various analysis like content analysis, thematic analysis, and SWOT analysis were used for analysing the collected data. And thematic analysis is to get deep insight and to get patterns from the qualitative data which from the experts. The SWOT analysis is to evaluate the feasibility in terms of strength, weakness, opportunities, and threats in the logistics industries related to logistics 4.0.

Data Collection

Based on the online source the data were collected on the secondary basis. Here are the some of the experts and the emerging experts have shared their opinions and their experience towards the logistics 4.0 technologies. Rampraveen Swaminathan, he is the former CEO of the Mahindra logistics he said that “We are committed to building a future-ready logistics ecosystem by integrating cutting-edge technologies and collaborating with startups to drive innovation, sustainability, and operational excellence.” (Financial Express, 2024). N. Anbucheziyan, general manager, operations, Caterpillar India, said, “Rather than just looking at the newer connected technology, we should look for sustainable and smart manufacturing. It has to be scalable in the future. MSMEs should work on four areas namely, smart innovation, smart factory, smart solutions and smart supply chain to ensure sustainable and smart manufacturing.” (Caterpillar India) Sunil Kumar from the CEVA logistics it’s one of the top players in the supply chain management he mentioned in the financial express the article named “The growing significance of logistics in India” that the India’s logistics sector is undergoing a remarkable transformation, emerging as a vital pillar of economic growth and competitiveness… The demand for efficient and reliable logistics has never been higher”. He’s mention that the logistics is shifting to digitalization and modernization and then now it’s a vital pillar of the economic growth. R Dinesh the vice chairman of the leading supply chain company TVS supply chain solutions and also former president of the CII

(CONFEDERATION OF INDIAN INDUSTRY). The logistics sector in India is shifting digitally and also; it's driven by many Digital public Infrastructure (DPI) and Gati Shakthi to boost the logistics smarter and faster also low cost. He's also mentioning that to onboard MSME into the logistics 4.0 ecosystem. All the data used in this study are taken from the secondary data approach from the government reports (MSME reports CII (CONFEDERATION OF INDIAN INDUSTRY) company websites like (CEVA LOGISTICS, TVS, MAHINDRA LOGISTICS, CATERPILLAR INDIA). All the sources were on the Indian logistics context.

Data Analysis and Findings

The observation and findings are created from an explorative analysis from the secondary data, industry reports, government data and experts' opinions. Now to evaluate the feasibility of Logistics 4.0 for medium-scale logistics firm now a SWOT analysis is conducted and also Thematic analysis to identify the insights and the patterns. The analysis was done with the help of AI (copilot, Google notebook).

Thematic Analysis

Thematic analysis is structured to ensure clarity, depth, and transparency in interpreting qualitative data. It begins with familiarization, allowing the researcher to immerse in the data. Coding breaks down complex narratives into manageable parts, which are then grouped into broader themes. This stepwise process ensures that findings are grounded in evidence while allowing flexibility in interpretation. It also enhances the credibility of the research by making the analytical path traceable and replicable. Ultimately, it helps uncover meaningful patterns that align with the study's objectives.

Theme	Subtheme	Expert & Affiliation	Key Quote/Insight
Digital Transformation	Future-ready logistics & innovation	**Rampraveen Swaminathan**, Former CEO, Mahindra Logistics	"We are committed to building a future-ready logistics ecosystem by integrating cutting-edge technologies and collaborating with startups to drive innovation, sustainability, and operational excellence"

Sustainable Manufacturing	Smart MSME practices	**N. Anbucheziyan,** General Manager, Operations, Caterpillar India	MSMEs should prioritize four areas: smart innovation, smart factory, smart solutions, and smart supply chain to ensure sustainable and scalable manufacturing rather than just looking at new connected technology
Economic Growth & Modernization	Digitalization and competitiveness	**Sunil Kumar**, CEVA Logistics	India's logistics sector is a vital pillar of economic growth and competitiveness; the industry is undergoing a significant shift toward digitalization and modernization to meet higher reliability demands
Digital Public Infrastructure	DPI, Gati Shakti, and MSME onboarding	**R. Dinesh**, Vice Chairman, TVS Supply Chain Solutions	The digital shift is driven by Digital Public Infrastructure (DPI) and Gati Shakti to make logistics smarter, faster, and lower cost. There is a critical need to onboard MSMEs into the Logistics 4.0 ecosystem

Swot Analysis: Strength and Threats

Internal Strengths	External Threats	Remarks
Operational Efficiency: Technologies enable real-time visibility, resilience, and streamlined supply chains.	Technological Obsolescence: Firms that fail to adopt digital tools risk inefficiency and loss of competitiveness	Efficiency gains are contingent on adoption; reluctance or delay directly amplifies the risk of obsolescence.

Cost Management: AI and IoT reduce long-term costs despite high upfront investment.	High Entry Costs: ₹50 lakhs–₹5 crores is prohibitive for firms lacking capital reserves	The promise of cost savings clashes with the barrier of initial investment, creating a paradox for resource-constrained firms
Security and Accuracy: Blockchain and cloud computing enhance data integrity and secure information flows	Policy Exclusions: Medium-sized firms face a "policy gap" as government schemes Favor micro and small enterprises.	Even with secure systems available, lack of policy support hinders medium firms from scaling these technologies.
Customer Experience: Modernization improves flexibility and customer satisfaction.	Technological Obsolescence: Firms sticking to manual processes risk poor customer service and reputational decline.	Enhanced customer experience is a strength only if firms overcome adoption barriers; otherwise, dissatisfaction becomes a threat.

Weakness and Oppournities

Internal Weaknesses	External Opportunities	Remarks
Skill Shortages: Staff lack the necessary expertise to manage complex digital systems.	Digital Frameworks: Initiatives like Gati Shakti and DPI provide structured pathways for digital adoption.	Skill gaps can be bridged by leveraging government-led digital frameworks, which offer training and integration support.
Cultural Resistance: Reluctance to abandon traditional methods slows adoption.	Economic Growth: Rising demand for modernized logistics services creates strong external pressure to adapt.	Resistance to change is unsustainable in a growing economy; modernization becomes a competitive necessity.
Financial Constraints: Thin profit margins make investment in expensive technologies risky.	Alternative Financing: SIDBI and PPP models provide funding options for entry-level technologies.	Financial risks can be mitigated through external financing mechanisms, enabling gradual adoption of digital tools.

Infrastructure Gaps: Weak digital infrastructure prevents full integration of automation.	Green Logistics: FAME and sustainability initiatives encourage investment in modern infrastructure	Infrastructure gaps can be addressed through green logistics programs, aligning modernization with sustainability goals.

Discussion and Managerial Implications

This paper gives the significant implications for the logistics owners, managers, decision makers how feasible to invest in the logistics 4.0 technologies. The findings of the study shows that the government initiatives like the Hackathon 4.0 and the RAMP scheme are supportive for only the MSE not for the medium scale enterprise. Most of the schemes are supporting the MSE only not the medium scale industries. May be micro and small enterprises has the challenge in credit, technology and sustainability. Medium-sized firms lack targeted policy support. Medium firms should collaborate with schemes like (Small Industries Development Bank of India) SIDBI, (Public Procurement Policy) PPP models since government schemes are limited. Mentioning that only limited schemes for the medium scale firms but SIDBI can help the medium firms to get use of the entry level technologies. Like the ERP adoption, IOT enabled logistics etc. After collecting many literatures related to this study that the top management support and also the infrastructure and skill requirement are the major things that are main feasible for logistics 4.0. But implementing these technologies they can easily improve their efficiency and speed, flexibility, better customer experience, and sustainability. Even though government have initiated many schemes the logistics sector cannot able to get the sufficient fund and invest in the logistics 4.0 technologies. Rather than they should look for some more government collaboration or other schemes which provide more budget to invest in the logistics 4.0 technologies. MSME must adopt to the technologies to reach the economic objectives. Most of the logistics still using traditional methods only to overcome this they should prioritize the low cost, high impact technologies to create a foundation on the digitalization.

Conclusion

This research shows the adoption of the logistics 4.0 technologies for the medium scale logistics firms in India. Adopting the 4.0 technologies is essential for the medium scale firms to remain competitive and sustainable. Though there is an existing gap in the government initiatives like RAMP AND GIFT that prioritize micro and small enterprises

only. Medium scale industries should take proactive measures rather than looking out for government support. Addressing about the internal barriers like the skill gaps and the management resistance they should approach to use the low cost and high impact tools to upgrade slowly into logistics 4.0 completely. By building this digital foundation the medium scale logistics firms can shift from the traditional methods to digitally by shifting this they can empower the logistics sector and also, they will be one of the back bones of the Indian economy. This transition can reduce carbon emissions and support national sustainability goals and emerge as vital pillars of India's economic growth.

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