

# Proceedings

## Two Day International Conference on “Global Contemporary Issues and Unlocking Innovation in Business Industry 4.0” (Hybrid Mode)

Organized by

Department of Commerce (SF),  
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&

Department of Business Administration,  
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## Preface

Industry 4.0 is an industrial revolution. Manufacturers adopting Industry 4.0 approaches often face issues as they implement technology aimed at automating factory processes. Industry 4.0 technologies are evolving fast, helping businesses to become 'smart' and more efficient. This E-ISSN Journal with the ISSN number 2455-3921 entitled “**INDUSTRY 4.0: CHALLENGES AND SOLUTIONS**” is the collection of articles submitted by Academicians, Research Scholars, UG and PG students from various institutions.

We would like to place our thanks to our Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar Managing Board President Thiru. U.S.M. Sampath Kumar, Vice-Presidents Thiru. A.S.P.K.R.R. Ramasamy, Tmt. S. Daisy Rani, Secretary and Correspondent Thiru. O.M.S.R.J. Mahesh Babu, Treasurer Thiru. M.D. Kumaran for their constant support throughout the publication of the book. Our wholehearted thanks go to the Principal Dr.A.Sarathi and the Self-Finance Programmes Co-ordinator Dr.A.Kalidass for their blessings, valuable support and guidance for publishing this journal.

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Our sincere gratitude goes to the paper contributors, for sharing their knowledge and expertise in the publication of this journal. Hope this journal will bring the Industry 4.0 technologies and also make attractive and presentable to the youth workforce.

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**Publications**



# The Role of E-Commerce in Advancing the Green Cosmetics Industry: Trends, Challenges, and Future Directions

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## Abstract

*This article investigates the pivotal role of e-commerce in the growth of the green cosmetics industry, highlighting how digital platforms are transforming consumer engagement and product distribution. It examines the trends driving consumer demand for sustainable beauty products, the challenges faced by green cosmetics companies in the digital space, and the opportunities for innovation and expansion. This research draws on recent studies, industry reports, and expert interviews to provide a comprehensive overview of the sector's current state and future prospects.*

*Keywords: E-Commerce, Green Cosmetics, Growth, Opportunity, Challenges*

## Introduction

The cosmetics industry is experiencing a paradigm shift as consumer awareness of environmental sustainability and ethical practices increases. Green cosmetics, defined by their use of natural, organic, and ethically sourced ingredients, are becoming increasingly popular. Simultaneously, e-commerce has emerged as a dominant force in retail, reshaping how consumers shop and how brands operate.

E-commerce platforms offer green cosmetics brands unparalleled opportunities to reach global audiences, reduce operational costs, and implement innovative marketing strategies. However, they also present challenges, such as intense competition, maintaining brand authenticity, and ensuring sustainable logistics. This article explores the intersection of e-commerce and green cosmetics, providing insights into how companies can navigate this dynamic landscape.

## Literature Review

**Market Growth** The global green cosmetics market is expanding rapidly, driven by heightened consumer awareness of sustainability and demand for natural ingredients.

According to *Global Market Insights (2023)*, the market was valued at USD 10.3 billion in 2022 and is projected to grow at an 8.2% CAGR, reaching USD 18.5 billion by 2030.

**Consumer Preferences:** Consumer preferences are increasingly shifting towards eco-friendly, non-toxic, and cruelty-free beauty products. According to *Nielsen (2023)*, 68% of consumers prefer purchasing products that are environmentally sustainable and ethically produced. This growing demand reflects a broader trend towards conscious consumerism, where ethical considerations significantly influence purchasing decisions in the beauty industry.

### Evolution of E-Commerce

- **Digital Retail Landscape** The digital retail landscape is rapidly evolving, with e-commerce trends and technologies significantly transforming the sector. According to *Statista (2023)*, advancements such as mobile shopping, AI-driven personalization, and augmented reality are enhancing customer experiences. These innovations enable retailers to offer seamless, personalized, and engaging online shopping experiences, driving consumer adoption and market growth.

### Integration of E-Commerce and Green Cosmetics

- **Benefits of E-Commerce for Green Brands:** E-commerce offers significant benefits for green cosmetics brands by providing access to a global audience, reducing overhead costs, and enabling targeted marketing strategies. Digital platforms allow green brands to effectively communicate their sustainability credentials and engage with eco-conscious consumers. E-commerce also facilitates direct-to-consumer sales, eliminating intermediaries and enhancing profit margins. Additionally, data analytics tools available on digital platforms enable brands to gather valuable consumer insights, optimize their product offerings, and tailor marketing efforts to meet evolving consumer demands.
- **Challenges in E-Commerce:** Green cosmetics brands face several challenges in the e-commerce landscape. Intense competition requires them to distinguish themselves through strong branding and authentic storytelling. Maintaining transparency and trust is crucial, as consumers increasingly demand proof of sustainability and ethical sourcing. Logistics pose another challenge, with the need for eco-friendly packaging and sustainable supply chain practices. Additionally, digital platforms require constant

engagement and updates to keep pace with consumer preferences and technology advancements, making effective digital marketing and customer service essential for success.

## Trends in E-Commerce for Green Cosmetics

- **Increased Consumer Awareness and Demand**

Increased consumer awareness and demand for sustainable beauty products are driven by several key factors, as highlighted by Euromonitor International (2023)

1. **Environmental Concerns:** Consumers are increasingly aware of the environmental impact of conventional beauty products. Issues such as plastic waste, harmful chemicals, and unsustainable sourcing practices have prompted a shift towards eco-friendly alternatives that minimize harm to the planet.
2. **Health and Safety:** The growing knowledge about the potential health risks associated with synthetic ingredients has led consumers to seek out non-toxic, natural products. Green cosmetics, often free from parabens, sulfates, and artificial fragrances, are perceived as safer and more beneficial for personal health.
3. **Ethical Considerations:** Many consumers are motivated by a desire to support ethical practices in the beauty industry, including cruelty-free testing and fair trade sourcing. Brands that align with these values resonate more with consumers who prioritize social responsibility.
4. **Influence of Social Media and Influencers:** Social media platforms and beauty influencers play a significant role in raising awareness about sustainable beauty products. They educate consumers about the benefits of green cosmetics and promote brands that align with eco-friendly and ethical standards, thus driving consumer interest and demand.

## Role of Social Media and Influencers

The role of social media and influencers in promoting green cosmetics is pivotal, with significant impact across several areas:

1. **Educational Content:** Influencers and brands use social media platforms to educate followers about the benefits of green cosmetics. They share information on the environmental and health advantages of natural ingredients, helping consumers make informed choices. Educational posts, tutorials, and infographics make sustainability more accessible and understandable to a broad audience.

2. **Product Reviews and Recommendations:** Influencers often provide honest reviews and personal experiences with green beauty products. Their endorsements can drive consumer interest and trust, as followers value their opinions and consider their recommendations when making purchasing decisions.
3. **Authentic Storytelling:** Social media allows influencers and brands to tell compelling stories about their commitment to sustainability. This includes behind-the-scenes looks at ethical sourcing, manufacturing processes, and brand values. Such transparency fosters a deeper connection with consumers who prioritize ethical and eco-friendly practices.
4. **Engaging Campaigns and Challenges:** Influencers frequently participate in or initiate social media campaigns and challenges that promote green cosmetics. These campaigns encourage user-generated content, broaden brand reach, and create a sense of community among eco-conscious consumers. Engaging campaigns help amplify the message of sustainability and encourage active consumer participation.

### Challenges Facing Green Cosmetics in E-Commerce

- **Maintaining Brand Authenticity**

Maintaining brand authenticity online requires several key strategies. Firstly, transparent communication about ingredient sourcing, manufacturing processes, and sustainability practices is crucial to build trust. Brands should consistently showcase their values through honest content and responsive customer service. Secondly, collaborating with credible influencers who align with the brand's ethos ensures genuine endorsements. Additionally, maintaining consistency across all digital platforms reinforces brand identity and commitment to values. Finally, actively engaging with consumers through social media and addressing concerns openly helps sustain authenticity and credibility.

#### **Supply Chain and Logistics Issues**

Addressing supply chain and logistics issues in green cosmetics involves several complexities. Sustainable sourcing requires careful selection of eco-friendly materials and ethical suppliers, which can be challenging due to limited availability and higher costs. Packaging must align with sustainability goals, necessitating the use of recyclable or biodegradable materials, which can be more expensive and less readily available. Distribution also presents challenges, as ensuring efficient and eco-

friendly transportation requires balancing cost and environmental impact. Effective management of these factors is crucial for maintaining sustainability throughout the supply chain (*Logistics Management, 2023*)

## Opportunities for Growth and Innovation

- **Technological Advancements**

Technological advancements like AI, AR, and machine learning significantly enhance the consumer experience in green cosmetics. AI-driven personalization tailors product recommendations, AR enables virtual try-ons to test cosmetics virtually, and machine learning analyzes consumer data for insights. These technologies improve engagement, satisfaction, and operational efficiency (*Journal of Business Research, 2023*).

- **Market Expansion**

Expanding into underserved markets and reaching international audiences offers several key opportunities:

1. **Emerging Market Growth:** Many developing countries are experiencing rising middle-class populations with increasing disposable incomes. Entering these markets allows green cosmetics brands to tap into new consumer bases that are becoming more aware of and interested in sustainable products.
2. **Localized Product Offerings:** Adapting products to meet local preferences and regulatory standards can help brands gain traction in new regions. Customizing formulations and packaging to align with regional tastes and environmental concerns enhances market acceptance and consumer loyalty.
3. **Strategic Partnerships and Distribution:** Forming partnerships with local distributors and retailers can facilitate market entry and expansion. Collaborations with regional influencers and eco-conscious organizations also help build brand credibility and visibility in new international markets (*McKinsey & Company, 2023*).

## Discussion

The integration of e-commerce into the green cosmetics industry offers significant opportunities for brands to innovate and expand their reach. Digital platforms enable personalized consumer experiences, foster direct brand-to-consumer relationships, and

support sustainable business practices. However, companies must navigate the complexities of online branding, competition, and logistics to succeed.

### Strategic Recommendations

1. **Enhance Digital Marketing Strategies:** Utilize data analytics and consumer insights to drive targeted marketing efforts.
2. **Focus on Transparency and Authenticity:** Communicate brand values and sustainability efforts clearly to build consumer trust.
3. **Invest in Technology:** Adopt innovative technologies to improve the online shopping experience and streamline operations.

### Conclusion

E-commerce is a crucial driver of growth and innovation in the green cosmetics industry, offering brands new ways to engage with consumers and promote sustainability. As consumer demand for ethical and environmentally friendly products continues to rise, green cosmetics companies must adapt to the digital landscape to remain competitive. By embracing technology, enhancing transparency, and expanding their reach, these brands can capitalize on the opportunities presented by e-commerce.

**Enhanced Consumer Engagement:** E-commerce platforms enable brands to connect with consumers through personalized marketing strategies.

**Increased Transparency and Trust:** Digital platforms provide a space for brands to communicate their sustainability efforts and ethical practices clearly.

**Global Market Access:** E-commerce removes geographical barriers, allowing green cosmetics brands to reach international markets and underserved regions.

**Innovation in Product Offerings:** Embracing technology such as AI, augmented reality (AR), and machine learning can enhance the consumer experience.

**Sustainable Logistics and Operations:** E-commerce platforms offer opportunities to implement and promote sustainable practices in logistics and supply chain management.

**Cost Efficiency:** Digital sales channels can reduce overhead costs associated with traditional retail, such as physical store maintenance and staffing.

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# Legal Framework of Intellectual Property Rights in India

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## Abstract

*Intellectual property (IP) deals with human intelligence such as artistic, literary, technical or scientific constructions. Intellectual property rights (IPR) refer to the legal rights granted to an inventor or manufacturer to protect their invention or manufacture of their product. These legal rights grant an exclusive right to the inventor/manufacturer to take full advantage of his/her invention/product for a limited period of time. Legal rights prevent all others from using the intellectual property for commercial purposes without the prior consent of the intellectual property rights holder. Intellectual property rights include trade secrets, utility models, patents, trademarks, geographical indications, industrial design, integrated circuit layout design, copyright and related rights, and new varieties of plants. Intellectual property certainly plays an important role in the modern digital economy.*

*Keywords: IP, IPR, Patents, Trademark, copyright*

## Introduction

Johannes Gutenberg's invention of the printing press in 1450 marks the beginning of the world's first copyright system. In the Venetian Conference held in 1485, the first intellectual property protection system was introduced. This was followed by the Statute of Monopolies in 1623 in England extended patent rights to technological inventions. Patent laws were introduced in the United States in 1760. The importance of international intellectual property increased with the establishment of the Paris Convention for the Protection of Industrial Property in 1883. Followed by the Berne Convention for the Protection of Literary and Artistic Works of 1886. In the year 1856, the Patents Act was introduced in India which has been in effect for more than 50 years, which was later amended and revised to be called the Indian Patents and Designs Act, 1911. The World Intellectual Property organisation Agreement of 1967 states that the following subjects will be protected under Intellectual Property Rights.

They are:

- Trademarks, service marks, commercial names and designations
- Inventions in all field of human Endeavour
- Industrial designs
- Protection against unfair competition
- Other right resulting from intellectual activity in the industrial, scientific, Literary or artistic fields;
- Literary artistic and scientific works scientific discoveries
- Performances of performing artist phonograms and broadcast

### Review of Literature

**Desai (2021)**, in his article on `Geographical Indications in India: Legal Framework and Economic Implications` examines the role of geographical indications (GIs) in promoting rural development and protecting traditional knowledge. The study analyzes the legal provisions for GI registration and the economic benefits for rural communities. Desai concludes that while GIs have the potential to enhance economic development, there are challenges related to enforcement and international recognition that need to be addressed.

**Rao (2020)**, in the article on `Trademark Law and Brand Protection in India` provides an in-depth analysis of trademark legislation and its effectiveness in protecting brands in India. The study highlights the procedural aspects of trademark registration, enforcement mechanisms, and the role of the judiciary in trademark disputes. Rao argues that while the legal framework is robust, there is a need for more efficient enforcement and greater awareness among businesses about the importance of brand protection.

**Sharma (2019)**, un the article on `Copyright Law in India: Challenges in the Digital Era` explores the complexities and challenges that arise in the enforcement of copyright laws in the context of digital technology. The article addresses issues such as online piracy, digital rights management, and the role of intermediaries. Sharma suggests that while India has made strides in updating its copyright laws, further reforms are needed to keep pace with technological advancements and global standards.

**Kumar and Singh (2015)**, in their article on `The Evolution of Intellectual Property Rights in India: An Overview` provides a comprehensive historical analysis of IPR in India. The study

traces the evolution from colonial times to the present day, highlighting significant legislative milestones such as the Indian Patents Act of 1970 and its subsequent amendments. The review also discusses India's compliance with international agreements like the TRIPS Agreement, emphasizing the balance India seeks to maintain between protecting IPR and promoting public interest.

### **Statement of the Problem**

According to Article 2 of the WIPO (World Intellectual Property Organisation) – Central Organisation for the protection of Intellectual Property Laws and the expert organization of the UN, "Intellectual Property shall include the rights relating to literary, artistic and scientific works, inventions in all fields of human endeavour, scientific discoveries, industrial designs, trademarks, service marks and commercial names and designations, protection against unfair competition, and all the other rights resulting from intellectual activity in the industrial, scientific, literary or scientific fields. Intellectual property rights can have a direct and substantial impact on industry and business, as intellectual property rights holders can enforce these rights and can stop a product from being manufactured, used, or sold to the public. Intellectual property protection encourages the dissemination, distribution and disclosure of creativity to the public, rather than keeping it secret, and encourages businesses to choose creative works to exploit. In this context, it is important to have an understanding about the Legal Framework of Intellectual Property Rights in our country.

### **Research Methodology**

The present study is descriptive in nature. The details are collected through various published sources such as magazines, newspapers and websites.

### **Development of Intellectual Property Rights in India**

The importance of intellectual property protection has become effective with the Agreement on Trade-Related Intellectual Property Systems in 1995, with the establishment of the World Trade Organization in the eighth round of the GATT. The TRIPS Agreement came into force on January 1, 1995 and is considered the most comprehensive multilateral agreement on intellectual property.



Source: <https://m.toppersnotes.com/current-affairs/blog/indias-patent-law-safeguards-under-fire-21sk>

### **Patent Act 1970**

After independence in 1970, a comprehensive patent rights bill was passed, called the “Patents Act 1970”. In order to reduce distortions related to international trade and to promote effective protection of intellectual property, the Patent Law was periodically amended during the years 1995, 1999, 2002 and 2005 to comply with its obligations under the TRIPS Agreement. The amendments were also aimed at making the law modern, harmonized and user-friendly for the protection of national and public interests, as well as complying with India's international obligations under the TRIPS Agreement. At present The Patents Amendment Act 2005 is fully in force and operational.

### **Trade Mark Act, 1999**

A trademark is a special sign that distinguishes products offered for sale or sold by one dealer from another. In India, trademarks have been protected for over 40 years under the provisions of the Trade and Merchandise Marks Act 1958. The Trademarks Act, introduced in 1994, is the result of extensive amendments to trademark and trade mark laws 1958. This

amendment was aimed at modernizing trade and business practices, increasing foreign trade through globalization, attracting foreign investment, and more importantly, simplifying the administration of the trademark system as much as possible and providing greater freedom in the judiciary. Although the bill did not pass, it highlighted areas where major changes were needed. Subsequently, the Trademarks Act 1999 was introduced with further consideration of the developments required in various fields such as trade and business practices, globalization, etc. The Act was subsequently passed by replacing the Commerce and Commodities Act of 1958, approved by the President on December 30, 1999. The introduction of the Trademarks Act in 1999 has proven to be very beneficial to the globalization of trade and commerce in India.

### **The Design Act 2000**

The advancement of science and technology in the 20th Century aroused the need to have more reliable legal system to improve the protection of industrial designs. Registration of design is important in order to promote development in the design industry. The current law is in line with the TRIPS Agreement and thus compatible with the globalization of trade and commerce. An industrial product mainly consists of two components. The artistic work and the functional part of the product. Design Act is applicable only to the artistic part of the industrial product. Day by day industrial design becoming daily part of the life of the consumer by catching consumers eyes through unique designs. For the same reason, it has become essential to provide protection to such industrial design.

### **The Geographical Indications of Goods (Registration and Protection) Act, 1999**

Geographical indication is new to India and was introduced recently as our Turmeric, Neem and Basmati were patented by people from outside India. To avoid allowing misuse of Indian Geographical Indications and Indicate that the goods are referenced from the Indian region geographical indications of goods Act was passed. For protecting our products in the country, A Bill was presented to Parliament and passed with the approval of the President and Geographical Indications of Goods (Registration and Protection) Act 1999, came into force. The Act is administered by the Geographical Indication Registry under the jurisdiction of the Controller General of Patents, Designs and Trade Marks.

### **Copyright Act, 1957**

The Copyright Act of 1957 is one of the oldest intellectual property rights in existence.

It has been amended several times to align it with global trade and commerce. This law concerns a person's creativity, as it protects their right to literary, artistic and musical works, sound recordings, cinematography and films. It is not necessary that the work be qualitative to be Registrants under this Act and shall be entitled to any single work having so little in common with any other work that it may be considered eligible for this purpose. Under copyright, the author obtains not only the right of paternity, but also the right that his work should not be reproduced without his prior authorization. Any violation of the same against his/her will can be taken to court by the author. The digital industry gives a very important role to copyright and computer programming. It was added to the law in 1984 as a literary act to recognize computer programming and protect the same. The introduction of computer programming created a lot of confusion for embedded software without which a computer could not function, which could not work freely with a computer. Later in 1999, with this amendment, the sale of computers and other similar equipment with embedded software would have been allowed for free.

### **The Protection of Plant Varieties and Farmers' Rights Act, 2001**

In recent times, India has seen a tremendous growth in the research of plant breeds. India being basically an agro based economy, has to give protection to researchers in order to encourage their interest in discovering a better breed of plants. Thus the idea of the Plant Breeders' Right came into existence. In wake of TRIPS under Article 27, The government introduced the Protection of Plant Varieties and Farmers' Right Act, 2001, to encourage development of new breeds of plants. The Act also promises to provide better growth in the seed industry and make available to the Indian farmers better quality of seeds.

### **The Semi-Conductor Integrated Circuits Layout Design Act, 2000**

In the past three decades, the information technology and digital industry has seen the biggest development, the development also getting pace day by day, and can be called the fastest growing sector of the century. The industry has seen significant change in electronic equipment, computers, telecommunication etc. and also it has affected human life in the biggest manner by providing advancement in many ways. Microelectronics, which primarily refers to Integrated Circuits (ICs) ranging from, Small Scale Integration (SSI) to Very Large-Scale Integration (VLSI) on a semiconductor chip – has rightly can be called the core, strategic technology world-over, especially for Information Technology (IT) based society. Integrated circuits require expertise and the effort to create one depends on the complexity of the output.

Hence, it is very necessary to cover the same under IPR and it is also necessary to encourage continue Research and Development in the field of microelectronics. In order to provide protection in the field of microelectronics, The Semiconductor Integrated Circuits Layout Design Act, 2000 was passed.

### Trade Secrets

Trade secrets are intellectual property Rights (IP) over confidential information that may be sold or licensed. In general, for information to be considered a trade secret, it must be:

- of commercial value because it is secret,
- to be known only to a limited group of persons, and
- Subject to reasonable steps taken by the legitimate owner of the information to maintain its confidentiality, including the use of confidentiality agreements for business partners and employees.

The unauthorized acquisition, use, or disclosure of such confidential information in a manner contrary to the honest business practices of others is an unfair practice and a violation of trade secret protection.

### Conclusion

The Ramayana was written centuries ago. However, this holy book still retains its value in the current modern world. Maharishi Valmiki is still accredited for his work. Vishwakarma is often praised for his architectural works even today. This is how the recognition of the creators of something intellectual lays the foundation of confidence in it for posterity. Intellectual property rights are monopoly rights that grant temporary privileges to their holders for the exclusive exploitation of income rights deriving from cultural expressions and inventions. There must be good reasons for a society to grant such privileges to some of its individuals, and so proponents of these rights provide us justifications for protecting today's Interglobal intellectual property rights.

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## Impact of Internet of Things in Small Cities

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### Abstract

*The Internet of Things (IoT) represents a revolutionary technological framework that interconnects physical objects embedded with sensors, software, and other technologies to the internet. This network facilitates seamless data exchange and automation across a range of devices, from everyday household items like smart thermostats and wearable fitness trackers to sophisticated industrial tools such as automated manufacturing systems. Key aspects of IoT include connectivity, data collection, automation, and data analysis. Devices within this ecosystem communicate effortlessly, gather environmental data, operate autonomously, and analyze data to make informed decisions or trigger specific actions. The defining characteristics of IoT encompass intelligence, connectivity, dynamic nature, enormous scale, sensing, heterogeneity, and security. In small cities, IoT can significantly enhance various sectors, providing benefits such as improved smart infrastructure, heightened public safety, optimized transportation, better healthcare services, efficient energy management, and comprehensive environmental monitoring. For instance, smart streetlights and waste management systems enhance efficiency, while surveillance systems and disaster management tools bolster public safety. Transportation benefits from smart traffic management and parking solutions, and healthcare sees advancements through remote health monitoring and efficient emergency services. Energy management becomes more effective with smart grids and renewable energy integration, while environmental monitoring is improved through air quality and water management sensors. Additionally, IoT supports local economic development by offering data analytics for businesses and creating job opportunities, while citizen engagement is enhanced through IoT-powered applications and feedback systems. However, implementing IoT in small cities comes with challenges. Limited infrastructure and budget constraints can hinder deployment and maintenance. A lack of technical expertise poses further difficulties, and ensuring data privacy and security is critical. Integrating IoT with existing systems is complex, and public awareness and acceptance of IoT technologies are necessary. Regulatory compliance, scalability, interoperability, and environmental factors also present significant hurdles. Addressing these challenges requires strategic planning, investment, and public engagement to fully realize*

*IoT' potential. Related works highlight various aspects of IoT and its implications for smart cities. Studies have investigated IoT device vulnerabilities, the importance of edge computing for smart cities, weather monitoring services, and smart city infrastructures, among others. These works provide insights into the requirements, challenges, and solutions associated with IoT deployment in smart cities, emphasizing the need for secure, scalable, and interoperable IoT systems. In conclusion, IoT has the potential to transform small cities by enhancing efficiency, sustainability, and livability. By addressing the challenges through strategic initiatives, small cities can leverage IoT technologies to improve the quality of life for residents, foster economic growth, and promote environmental sustainability, ultimately becoming smarter, more connected communities.*

*Keywords: sophisticated, worldwide, sensors*

## **Introduction**

The Internet of Things (IoT) is a ground breaking technological framework that connects physical objects embedded with sensors, software, and other technologies to the internet, allowing them to collect and exchange data. This interconnected network ranges from everyday household items like smart thermostats and wearable fitness trackers to advanced industrial tools such as automated manufacturing systems. Key aspects of IoT include connectivity, data collection, automation, and data analysis. Devices communicate seamlessly, gather environmental data, operate autonomously based on this data, and analyze it to make informed decisions or trigger specific actions. IoT is characterized by intelligence, connectivity, dynamic nature, enormous scale, sensing, heterogeneity, and security. Intelligence involves smart algorithms and computation, while connectivity ensures network accessibility. The dynamic nature reflects the continuous data collection and adaptability of IoT devices, and the enormous scale refers to the vast number of interconnected devices. Sensing provides accurate environmental data, and heterogeneity ensures diverse devices interact seamlessly. Security is crucial to protect against vulnerabilities and ensure privacy. In small cities, IoT can significantly enhance various sectors. Smart infrastructure, such as lighting and waste management, improves efficiency. Public safety benefits from surveillance and disaster management systems. IoT optimizes transportation with smart traffic management and parking solutions, while healthcare is improved through remote

health monitoring and efficient emergency services. Energy management, environmental monitoring, economic development, and citizen engagement are other areas transformed by IoT. However, challenges include limited infrastructure, budget constraints, technical expertise, data privacy, integration with existing systems, public awareness, regulatory compliance, scalability, interoperability, and environmental factors. Overcoming these challenges is vital for IoT to realize its full potential in enhancing the quality of life and promoting economic growth in small cities.

### **What is Internet of Things (IOT)**

The Internet of Things (IoT) refers to a network of physical objects, or "things," embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the internet. These objects range from ordinary household items to sophisticated industrial tools.

#### **Key aspects of IoT include**

1. **Connectivity:** Devices are connected to the internet and to each other, allowing for seamless communication.
2. **Data Collection:** Devices gather data from their environment and send it to a central server or other devices.
3. **Automation and Control:** IoT enables automation by allowing devices to operate without human intervention, based on the data they collect.
4. **Analysis and Action:** Collected data is analyzed to make informed decisions or trigger specific actions.

Applications of IoT span various sectors, including smart homes, healthcare, agriculture, transportation, and industrial automation. Examples include smart thermostats, wearable fitness trackers, connected cars, and automated manufacturing systems.

### **Universe of Internet of Things (IOT)**

Some most popular characteristics of Internet of things are

- (a) Intelligence
- (b) Connectivity
- (c) Dynamic Nature
- (d) Enormous scale
- (e) Sensing
- (f) Heterogeneity
- (g) Security

**(a) Intelligence**

IoT comes with the combination of algorithms and computation, software & hardware that makes it smart. Ambient intelligence in IoT enhances its capabilities which facilitate the things to respond in an intelligent way to a particular situation and supports them in carrying out specific tasks. In spite of all the popularity of smart technologies, intelligence in IoT is only concerned as means of interaction between devices, while user and device interaction is achieved by standard input methods and graphical user interface

**(b) Connectivity**

Connectivity empowers Internet of Things by bringing together everyday objects. Connectivity of these objects is pivotal because simple object level interactions contribute towards collective intelligence in IoT network. It enables network accessibility and compatibility in the things.

**(c) Dynamic Nature**

The primary activity of Internet of Things is to collect data from its environment, this is achieved with the dynamic changes that take place around the devices. The state of these devices change dynamically, example sleeping and waking up, connected and/or disconnected as well as the context of devices including temperature, location and speed. In addition to the state of the device, the number of devices also changes dynamically with a person, place and time. The state of devices change dynamically, e.g., sleeping and waking up, connected and/or disconnected as well as the context of devices including location and speed. Moreover, the number of devices can change dynamically

**(d) Enormous scale**

The number of devices that need to be managed and that communicate with each other will be much larger than the devices connected to the current Internet. The management of data generated from these devices and their interpretation for application purposes becomes more critical. Gartner (2015) confirms the enormous scale of IoT in the estimated report where it stated that 5.5 million new things will get connected every day and 6.4 billion connected things will be in use worldwide in 2016, which is up by 30 percent from 2015. The report also forecasts that the number of connected devices will reach 20.8 billion by 2020.

**(e) Sensing**

IoT wouldn't be possible without sensors which will detect or measure any changes in the environment to generate data that can report on their status or even interact with the environment. Sensing technologies provide the means to create capabilities that reflect a true awareness of the physical world and the people in it. The sensing information is simply the analogue input from the physical world, but it can provide the rich understanding of our complex world

**(f) Heterogeneity**

Heterogeneity in Internet of Things as one of the key characteristics. Devices in IoT are based on different hardware platforms and networks and can interact with other devices or service platforms through different networks. IoT architecture should support direct network connectivity between heterogeneous networks. The key design requirements for heterogeneous things and their environments in IoT are scalabilities, modularity, extensibility and interoperability. The devices in the IoT are heterogeneous as based on different hardware platforms and networks. They can interact with other devices or service platforms through different networks

**(g) Security**

IoT devices are naturally vulnerable to security threats. As we gain efficiencies, novel experiences, and other benefits from the IoT, it would be a mistake to forget about security concerns associated with it. There is a high level of transparency and privacy issues with IoT. It is important to secure the endpoints, the networks, and the data that is transferred across all of it means creating a security paradigm.

**Impact of Internet of Things in Small cities**

The Internet of Things (IoT) has a significant impact on small cities, offering various benefits and opportunities. Here are some key areas where IoT can make a difference:

**1. Smart Infrastructure**

**Smart Lighting:** Streetlights equipped with IoT sensors can adjust brightness based on the time of day or presence of pedestrians, reducing energy consumption and costs.

**Smart Waste Management:** IoT-enabled waste bins can signal when they are full, optimizing collection routes and reducing waste management costs.

## 2. Public Safety and Security

**Surveillance Systems:** IoT cameras and sensors can help monitor public areas, enhancing security and enabling quicker response to incidents.

**Disaster Management:** IoT sensors can detect natural disasters like floods or earthquakes early, allowing for timely alerts and better preparedness.

## 3. Transportation and Mobility

**Smart Traffic Management:** IoT can optimize traffic flow through real-time monitoring and adaptive traffic signals, reducing congestion and improving travel times.

**Parking Solutions:** Smart parking systems can guide drivers to available spots, reducing the time spent searching for parking and lowering emissions.

## 4. Healthcare

**Remote Health Monitoring:** IoT devices can monitor patients' health conditions in real-time, allowing for remote consultations and timely medical interventions.

**Emergency Services:** IoT can enhance the efficiency of emergency services by providing real-time location data and other critical information.

## 5. Energy Management

**Smart Grids:** IoT can optimize energy distribution and consumption, improving efficiency and reliability of power supply.

**Renewable Energy Integration:** IoT can help manage and integrate renewable energy sources like solar and wind into the local grid.

## 6. Environmental Monitoring

**Air Quality Sensors:** IoT sensors can monitor air quality and provide data to take necessary actions to improve it.

**Water Management:** IoT can help in monitoring water quality and managing water resources more efficiently.

## 7. Economic Development

**Support for Local Businesses:** IoT can provide data analytics to help small businesses understand customer behavior and optimize operations.

**Job Creation:** The implementation and maintenance of IoT infrastructure can create new job opportunities in technology and related fields.

## 8. Citizen Engagement

**Smart Applications:** IoT-powered applications can provide citizens with real-time information about city services, events, and issues.

**Feedback Systems:** IoT can facilitate direct communication between citizens and city officials, improving governance and service delivery.

In summary, IoT can transform small cities by making them more efficient, sustainable, and livable. The integration of IoT technologies can enhance the quality of life for residents while promoting economic growth and environmental sustainability.

### **Challenges of IOT in small cities**

Implementing IoT (Internet of Things) in small cities can be challenging due to several factors:

1. **Limited Infrastructure:** Small cities may lack the advanced infrastructure required for IoT deployment, such as high-speed internet and extensive wireless coverage.

2. **Budget Constraints:** Limited financial resources can hinder the adoption and maintenance of IoT systems. The cost of IoT devices, implementation, and ongoing support may be prohibitive.

3. **Technical Expertise:** Small cities may not have the necessary technical expertise or workforce to implement and manage IoT solutions. This can lead to difficulties in deployment and maintenance.

4. **Data Privacy and Security:** Ensuring data privacy and security is critical, and small cities might struggle with the resources needed to protect against cyber threats and manage data securely.

5. **Integration with Existing Systems:** Integrating IoT solutions with existing infrastructure and systems can be complex, requiring significant effort and expertise.

6. **Public Awareness and Acceptance:** Residents might be unfamiliar with IoT technology, leading to resistance or lack of trust in new systems. Public education and engagement are crucial.

7. **Regulatory and Compliance Issues:** Navigating the regulatory landscape and ensuring compliance with laws and standards can be challenging, especially with limited legal and regulatory resources.

8. Scalability: Small cities might find it difficult to scale IoT solutions as their needs grow, due to limitations in both infrastructure and funding.

9. Interoperability: Ensuring that different IoT devices and systems work together seamlessly can be a challenge, especially with diverse manufacturers and standards.

10. Environmental Factors: Geographic and environmental conditions unique to small cities, such as extreme weather, can impact the reliability and durability of IoT devices and networks.

### **Related works**

(Sanjay Kumar Gupta et al.) 2020. In this study, we investigate IoT devices deployed around the world, their vulnerabilities, recent attacks experienced, and possible mitigation solutions. According to (LatifU.Khan et al.) 2020, edge computing is crucial to making smart cities a reality. A survey of the state-of-the-art literature on smart city edge computing applications was conducted and analyzed in terms of the evolution of edge computing paradigms. Additionally, they have created a comprehensive and detailed taxonomy of the literature. As well as discussing the key requirements, they outlined the recently reported synergies of edge computing to enable smart cities. A weather monitoring service (S. Kumari et al) 2020 has been discussed as one of four modules within this research report. The proposed model, which is more advanced, involves using the camera on a mobile phone to check if a space is available. (RashmiDongre et al..) 2019 has provided a comprehensive overview of the Internet of Things paradigm for smart cities, integrated ICT network types, doable opportunities, and considerable requirements. Additionally, they have analyzed the latest efforts from standard bodies.

(R. AL Mogbil et al.) 2020 has presented a design to make IoT architecture and discussed the requirements of smart homes and cities, and the security countermeasures they can take to counter security attacks. (Elvira Ismagilova et al.) 2020. They have analyzed the practical challenges of smart cities and the relevant key literature is depicted. Privacy and security of mobile devices and services, smart city infrastructure, power systems, healthcare, frameworks, algorithms, and protocols to improve security and privacy, operational threats for smart cities, use and adoption of smart services by citizens, use of the blockchain, and use of social media are all discussed in detail. Their review provides a useful perspective on many of the key issues and offers a key direction for future studies. (Malapur et al.) 2017 has



proposed IoT technologies to manage waste and trip management in cities to reduce cost and time with an optimized path for waste collection. And I've proposed the outcomes of the same experiment. (Lokesh Pawar et al.) 2019, have analyzed the services that a Smart City must provide and also discussed the current challenges and respective solutions. They have also included the future perspective of IoT. (Madhvi A. Pradhan et al.) 2017. They have attempted to implement a smart city environment with characteristics like water pollution detection, smart accident detection, and video supervision. Ideas for the betterment of smart cities were also given. (Pradip Kumar Sharma et al.) 2019, have presented a survey on emerging technologies for a sustainable smart city network. They have discussed the requirements and challenges for a sustainable network and the role of heterogeneous integrated technologies in providing smart city solutions. They have also discussed different network architectures from a security perspective to create an ecosystem. Suitable recommendations are given to resolve the challenges of smart cities.

## Conclusion

The Internet of Things (IoT) stands as a ground breaking technology that interlinks physical objects embedded with sensors and software to the internet, facilitating efficient data exchange and automation across diverse sectors. Its core characteristics—intelligence, connectivity, dynamic nature, enormous scale, sensing, heterogeneity, and security—underscore its transformative potential. In small cities, IoT can significantly enhance smart infrastructure, public safety, transportation, healthcare, energy management, environmental monitoring, economic development, and citizen engagement. Practical applications include smart streetlights, waste management systems, optimized traffic flow, remote health monitoring, smart grids, and air quality sensors, all of which contribute to a more efficient, sustainable, and livable urban environment. However, realizing IoT's full potential in small cities involves overcoming substantial challenges. Limited infrastructure, budget constraints, and a lack of technical expertise can impede deployment. Additionally, ensuring data privacy, integrating with existing systems, raising public awareness, navigating regulatory landscapes, and achieving interoperability are critical hurdles. Small cities must also consider scalability and environmental factors affecting IoT device reliability. Addressing these challenges through strategic planning, investment, and public engagement is essential. By doing so, small cities can harness IoT to improve the quality of life for residents, foster economic

growth, and enhance environmental sustainability, ultimately transforming into smarter, more connected communities.

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# Models of Emotional Intelligence: An Analytical Review

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## Abstract

*This analytical review examines various models of emotional intelligence (EI) to determine the most effective framework. Researchers have conceptualised emotional intelligence, a pivotal construct in understanding human behaviour and performance, through multiple models, each with unique components and methodologies. This paper critically examines the ability, mixed trait, and 9-layer models, paying particular attention to their theoretical foundations, methods of measurement, and real-world applications. The results conclude that the Ability Model is the most effective framework for evaluating and utilising emotional intelligence. The study draws this conclusion based on its clear structure, robust empirical support, and practical utility in diverse contexts.*

*Keywords:* Ability Model, Cognitive Abilitie, 9-layer Model, Empirical Validation.

## Introduction

The term "emotional intelligence" stems from Thorndike's 1920 concept of "social intelligence." In 1983, psychologist Howard Gardner introduced the theory of multiple intelligences, arguing that intelligence encompasses eight different forms. In the year 1990, American psychologists Peter Salovey and John Mayer [1] joined forces to articulate EI as the ability to observe and distinguish both one's own and others' emotions, leveraging this insight to direct one's thoughts and behaviours. Following the release of Goleman's book "Emotional Intelligence: Why It Can Matter More Than IQ" in 1995, the concept of EI surged in popularity [2]. Reuven Bar-On, acknowledged for introducing the term "emotional quotient," is a leading expert in the field of EI [3]. The trait EI model, introduced by Petrides and Furnham in 2001, includes abilities and moods related to emotions that individuals assess themselves using rating scales and questionnaires. These elements reside in the lower tiers of the personality hierarchy. [4] Dragas & Pappas (2017) developed the knowledge pyramid (8-layer model) [5], and Driggs and Papoutsis subsequently introduced the emotional intelligence

pyramid (9-layer model) [6], both incorporating Gardner's concepts of intrapersonal and interpersonal intelligences [7–10].

### Models of Emotional Intelligence

Figure 1 integrates sources cited from [11, 2, 12, 13, 8], featuring the models of Mayer & Salovey, Goleman and Baron, Petrides & Furnham, and ending with Drigas & Papoutsis's nine-layer model.

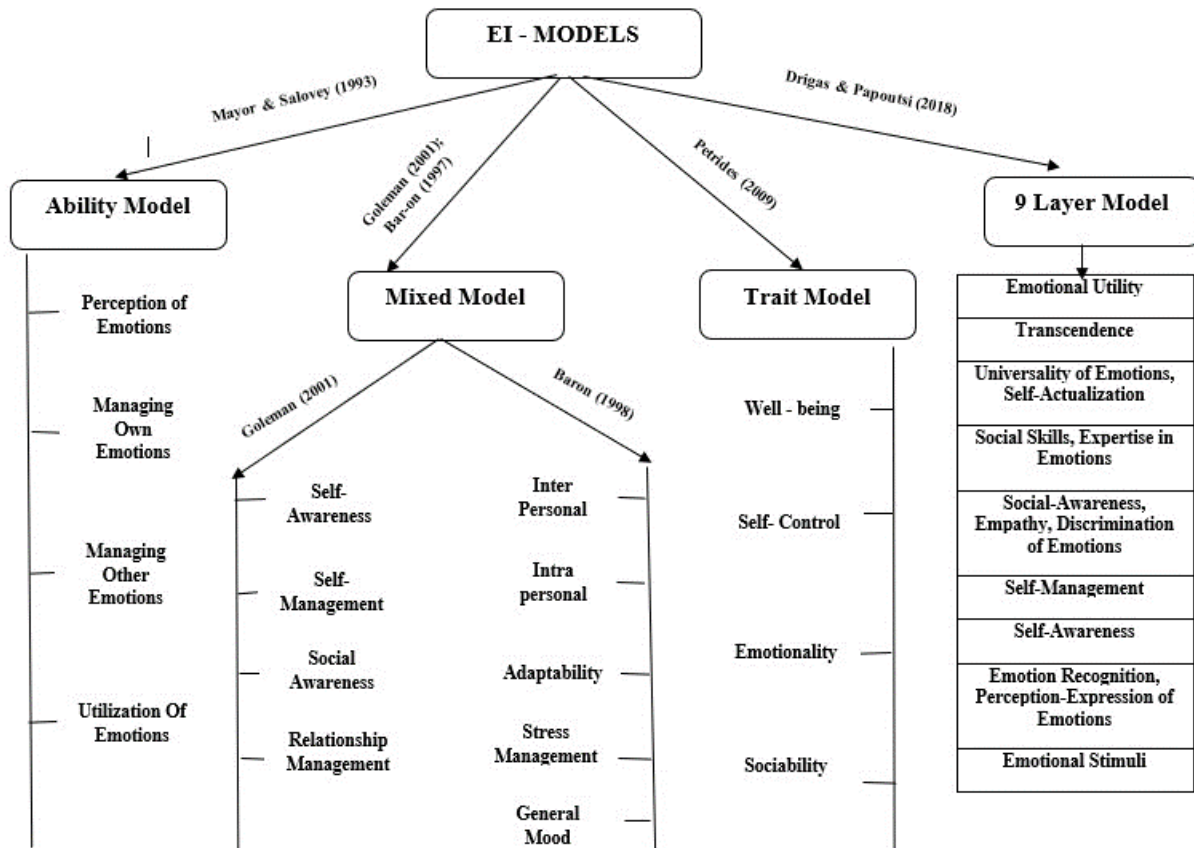


Figure 1: An overview of EI models

### Ability Model of EI

Salovey & John Mayer coined the term "emotional intelligence" in 1990 [14] and have subsequently explored its importance through additional research. Building on Gardner's research and theories about personal intelligence, they devised an ability-based model of EI. Four components make up the ability model: (a) recognising emotion, (b) using emotion to aid thinking, (c) understanding emotion, and (d) managing emotion [15, 16]. As stated in [17], "the four branches operate in a hierarchical manner, where emotion perception serves as

the foundational or lowest branch and emotional management represents the advanced or highest branch." They also clarified the following aspects: (a) recognising emotions involves the capacity to recognise emotions within faces and images; (b) using emotions to enhance cognition (self-emotion regulation) entails utilising emotional information and directionality to improve thinking; (c) understanding emotions (managing others' emotions) involves containing the capability to interpret emotional cues in relationships, transitions between emotions, and emotional language; and (d) emotional management refers to the skill of managing personal and interpersonal emotions for personal development [16].

### **Mixed Model of EI**

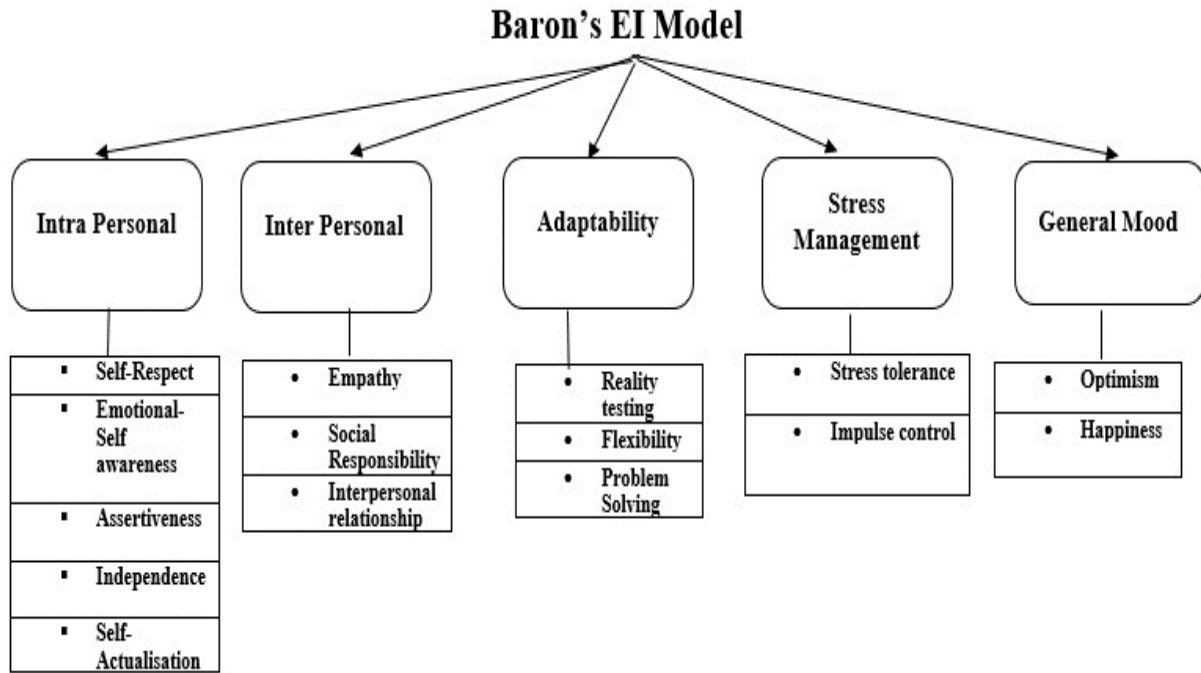
Goleman [18] and Bar-On [19] put forth inclusive mixed concept of EI. In the mixed framework of EI, there are benefits derived from both general disposition (trait) and competency (ability). According to [20], Bar-On theorises his mixed model, while Goleman prioritises practicality in his mixed model.

### **Goleman's Competency Model**

Goleman [21] outlined the original model to include five dimensions and twenty-five competencies of emotional intelligence. Dimension one (1) involves self-awareness: interpreting internal states, preferences, resources, and intuitions. Dimension two (2) is self-regulation: regulating internal states, impulses, and resources. Dimension three (3) concerns social skills: adeptness at eliciting desired responses from others. Dimension four (4) pertains to empathy: understanding the emotions, needs, and concerns of others. Dimension five (5) relates to motivation: emotional tendencies that guide or facilitate goal attainment. In 2001, Goleman [18, 22] restructured his model, separating it into four dimensions and twenty emotional intelligence competencies.

### **Baron's EI Model**

Bar-On [3], in his PhD dissertation, presented the idea of emotional quotient (EQ) as a complement to the intelligence quotient (IQ). Figure 2 shows that Baron's EI model is structured with five dimensions and 15 components. Bar's model of personality has faced criticism within scholarly research regarding the accuracy of self-ratings as a measure of EI [7, 23].



*Figure 2: Baron's EI Model*

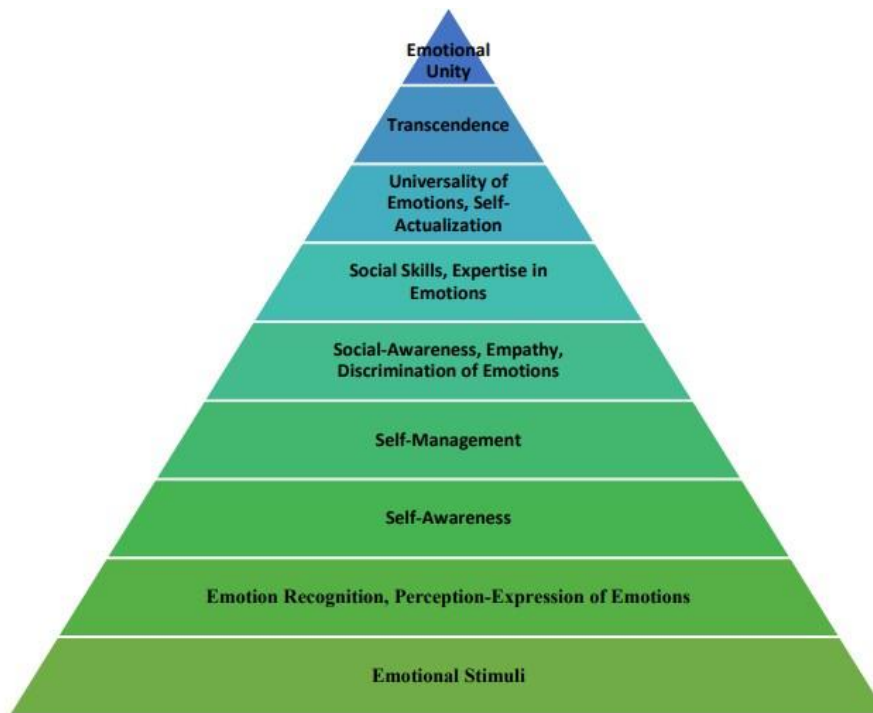
### Trait's Model of EI

Trait EI integrates fifteen emotion-related facets across personality dimensions, arranged into 4 key factors: well-being, self-control, emotionality, and sociability [20, 13]. According to [20], well-being enhances adaptation; self-control regulates urges and desires; emotionality encompasses sensing and conveying emotions for relationship maintenance; and social interaction influences social relationships and societal impact. Meanwhile, adaptability and self-motivation, while not assigned to specific factors, directly contribute to the overall trait EI score [13].

### The Pyramid of EI: The 9-Layer Concept

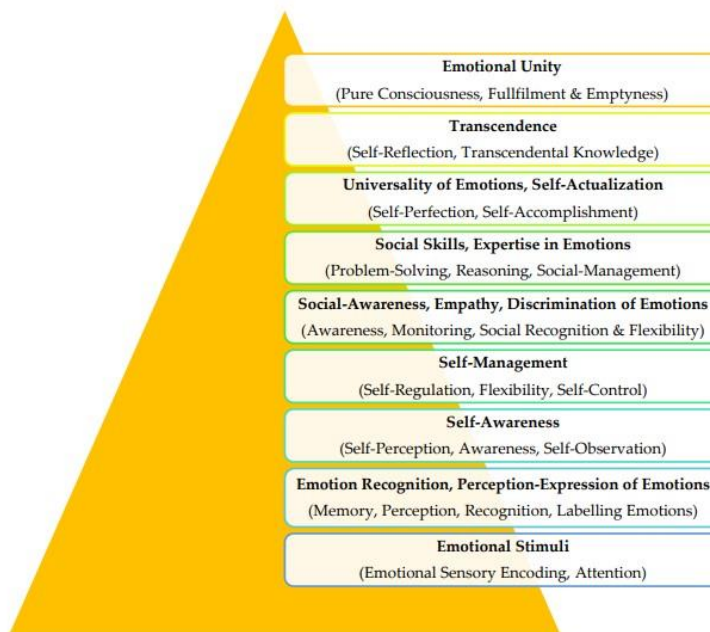
Drigas and Papoutsis [1] created the Pyramid of EI, known as the 9-Layer Model. "The layering of the emotional intelligence pyramid aligns with the hierarchical structure of knowledge intelligence functions" [16, 1]. According to [1, 18–20], the EI pyramid incorporates Gardner's ideas on intrapersonal and interpersonal intelligences. The nine-layer model employs a hierarchical structure to integrate elements from both the Ability Emotional Intelligence and Trait EI models. Figure 3 is sourced from [1]. The emotional intelligence pyramid consists of nine layers: (1) emotional stimuli; (2) emotion recognition; (3) self-

awareness; (4) self-management; (5) social awareness; (6) social skills; (7) universality of emotions; (8) transcendence; and (9) emotional unity.



**Figure 3: The emotional intelligence pyramid (9-layer model).**

Driggs [47] asserts that "emotional intelligence intertwines with cognition, metacognition, and metaemotion," as illustrated in Figure 4 [1].



**Figure 4: The Cognitive and metacognitive processes to move from a layer to another**

## Perspectives on the Mayer & Salovey Ability Model of EI

According to [24], Salovey and Mayer's four-pronged approach is considered the most scientifically rigorous model of EI. Reference [25] notes that Salovey and Mayer propose a more focused understanding of EI through their 'ability model'. However, as highlighted by [24], the model has its shortcomings compared to mixed models, such as narrower definitions and the exclusion of certain personality traits [25]. Zeidner [24] argued that a hybrid model is more effective in fitting the framework of EI by taking into account relationships among components of EI and personality traits such as neuroticism and extraversion, thereby recognising that emotional intelligence is not solely based on innate abilities.

### Key Findings for Why the Ability Model is the Best

- 1. Core Theory:** Mayer and Salovey [26] formulated the Ability Framework, which characterises emotional intelligence (EI) as cognitive abilities involved in processing and utilising emotional information. This model stands out for its clear and structured framework, contrasting with models that integrate cognitive abilities with personality traits and motivational factors.
- 2. Empirical Evidence:** Extensive empirical research confirms the model's reliability and validity. It demonstrates that the model's four branches: perceiving emotions, using emotions to facilitate thinking, understanding emotions, and managing emotions: are distinct yet interconnected skills [27].
- 3. Measurement Instruments:** The Mayer-Salovey-Caruso EI Test (MSCEIT) provides objective, measures based on performance of EI, thereby minimising the subjectivity and bias commonly found in self-report tools [28].
- 4. Predictive Accuracy:** Research also shows that the Ability Model's measures are strong predictors of outcomes such as academic performance, job performance, and mental health, exceeding the predictive power of cognitive intelligence and personality traits [29].
- 5. Versatility:** The model's emphasis on cognitive processing makes it relevant across diverse domains and cultures, facilitating the development of universally applicable EI training programmes and interventions [30].



## Conclusion

In conclusion, this analytical review has examined different models of emotional intelligence (EI) and assessed their efficacy in comprehending human behaviour and improving performance. Models such as the ability concept, mixed trait concept, and 9-layer paradigm have conceptualised EI, each offering distinct perspectives on its cognitive and emotional dimensions.

After critically analysing these models, considering their theoretical foundations, measurement techniques, and practical implementations, the research has pinpointed the Ability Model as the optimal framework for assessing and utilising emotional intelligence. This model distinguishes itself with its coherent and systematic approach, defining cognitive capabilities linked to emotional processing and control.

Furthermore, strong empirical evidence supports the Ability Model, showcasing its predictive effectiveness across diverse fields such as education, healthcare, and organisational contexts. Its practical value extends to guiding interventions designed to improve emotional skills like self-awareness, empathy, and effective coping mechanisms

While recognising the strengths of the ability model, it is crucial to acknowledge the continuous evolution and adaptation of EI models to accommodate diverse cultural contexts and individual differences. Future research should explore further the applicability of these models across various populations and settings, ensuring a comprehensive understanding and effective application of emotional intelligence in practical contexts.

To conclude, this review enhances our understanding of EI by endorsing the adoption of the Ability Model as a fundamental framework, backed by empirical evidence and practical relevance in improving human behaviour and performance.

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# A Study on Entrepreneurial Potential among Graduate Students

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## Abstract

*Now a day's entrepreneurship becomes a important role in the economic country. In some of the colleges in the curriculum the management added the course. Students are also interested in that. In such a way the college can give the insight to the students to get shine. The product or service may or may not be new or unique knout value must somehow be infused by the entrepreneur by receiving and allocating the necessary skills and resources. In recent years, fostering entrepreneurship has become a topic of the highest priority in public policy throughout most industrial countries. Well educated technical entrepreneurs are of paramount importance to economic development of any nation. The development of entrepreneurial talent is important to sustaining a competitive advantage in a global economy that is catalyzed by innovation. For this study 54 respondents were collected using structured questionnaire from the select college in the Coimbatore city. mean, standard deviation were used to analyze the collected data. The study reveals that the structured questionnaire was related with the each variable.*

*Keywords: Entrepreneurial potential, students, entrepreneurs*

## Introduction

Now a day the students are very much interested in the entrepreneurship. The entrepreneurship related courses are been inculcated in the curriculum. The role of entrepreneurship in economic development, creativity, firm formation, job creation, and wealth creation has been emphasized in the entrepreneurship literature (Otache et al., 2019). Entrepreneurship has been viewed as a critical contributor and an economic engine of every country as it helps in creating new jobs, and increases innovation and competitiveness in the labor market (Barba-Sánchez et al. 2022). Entrepreneurship activities have been given importance in many Western countries and are also gaining more attention in developing countries. Many studies have identified entrepreneurial intention (EI) as one of the most significant predictors of entrepreneurial activities and behaviors (Krueger et al. 2000; Autio et al. 2001; Arasti et al. 2012). Hence, the focus of various contemporary researches has shifted from entrepreneurship to EI (Yu

et al. 2021). Indeed, the number of studies using EI as a research framework has increased since the early 90s, confirming the importance of EI aspect in several settings (Liñán and Fayolle 2015).

In addition, it is crucial for graduates to eventually alter their mindset from searching for jobs to creating jobs as a country's government will not be able to ensure sufficient job provision for all tertiary-level graduates in the future (Reuel Johnmark et al. 2016). University students should shift their focus towards entrepreneurial revolution (Nuan and Xin 2012; Jiang and Sun 2015). Considering this, it is important to understand the factors that affect the EI of students in order to nurture their future entrepreneurialism in their respective countries.

## **Review of Literature**

Norffadhillah rafa (2022) made an attempt on the effects of the need for achievement & entrepreneurial innovativeness on the entrepreneurial potential of the respondents. Impact of entrepreneurial mentoring is also analyzed. Data was collected through online due to the pandemic. Findings reveal that, there was a positive relationship between entrepreneurial personality & potential, entrepreneurial innovations of students. Megawati simanjuntak (2016) says that entrepreneurship plays a vital role in the economic development of any country & it can be linked to economic growth of any nations. The purpose research is to identify the education role & self – concept among UG students & influence towards their entrepreneurial potential. The data was analyzed by multiple regressions. The study reveals that self- concept was positively influence the entrepreneurial potential. Mareyke sumual Gilly (2023) this study aims to analyze & provide empirical evidence of entrepreneurial self-tension that exists in a person & the expertise of managing a business, which a person has for students. The findings show that the entrepreneurial potentials of students. Rengamani (2015) says entrepreneurship is the dynamic process of creating incremental wealth. An attempt was made to infer relationship between personal factors with dimensions of entrepreneurial traits as well as with overall interest towards entrepreneurship. The study concludes that there was a strong link between entrepreneurial venture in a country & the country's economic development. The research also indicates that business venture by the educated add more value to the economy as whole. Policy changes could there be incorporated so as to transform the self-financing institutions in Tamil Nadu, into institutions which are technopreneurail hubs, thus imbibing the students with entrepreneurial qualities as throbbing with the skills for entrepreneurship.

## Objectives of the Study

- To evaluate the level of entrepreneurial possible among students considering entrepreneurship as a career path.

## Framework of the Entrepreneurship Potential



## Analysis & interpretations

### Reliability analysis

#### Reliability Statistics

Cronbach's Alpha	N of Items
.709	10

### Interpretation

Generally, a Cronbach's alpha above 0.70 is considered satisfactory for many purposes, suggesting that the items in your measure are reasonably related to each other.

### Descriptive Analysis

S.No	Variables	N	Mean	SD
1.	Age	54	3.11	.718
2.	Area of Residing	54	1.54	.503
3.	Go straight for the goals	54	3.76	1.045
4.	Believe that unfortunate events occur because of bad luck.	54	2.93	1.242
5.	Like of solve complex problems	54	3.65	1.119
6.	Don't quit a task before it is finished	54	4.00	1.274
7.	Turns plan into action.	54	3.80	1.265
8.	See difficulties everywhere.	54	3.28	1.250
9.	Plan, my life based on how I feel.	54	3.78	10223
10.	Give-up easily.	54	2.44	1.383
11.	Am a hard worker.	54	4.13	.848
12.	Continue until everything is perfect.	54	4.24	.910

## Inference

On average, respondents scored 3.76 for their tendency to go straight for their goals, with a standard deviation of 1.045, indicating some variability in this trait among the sample. The average rating for this belief is 2.93, with a standard deviation of 1.242, suggesting some variation in the extent to which participants attribute unfortunate events to bad luck. On average, respondents reported a liking for solving complex problems with a mean score of 3.65 and a standard deviation of 1.119, indicating variability in preferences for engaging with complex tasks. The average score for this trait is 4.00, with a standard deviation of 1.274, suggesting some variability in the tendency to persist with tasks until completion. Participants, on average, scored 3.80 for their ability to turn plans into action, with a standard deviation of 1.265, indicating variability in this trait among the sample. The average rating for this belief is 3.28, with a standard deviation of 1.250, suggesting some variability in the tendency to perceive difficulties in various situations. On average, respondents reported planning their lives based on how they feel with a mean score of 3.78 and a standard deviation of 1.223, indicating some variability in this approach to life planning. The average score for this trait is 2.44, with a relatively high standard deviation of 1.383, suggesting considerable variability in the tendency to give up easily among respondents. Respondents reported being hard workers with an average score of 4.13 and a standard deviation of 0.848, indicating some variability in self-perceived work ethic. On average, respondents scored 4.24 for their tendency to continue working on tasks until everything is perfect, with a standard deviation of 0.910, suggesting some variability in this trait among the sample.

## Conclusion

The country urgently needs a strong push to boost its economic growth. Studies show a clear connection between starting new businesses in a country and its economic progress. Additionally, research suggests that when educated graduates start businesses, it greatly benefits the entire economy.

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# Role of Consumer Mindset in E-Commerce Platforms in Chennai City

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## Abstract

*E-commerce has been playing a vital role in the future development of financial sectors and paves the way to doing business in an emerging economy. The article's primary purpose is to obtain quantitative data on the reality of E-commerce platforms in India to explain the industry's growth and its impact on customer behaviour. This paper draws on significant literature also and it also examines customer behaviour using questionnaires. Moreover, the future evolution of online purchasing will be assessed and a thorough comparison of consumer performance from corner to corner. This paper supports the swot topics, which include modern trends and problems in online buying, as well as input consumer behaviour elements. Furthermore, the study's findings disclose that internet customer trust and perceived risk have significant influence on their purchasing decisions.*

**Keywords:** *E-commerce, consumer behaviour, online purchasing, purchasing decision*

## Introduction

The term "e-commerce," or electronic commerce, refers to the online purchasing and selling of goods and services. Electronic or internet commerce are other names for e-commerce. These services are offered online via a network of computers. Data, finances, and money transactions are all categorized as e-commerce. There are four possible ways to conduct these commercial transactions: business-to-business (B2B), business-to-customer (B2C), customer-to-business (C2B), and business-to-business (B2B). Conventionally, e-commerce is defined as any business transaction conducted via the internet. E-commerce websites include Amazon, Flipkart, Shopify, Myntra, Ebay, Quikr, and Olx, among other online retailers. Global retail e-commerce is expected to reach \$37 trillion by 2025.

### Advantages of E-Commerce

There are many advantages of e-commerce including

- Companies can reach a wider audience.
- Shopping from home is more convenient for the consumer.
- Consumers can easily comparison shop across different brands.
- There's a greater selection of goods available.

### Disadvantages of E-Commerce

While there are many benefits of ecommerce, there are some potential downsides as well. Below are some common disadvantages:

- Less personalized service since there's no interaction with sales clerks.
- Shipping charges and waiting for a product to arrive.
- Inability to see a product before buying.
- Inconvenience of returning products.
- Security issues of websites may put consumer information at risk.

### History of E-Commerce

E-commerce began with the development of the telephone at the turn of the twentieth century. If you define e-commerce as the networking of business communities and the digitization of business information, EDI (Electronic Data Interchange) is commonly regarded as the start of ecommerce. Since the 1960s, large corporations have been investing in the development of EDI. It wasn't until the 1980s that it acquired widespread acceptability. Over the last 30 years, the definition of electronic commerce has evolved. Electronic commerce was originally defined as the electronic facilitation of economic transactions utilizing technology such as Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT). Both of these technologies were introduced in the late 1970s and allow firms to exchange commercial documents such as purchase orders and invoices electronically.

### Literature of Review

Raghu (2022) in their study finds that E-commerce will spread rapid and continuous growth in India and it provide several kinds of opportunities to the retailers, producers, the people and wholesalers in the future.

Bhat (2016) in their research concluded that, a nation's progress and development can be greatly aided by e-commerce, if it is given the proper impetus and favourable environmental conditions to thrive.

Shahjee, R., (2016) states that an internet business has provided a platform for businesses to display their variable products and to streamline the process for customers to quickly ascertain the outcomes of their premium, which was previously challenging with general showcasing. However, in reality, a portion of the issues that face online businesses are related to lack of awareness about PCs and the internet among consumers, especially those in developing nations.

Shettar, M., (2016) in his study states concluded that the growth of E-commerce volumes in India is attracting the attention of players around the globe. E-commerce creates new opportunities for business it also creates new opportunities for education and academics. It appears that there is tremendous potential for providing E-business education.

Goele, S., Chanana, N., (2012) makes reference to in their examination, that a portion of the ventures like Travel and the travel industry, electronic, equipment items, and attire will blast in the coming future with the assistance of web-based business. A portion of the variables which will add to this development are M-trade, substitution ensures, distinctive installment modes, coordination, and shipment choices, item quality norms, client care administrations.

Awais Muhammad and Samin Tanzila (2012) demonstrate how the globe has become a global village due to internet use. People are now closer to one another and at shorter distances thanks to the Internet. Commerce is a country's backbone, and it will be reinforced if it is supported by electronic instruments, of which e-commerce is an essential component.

Dutta and Dutta, (2009) found that the biggest influence on total customer happiness comes from tangibles which comprises bank locations, ATMs located in handy locations, telebanking, and online banking services, has the biggest gap between client expectations and perceptions. The report identifies a significant cause for concern for the Indian banking sector because all of the banks in this category have a significant service quality disparity.

Ozok (2007) determined eleven factors that support general uniformity in customer relationship management for e-commerce. These elements include the following: uniformity in transaction procedures, uniformity in website design, uniformity in navigation, uniformity in promotions, uniformity in in-stock indicators, uniformity in product variety, uniformity in

fraud prevention, uniformity in product guarantees, uniformity in overall site fairness, and uniformity in return policies.

Rust and Chung, (2006) suggests that learning about customers' actions (as well as their perceptions and emotions) during a variety of e-commerce interactions, in addition to what they do in a single online interaction.

Hsieh (2005) in his study explain the factors that a company should take into account to persuade clients to eventually include the SST that the company offers into their daily routine after they have at least given it a try. The conclusion is that a company should take the time to determine whether they are prepared before deciding to add SST to their line of products or services.

Snellman and Vihtkari, (2003) in their study reveal that, both technology-based and interpersonal service interactions, failures are typically rather prolific. The two most typical reasons for dissatisfaction in interpersonal service contacts are rude or unpleasant treatment and time-related issues. However, technology, service design, or process flaws are frequently linked to dissatisfaction in technology-based encounters.

Chou and Chou (2000) reveal that, Worldwide banks today see a vast potential market for online banking due to the astounding expansion of electronic commerce. Establishing and executing a strong internet system is vital for a bank to offer its clientele effective services. Network technologies, platform and standards, scalability, security, and intelligent software agents are some of the technological factors that need to be taken into account when adjusting to a particular online environment. Banking companies must carefully choose the right networking technologies to cater to the internet market in order to meet the demands of international business communities. Taking responsibility for risk and liability increases when banks choose electronic commerce as one of their core business operations.

### **Statement of the Problem**

In India, e-commerce is regarded as a massive opportunity with a high success rate. In the market, there are numerous large and small businesses. Are they truly going to last in the market for a long time, and do they have a good chance of succeeding? What do customers anticipate from them, and are they prepared to meet those expectations? The goal of the research is to figure out how the E-commerce platform affects customer mindset.

## Need for the Study

Digital marketing is a broad word that refers to the focused, measurable, and interactive marketing of products and services through the use of digital technology to reach and convert leads into customers, as well as keep them. The impact of digital marketing on e-commerce sites is examined in this study, which aids in understanding the digital era's current factors, promotional techniques, and raising awareness of e-commerce sites.

## Objectives of the Study

1. To gain a better understanding of the current state and trend sine-commerce.
2. To determine the factors that determine on consumer mind sets in the e-commerce platforms.

## Research Methodology

Primary and secondary data is used for the research. Primary data is collected through questionnaire and personal comments from the respondents. The data is also collected from secondary sources like internet, magazines, Journals etc. Five-point Likert scale is used for the study. Simple random sampling is used as sampling procedure. It is taken according to geographic location. Total sample size is 250. The statistical tool used for the study is factor analysis by using SPSS.

## Result

Factor analysis helps identify key elements such as website usability, perceived trust and security, and the quality of product information and reviews. It also highlights the importance of competitive pricing and promotional offers in shaping consumer preferences. By analyzing these factors, businesses can optimize their strategies to enhance user satisfaction and drive sales in the competitive e-commerce environment. This analytical approach enables a deeper understanding of consumer priorities and behaviors, facilitating more targeted and effective business decisions. A systematic reduction is highly essential for a consistent and unbiased estimate on a unit of the sample. For this purpose, the researcher has applied exploratory factor analysis to obtain the result. The factor analysis by the principal component method and varimax rotation applies on the sixteen variables of consumer mindsets. This attempt is applied to reduce the variables into predominant factors. The data reduction process is based on a grouping of likelihood variables with high

correlation coefficients.

<b>Table 1 KMO and Bartlett's Test for factors that determine on consumer mindset</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.935
Bartlett's Test of Sphericity	Approx. Chi-Square	2688.145
	Df	153
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) test brings out how data is sufficiently suited for factor analysis. It tests the sampling adequacy for each variable. KMO measure should be greater than 0.7 for a satisfactory factor analysis to proceed. Bartlett test of Sphericity checks if the variables are sufficiently correlated or not. This test should have a significance level of <0.05, to prove that the variables are valid and fit for a factor analysis. If not, it is not appropriate for factor analysis.

<b>Table 2 Rotated component matrix for factors that determine on consumer mindset</b>		
	Component	
	Trustworthiness	User experience
Company profile	.571	
Identity	.348	
Security certificate	.244	
customer service	.699	
product information	.737	
terms condition	.455	
Website		.559
Cost of delivery		.237
Speed of delivery		.268
Simplicity		.281
privacy		.822
information		.494
Ability to track		.365
speed		.630
Web site interface		.653
Personalized offers		.392
Source: Computed Data		

The aim of the rotated component matrix in table 2 is to reduce the number of factors based on the loadings of variables. It can be noted from the rotated component matrix table that the factors that determine on consumer mindset include sixteen statements which are reduced to two predominant factors. The loaded factors, along with the variables are presented under each factor.

Trustworthiness is the quality of being reliable and dependable, earning the confidence of others through consistent actions and integrity. It involves honesty, where individuals are truthful and transparent in their dealings. A trustworthy person keeps their promises and commitments, demonstrating accountability and responsibility. They are also perceived as having strong moral principles, ensuring their decisions and actions are ethical. In essence, trustworthiness fosters a sense of safety and confidence, encouraging positive and lasting relationships.

User experience (UX) encompasses all aspects of a user's interaction with a product, service, or system. It focuses on creating intuitive, efficient, and enjoyable experiences, ensuring users can easily achieve their goals. Good UX design considers usability, accessibility, and emotional impact, making the interaction seamless and satisfying. By prioritizing user needs and preferences, businesses can enhance customer satisfaction, loyalty, and engagement. Ultimately, a positive user experience drives the success and adoption of products and services.

## **Discussion**

The rigorous process involved employing exploratory factor analysis (EFA) to condense sixteen variables associated with consumer mindsets into two primary factors, such as trustworthiness and user experience. Employing the principal component method and varimax rotation ensures that the factors extracted are independent and interpretable, crucial for obtaining unbiased estimates from the sample. The emphasis on grouping variables with high correlation coefficients underscores the importance of identifying cohesive patterns in consumer behavior. Furthermore, the Kaiser-Meyer-Olkin (KMO) test validates the adequacy of the data for factor analysis, requiring a measure above 0.7 to proceed confidently. Similarly, Bartlett's test of Sphericity verifies the interrelationships among variables, ensuring they are sufficiently correlated to justify factor analysis. This methodical approach not only reduces complexity but also provides a structured framework to understand and predict consumer preferences effectively in e-commerce contexts.

Through factor analysis, the identification of trustworthiness and user experience as predominant factors reflects their pivotal roles in shaping consumer perceptions and behaviors. Trustworthiness encompasses aspects such as reliability, security, and ethical conduct of the e-commerce platform, influencing consumer trust and loyalty. Meanwhile, user experience encompasses usability, navigation ease, and overall satisfaction, directly impacting user engagement and repeat purchases. By presenting loaded factors and variables under each factor in the rotated component matrix table, the research provides clear insights into which aspects of consumer mindset are most influential. This analytical clarity enables businesses to prioritize improvements in trustworthiness and user experience, thereby enhancing customer satisfaction, retention, and ultimately, business success in the competitive e-commerce landscape.

## Conclusion

The study on the impact of e-commerce platforms on consumers' mindsets, focusing on customers in Chennai city, highlights significant findings. Through an exploration of factors such as trustworthiness and user experience using methodologies like exploratory factor analysis, the research has underscored their crucial roles in shaping consumer behaviors. Factors like reliability, security, usability, and overall satisfaction emerged as pivotal in influencing consumer perceptions and preferences in e-commerce transactions. The validation of data adequacy through tests like the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity ensures the robustness and reliability of the study's findings. These insights provide valuable guidance for businesses seeking to enhance their e-commerce strategies, improve customer engagement, and foster long-term relationships with consumers in Chennai and beyond. By prioritizing trustworthiness and optimizing user experiences, businesses can effectively meet consumer expectations and drive sustainable growth in the competitive e-commerce landscape.

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# A Pragmatic Look at AI in Indian Banking – A Study of Select Banks

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## Abstract

*The banking sector has emerged as a resurgent sector in India's economy, actively integrating technology to innovate and improve services. Artificial Intelligence (AI), a rapidly advancing field globally, offers a diverse array of functionalities such as Chatbots and Robo-advisers, transforming how banks interact with customers. Indian banks are notably at the forefront of adopting AI, harnessing its capabilities to drive operational efficiency and enhance customer experiences. This transformation has been catalyzed by rapid technological progress, fundamentally reshaping how banks operate and interact with customers. This paper examines the specific applications of AI within India's banking industry, emphasizing its benefits and impediments. The significant growth of AI in banking also underscores the critical importance of robust cybersecurity measures to mitigate risks associated with increased digitalization.*

*Keywords: Artificial Intelligence, Applications, Benefits and Impediments*

## Banking – an Overview

Banking is the essential function of managing and safeguarding finances, pivotal to facilitating economic activities by enabling the flow of money. The evolution of banking in India has seen a remarkable shift from traditional cash transactions at counters to the seamless availability of services round-the-clock. Fintech innovations have played a pivotal role in revolutionizing payments and lending practices, pushing banking to the forefront of technological change. In India, the banking sector has experienced a significant resurgence, marked by profound transformations driven by rapid technological advancements.

A pivotal impact of technology on banking has been the widespread adoption of digitalization. Online and mobile banking platforms now offer customers convenient access to a comprehensive range of banking services directly from their smartphones or computers. This

digital revolution has not only streamlined banking operations, enhancing efficiency and speed, but has also greatly enriched the overall customer experience. Furthermore, banks have forged strategic partnerships with fintech firms, harnessing their technological capabilities to introduce pioneering services such as instant loans, digital KYC processes, and AI-driven customer service solutions.

## **Introduction to AI**

Artificial Intelligence (AI) is a transformative technology that enables machines to simulate human intelligence processes. It encompasses a broad spectrum of techniques and approaches aimed at allowing machines to perceive, comprehend, and act in ways that traditionally required human intelligence. AI technologies work synergistically, leveraging vast amounts of data to extract insights, make informed decisions, and automate tasks across various industries and domains.

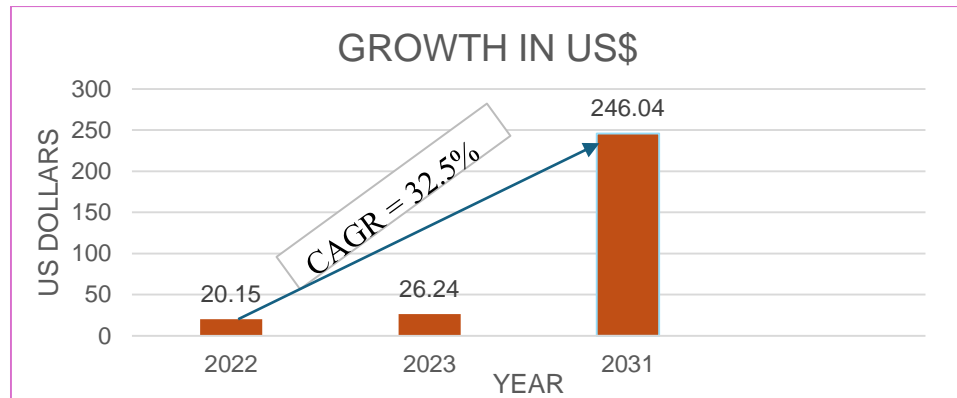
The continuous advancement of AI is driven by innovations in algorithms, increased computational power, and the availability of big data. While AI offers tremendous opportunities for efficiency, productivity, and innovation, it also raises ethical and societal considerations regarding privacy, bias, job displacement, and the impact on human decision-making processes.

## **Artificial Intelligence in Banking**

The incorporation of Artificial Intelligence (AI) technology has significantly transformed the landscape of banking services, which are among the most heavily utilized. AI has immense potential to revolutionize Indian banking by reducing errors, improving customer experiences, and optimizing operations. To expand their customer base, banks must continuously enhance their services while prioritizing robust security measures. AI implementation enables banks to efficiently process vast amounts of data, extracting valuable insights about their customers. The importance of AI surged notably in response to the global impact of the COVID-19 pandemic. Overall, AI represents a crucial tool in modernizing banking practices, ensuring resilience, and meeting evolving customer expectations in an increasingly digital era.

The Global Artificial Intelligence (AI) market in Banking, Financial Services, and Insurance (BFSI) was valued at USD 20.15 billion in 2022. It is projected to increase from USD 26.24 billion in 2023 to USD 246.04 billion by 2031, with a compound annual growth rate (CAGR) of 32.5% during the forecast period from 2024 to 2031.

**Figure: 1 – Global AI Market Size**



Source: Internet

## Objectives

The chief objectives of the study are

- To study the key applications of AI in banking.
- To study about the AI tools used by top commercial banks in India.
- To identify the benefits and impediments associated with AI adoption in banking

## Methodology

- The study is descriptive in nature and is based on secondary data.
- The data is collected from various sources like journals, reports, various bank portals and internet sources. The inferences drawn from the study are purely based on secondary data.

## AI in Indian Banking – The Current Scenario

Today, the major commercial banks in India have embraced AI technology. The present study throws light on the application of AI in select banks viz. SBI, HDFC Bank, ICICI Bank and Axis Bank.

### State Bank of India (SBI)

State Bank of India (SBI), India's largest public-sector bank serving 420 million customers, has embarked on its AI journey with a focus on enhancing both employee and customer experiences. SBI has introduced SIA, an AI-powered chat assistant developed by Payjo, a startup from Silicon Valley and Bengaluru. SIA efficiently handles customer inquiries in real-time and assists with everyday banking tasks, simulating the role of a human bank

representative. Since its launch, SIA has successfully managed millions of queries from thousands of customers. According to Payjo, SIA is capable of handling up to 10,000 inquiries per second or 864 million in a day, showcasing its robust capacity comparable to major tech platforms like Google.

### **HDFC Bank**

HDFC Bank has developed an AI-based chatbot named "Eva," created by Bengaluru-based Senseforth AI Research. Since its inception, Eva (Electronic Virtual Assistant), has handled over 2.7 million customer queries, engaged with more than 530,000 unique users, and conducted 1.2 million conversations. In accordance with the bank, Eva possesses the capability to gather information from numerous sources and provide concise responses in less than 0.4 seconds. Soon after its launch, Eva responded to over 100,000 queries from customers across 17 countries worldwide. The introduction of Eva enables HDFC Bank customers to instantly access information about the bank's products and services without the need for searching, browsing, or making calls. Moreover, Eva improves over time by learning from its interactions with customers.

### **ICICI Bank**

ICICI Bank, India's second-largest private sector bank, has implemented software robotics across more than 200 business processes throughout its various functions. This technology, known as "robotic software," aims to automate repetitive, high-volume, and time-consuming tasks that mimic human actions. ICICI Bank is a pioneer in India and among the few globally to adopt this advanced automation technology. Additionally, in February of this year, ICICI Bank introduced its AI-based chatbot named iPal. Since its launch, iPal has engaged with 3.1 million customers, addressing approximately 6 million queries with an impressive accuracy rate of 90 percent. The bank is currently integrating iPal with popular voice assistants such as Cortana, Siri, and Assistant to enhance customer interaction capabilities.

### **Axis Bank**

Axis Bank, India's third-largest private sector bank, introduced an innovation lab named "Thought Factory" last year aimed at expediting the creation of advanced AI technology solutions for the banking industry. Most recently, Axis Bank launched a new app called Conversational Banking, which leverages AI and NLP (Natural Language Processing) to assist

users with both financial and non-financial transactions, address frequently asked questions, and connect with the bank for various products including loans.

### **Applications of AI in Banking**

Artificial intelligence has become an integral part of our world, and banks have already started integrating this technology into their products and services. The applications of AI would go a long way in vigorous growth of the banks. The major AI applications in the banking industry are elucidated:

#### **Cybersecurity and Fraud detection**

Every day, numerous digital transactions such as bill payments, money withdrawals, check deposits, and more occur through apps and online accounts. Consequently, the banking sector faces an increasing imperative to enhance its fraud detection capabilities. Artificial intelligence (AI) plays a pivotal role in this scenario. By leveraging AI and machine learning, banks can detect fraudulent activities, identify system vulnerabilities, mitigate risks, and bolster the security of online financial operations. Moreover, AI enables banks to proactively manage cyber threats. Through continuous monitoring and predictive capabilities, AI empowers financial institutions to preemptively respond to potential cyberattacks, safeguarding employees, customers, and internal systems alike.

#### **Loan and Credit Decisions**

Banks are increasingly adopting AI-driven systems to enhance the accuracy, security, and profitability of their loan and credit decisions. While traditional methods heavily rely on credit history, scores, and references, AI-powered systems can analyze customer behavior and patterns even for those with limited credit histories, accurately assessing their creditworthiness. These systems also provide proactive alerts to banks regarding behaviors that could heighten default risks. In essence, such technologies are pivotal in reshaping the landscape of consumer lending.

#### **Chatbots**

Chatbots represent a prime example of how artificial intelligence is effectively applied in the banking sector. Unlike human agents with fixed hours, chatbots operate 24/7 once deployed. They continuously learn from individual customer usage patterns, enabling them to efficiently comprehend user needs.

Integrating chatbots into banking apps ensure continuous availability for customers. Furthermore, by analyzing customer behavior, chatbots can deliver personalized support, streamline communication processes like emailing, and suggest appropriate financial products and services. This integration not only enhances customer service but also optimizes operational efficiency in banking.

### **Data Collection and Analysis**

Every day, banks and financial institutions handle millions of transactions, creating an immense volume of data that poses significant challenges for manual processing by employees. The sheer scale makes accurate structuring and recording impossible without errors.

Innovative AI and advancements in banking software development address these challenges by enabling efficient data collection and analysis. This not only enhances user experience but also facilitates fraud detection and informed credit decisions based on comprehensive data insights.

### **Risk Management**

External global factors like currency fluctuations, natural disasters, or political unrest can significantly affect the banking and financial industries. In such volatile times, making cautious business decisions becomes paramount. Generative AI services in banking provide predictive analytics that offer insights into future scenarios, enabling proactive preparation and timely decision-making. AI in banking also aids in identifying risky loan applications by assessing the likelihood of clients defaulting on loans. By analyzing historical behavioral patterns and smartphone data, AI predicts future behaviors, thereby enhancing risk assessment capabilities

### **Customer Experience**

Customers today seek superior experiences and enhanced convenience. They can now open bank accounts effortlessly from their smartphones, a convenience that continues to drive innovation. Integrating artificial intelligence into banking and financial services further elevates the consumer experience by streamlining processes and increasing convenience. AI technology accelerates the recording of Know Your Customer (KYC) information, minimizing errors and saving time. Automated eligibility assessments for services like personal loans eliminate the need for manual processes, offering clients a hassle-free experience. Moreover, AI-based software reduces approval times for services such as loan disbursements. In customer service, AI

ensures accurate capture of client information during account setup, ensuring a seamless experience for customers.

### Regulatory Compliance

Banking operates within a heavily regulated sector worldwide, where governments enforce regulations to prevent financial crimes and ensure banks maintain acceptable risk profiles to prevent large-scale defaults. Traditionally, banks rely on internal compliance teams to manage these challenges, which are time-consuming and require substantial investments when handled manually. Moreover, compliance regulations frequently evolve, necessitating continuous updates to bank processes and workflows. AI in banking leverages deep learning to interpret new compliance requirements for financial institutions, enhancing decision-making processes. While AI cannot replace compliance analysts entirely, it significantly accelerates and streamlines their operations, making them more efficient.

### Benefits of AI in Banking

Artificial Intelligence (AI) has transformed the banking sector, revolutionizing operations, enhancing customer satisfaction, and bolstering security in dynamic ways. The primary advantages of integrating AI in banking can be discerned from figure-2.

### Increased Efficiency and Productivity

AI improves process efficiency by automating tedious and repetitive tasks typically carried out within organizations. This not only boosts productivity but also liberates bank staff to focus on more critical and complex tasks, thereby enhancing their contribution to value-added activities

**Figure: 2 – Benefits of AI in Banking**





### **Improved Customer Service**

AI technologies such as chatbots and virtual assistants deliver 24/7 customer service, providing instant responses and personalized assistance. This capability enhances customer engagement and satisfaction by ensuring a seamless and efficient service experience.

### **Cost Reduction**

AI eliminates the challenges and expenses associated with manual operations by automating various processes involved in operational execution. It facilitates the automation of banking services across multiple areas, including customer relations and post-purchase operations, ensuring efficient resource allocation and minimal overhead costs.

### **Risk Reduction**

AI strengthens risk management in banking through advanced tools for detecting fraud, assessing credit risks, and monitoring regulatory compliance. By analyzing extensive datasets, AI systems can pinpoint patterns and anomalies that signal fraudulent activities or potential risks, facilitating proactive management and mitigation strategies..

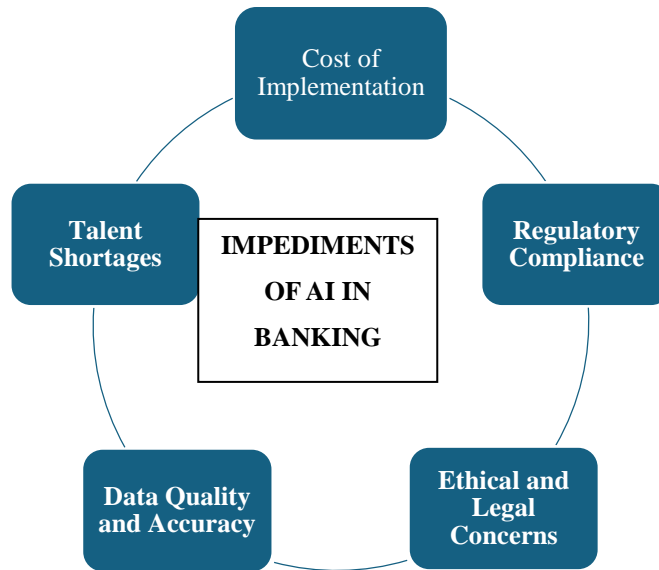
### **Improved Data Security**

In today's landscape where data breaches pose significant risks and costs, AI plays a crucial role in bolstering the security framework of banking institutions. AI-powered systems continuously monitor and analyze transactions and user behaviors, promptly detecting and responding to threats in real-time. This proactive approach ensures the protection of sensitive financial information against potential security breaches.

### **AI in Banking - Impediments**

The banking sector encounters several significant challenges as it embraces AI in its pursuit of maximizing its potential. The major impediments associated with the application of AI in banking can be perceived from figure-3.

**Figure: 3 – Impediments of AI in Banking**



### **Cost of Implementation**

When evaluating the cost-effectiveness of implementing AI in banking, it is acknowledged that initial costs can be substantial. These include investments in new infrastructure, system changes, and hiring technology specialists. It is crucial to carefully estimate and assess these expenses against the future benefits that the bank stands to gain from its AI investment.

### **Regulatory Compliance**

AI must adhere to legal frameworks such as GDPR and other financial regulations governing the market. Ensuring compliance of AI systems with these laws can be challenging, yet it is essential to prevent legal consequences and maintain customer trust.

### **Ethical and Legal Concerns**

The integration of AI in banking has raised significant ethical and legal concerns, including privacy issues, security risks, lack of transparency, and algorithmic bias. Privacy concerns arise from how AI systems handle personal data without proper permissions, while security risks involve vulnerabilities that may lead to operational disruptions and financial losses due to malicious attacks. Transparency issues stem from challenges in understanding data sources and how AI outputs decisions. Additionally, algorithmic bias is a critical concern, as AI

systems can perpetuate biases from their training data, resulting in unfair and discriminatory outcomes.

Addressing these ethical challenges is imperative for the responsible deployment of AI in banking. It requires banks to establish stringent guidelines that prioritize fairness, transparency, and accountability in their AI applications. By doing so, they can ensure ethical and equitable use of AI technologies while maintaining trust and safeguarding customer interests.

### **Data Quality and Accuracy**

The efficacy of AI relies significantly on the quality of the data it processes. Inconsistencies, incompleteness, or errors in data can result in inaccurate outputs and decisions. Hence, banks need to prioritize investment in robust data management systems to ensure that their AI tools access clean, accurate, and comprehensive datasets.

### **Talent Shortages**

There is fierce competition for positions due to strong demand for skilled AI and data science professionals in the banking industry. Major challenges include recruiting and retaining AI talent, as well as effectively training the existing workforce to collaborate seamlessly with AI systems.

### **Conclusion**

To conclude, AI offers numerous benefits to the banking sector, transforming business processes and customer services in India. AI is utilized for regulatory compliance, fraud detection, and assessing creditworthiness, enhancing efficiency and enabling personalized services. It also supports broader goals like financial inclusion. While digitalization advances traditional banking models, it exposes institutions to increased cybersecurity threats. Looking ahead, AI holds a promising future in finance. More banks are embracing AI-powered solutions to automate tasks, streamline operations, and deliver seamless, personalized customer experiences. This innovation not only drives industry advancement but also reshapes the competitive landscape, positioning these banks as leaders in technological transformation. At the same time, it is inevitable on the part of the banks to curb the cyber crimes and ensure cyber security so as to protect the interests of the customers.

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# Augmented Reality (AR) in Retail: Enhancing Customer Experience and Business Operations

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## Abstract

*Augmented Reality (AR) is revolutionizing various business sectors by merging digital elements with the physical world to create immersive and interactive experiences. This paper explores the application of AR in the retail industry, focusing on how it enhances customer experience and optimizes business operations. AR enables customers to virtually try products before purchasing, addressing issues of dissatisfaction and return inconvenience. For example, IKEA's AR app allows users to visualize furniture and décor in their own homes, thereby improving purchasing confidence and satisfaction. Beyond retail, AR has transformative potential in training, design, and modeling, offering businesses innovative ways to engage users and streamline processes. This paper examines the current AR applications in retail, their impact on customer satisfaction, and the future prospects of AR technology in enhancing retail strategies.*

*Keywords: Augmented Reality, Retail, Customer Experience, Virtual Try-On, IKEA AR App*

## Introduction

In the rapidly evolving world of retail, businesses are constantly seeking innovative solutions to enhance customer experience and streamline operations. Augmented Reality (AR) has emerged as a ground breaking technology that merges digital content with the physical world, offering immersive and interactive experiences. Unlike Virtual Reality (VR), which creates entirely digital environments, AR overlays digital information onto real-world settings, enriching the user's interaction with their environment. This technology has gained traction across various sectors, but its application in retail is particularly transformative. AR enables customers to visualize and interact with products in their own space before making a purchase, addressing common issues such as uncertainty and dissatisfaction.

For instance, AR applications like IKEA's Place app allow users to see how furniture and home décor items will look in their homes, thereby enhancing decision-making and reducing return rates. Beyond improving customer experience, AR also holds promise for

other business areas such as training, design, and logistics. Its ability to overlay 3D models onto physical spaces offers significant advantages in visualizing product designs and optimizing operational processes. This paper explores the role of AR in the retail sector, examining its benefits, current applications, and future potential. By highlighting key examples and analyzing the impact of AR on customer satisfaction and business operations, this study aims to provide insights into how AR technology is shaping the future of retail.

## Augmented Reality

Augmented Reality (AR) is an advanced, interactive enhancement of the real world, created using digital visuals, sounds, and other sensory inputs through holographic technology. It merges real-world elements with computer-generated content to provide a richer, more engaging experience. For example, Pokémon Go lets users find Pokémon in their real surroundings while animated characters appear on their screens.

AR has many uses in business, including marketing, manufacturing, training, and logistics. With its wide range of applications, AR offers significant potential that almost any business can use and benefit from.

The anticipation that AR will quickly dominate the market stems from the fact that the necessary hardware is already available and widely used. Nearly everyone has a mobile phone today, which is not just for entertainment but also for training, work, and business purposes. By simply installing an AR application or a standard Augmented Reality Browser, users can easily engage with mixed reality.

Here are a few business areas where AR has made significant strides

- **Training and education:** AR enables employees to experience real-life scenarios rather than just reading about them. It allows companies to create personalized training programs that enhance employees' skills and confidence in their roles.
- **Design and modelling:** AR offers significant advantages. It enables businesses to overlay 3D models onto physical spaces, enhancing presentations and marketing materials. Designers can also use AR to view accurate models of products early in the design and development stages, ensuring their plans are well-developed and effective.
- **Retail:** AR addresses the common issue of dissatisfaction with purchases and the inconvenience of returns. It allows customers to try products virtually before buying, which enhances customer satisfaction and increases sales. For instance, IKEA's app

enables customers to visualize how furniture and home décor items will look in their own spaces before buying them.

- **Repair and Maintenance:** AR helps even those with little experience to diagnose issues and carry out repairs by providing clear, step-by-step instructions through AR overlays. This enhances customer satisfaction by minimizing downtime and reducing costs.

For example, BMW has recently introduced an AR feature in their service app, which offers interactive repair guides and 3D visuals for identifying and fixing issues with their vehicles.

- **Industrial Applications:** AR is significantly enhancing efficiency and performance in industrial settings. It allows field technicians to connect with remote experts and receive real-time support, eliminating manual errors and simplifying complex tasks.

A current example is Caterpillar's use of AR for equipment maintenance. Their AR system provides technicians with step-by-step visual instructions and real-time data overlays, improving accuracy and reducing downtime during repairs.

### **Top Benefits of Implementing Augmented Reality**

There are nine significant benefits of AR that are highly valuable and have drawn numerous brands due to their concrete and measurable results.

- Unique Customer Experience
- Enhancing Human Efficiency
- Time Saving
- User Engagement
- Improve the Quality Of the Production Process
- Marketing
- Employee Training
- Data Analysis
- Competitive Edge

### **Literature Review**

This section reviews relevant literature in three stages. First, it situates this study within the context of service design literature. Second, it introduces and defines the concept of customer experience. Given the shift in the retail industry towards competition driven by

exceptional experiences, this review focuses on how AR can enhance retail services during this transformation (Smith et al., 2024). Third, it examines research connecting customer, retailer, and technological perspectives of AR to the creation of engaging experiences. Together, these perspectives provide a comprehensive framework for designing effective AR services in the current retail landscape.

### **Digital Service Design**

Service design integrates insights from management, marketing, and technology to enhance service delivery. Initially focused on interface design, it now highlights customer interactions and the overall structuring of service encounters (Bitner et al., 2023).

Service design involves organizing people, resources, and communication to improve service quality and customer interactions (Sangiorgi and Prendiville, 2024). It often prioritizes the customer, aiming to enhance both individual and overall service experiences (Gummerus et al., 2024; Lim et al., 2022). Some approaches concentrate on internal processes, while others focus on customer experience and participatory design (Teixeira et al., 2023; Meroni and Sangiorgi, 2024). With the advancement of digital technology, service design is adapting to incorporate these innovations. Digital technologies, known for their adaptability and integration, are transforming how services are designed (Barrett et al., 2023; Kunz and Walsh, 2023).

In India, Reliance Jio has revolutionized digital service design by integrating AR into their customer support and retail environments. For instance, their app offers AR features that allow users to visualize data plans and phone models in their own environment before making a decision. This study focuses on how AR can be leveraged in Indian retail to develop new and effective services, with customer experience being a crucial factor in guiding this design.

### **Customer Experiences in Retail**

In this paper, customer experience is defined as the overall perception a customer forms while learning about, purchasing, using, maintaining, and disposing of a product or service (Jain et al., 2024). The essence of customer experience is found in the interaction between the company offering a product or service and the customer receiving it (Jain et al., 2024). An experience is created when a company intentionally uses its services and products to engage customers in a way that creates a memorable event (Pine and Gilmore, 2023).



Customer experiences are personal, occurring in the individual's mind and engaging them on emotional, physical, intellectual, or even spiritual levels (Bolton et al., 2024). Therefore, companies must craft a cohesive, authentic, and sensory-rich experience that resonates with customers and differentiates them from competitors to establish a strong emotional connection (Berry and Carbone, 2023). Current literature indicates that customer experience encompasses both the retailer's creation of interactions and the customer's perception of these experiences. In India, these interactions frequently take place in an omnichannel environment, blending physical and digital touch points.

For example, Big Bazaar combines in-store shopping with a mobile app that offers personalized deals and virtual store experiences. This integration can make customer journeys unpredictable and varied (Bolton et al., 2024; Hilken et al., 2024).

### **Augmented Reality and Customer Experiences**

Augmented Reality (AR) is commonly defined as a technology that overlays virtual objects onto the real world, making them appear to coexist in the same space (Azuma et al., 2024). In terms of customer experience, AR acts as a medium that enhances interactions between retailers and their customers (Poushneh and Vasquez-Parraga, 2024). AR is seen as having substantial potential to transform retailer-customer relationships (Christ-Brendemühl and Schaarschmidt, 2024).

For instance, in India, Lenskart has successfully implemented AR in its app, allowing customers to virtually try on eyewear before making a purchase. This technology not only enhances the shopping experience but also helps in making more informed buying decisions. Recent research has shown that AR positively affects various aspects of customer experience, as evidenced by studies and applications in different sectors.

### **The Customer Perspective**

Research focusing on a customer-centric view has explored various factors affecting customers' willingness to use Augmented Reality (AR) in retail settings. It has been found that both practical and enjoyable aspects influence the decision to use AR (Tan et al., 2024).

One key finding is that AR's utility value lies in its ability to deliver timely and relevant information. For example, AR can provide details like product availability or delivery times, which can come directly from the retailer or be shared by other customers and influencers (Chylinski et al., 2024). By offering accurate information when needed, AR

enhances the shopping experience and helps mitigate various risks, such as time, performance, financial, and social concerns (Alimamy et al., 2024).

Cognitive theories suggest that AR helps users by reducing the mental load through augmented information overlays (Riar et al., 2024). However, some studies argue that AR might increase cognitive strain by requiring users to process information from both real and virtual sources, potentially affecting adoption (Lu and Smith, 2024).

Additionally, AR's appeal extends to its hedonic value, including its fun and engaging aspects (Jessen et al., 2024). Factors like the visual appeal and interactive quality of AR can significantly influence its use.

In India, Tata CLiQ uses AR in their app to let customers visualize how furniture and home decor items would look in their own homes before purchasing. This playful and interactive feature enhances customer engagement and satisfaction, reflecting the "playground effect" where AR provides enjoyment and intrinsic value (Huang and Liao, 2024; Jessen et al., 2024).

### **The Retailer Perspective**

From a retailer's standpoint, research has explored how AR impacts various factors that ultimately boost sales. A key insight is that the effectiveness of different AR services depends on the retailer's specific profile and goals.

For instance, AR is particularly beneficial for retailers entering the online shopping space, where customers are physically distant from products. AR helps bridge this gap by providing detailed product information, which can enhance purchase conversion rates (Chen et al., 2024). This benefit is most significant for non-commodity products and items that involve higher purchasing risks, rather than for everyday goods or in-store shopping (Sun et al., 2024).

Similarly, luxury brands can leverage AR to highlight their exclusive attributes and enhance brand perception (Javornik et al., 2024). In India, Tata CliQ Luxury uses AR to showcase high-end fashion items, offering a virtual try-on experience that aligns with the luxury brand's image. This use of AR helps strengthen the emotional connection between customers and the brand (Smink et al., 2024; Jessen et al., 2024). However, the long-term impact of such AR innovations on brand perception remains a topic of debate (Riar et al., 2024).

Finally, effective AR services should integrate seamlessly into the retailer's broader service ecosystem. For example, Reliance Digital has incorporated AR into its service ecosystem to enhance customer touch points and improve value distribution across various service channels. This integration requires careful management to address potential resistance from ecosystem partners and ensure the success of the AR service (Archibald et al., 2024). Overall, the retailer's business context is a crucial factor in designing successful AR services.

### The Technical Perspective

In summary, AR holds significant promise for enhancing customer experiences through its utility and hedonic values. However, research shows that these benefits depend heavily on the technical design of the AR solution. Factors such as interaction capabilities and the overall robustness of the AR technology play crucial roles (Riar et al., 2024). Technical issues or limited interaction options can diminish the enjoyment of AR experiences (Park and Yoo, 2024).

Moreover, if AR provides inaccurate information, its usefulness is undermined. Other challenges include cognitive and technical barriers (Javornik, 2024), high customer participation requirements (Christ-Brendemühl and Schaarschmidt, 2024), and concerns about privacy and data security (Rauschnabel et al., 2024), all of which can affect customer willingness to engage with AR.

In the Indian context, companies like Flipkart have faced these challenges when implementing AR in their e-commerce platform. While Flipkart's AR features, such as virtual product try-ons, offer significant benefits, issues like technical glitches and the need for accurate, real-time information highlight the importance of robust AR design.

Additionally, managing customer concerns about privacy and ensuring seamless interaction are essential for maximizing the effectiveness of AR solutions (Gäthke, 2024; de Ruyter et al., 2024).

### AR in Indian Retail Case Studies

While the adoption of AR in Indian retail is still in its nascent stages compared to the West, several brands are making notable strides. Here are some detailed examples:

#### **Myntra - Virtual Try-Ons**

**Challenge:** Enabling customers to visualize how clothes would look on them without physical try-ons.

**Solution:** Myntra has pioneered virtual try-on experiences for apparel, allowing customers to see how different outfits would look on them using their smartphone cameras. This technology leverages AR to create a 3D model of the customer, enhancing the online shopping experience and reducing return rates.

#### **Lenskart - Virtual Try-On for Eyewear**

**Challenge:** Assisting customers in finding the perfect eyewear frame that suits their face shape.

**Solution:** Lenskart implemented AR technology to allow customers to virtually try on different eyewear frames. This feature uses facial recognition to provide a realistic preview, helping customers make informed decisions and increasing customer satisfaction.

#### **Nykaa - Virtual Makeover Tool**

**Challenge:** Allowing customers to try on cosmetics virtually to find suitable shades and products.

**Solution:** Nykaa introduced an AR-based virtual makeover tool that lets customers try on various makeup products virtually. By using their smartphone cameras, customers can see how different makeup looks on them, making it easier to choose the right products.

#### **Pepperfry - AR for Furniture Visualization**

**Challenge:** Enabling customers to visualize large furniture items in their homes.

**Solution:** Pepperfry has integrated AR into their app to help customers visualize how furniture pieces will look in their living spaces. By placing 3D models of the furniture in a live camera view of their rooms, customers can make confident purchase decisions and reduce uncertainty.

#### **Croma - AR for Home Electronics**

**Challenge:** Helping customers visualize home electronics in their spaces.

**Solution:** Croma is exploring AR applications to showcase how products like TVs, refrigerators, and other electronics would look and fit in customers' homes. This enhances the shopping experience by providing a realistic preview of the products in their intended environment.

## Reliance Digital - AR for Home Decor and Electronics

**Challenge:** Enabling customers to see how home decor items and electronics would look in their homes.

**Solution:** Reliance Digital has been exploring AR applications that allow customers to visualize home decor items and electronics in their spaces. This helps in reducing the guesswork and ensures that customers make informed purchasing decisions.

## Unorganized Furniture Retailers

**Challenge:** Providing a way for customers to visualize large furniture items in their homes.

**Solution:** Many unorganized furniture retailers are starting to offer AR-based product visualization services. These services help customers see how furniture pieces will look in their homes, improving their confidence in making purchases.

## Challenges and Opportunities

**Infrastructure:** While improving, India's internet infrastructure still poses challenges for seamless AR experiences.

**Smartphone Penetration:** Increasing smartphone adoption is a positive factor, but there's still room for growth.

**Consumer Awareness:** Educating consumers about AR benefits and how to use it effectively is crucial.

**Data Privacy:** Addressing data privacy concerns is essential to build trust with customers.

**Future Outlook:** The Indian retail industry is ripe for AR adoption. As technology improves and consumer awareness grows, we can expect to see more innovative AR applications in the coming years. This will lead to enhanced customer experiences, increased sales, and reduced returns.

## Lessons Learned from AR Adoption in Indian Retail

### Enhanced Customer Engagement

AR significantly improves customer engagement by providing interactive and immersive shopping experiences. Retailers who have implemented AR have seen increased customer interaction with their products.

### Informed Purchase Decisions

AR tools like virtual try-ons and product visualization help customers make more informed purchase decisions. This reduces return rates and increases customer satisfaction.

### **Competitive Advantage**

Early adopters of AR technology gain a competitive edge in the market. Brands like Myntra, Lenskart, and Nykaa stand out by offering innovative shopping solutions that attract tech-savvy customers.

### **Technology Integration**

Successful AR implementation requires seamless integration with existing retail systems. Retailers must ensure their apps and websites can support AR features without compromising performance.

### **Consumer Education**

Educating consumers on how to use AR tools effectively is crucial. Brands need to provide clear instructions and support to help customers leverage AR technology fully.

### **Infrastructure Challenges**

The adoption of AR is hindered by infrastructure limitations, such as internet connectivity issues. Retailers must work within these constraints and optimize their AR solutions for varying internet speeds and device capabilities.

### **Privacy and Security**

Addressing data privacy and security concerns is essential to building trust with customers. Retailers need to implement robust measures to protect user data and ensure transparency about how data is used.

### **Scalability**

As AR technology becomes more popular, retailers must ensure their systems can scale to handle increased usage. This involves investing in robust backend systems and infrastructure to support high traffic.

### **Continuous Innovation**

The AR landscape is rapidly evolving, and retailers need to stay updated with the latest advancements. Continuous innovation and iteration of AR features are necessary to meet changing customer expectations and technological developments.

### **Market Adaptation**

Understanding the unique needs and preferences of the Indian market is crucial. Retailers must adapt their AR solutions to cater to local tastes and shopping behaviors, ensuring relevance and appeal to their target audience.

## Conclusion

Augmented Reality (AR) is transforming the retail landscape by bridging the gap between physical and digital experiences. The integration of AR technology into retail not only enhances the customer experience by allowing virtual product trials but also addresses common challenges such as dissatisfaction with purchases and high return rates. By providing a more engaging and interactive shopping experience, AR applications like IKEA's furniture visualization tool significantly improve customer satisfaction and confidence in their purchases.

Moreover, AR's potential extends beyond retail into areas such as training, design, and modeling, where it offers valuable benefits in terms of interactive learning, accurate design visualization, and effective communication. As AR technology continues to evolve and become more accessible through widely used mobile devices, its impact on the retail industry is expected to grow, offering new opportunities for businesses to innovate and improve their operations.

In conclusion, AR represents a significant advancement in how businesses interact with customers and manage their operations. Retailers who embrace AR technology are likely to gain a competitive edge by enhancing customer engagement, optimizing their sales processes, and staying ahead of industry trends. The continued development and adoption of AR will likely shape the future of retail, making it a crucial area for ongoing research and innovation.

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# Consumer Preferences and Satisfaction towards DTH Services in Virudhunagar District: An Overview

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## Abstract

*This study aims to explore consumer preferences and satisfaction levels regarding Direct-to-Home (DTH) services in Virudhunagar District. The research examines factors influencing consumer choices, satisfaction levels, and the overall impact of DTH services on their viewing experience. A structured questionnaire was used to collect data from 59 respondents across the district, and the results were analyzed using statistical tools to draw meaningful conclusions.*

*Keywords: Consumer, DTH Services, Virudhunagar*

## Introduction

The advent of DTH services has revolutionized the television viewing experience by offering a wide range of channels and superior picture quality. With the increasing number of service providers, understanding consumer preferences and satisfaction levels has become crucial for businesses to thrive in a competitive market. This study focuses on the Virudhunagar District, aiming to identify key factors that influence consumer preferences and measure their satisfaction with existing DTH services.

## Objectives of the Study

1. To identify the factors influencing consumer preferences towards DTH services.
2. To measure the satisfaction levels of consumers with their current DTH service providers.

## Research Methodology

The study employs a descriptive research design, utilizing both primary and secondary data. A structured questionnaire was distributed to 59 respondents in Virudhunagar

District, selected through convenience sampling. The questionnaire covered various aspects such as service quality, channel variety, pricing, customer support, and overall satisfaction. Data was analyzed using statistical tools like mean, standard deviation, and chi-square tests to interpret the findings.

## Review of Literature

In their 2023 study, **Dr. M. Nithya and Dr. D. Padma** examined the impact of technology, particularly social networking, on marketing products. They noted that social media can lead to products "going viral," increasing sales without traditional advertising efforts. The study also highlights the complexity of human attitudes, which can be influenced by various factors, including genetic transmission. The primary focus of the research is to assess consumer attitudes and preferences regarding the service facilities offered by Direct-to-Home (DTH) providers.

**Dr. R. SathruSangaraVelsamy and N. Manivannan** (2016) discuss the technical components of Direct-to-Home (DTH) systems, which primarily utilize Ku-band capacity. A key advantage is the use of small TVRO (Television Receive Only) dishes, often less than 1 meter, with LNBF (Low Noise Block Down) converters that amplify and downconvert satellite signals. The study details how multi-satellite TVROs can receive signals from multiple satellites using a single dish and multiple LNBFs. The STB (Set Top Box) plays a crucial role in demodulating, decrypting, and displaying content, requiring a CA (Conditional Access) module to manage access to subscribed content. Middleware facilitates viewer interaction, providing features like program guides and pay-per-view options, with potential connectivity for automatic service provider interaction.

In their 2015 study, **Dilip Kumar and Dr. S.M. Yamuna** investigated consumer perceptions and preferences towards DTH services in Coimbatore city. The study examined six major DTH service providers: Sun Direct, TATA Sky, Dish TV, Big TV, Videocon, and Airtel. Data analysis revealed that Sun Direct was the preferred service due to its superior picture quality, reasonable pricing, diverse packages, and extensive channel offerings. The authors concluded that DTH providers should focus on customer service, picture quality, and competitive pricing to enhance customer satisfaction and business success.

In their 2015 study, **R. Rajeswari and R. Pavithra** explored the factors influencing consumer preferences and satisfaction levels towards Direct-to-Home (DTH) services. The

study highlighted that advancements in science and technology have made DTH a popular and powerful medium for entertainment, surpassing cinema and cable TV. Key drivers for the growth of DTH services include the rise of the middle class, increased discretionary spending, and the shortcomings of cable operators. The study aimed to understand brand preference and consumer satisfaction with DTH services, noting that value-added services and market competition have significantly influenced consumer choices.

**J. Jayashree and A. Sivakumar** (2013) examine consumer perceptions of DTH services in Coimbatore city, focusing on four providers: Sun Direct, TATA Sky, Dish TV, and Big TV. The study highlights significant shifts in consumer attitudes and the impact of innovative technology on purchasing decisions. Findings reveal that Sun Direct is the preferred choice among respondents due to its superior picture quality, reasonable pricing, diverse packages, and extensive channel offerings. The authors suggest that DTH providers should prioritize customer service, picture quality, and pricing to enhance satisfaction and competitiveness.

## Statement of Problems

### 1. Limited Understanding of Consumer Preferences

There is a lack of comprehensive knowledge regarding the specific factors that drive consumer preferences for DTH services in Virudhunagar District, making it difficult for service providers to tailor their offerings effectively.

### 2. Satisfaction Levels and Quality of Service

Current levels of consumer satisfaction with various aspects of DTH services, such as picture quality, channel variety, pricing, and customer support, remain unclear. This gap can hinder providers in identifying critical areas for improvement.

### 3. Technological Advancements

With rapid technological changes, the study seeks to address how advancements in DTH technology impact consumer satisfaction and whether current offerings meet evolving consumer expectations.

## Data Analysis and Interpretation

How satisfied are you with the following aspects of your current DTH service provider:

Descriptive Statistics								
	N	Minimum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Picture and Sound Quality	59	1	2.542	1.381	.031	.311	-1.513	.613
Channel Variety	59	1	1.915	1.193	1.366	.311	1.060	.613
Pricing	59	1	3.034	0.909	-.924	.311	.336	.613
Customer Support	59	1	2.746	1.240	-.393	.311	-1.484	.613
Availability of Regional Channels	59	1	2.848	1.142	-.482	.311	-1.206	.613
Availability of HD Channels	59	1	2.881	1.115	-.453	.311	-.912	.613
Ease of Installation	59	1	3.034	1.033	-1.040	.311	.030	.613
Additional Features (e.g., Recording, Interactive Services)	59	1	2.966	1.098	-.902	.311	-.473	.613

Source output: SPSS Output

The television broadcasting landscape has undergone significant changes over the past few decades, with Direct-to-Home (DTH) services emerging as a prominent method of television distribution. Offering superior picture and sound quality, a wide variety of channels, and the convenience of direct satellite transmission, DTH services have gained immense popularity among consumers. In India, the DTH market has witnessed rapid growth, driven by the increasing demand for better viewing experiences and the advent of digitalization.

Virudhunagar District, located in the southern part of Tamil Nadu, is no exception to this trend. The district has seen a considerable shift from traditional cable TV to DTH services, owing to the benefits offered by the latter. As competition among DTH service

providers intensifies, understanding consumer preferences and satisfaction levels becomes crucial for businesses to tailor their offerings and enhance customer retention.

This study aims to explore and analyze the factors influencing consumer preferences towards DTH services and measure the satisfaction levels of consumers with their current service providers in Virudhunagar District. By identifying the key determinants of consumer choice and evaluating their satisfaction with various aspects of DTH services, this research seeks to provide valuable insights for DTH operators to improve their service quality and meet consumer expectations more effectively.

To achieve these objectives, a structured questionnaire was administered to 59 respondents across the district. The questionnaire covered various dimensions of DTH services, including picture and sound quality, channel variety, pricing, customer support, availability of regional and HD channels, ease of installation, and additional features like recording and interactive services. The responses were analyzed using descriptive statistics, providing a comprehensive overview of consumer perceptions and satisfaction levels.

The descriptive statistics revealed the following key findings:

- **Picture and Sound Quality:** The mean score for picture and sound quality was 2.542, with a standard deviation of 1.381. The skewness of 0.031 and kurtosis of -1.513 suggest a relatively symmetric distribution with a tendency towards lower satisfaction levels.
- **Channel Variety:** The mean score for channel variety was 1.915, indicating a generally higher level of satisfaction among consumers. However, the skewness of 1.366 and kurtosis of 1.060 reflect a positive skew with some respondents reporting significantly higher satisfaction.
- **Pricing:** Pricing received a mean score of 3.034, with a standard deviation of 0.909. The negative skewness of -0.924 and kurtosis of 0.336 indicate a slight preference for lower pricing among consumers.
- **Customer Support:** Customer support had a mean score of 2.746, with a standard deviation of 1.240. The distribution is slightly negatively skewed (-0.393) with a kurtosis of -1.484, indicating mixed satisfaction levels.
- **Availability of Regional Channels:** The mean score for the availability of regional channels was 2.848, with a standard deviation of 1.142. The negative skewness (-0.482) and kurtosis (-1.206) suggest a tendency towards dissatisfaction among some respondents.

- **Availability of HD Channels:** The mean score was 2.881, with a standard deviation of 1.115. The distribution shows a slight negative skew (-0.453) and moderate kurtosis (-0.912).
- **Ease of Installation:** Ease of installation received a mean score of 3.034, with a standard deviation of 1.033. The negative skewness (-1.040) and minimal kurtosis (0.030) indicate a general preference for easier installation processes.
- **Additional Features:** The mean score for additional features like recording and interactive services was 2.966, with a standard deviation of 1.098. The negative skewness (-0.902) and kurtosis (-0.473) suggest that consumers appreciate these features, although there is room for improvement.

In conclusion, this study provides a detailed understanding of consumer preferences and satisfaction levels towards DTH services in Virudhunagar District. The findings highlight the areas where service providers excel and the aspects that require enhancement. By addressing these factors, DTH operators can better cater to consumer needs, thereby improving customer satisfaction and loyalty.

### Limitations of the Study

Despite the comprehensive approach and rigorous analysis undertaken in this study, several limitations should be acknowledged:

1. **Sample Size:** The study was conducted with a sample size of 59 respondents. While this sample provides valuable insights, a larger sample size might offer a more representative and generalizable understanding of consumer preferences and satisfaction levels across the entire Virudhunagar District.
2. **Sampling Method:** The study employed convenience sampling, which may not fully capture the diversity of the population. A more randomized or stratified sampling method could provide a more balanced representation of different demographic segments.
3. **Geographical Scope:** The research was confined to Virudhunagar District, and the findings may not be applicable to other regions with different socio-economic and cultural contexts. Comparative studies in other districts or states could help in understanding regional variations in consumer preferences and satisfaction.
4. **Self-Reported Data:** The study relied on self-reported data collected through questionnaires. There is a possibility of response bias, where respondents might provide

socially desirable answers or may not accurately recall their experiences with DTH services.

5. **Limited Factors:** While the study examined key factors such as picture and sound quality, channel variety, pricing, customer support, and additional features, there could be other influential factors not covered in the questionnaire. Future research could explore additional dimensions such as service interruptions, user interface experience, and promotional offers.
6. **Temporal Limitations:** The data was collected at a specific point in time, and consumer preferences and satisfaction levels might change over time due to technological advancements, changes in service offerings, or shifts in consumer expectations. Longitudinal studies could provide insights into how these factors evolve.
7. **Quantitative Focus:** The study primarily employed quantitative methods to analyze the data. While this approach provides statistical rigor, incorporating qualitative methods such as interviews or focus groups could offer deeper insights into consumer experiences and perceptions.
8. **External Influences:** External factors such as marketing campaigns, economic conditions, or regulatory changes could influence consumer preferences and satisfaction. These factors were not controlled for in this study and might have impacted the results.
9. **Measurement Limitations:** The use of a Likert scale for measuring satisfaction levels and preferences might not capture the full nuance of consumer sentiments. Other measurement tools and scales could be employed to provide a more detailed assessment.

### Suggestions for Enhancing DTH Services

Based on the descriptive statistics and analysis of consumer preferences and satisfaction towards DTH services in Virudhunagar District, the following suggestions can be made for DTH service providers to enhance their offerings and improve customer satisfaction:

1. **Improve Picture and Sound Quality:** Despite a mean score of 2.542, there is room for improvement in picture and sound quality. Investing in advanced technology to deliver high-definition (HD) and ultra-high-definition (UHD) content can significantly enhance the viewing experience. Regular maintenance and upgrades to transmission equipment can also help in reducing disruptions and improving overall quality.

2. **Expand Channel Variety:** With a mean score of 1.915, channel variety is a critical factor influencing consumer preferences. Service providers should consider expanding their channel lineup, including more regional, international, and niche channels to cater to diverse tastes. Offering customizable packages where consumers can choose channels based on their preferences can also increase satisfaction.
3. **Re-evaluate Pricing Strategies:** Pricing received a mixed response with a mean score of 3.034. To address this, DTH providers should explore flexible pricing models, including tiered packages, pay-per-view options, and bundling of services with internet and other utilities. Offering discounts, loyalty programs, and promotional offers can also make services more affordable and attractive.
4. **Enhance Customer Support:** With a mean score of 2.746, customer support is an area that requires attention. Service providers should focus on training customer service representatives to be more responsive, knowledgeable, and courteous. Implementing a robust support system with multiple touchpoints such as phone, email, chat, and social media can ensure timely resolution of issues. Additionally, providing self-help resources and a comprehensive FAQ section on the website can empower customers to solve minor problems independently.
5. **Increase Availability of Regional Channels:** The availability of regional channels scored a mean of 2.846, indicating a demand for more localized content. DTH providers should consider partnering with regional content creators and broadcasters to include more regional language channels. Promoting regional content can help in building a loyal customer base that values local culture and programming.
6. **Expand Availability of HD Channels:** With a mean score of 2.881, the availability of HD channels is relatively satisfactory but can still be improved. Providers should aim to increase the number of HD channels offered, including popular and in-demand channels. Educating customers on the benefits of HD viewing and offering free trials of HD channels can also encourage upgrades to HD packages.
7. **Simplify Installation Processes:** Ease of installation received a mean score of 3.034. Simplifying the installation process, offering quick and hassle-free setup services, and providing clear and easy-to-follow instructions can improve customer experience. Additionally, offering professional installation services at no extra cost or at a minimal fee can enhance satisfaction.



8. **Enhance Additional Features:** Additional features such as recording and interactive services scored a mean of 2.966. DTH providers should invest in developing and promoting value-added services like DVR (Digital Video Recorder), interactive TV, and on-demand content. Ensuring that these features are user-friendly and reliable can significantly enhance the overall viewing experience.
9. **Gather Continuous Feedback:** Regularly collecting feedback from customers through surveys, focus groups, and direct interactions can provide valuable insights into changing preferences and areas for improvement. Implementing a feedback loop where customer suggestions are taken seriously and acted upon can build trust and loyalty.
10. **Market and Promote Services Effectively:** Effective marketing and promotion strategies can help in highlighting the unique features and benefits of the DTH service. Creating awareness about new channels, packages, and features through various marketing channels such as TV ads, social media, and community events can attract new customers and retain existing ones.

## Conclusion

The study on consumer preference and satisfaction towards DTH services in Virudhunagar District provides valuable insights into the factors influencing consumer choices and their levels of satisfaction with existing service providers. The research highlights several key aspects of DTH services that are crucial for customer satisfaction, including picture and sound quality, channel variety, pricing, customer support, availability of regional and HD channels, ease of installation, and additional features.

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# Opportunities and Challenges for Developing Human Capital through Skill Enhancement of youth in Two-Tier Cities during Industry 5.0

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## Abstract

*Industry 5.0 represents the next phase of industrial evolution, emphasizing the collaboration between humans and advanced technologies, including AI and robotics. This transition offers significant opportunities for human capital development. Key areas of focus include skill enhancement through reskilling and upskilling programs, the cultivation of soft skills such as critical thinking and creativity, and the transformation and creation of job roles to meet new technological demands. Industry 5.0 promotes a human-centric workplace environment, prioritizing ergonomics, safety, and efficiency. It also emphasizes inclusivity and diversity, ensuring a broad talent pool and accessibility for all individuals. The synergy between humans and machines fosters innovation and efficiency, while sustainable development is driven by green skills and corporate social responsibility. Embracing these changes will ensure businesses and employees thrive in this new era, marked by a more capable, satisfied, and innovative workforce.*

*Keywords: Industry 5.0, Human Capital Development, Skill Enhancement*

## Introduction

Industry 5.0 is the next phase of industrial evolution, following Industry 4.0. While Industry 4.0 focused on the integration of cyber-physical systems, automation, and the Internet of Things (IoT), Industry 5.0 emphasizes the collaboration between humans and advanced machines, including artificial intelligence (AI) and robotics. This era is characterized by personalized production, sustainable practices, and a greater focus on human creativity and problem-solving.

## **Opportunities for Developing Human Capital through Skill Enhancement**

**Reskilling and Upskilling:** As technology evolves, so do the required skills. Industry 5.0 encourages continuous learning and development to ensure the workforce can work alongside advanced machines. Training programs in AI, robotics, data analytics, and other emerging technologies are essential.

**Soft Skills:** Critical thinking, creativity, problem-solving, and emotional intelligence become more valuable. These skills complement technological advancements and enhance human-machine collaboration.

## **Job Creation and Transformation**

**New Roles:** The rise of Industry 5.0 will create new job roles that require a blend of technical and soft skills. Positions like AI specialists, human-robot interaction designers, and sustainability managers will emerge.

**Job Transformation:** Existing roles will evolve. For instance, manufacturing jobs will shift from manual tasks to supervisory and decision-making roles, focusing on overseeing automated processes.

## **Enhanced Workplace Environment**

**Human-Centric Design:** Workplaces will be designed to prioritize human well-being. Ergonomics, flexible work arrangements, and collaborative spaces will improve job satisfaction and productivity.

**Safety and Efficiency:** Advanced technologies will enhance workplace safety by taking over hazardous tasks and providing real-time monitoring and feedback to prevent accidents.

## **Inclusive Workforce Development**

**Diverse Talent Pool:** Industry 5.0 promotes diversity and inclusion, ensuring that people from different backgrounds and abilities can contribute. This includes initiatives to bring more women and underrepresented groups into STEM fields.

**Accessibility:** Technologies will be developed to be accessible to all, including those with disabilities, ensuring equal opportunities in the workforce.

## **Collaboration and Innovation**

**Human-Machine Synergy:** Collaboration between humans and machines will lead to innovative solutions and increased efficiency. Machines will handle repetitive tasks, allowing humans to focus on creativity and strategic thinking.

**Cross-Disciplinary Teams:** Teams composed of individuals with diverse expertise will drive innovation. Engineers, designers, psychologists, and other professionals will work together to solve complex problems.

## **Sustainable Development**

**Green Skills:** With a focus on sustainability, there will be a demand for skills related to green technologies and practices. This includes knowledge in renewable energy, waste management, and sustainable manufacturing.

**Corporate Social Responsibility (CSR):** Companies will invest in human capital to align with CSR goals, promoting ethical practices and contributing to the community's well-being.

Industry 5.0 presents a significant opportunity for developing human capital. By focusing on skill enhancement, job creation, workplace improvement, inclusivity, collaboration, and sustainability, Industry 5.0 can lead to a more capable, satisfied, and innovative workforce. Embracing these changes will ensure that both businesses and employees thrive in this new industrial era.

Two-tier cities, characterized by rapid urbanization and growing industrial bases, play a crucial role in the economic landscape of many countries. As Industry 5.0 brings about a paradigm shift towards human-machine collaboration, these cities have a unique opportunity to enhance their workforce's skills to stay competitive and foster innovation (Karabegović, 2021).

## **Strategies for Skill Enhancement**

### **1. Establishing Training and Development Centers**

**Technical Institutes:** Setting up institutes specializing in AI, robotics, and other emerging technologies will provide the necessary technical skills. Partnerships with industries and universities can ensure curriculum relevance and access to cutting-edge research (Rojko, 2020).

**Vocational Training:** Expanding vocational training programs to include advanced

manufacturing, IoT, and data analytics will equip workers with practical, industry-specific skills (Xu et al., 2018).

## **2. Public-Private Partnerships**

**Collaborative Programs:** Governments and private sectors can collaborate to create skill development programs tailored to industry needs. These programs can include apprenticeships, internships, and co-op placements (Schwab, 2017).

**Funding and Incentives:** Offering grants, tax incentives, and subsidies to companies that invest in workforce training can encourage more businesses to participate in skill enhancement initiatives (Bughin et al., 2018).

## **3. E-learning and Online Platforms**

**Access to Resources:** Online learning platforms can provide access to courses and certifications in emerging technologies. These platforms can be particularly beneficial for remote and underserved areas within two-tier cities (Marr, 2020).

**Flexibility:** E-learning allows workers to balance their education with other responsibilities, making it easier for them to acquire new skills without leaving their jobs (OECD, 2019).

## **4. Industry-Academia Collaboration**

**Research and Development:** Collaborations between industries and academic institutions can lead to the development of new technologies and processes. These partnerships can also offer students hands-on experience and exposure to real-world challenges (Calitz et al., 2017).

**Curriculum Development:** Engaging with industry experts to develop and update curricula ensures that educational programs remain relevant to current and future industry demands (Ford, 2018).

## **5. Government Initiatives**

**Policy Support:** Governments can implement policies that promote skill development, such as mandatory training programs, certification requirements, and skill development funds (World Economic Forum, 2020).

**Regional Development Plans:** Integrating skill enhancement into broader regional development plans can ensure coordinated efforts across different sectors and stakeholders (Manyika et al., 2017).

## 6. Focus on Soft Skills

**Holistic Training Programs:** Incorporating soft skills such as critical thinking, creativity, communication, and teamwork into technical training programs ensures a well-rounded workforce (WEF, 2018).

**Workshops and Seminars:** Regular workshops and seminars on leadership, problem-solving, and emotional intelligence can help workers adapt to the collaborative nature of Industry 5.0 (Gleason, 2018).

## 7. Community Engagement

**Local Talent Pools:** Engaging with local communities to identify talent and provide training opportunities can help two-tier cities retain their workforce and reduce brain drain (Florida, 2019).

**Awareness Campaigns:** Raising awareness about the importance of skill development and the opportunities presented by Industry 5.0 can encourage more individuals to pursue training programs (Manyika et al., 2017).

## Conclusion

Two-tier cities have the potential to significantly benefit from Industry 5.0 by focusing on skill enhancement. Through strategic initiatives such as establishing training centers, fostering public-private partnerships, leveraging e-learning platforms, and emphasizing soft skills, these cities can develop a skilled and adaptable workforce. By doing so, they can ensure sustained economic growth, innovation, and competitiveness in the evolving industrial landscape.

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# An Examination on the Behavioral Deliberate of Existing Bank Clients in a Creating Nation to Utilize Versatile Managing an Account Administrations

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## Abstract

*Portable keeping money has gotten to be exceptionally imperative in today's life as innovative progressions have driven bank clients to utilize keeping money administrations. Clients ademeanours toward portable managing an account administrations are based on their desires is the foundation of this inquire about. So, the most objective is to watch the intentional conduct in intellect of clients to embrace versatile keeping money administrations. This ponder too looks at the impact of six factors on monetary administrations clients want to utilize versatile keeping money administrations, counting seen benefits, seen ease of utilize, believe, security, seen protection, and innovation skill. Subsequently, the objective of this consider is to discover out the crucial and choosing variables that will impact clients readiness to utilize portable keeping money highlights in Bangladesh as a creating nation. The sample of this study consists of 310 respondents from Bangladesh, a developing country. SEM was used to test the hypotheses for the analysis. The results showed that in Bangladesh, the factors such as price awareness, security and serviceability mostly determine whether customers use mobile banking. This fact proves that financial institutions are successful in providing services to customers through mobile phones. Customers take advantage of all the benefits of mobile banking only to save money, costs and work. The investigate proposes that versatile keeping money operations must be convenient and precise, the exchange prepare must be brief, interactivity, comfort of utilization, and so on. The discoveries have imperative suggestions for bank administrative specialist, administration, financiers, and administrators who wish to extend versatile keeping money utilization t secure their long-term benefit.*

**Keywords:** consumer; consumption; mobile banking; developing economy; technology

## Introduction

The introduction of new technologies has changed the way consumers interact with service providers. According to the traditional service model in retail banking, customers must frequently visit a physical branch to receive financial services. The situation today is different (Khatun et al., 2021). Cross-banking is just one part of the expansion of technological services deemed necessary for e-banking, with ATMs and mobile banking being examples (Laukkanen, 2016). As the financial industry adopts technology, the way financial services are sold will change (Al Khasawneh et al., 2018). The competitive environment of the money related administrations division has made innovation an ever more vital component (Sulaiman et al., 2007). The extended organize capacity and remote application innovations have made it conceivable to introduce and utilize versatile commerce administrations more broadly (Alshaali and Varshney, 2005). The gigantic and fast progression of communications and data frameworks has boosted the utilization of advancement by both companies and people, which in turn has expanded the utilize of innovation as a key source of communication and giving administrations to the clients (Krishanan et al., 2015). Electronic gadgets like cell phones utilizing by the banks in numerous endeavors especially keeping money administrations, showcasing endeavors and advertising administrations of the banks that involve numerous of the methodologies which have been taken by firms and banks (Krishanan et al., 2015). One of the later advancements in deals and promoting, and benefit demonstrating is the utilize of versatile gadgets (Khatun et al., 2021). It is hence seen as a device of online benefit, which is characterized as the utilize of intuitively transmission systems to communicate different administrations to Clients at any time that improve benefit quality, rapidly and opportune benefit (Lonkani et al., 2020). As a result, a parcel of companies started utilizing advanced apps to streamline their methods and remain in persistent touch with their clients. This included banks, which started to grow the sum of computerized keeping money they given in line with electronic wallets. Mobile keeping money could be a organize that serves basic and practical section to budgetary assention data, fundamental financial actualities, and reports on different money related products and administrations, based on buyer needs. This imaginative arrange for serving keeping money administrations is quickly accomplishing footing in Bangladesh (Shankar and Datta, 2018). According to Bangladesh Bank, users can access Mobile Banking Services (MFS) from 17 banks; Among them, BRAC Bank's Bkash and Rocket and Dutch Bangladesh

Bank are leaders in mobile banking. BRAC Bank's Bkash Bank and Dutch Bangladesh Bank's Rocket are among the 17 banks approved to provide services using MFS. According to Bangladesh Bank data, the number of mobile banking users peaked at 53.7 million in June 2019 (Khatun et al., 2021). The number of successful bank account users in Bangladesh is 27.4 million. As the number of mobile banking users continues to increase, banks need to pay more attention to providing quality financial services to customers (Al Amin et al., 2021). It is clear that the average number of people using technology in Bangladesh is increasing (Akhter et al., 2020). All banks should offer more technology-based products to their customers such as digital currency. In order to understand the market and the behavior of buyers, financial service providers need to know the key factors that can explain and predict the consumer behavior that wants to use and receive mobile banking services. Also, with the development of this advanced technology, businesses, especially banks, will be able to manage their existing customers while preferring to switch their bank accounts to mobile phones (Palani et al., 2012). However, from a financial management perspective, it is not easy to retain existing bank customers and attract new customers. Banks, on the other hand, are responsible for researching and analyzing factors that may affect the readiness of banking service users to support mobile banking. The main purpose of this study is to determine the factors affecting customers' willingness to adopt mobile banking systems (Akhter et al., 2020; Gazi, 2020). Portable keeping money permits them to exchange cash and total all of their assignments without having to take off the range. The more helpful advanced installments permits for a move within the nature of the managing an account industry based on the client's disposition. Utilizing portable keeping money which is broadly utilized by clients, banks are beginning to extend their operations (Palani and Yasodha, 2012; Gazi et al., 2023). Initially, it only provided notifications of deposit and withdrawal transactions via mobile phone, but now banks have made many installations in the field of mobile services. Bangladesh Bank's existing customers are generally less knowledgeable but their willingness to accept mobile banking services is increasing (Akhter et al., 2020; Gazi et al., 2022). Although there are extensive studies on the motivations of Western consumers to adopt telemarketing (Chah et al., 2011; Sreejesh et al., 2016), similar studies have not been conducted on Bangladeshi citizens. Therefore, we decided to conduct a quantitative study to measure the level of satisfaction of Bangladeshi customers with mobile banking. Therefore, the main objective is to track the behavioral intentions of Bangladeshi customers to use

mobile banking services. This study also explores how benefits, ease of use, trust, security, privacy and technology impact financial services for consumers who choose to use mobile banking services. Therefore, this study aims to reveal the main factors that may affect customers' use of mobile banking services. In the context of Bangladesh, many studies on the adoption of Internet banking services have addressed the private or public sector, highlighted the challenges and opportunities to solve the problems of e-banking, the connection of Internet banking with banking services, etc. has shown. (Al Amin et al., 2021; Bhatt and Bhatt, 2016; Akhter et al., 2020). Similarly, in the context of developing countries, many articles examine e-banking and online banking in separate research models based on behavioral intention to adopt m-banking, but there is no study on customers' m-banking adoption behavior (M). -banking) in developing countries. This motivates this study to fill the current gap in mobile banking research.

## Review of Literature

The term portable managing an account alludes to the concept of having your bank on your phone through extraordinary programs given by money related organizations such as banks or microfinance teach. Portable keeping money permits clients to get to and total a assortment of monetary operations, permitting them to streamline their work, spare time and cash, minimize commuting costs, and reduce the threat of character robbery (Mujahed et al., 2020). Versatile administrations have gotten to be an alluring substitute for numerous businesses, counting keeping money, as a result of the fast development of portable phones. Be that as it may, in compared to add up to keeping money exchanges, the portable keeping money advertise is still moderately little especially since its appropriation and utilization are not considering almost the utilize and acknowledgment of portable managing an account (AlSouf, 2014). The versatile keeping money stage offers real-time, two-way information exchange, managing an account, and installments for portable, widespread get to monetary data and administrations (Mujahed et al., 2020). The two main types of mobile business are the financial business model and the mobile service provider-led model (Bhatt and Bhatt, 2016). In the commercial art of financial management, only financial buyers are allowed to use mobile banking services and perform various banking activities (AlSouf, 2014). In contrast, in the mobile service provider model, customers who do not have a bank account can still carry out financial transactions through mobile service providers (Bhatt and Bhatt, 2016). Mobile banking services can be divided into four types: SMS banking, app, browser

and mobile application. Balance inquiries, small statements, transfers, payments, etc. These are important tasks that mobile commerce companies can perform (Bhatt and Bhatt, 2016). The popularity of information technology has spurred the development of payment gateways with better performance and greater capabilities in the banking industry. This has a positive impact on financial institutions in terms of the bank's customers (Boateng et al., 2016). The level of monetary association among keeping money clients is thought to be altogether affected by the utilize of portable keeping money administrations (Abdinor and Mbamba, 2017). Online keeping money incorporates versatile cash as a extraordinary case that gives made strides and extra comfort in terms of having get to monetary data at any time and from any area (Hossain et al., 2021). Increasingly individuals are utilizing smartphone keeping money, which suggests that a developing number of budgetary exchanges can be completed offline. Portable managing an account has been upheld and connected by unused cohort banks and other budgetary teach around the world, making it one of the characteristics of versatile money related administrations that are extending rapidly (Arahita and Hatammimi, 2015). All inclusive, versatile keeping money is regarded to be among the foremost valuable and fruitful budgetary electronic endeavor apps (Baptista and Oliveira, 2016). Portable managing an account has as of late gotten need consideration from monetary authorities, and work to embrace this modern innovation is continuous. Money related educate, such as banks, have moved their department operations course of World Wide Web monetary benefit offerings (e.g., the improvement of mobile banking operations) in response to the quick increment within the utilization of brilliantly portable phones (Nasri and Charfeddine, 2012). Portable managing an account administrations incorporate checking equalizations, looking monetary charters, transmitting treasury, paying utility notes, dealings center, and directing prefecture (Akhter et al., 2020). This study established an independent relationship between independence and change after developing hypotheses based on data analysis (e.g., attitudes towards accepting and using mobile banking). This study is designed as follows to address each variable and their relationship with mobile banking, research, analysis and findings. The next step is to analyze the findings and provide managerial implications for those who will provide banking services.

## **Faith Development**

### **Perceived Usefulness (PU)**

PU is a fundamental concept in the acceptance model. He said PU is where a person believes that using a particular technique will improve their daily performance. Davis (1989) proposed this concept and it is widely used in many IT fields to measure innovation in business, life and education (Chau and Lai, 2003). In Rogers' (2003) innovation diffusion theory, PU is called "relative advantage", which means the perceived quality of the innovation relative to its antecedents. PU affects mobile banking services and is considered a new trend in the current payment system (Abuga and Manyange, 2015). Previous studies have shown that higher levels of PU can increase consumers' willingness to engage in certain behaviors, such as using mobile financial services (Raza et al., 2017; Al Khasawneh, 2015). Perceived usefulness (PU) has a greater impact on mobile banking services (Abuga and Manyange, 2015). Previous studies have shown that perceived value has a positive impact on consumer behavior (Venkatesh et al., 2003). Many studies have shown that optimal PU balance can increase consumers' willingness to engage in certain behaviors (Raza et al., 2017). Davis (1989) defines competence as the degree to which an individual believes that using a particular technique will increase his or her performance. In Rogers' (2003) innovation diffusion theory, perceived benefit is called "estimated advantage" and is defined as the approval of an innovation relative to its premises. M Bank application support should provide significant benefits to customers such as convenience, accessibility and ease of use. Therefore, the usefulness of these applications should be a factor that determines consumers' willingness to adopt them. Accordingly, the following hypotheses are put forward:

H1: Consumers' intention to use mobile banking services is affected by perceived satisfaction (PU) with the service.

### **Seen ease of utilize (PEOU)**

PEOU alludes to the degree to which clients anticipate a target component to be simple to utilize, as Davis (1989) clarified. For versatile keeping money administrations, the specialized characteristics of the plan ought to be clear and user-friendly so that clients can effectively learn and acknowledge the benefit (Koksal, 2016). Be that as it may, a few components of the portable money related keeping money framework may make complexity. Hence, in case the useful exercises of portable managing an account are seen as essential and direct for utilization purposes, clients' utilization will be emphatically impacted (Agarwal

and Prasad, 1998). The metric for this develop is the rate of potential keeping money clients who say the benefit framework is straightforward and easy (Venkatesh et al., 2003). In conclusion, it is fundamental to plan innovation that's simple to utilize, since seen ease of utilize can altogether impact usersâ states of mind and behaviors towards utilizing the innovation. In any case, it is critical to note that ease of utilize can shift depending on the setting and client characteristics. The seen ease of utilize (PEU) can uncover the sum of client desires for an easy-to-use target component, agreeing to Davis (1989). It is specified that the specialized characteristics of versatile managing an account benefit plan must be justifiable and user-friendly for target clients to memorize and acknowledge the service effortlessly (Koksal, 2016). A few components within the portable monetary managing an account systemâs benefit may cause a few complexities. On the off chance that the useful exercises of versatile keeping money are seen as essential and direct for utilization points, clientsâ utilization will be affected (Agarwal and Prasad, 1998). The develop metric is the rate of potential keeping money clients who say the benefit framework is straightforward and effortless (Venkatesh et al., 2003).H2: Perceived usability influences clients' propensity to utilize mobile banking services.

### **Seen believe (PT)**

Establishing a believe component is vital since it minimizes unfavorable recognitions, skepticism, and misconception among clients, thus improving person selection penchant over time (Sahoo and Pillai, 2017). Seen believe (PT) reliably speaks to clientsâ eagerness to depend on a specific act like versatile keeping money administrations (Koksal, 2016). The taking after three unmistakable highlights of believe are set up: The capacity of a certain benefit to total basic work on time; the capacity to convey on its guarantees without lying; and the trustworthiness in considering clientsâ needs in correct time (Alalwan et al., 2015). As a result, believe plays a basic part in expanding versatile managing an account appropriation by minimizing concerns approximately security and fraud-related dangers for the innovative established versatile managing an account environment (Afshan and Sharif, 2016). Other than, one of the foremost critical criteria in considering and surveying the advance and thriving of versatile managing an account is client believe (Khasawneh, 2015). As a result, it is hypothesized: H3: The probability that clients will utilize versatile managing an account depends on how dependable they feel.

### **Perceived Security (PS)**

Security is the most important thing when making financial transactions online or electronically. Therefore, perceived security (PS) can be a significant issue for mobile banking due to the risk of unauthorized access to financial information. Security measures for all mobile marketing applications have been shown to have a positive impact on people's desire and preference to use the application (Changchit et al., 2017; Kalakota and Whinston, 1997; Yenisey et al., 2005; Merhi et al., 2019). This measure has been examined in many previous studies. A study conducted in the United Kingdom found that online banking is significantly affected by perceived security (Jun and Cai, 2010). As a result, it is hypothesized: H4: Perception of safety influences behavioral intentions to utilize mobile banking in a good.

### **Seen security (PP)**

Client's readiness to utilize online is said to be intensely impacted by the level of mystery they have over the online framework (Sreejesh et al., 2016; Namahoot and Laohavichien, 2018). In expansion, clients' penchant to set in online managing an account administrations, especially money related exchanges are affected based on how they see the Web agreement's privacy (Zorotheos and Kafeza, 2009). Protection has gotten to be a major moral concern nowadays due to the expanding dependence on electronic data. Security is the term utilized to depict the opportunity to choose how individual data is collected and utilized with the included right to avoid unauthorized divulgence (Westin, 1967). Protection concerns have been connected to innovation appropriation, with thinks about appearing that security concerns ruined e-commerce utilize in 65% of members (Harris, 2004). A consider by Measurements Canada in 2006 found that 57% of shoppers delayed to utilize credit cards online, showing the significance of security in online exchanges. Concerns around security, data administration, and interaction administration are the three seen prerequisites for protection that were recognized (Nemati, 2010). H5: The client's impression of privacy influences their willingness to use mobile banking.

### **Technological Competence (TC)**

Tippins and Sohi (2003) define technological competence (TC) as a person's ability to use ICT tools effectively and organize information to manage and store information. Individuals who are confident in their ability to use technology are more likely to accept and



adopt technology products and services (Venkatesh and Davis, 2000). Research also shows that a person's level of knowledge is related to their perception of the usability and efficiency of the product, which is an important determinant of user satisfaction with the technology (Venkatesh and Davis, 2000). For example, more sophisticated individuals may view mobile banking as a convenient option due to its ease and convenience of use, which has a positive impact on their willingness to use technology (Yang, 2010). H6: Clients' inclination to use mobile banking is influenced by technology competency (TC).

## Methods

### Examining and information collection

We will go over examining and data-gathering forms in this area. At that point comes energetic useful checking and unwavering quality tests that are utilized to survey speculations (Cheah et al., 2011). This was a quantitative and exploratory investigate extend. It depended exclusively on essential information. The consider has utilized a survey to gather data random testing technique that's not based on chance. The overview survey was issued at irregular to individuals who claimed to have a bank or portable managing an account. Whether users have any portable bank accounts was the primary address replied within the survey. If the response was no, the survey was put on hold until a substitution respondent may well be found. A add up to of 350 individuals were given a web study frame to fill out. As a result, 310 answers were regarded to be true blue, demonstrating a reaction rate of 88%. The include of the online study survey was a pre-structured embraced way. Emails and different phone calls were utilized to contact respondents (Kharbat and Daabes, 2021). The respondents were given get to the survey from 10 June 2022, to 31 January 2023. The survey took between 5 and 10 min to total for each member.

### Estimation instruments

Items determined from accessible writing were utilized to get to autonomous factors in this examination. Table 1 arranges all of the factors. PU, PEOU, PT, PS, PP, and TC are the six autonomous factors utilized in this inquire about. Three to six concerns were postured by each one of these components, all of which were custom-made to the portable keeping money setting. To degree the crave to utilize portable managing an account, a add up to of different choice questions were created. The surveys for each variable in this ponder were adjusted from past inquire about. All things of Table 1 were measured on 5- a 5-point Likert

scale (emphatically agree-strongly oppose this idea) extending from unequivocally concur (5) concur (4) unbiased (3) oppose this idea (2) unequivocally oppose this idea (1).

Table 1. Measurement of items adopted.

Constructs	Measure items	Reference	
Perceived usefulness	PU1	It saves time compared to visiting a physical bank branch.	Al Ghazali (2015)
	PU2	When I go somewhere other than a bank, I typically receive superior service.	
	PU3	I can use mobile banking to conduct agreements in any condition.	
	PU4	I can conduct transactions from the convenience of my own home using mobile banking.	
Perceived ease of use	PEOU1	For me, learning how to use mobile banking is simple.	Davis (1989)
	PEOU2	I find it simple to use mobile banking to accomplish my banking goals.	
	PEOU3	My experience with mobile banking is straightforward and easy to comprehend.	
Perceived trust	PT1	Mobile banking, in my opinion, is secure.	Farah et al. (2018)
	PT2	Mobile banking, in my opinion, delivers on its promise.	
	PT3	It also protects my profile.	
Perceived security	PS1	Overall, I am not concerned about mobile banking security.	Narvik et al. (2014)
	PS2	My banks, I feel, safeguard me from illegal charges.	
	PS3	My transactions, I believe, are safe.	
Perceived privacy	PP1	I have faith that the mobile financial sector will maintain the confidentiality of my individual economic details.	Akhter et al. (2020)
	PP2	My personal banking data, I suppose, will not be disclosed via the mobile banking system.	
	PP3	Working with technology is something I enjoy doing.	
Technology competency	TC1	My ability to pick up new technology is excellent.	Akhter et al. (2020)
	TC2	I'm fascinated by new technology.	
	TC3	This technology is easier to use.	
Behavioral intention	BI1	In the future, I plan to continue utilizing mobile banking.	Agarwal (1999)
	BI2	In my daily life, I will make every effort to use mobile banking.	
	BI3	I resolve to sustain to utilize mobile banking on a regular basis.	

## Research model

An intentionality model for using banking apps was created using the literature search as a foundation (Figure 1). Mobile banking adoption in Bangladesh is influenced by the postulated constructs and assumptions listed below (Yunus, 2014).

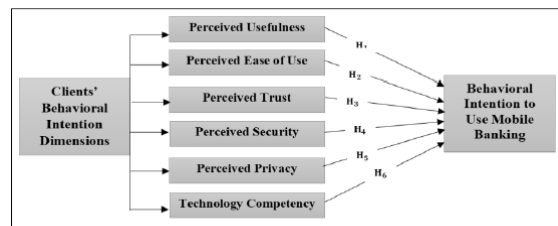


Figure 1. Research framework.

## Analysis and Results

### Demographic Profile of Respondents

The demographic details of the responses of the respondents are shown in (Table 2); 73% of the respondents are male and 27% are female. The age group of 21-30 years constitutes 56% of the total age group and the control age group. 31 percent of the respondents are under the age of 20. Most of the respondents (75.5%) were students, 16.30% were employed and 3.2% were business owners. The majority of the participants in this study

have a basic phone (14.50%). 3G mobile phones ranked second with 85.50%. The research also shows that 46 percent of respondents have no experience with telemarketing. Only 54% of people use mobile banking services.

Table 2. Demographic profile of respondents.

Variables		Frequency	Percentage
Gender	Male	225	73
	Female	85	27
Age	Below 20	95	31
	21–30	174	56
	31–40	35	11
	41–60	5	1.6
	Above 60 years	1	0.4
Occupation	Student	235	75.5
	Home maker	14	5
	Business	10	3.2
	Job holder	51	16.30
Adopted item	Normal phone	45	14.50
	Smart phone	265	85.50
Monthly income	Below 10,000	169	54.50
	BDT 10,000–20,000	87	28
	BDT 21,000–30,000	43	14
	BDT 31,000–40,000	9	2.9
	BDT 40,000+	2	0.60
Mobile banking prior experience	Yes	165	54
	No	145	46

### Graphic Statistics

After screening for lost information and copied reactions, we held 310 answers for last information examination. As appeared in Table 3, all seven of the utilized constructions thing cruel values are appeared. Each constructs cruel esteem extend is displayed as takes after: 2.01 to 5.26, 4.01 to 4.89, 4.14 to 4.44, 2.11 to 3.09, 2.56 to 4.15, 3.03 to 3.45, and 4.11 to 4.23 with the going with standard deviations appeared with in the table. The calculated cruel values appear respondents for the most part concur with the study's arranged things. This proposes that the lion's share of members express for the most part positive reactions to the components being measured in this inquire about. The skewness and kurtosis were utilized to check the data's ordinariness. The ordinary run for skewness-kurtosis esteem is  $\hat{A} \pm 2.58$ . Hence, all the things within the dataset for both tests were found to be ordinarily dispersed (i.e.,  $< \hat{A} \pm 2.58$ ) (see Table 3). The tables skewness and kurtosis values are all inside the allowed extend, appearing that the information were collected appropriately. The result shows the least and most noteworthy reply rates for each address. Cronbach's alpha values for all structures were moreover over the limit of 0.7, demonstrating tall levels of inner consistency. Table 3 moreover appears the figure stacking for all things was over their edge esteem, which assigns that the builds have a solid inner consistency.

**Table 3.** Descriptive statistics (source: author calculation).

Items	$\bar{x}$	$\sigma$	Skew	Kurtosis	Min	Max	$\alpha$	Loading	Overall ( $\bar{x}$ )	Overall ( $\sigma$ )
PU1	2.01	1.15	-1.01	-1.63	1.00	5.00		0.929		
PU2	2.22	1.89	-1.11	-0.26	1.00	5.00	0.961	0.947	3.11	0.2561
PU3	5.26	1.77	-1.77	-1.17	1.00	5.00		0.958		
PU4	3.45	1.82	-1.04	-1.29	2.00	5.00		0.960		
PEOU1	4.01	0.76	-1.71	-1.45	1.00	5.00		0.927		
PEOU2	4.77	1.14	-1.74	-1.22	1.00	5.00	0.963	0.966	3.29	0.2145
PEOU3	4.64	1.88	-1.13	-1.18	1.00	5.00		0.959		
PEOU4	4.89	1.19	-0.44	-1.36	1.00	5.00		0.939		
PT1	4.29	2.36	-1.88	-1.77	2.00	5.00		0.968		
PT2	4.44	1.41	-0.46	-1.43	1.00	5.00	0.962	0.948	3.55	0.3651
PT3	4.14	1.71	-0.96	-0.96	1.00	5.00		0.972		
PS1	3.09	1.86	-1.04	-0.82	1.00	5.00		0.938		
PS2	2.12	1.43	-0.13	-0.48	1.00	5.00	0.936	0.946	4.02	0.4125
PS3	2.11	0.44	-1.44	-1.25	1.00	5.00		0.935		
PP1	5.47	0.93	-0.49	-0.77	1.00	5.00		0.956		
PP2	4.15	1.90	-1.78	-1.65	2.00	5.00	0.957	0.963	4.77	0.1782
PP3	2.56	0.76	-1.59	-1.88	2.00	5.00		0.959		
TC1	3.45	1.05	-0.54	-0.78	1.00	5.00		0.907		
TC2	3.03	0.75	-1.40	-1.76	1.00	5.00	0.941	0.966	3.46	0.4265
TC3	4.01	1.68	-1.69	-1.44	1.00	5.00		0.907		
BI1	4.48	1.92	-1.78	-0.29	1.00	5.00		0.923		
BI2	4.23	1.91	-1.11	-0.79	1.00	5.00	0.950	0.979	3.22	0.3256
BI3	4.11	2.91	-0.77	-0.49	2.00	5.00		0.956		

### Assessing Measurement Model

Validation of dependent and independent measures was performed using the confirmatory factor analysis approach. With a value of  $\chi^2/df = 1.327$ , GFI = 0.991, AGFI = 0.982, NFI = 0.987, CFI = 0.981, TLI = 0.990, SRMR = 0.025, RMSEA = 0.028, and  $P$ -close = 1.00, the measurement model was found to be statistically significant. The measurement model is evaluated in terms of its consistency, reliability, validity, and capacity to discriminate. Validation of the measurement model concludes the structured model and permits testing of the assumptions.

**Table 4.** Model fit indices.

Fit indices.	Measurement model	Cut-off point
Squared/df	1.327	$\leq 3.000$
GFI	0.991	$\geq 0.900$
AGFI	0.982	$\geq 0.800$
NFI	0.987	$\geq 0.900$
CFI	0.981	$\geq 0.900$
TLI	0.990	$\geq 0.900$
SRMR	0.025	$\leq 0.100$
RMSEA	0.028	$\leq 0.080$
$P$ -close	1.000	$\geq 0.010$

### Conclusion

In arrange to keep and if you don't mind clients, banks must upgrade their administrations as versatile keeping money has developed to be a pivotal component that

buyers presently utilize effectively. The utilize of versatile managing an account to transmit cash, cash, credit, charge, and other things upgrades our understanding of consumers behavioral eagerly to utilize versatile innovation. To summarize, various financial organization have in the interim introduced and finished portable managing an account administrations in arrange to broaden their customer premise and supply more specialized financial resolutions in arrange to remain competitiveness within the create; be that as it may, the upgrade and advance of portable managing an account has been closely connected to client acknowledgment. Since a result, the think about is basic for Bangladeshs managing an account trade, because it permits for extraordinary and smart commonsense commitments. Analyzing the factors that influence consumers behavioral bury to utilize versatile keeping money in Bangladesh is the studyâs point. Out of a add up to of 6 factors, three seen utility, security, and innovation competency were found to be the foremost critical in anticipating clients behavioral purposeful to utilize versatile managing an account administrations in Bangladesh. In spite of the truth that believe, protection and seen ease of utilize not to play a expansive introduce in meaning act reason, portable keeping money work serves will consider its parts to form their works more competitive within the advertise. Altogether, recognizing and taking into consideration the alter that will impact buyer eagerness to require up versatile managing an account will without a doubt help financial organization create organizational objectives that will quick buyers readiness to require up and strain its additional uncommon versatile managing an account benefit more successfully.

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# Impact of Digital Transformation and Boundary Spanning on Sustainable Competitive Advantage in Manufacturing Enterprises: An Empirical Analysis

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## Abstract

*In the fast-paced corporate environment of today, DT has become an essential component for achieving a long-term competitive advantage. The effect of DT and BS on SCA within industrial organizations is investigated in this empirical investigation. This study uses a quantitative research design with 203 participants to gather data from a sample of manufacturing businesses utilizing a structured questionnaire survey. The survey includes questions about DT, BS, and SCA variables. Regression analysis and structural equation modelling are two statistical methods that are used to study the data and evaluate the hypothesized correlations. The results show a substantial and favourable correlation between DT and SCA. Manufacturing companies can improve operational effectiveness, product quality, and customer satisfaction by implementing digital technologies like IoT, AI, and big data analytics, which strengthens their competitive position. To achieve SCA in manufacturing businesses, this research emphasizes the significance of supporting DT initiatives and encouraging BS activities. The findings give managers and decision-makers insightful information that will help them comprehend how DT and BS dynamics work and how that understanding affects organizational effectiveness.*

**Keywords:** Boundary Spanning, Manufacturing Enterprises, Empirical Analysis, AI

## Introduction

The current and future state of industry and industrial processes are being profoundly altered by the growing digitalization. The "second machine age" is one term used to describe the effects of technology and the modifications in manufacturing processes. "Combinations of information, computing, communication, and connectivity technologies" are used to

describe the opportunities. The overall digitalization and cross-linking of the value-creation process are at the heart of DT in manufacturing [1,2]. Technologies for information and communication are combined and alter production procedures. Consequently, the definition of transformation is "fundamentally altering traditional ways of doing business by redefining business processes and relationships." Workflows drastically change as a result of Information Technologies (IT) [3]. Industrial and economic powers [4] have proposed strategies based on the fusion of manufacturing businesses and information technology, such as "Industry 4.0" and the "National Strategic Plan for Advanced Manufacturing Industry" [5], as the fifth technological revolution advances and a new generation of information technology fully penetrates society. Deep changes are being made to the manufacturing landscape worldwide. China, the largest producer, and trader in the world, has made incredible progress over the past 40 years. In 2019, China's manufacturing sector contributed 28.1% of the global added value [6]. DT is being promoted by traditional manufacturing companies [7].

The second major paradigm of intelligent manufacturing is digital-networked manufacturing, commonly referred to as second-generation intelligent manufacturing or "Internet + manufacturing" [8]. Around the turn of the 20th century, Internet technology started to gain popularity [9]. The integrated growth of the manufacturing sector and the Internet has been consistently advanced by "Internet +." People, things, processes, and data are all connected via the network. Through intra- and inter-enterprise cooperation, as well as the sharing and integration of all types of social resources, "Internet +" alters the value chain of the manufacturing industry and accelerates the transition from digital manufacturing to digital-networked manufacturing [10]. The Chinese government emphasized the need to "accelerate the construction of a manufacturing power, to develop advanced manufacturing industry, and to promote the deep integration of Internet, big data, artificial intelligence, and the real economy"[11]. In reality, businesses like Apple, Huawei, Amazon, BYD, etc. [12] have developed strong relationships with their local and international competitors, suppliers, universities, research institutions, and other organizations. These companies have recognized the "creative destruction" of the traditional technical paradigm and assisted the development of cutting-edge technologies through boundary-spanning search and knowledge rebuilding. It is currently understood from the perspective of boundary-spanning search in industrial value networks as a result [13]. The absolute innovation management framework is defined as a



framework that connects the innovation ecosystem with the corporate strategy of the firm by implementing innovation management as a strategy through design thinking to make innovation more user/human-centred that is desirable by a customer, viable for business, and technically feasible. Corporate venturing and corporate entrepreneurship need to be supported to accomplish SCA and economic growth while meeting the demands of Industry 5.0 and the IoT era [14,15].

## Literature Review

In 2019, Haseeb *et al.* [16] examined how social and technological concerns affected securing a sustainable competitive advantage and long-term corporate performance. Direct information was acquired from Malaysian SMEs to accomplish the goal. Managerial staff viewpoints of these SMEs were favored concerning the contributions of social and technological difficulties in establishing an SCA and sustainable business performance. Data was gathered via an email survey. Managerial staff at SMEs was given a total of 500 questionnaires. To distribute the surveys, simple random sampling was used. In 2019, Hamadamin *et al.* [17] evaluated the impact of "strategic Human Resources Management (HRM) practices" on the acquisition of "competitive advantages" that will last, as well as the contribution of "human capital" development and staff commitment in an academic setting. Six hundred questionnaires were distributed at random to the staff members of a few universities in Erbil, Iraq. Smart Partial Least Square PLS was used in the analysis along with Structural Equation Modelling (SEM) methods. In 2020, Shah *et al.* [18] looked into how customers' attitudes toward Corporate Social Responsibility (CSR) affect their willingness to commit in the long run. It examines how relationship age has a moderating effect on relationships involving CSR commitment in the banking sector of a developing country. Using structural equation modelling based on partial least squares, the presented hypotheses were tested on a sample of 360 respondents from Pakistan's retail banking sector.

In 2020, Gomez *et al.* [19] established a research model to empirically assess the effects of the three CRM components on customer knowledge management and innovation, as well as the endeavours of the organizations to move through DT and create sustainable business models. The CRM benefit map was picked as the beginning point for this project because it comprises two unique paths—a set of current-exploitation patterns for organizational performance and an experimental one for potential innovation. This new

technology will open the door for a long-term, viable company plan. The construction of the research model has been influenced by each potential combination of the three CRM modules and the three sustainability dimensions. In 2020, Lin *et al.* [20] proposed a combination of capabilities for the transformation of smart manufacturing and also developed a dynamic capability-based framework of maturity assessment. First, the connection between current maturity models and dynamics capability was looked into. The conclusion suggested that the majority of maturity models are unable to pinpoint an organization's dynamic capability or assess this capability in a dynamic and competitive environment during the transition.

In 2021, Ziółkowska *et al.* [21] studied the broad changes brought about by digital technology in the marketing idea, its tools, and operations in Polish SMEs, as well as how they impact marketing activities in small and medium-sized firms (SMEs). The primary research question focused on how marketing activities carried out by organizations today develop. Analyses and considerations were supported by a critical literature review, an examination of empirical study findings, and the author's observations of the market. In 2020, Liu *et al.* [22] provided a reference architecture and a process for constructing a smart factory for China's traditional manufacturers. The fundamental components of the smart factory are the intelligent manufacturing workshop and the industrial Internet of Things, and studies have been done on big data analysis, product tracking, and real-time monitoring technologies. The Internet of Things, which includes CNC machine tools, wireless sensor networks, and radio frequency identification networks was the foundation for the intelligent manufacturing workshop's real-time tracking and monitoring system.

In 2018, Loonam *et al.* [23] analyzed the methods used by these organizations to successfully implement digital technologies by reviewing 10 case studies from the literature. The research results show a conceptual framework intended to help management comprehend the steps needed to implement DT. In 2019, Ukko *et al.* [24] conducted an empirical analysis of the sustainability strategy's contribution to the relationship between a digital business strategy and financial performance. Also suggested that a sustainability strategy promotes the relationship between managerial capability and financial performance, but inhibits the relationship between operational capability and financial performance by categorizing two capabilities that were required to realize a digital business strategy. In 2020, Abdulwase *et al.* [25] investigated the link between business strategy and gaining a competitive edge within an organization. The importance of business strategy has previously been shown by scant

research in a variety of organizational domains. stressed the significance of company strategy in creating a competitive edge based on the available empirical literature. The business strategy was shown to be crucial for gaining a competitive advantage and capturing the market. Additionally, a quality plan affects the organization's market.

### **Problem Statement**

The introduction of DT has significantly altered how organizations function and compete in the dynamic and fiercely competitive manufacturing environment [26][27]. The precise effect of DT and BS on the achievement of SCA in manufacturing businesses, however, has not yet been the subject of empirical research. Organizational leaders and managers are unable to make informed decisions or create efficient strategies to deal with the challenges of the digital era because of this information gap. Even while many manufacturing companies have used digital technology to streamline internal operations and improve consumer connections, it is still unclear how these developments will affect SCA. Furthermore, there is still a lack of knowledge on the function of BS in the context of DT, which entails building and maintaining strong relationships with external stakeholders. The potential advantages of utilizing BS activities to promote cooperation, creativity, and resource sharing outside of organizational boundaries have not yet been thoroughly investigated.

### **Proposed Methodology**

This empirical investigation will employ a quantitative methodology to look into how DT and BS affect SCA in manufacturing firms. Using a standardized questionnaire, a cross-sectional survey is used to collect data. Individuals from Indian manufacturing companies will make up the study's target demographic. A sample of 203 individuals with knowledge of and experience with urban surroundings will be chosen using a purposive sampling technique. The representation of people from various age groups, genders, and socioeconomic positions will be ensured through efforts. The questionnaire will be created based on the independent and dependent factors that the research will identify. There is 13–15 questions for each set of variables, and responders is given suitable response scale values to reflect their responses.

## Data Analysis

To guarantee accuracy and consistency, the collected data is cleansed and pre-processed. For statistical analysis, the “Statistical Package for the Social Sciences (SPSS)” is utilized. The associations between DT, BS, and SCA is examined using appropriate statistical techniques in SPSS, such as correlation analysis and regression analysis. Calculated descriptive statistics for each variable include frequencies, percentages, means, and standard deviations. They will also be compared using ANOVA, multiple regression analysis, and other inferential statistical techniques.

## Research Hypotheses

### *Hypothesis 1*

DT has a positive impact on BS in manufacturing enterprises.

### *Hypothesis 2*

BS has a positive impact on SCA in manufacturing enterprises.

### *Hypothesis 3*

DT has an indirect positive impact on SCA in manufacturing enterprises through its positive impact on BS.

## Objectives of the Study

- To examine the impact of DT on BS in manufacturing enterprises.
- To contribute to the understanding of the role of DT and BS in enhancing the competitive advantage of manufacturing enterprises in India.
- To offer insights and recommendations for manufacturing enterprises in India to effectively leverage DT and BS for SCA.

## Results and Discussion

Only 156 of the 203 participants in the survey finished the entire questionnaire; the remaining participants did not, and some of the survey columns remained neglected. Therefore, the respondents who didn't fully complete the survey were excluded from the survey before the data analysis was done, indicating that the results were based on 156 respondents.

## Frequency Table

### Socio-Demographic Factors

**Table 1:** Frequency Table 1

<b>Factors</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
18-24	10	6.4
25-34	23	14.7
35-44	51	32.7
45-54	42	26.9
55+	30	19.2
<b>Gender</b>		
Male	151	96.8
Female	5	3.2
<b>Education</b>		
Less than high school	1	.6
High school or equivalent	3	1.9
Some college or trade school	11	7.1
College or university degree	70	44.9
Postgraduate degree	71	45.5
<b>Employment</b>		
Workers	8	5.1
Lower Management	12	7.7
Middle Management	32	20.5
Senior Middle Management	45	28.8
Top Management	59	37.8
Full time	142	91.0
Part-time	14	9.0
<b>Experience</b>		
< 5 Years	14	9.0
5. 1 to 10 Years	17	10.9
10.1 to 15 Years	27	17.3
15. to 25 Years	48	30.8
> 25 Years	50	32.1

Table 1 gives a thorough analysis of the sampled population's demographics based on several common traits. The majority (32.7%) of people are in the 35–44 age group, followed by the 45–54 age group (26.9%), in terms of age. Men make up the majority of the population—96.8% of them—while women make up 3.2% of the total. In terms of education, persons with postgraduate degrees and college/university degrees make up a significant portion of the population, with rates of 45.5% and 44.9%, respectively. With a frequency of 37.8%, top management positions are the most prevalent in terms of employment, followed

by middle management with a frequency of 20.5%. 91.0% of those who responded, or those who responded, are employed full-time. With regard to experience, individuals with 15.1 to 25 years of experience have the highest frequency (30.8%), closely followed by those with more than 25 years of experience (32.1%). This table offers important details about the survey population's demographics in several dimensions.

### Digital Transformation (DT)

**Table 2:** Frequency Table 2

Factors	Frequency	Percentage
<b>To what extent has your organization undergone DT? (DT1)</b>		
Not at all	6	3.8
Minimally	25	16.0
Partially	45	28.8
Significantly	65	41.7
Fully	15	9.6
<b>How long has your organization been undergoing DT? (DT2)</b>		
Less than a year	14	9.0
1-2 years	30	19.2
3-5 years	58	37.2
6-10 years	31	19.9
More than 10 years	23	14.7
<b>What motivated your organization to undergo DT? (DT3)</b>		
Competition	24	15.4
Customer demand	24	15.4
Internal efficiencies	88	56.4
Regulation	15	9.6
Other	5	3.2
<b>How has DT affected your organization's operations and processes? (DT4)</b>		
No significant impact	24	15.4
Positively	132	84.6
<b>To what extent has DT improved your organization's efficiency? (DT5)</b>		
Not at all	4	2.6
Minimally	9	5.8
Partially	38	24.4
Significantly	85	54.5
Fully	20	12.8
<b>To what extent has DT improved your organization's customer experience? (DT6)</b>		
Not at all	3	1.9
Minimally	15	9.6
Partially	43	27.6
Significantly	80	51.3
Fully	15	9.6
<b>How has DT impacted your organization's workforce? (DT7)</b>		

No significant impact	43	27.6
Positively	113	72.4
<b>Has your organization invested in new technology as part of its DT effort? (DT8)</b>		
No	33	21.2
Yes	123	78.8
<b>To what extent has DT increased your organization's competitiveness? (DT9)</b>		
Not at all	7	4.5
Minimally	11	7.1
Partially	48	30.8
Significantly	77	49.4
Fully	13	8.3
<b>How has DT impacted your organization's culture? (DT10)</b>		
Negatively	2	1.3
No significant impact	43	27.6
Positively	111	71.2
<b>How has DT affected your organization's profitability? (DT11)</b>		
Negatively	2	1.3
No significant impact	48	30.8
Positively	106	67.9
<b>To what extent has DT improved your organization's decision-making process? (DT12)</b>		
Not at all	5	3.2
Minimally	7	4.5
Partially	40	25.6
Significantly	85	54.5
Fully	19	12.2
<b>Has DT enabled your organization to better understand and serve its customers? (DT13)</b>		
No	14	9.0
Yes	142	91.0
<b>To what extent has DT changed the way your organization operates? (DT14)</b>		
Not at all	3	1.9
Minimally	12	7.7
Partially	51	32.7
Significantly	74	47.4
Fully	16	10.3
<b>How has DT impacted your organization's ability to adapt to change? (DT15)</b>		
No significant impact	31	19.9
Positively	125	80.1

A thorough review of the many DT-related organizational aspects is provided in Table 2. According to the research, a sizeable percentage of businesses have engaged in some form of DT, with 41.7% reporting significant advancement and 9.6% claiming full deployment. The main drivers of DT were internal efficiencies (56.4%) and customer demand (15.4%), however competition and regulation also had an impact. Operations and procedures (84.6%),

organizational effectiveness (54.5%), and customer experience (51.3%) all saw positive effects as a result of DT. Investment in new technology was common (78.8%), and workforce-related changes were typically favourable (72.4%). The majority of respondents indicated that DT had a good impact on organizational culture (71.2%) and profitability (67.9%). Additionally, DT initiatives improved decision-making processes (54.5%) as well as customer comprehension and service (91.0%). These results demonstrate the widespread application of DT and its transformational impacts on a variety of organizational activities and results.

### Boundary Spanning (BS)

**Table 3:** Frequency Table 3

**(a) BS1- BS5**

Factors	Frequency	Percentage
<b>How would you rate your organization's ability to effectively communicate and collaborate across departments and stakeholders? (BS1)</b>		
Poor	7	4.5
Fair	25	16.0
Good	63	40.4
Very Good	44	28.2
Excellent	17	10.9
<b>How has DT affected your organization's ability to communicate and collaborate across departments and stakeholders? (BS2)</b>		
It has made it worse	1	.6
It has not made a significant difference	41	26.3
It has made it better	114	73.1
<b>To what extent has DT facilitated BS within your organization? (BS3)</b>		
Not at all	5	3.2
Minimally	16	10.3
Partially	55	35.3
Significantly	64	41.0
Fully	16	10.3
<b>How has DT impacted the level of trust within your organization, particularly across departments and stakeholders? (BS4)</b>		
It has decreased trust	3	1.9
It has not made a significant difference	61	39.1
It has increased trust	92	59.0
<b>How has DT impacted the level of transparency within your organization, particularly across departments and stakeholders? (BS5)</b>		
It has decreased transparency	1	.6
It has not made a significant difference	41	26.3
It has increased transparency	114	73.1



For several criteria connected to the influence of DT within an organization, Table 3(a, b, c) presents a frequency distribution and corresponding percentages. Table 3(a) shows the percentage of respondents who rated BS1 as "Good" (40.4%) or "Very Good" (28.2%), compared to the number who rated it as "Fair" (16.0%), "Poor" (4.5%), or "Excellent" (10.9%). Only a small minority (26.3%) of participants said BS2 had no actual impact, while the majority (73.1%) said it had improved their lives. Only 0.6% of respondents claimed that DT had worsened the situation. Questions about BS3 received a range of answers. In terms of how much it assisted success, "Partially" (35.3%), "Minimally" (10.3%), "Fully" (10.3%), and "Not at all" (3.2%) were the responses that received the highest percentage of replies. Regarding BS4, the majority (59.0%) thought that DT had improved trust, while 39.1% thought it had had little impact. Only 1.9% of respondents felt that trust had dropped. A sizable majority (73.1%) of respondents to BS5 thought that DT had increased transparency, whereas a smaller portion (26.3%) perceived no discernible difference. Only a tiny minority (0.6%) thought it had reduced transparency.

**(b) BS6- BS10**

<b>To what extent has DT enabled your organization to better integrate with external stakeholders? (BS6)</b>		
Not at all	4	2.6
Minimally	11	7.1
Partially	44	28.2
Significantly	78	50.0
Fully	19	12.2
<b>How has DT impacted your organization's ability to effectively coordinate with external stakeholders? (BS7)</b>		
It has not made a significant difference	45	28.8
It has made it better	111	71.2
<b>How has DT impacted your organization's ability to effectively manage relationships with external stakeholders? (BS8)</b>		
It has made it worse	1	.6
It has not made a significant difference	45	28.8
It has made it better	110	70.5
<b>To what extent has DT facilitated the sharing of information across departments and stakeholders within your organization? (BS9)</b>		
Not at all	1	.6
Minimally	15	9.6
Partially	36	23.1
Significantly	78	50.0
Fully	26	16.7
<b>To what extent has DT enabled your organization to better manage conflicts across</b>		

<b>departments and stakeholders? (BS10)</b>		
Not at all	5	3.2
Minimally	19	12.2
Partially	42	26.9
Significantly	73	46.8
Fully	17	10.9

Table 3(b) shows that concerning BS6, the majority of respondents (50%) who responded "Partially" (28.2%), "Fully" (12.2%), "Minimally" (7.1%), and "Not at all" (2.6%), thought that DT had substantially helped integration. 71.2 percent of respondents thought DT improved BS7, while 28.8 percent saw no discernible improvement. According to BS8, the vast majority of respondents (70.5%) claimed that DT had made things better, followed by "Not a significant difference" (28.8%) and "Made it worse" (0.6%). Regarding BS9, a significant portion (50.0%) stated that DT had significantly assisted it, followed by "Partially" (23.1%), "Fully" (16.7%), "Minimally" (9.6%), and "Not at all" (0.6%). In BS10, a strong majority (46.8%) believed that DT had significantly improved management, with the remaining respondents believing it had done so "Partially" (26.9%), "Fully" (10.9%), "Minimally" (12.2%), and "Not at all" (3.2%).

**(c) BS11- BS14**

<b>How has DT impacted the level of collaboration within your organization, particularly across departments and stakeholders? (BS11)</b>		
It has decreased collaboration	2	1.3
It has not made a significant difference	54	34.6
It has increased collaboration	100	64.1
<b>To what extent has DT enabled your organization to better leverage its networks and partnerships to achieve its goals? (BS12)</b>		
Not at all	5	3.2
Minimally	14	9.0
Partially	41	26.3
Significantly	74	47.4
Fully	22	14.1
<b>To what extent has DT enabled your organization to better manage its relationships with stakeholders? (BS13)</b>		
Not at all	5	3.2
Minimally	12	7.7
Partially	40	25.6
Significantly	79	50.6
Fully	20	12.8
<b>To what extent has DT enabled your organization to better manage risk across</b>		

<b>departments and stakeholders? (BS14)</b>		
Not at all	5	3.2
Minimally	20	12.8
Partially	48	30.8
Significantly	64	41.0
Fully	19	12.2

According to Table 3(c), the majority of respondents (64.1%) said that DT had helped collaboration on BS11, while 34.6% saw no difference at all and a very small percentage (1.3%) thought it had hampered it. Concerning BS12, the highest percentage (47.4%) indicated that DT had allowed significant leverage, followed by "Partially" (26.3%), "Minimally" (9.0%), "Fully" (14.1%), and "Not at all" (3.2%). A huge majority (50.6%) of respondents to BS13 said that DT had significantly improved matters, with the remaining respondents agreeing "Partially" (25.6%), "Fully" (12.8%), "Minimally" (7.7%), and "Not at all" (3.2%). The responses' views on BS14 were rather diverse. The majority of respondents (41%) said that DT had significantly enhanced risk management, while the percentages for "Partially" (30.8%), "Fully" (12.2%), "Minimally" (12.8%), and "Not at all" (3.2%) were next.

### Sustainable Competitive Advantage (SCA)

**Table 4:** Frequency Table 4

**(a) SCA1- SCA5**

<b>Factors</b>	<b>Frequency</b>	<b>Percentage</b>
<b>How would you rate your organization's current level of SCA? (SCA1)</b>		
Poor	2	1.3
Fair	30	19.2
Good	59	37.8
Very Good	45	28.8
Excellent	20	12.8
<b>How has DT impacted your organization's SCA? (SCA2)</b>		
It has increased it	1	.6
It has decreased it	58	37.2
It has not made a significant difference	97	62.2
<b>To what extent has DT enabled your organization to gain new or improved sources of SCA? (SCA3)</b>		
Not at all	5	3.2
Minimally	14	9.0
Partially	48	30.8
Significantly	68	43.6

Fully	21	13.5
<b>How has DT impacted your organization's ability to differentiate itself from its competitors? (SCA4)</b>		
It has decreased differentiation	1	.6
It has not made a significant difference	67	42.9
It has increased differentiation	88	56.4
<b>To what extent has DT enabled your organization to better respond to changing market demands and customer needs? (SCA5)</b>		
Not at all	4	2.6
Minimally	14	9.0
Partially	44	28.2
Significantly	74	47.4
Fully	20	12.8

The frequency table is presented in Table 4 (a, b, and c), which examines several variables connected to an organization's current level of SCA and the effects of DT on it. According to Table 4(a), the majority of respondents rated SCA1 as "Good" (37.8%) or "Very Good" (28.8%). The chart shows that the majority of respondents (62.2%) thought that DT had little impact on SCA2 findings. The replies differed when SCA3 was taken into account. A sizeable majority of respondents (30.8%) thought that DT had partially enabled this feature, while a sizeable percentage (43.6%) believed that it had greatly contributed to it. The majority of responders (56.4%) who looked at SCA4 thought that differentiation had risen. Finally, the replies to SCA5 were generally favourable. The vast majority of respondents (47.4%) said that DT had greatly aided their organization in this regard.

**(b) SCA6- SCA10**

<b>How has DT impacted your organization's ability to leverage its strengths and resources to gain a competitive advantage? (SCA6)</b>		
It has decreased the ability to leverage strengths and resources	2	1.3
It has not made a significant difference	58	37.2
It has increased the ability to leverage strengths and resources	96	61.5
<b>To what extent has DT enabled your organization to better capture value from its core competencies and capabilities? (SCA7)</b>		
Not at all	1	.6
Minimally	19	12.2
Partially	47	30.1
Significantly	70	44.9
Fully	19	12.2
<b>To what extent has DT enabled your organization to better protect its intellectual property and proprietary information? (SCA8)</b>		
Not at all	6	3.8

Minimally	20	12.8
Partially	51	32.7
Significantly	59	37.8
Fully	20	12.8
<b>How has DT impacted your organization's ability to effectively manage and utilize its data and information assets? (SCA9)</b>		
It has not made a significant difference	47	30.1
It has increased the ability to manage and utilize data and information assets	109	69.9
<b>To what extent has DT enabled your organization to better leverage its customer and market data to gain a competitive advantage? (SCA10)</b>		
Not at all	2	1.3
Minimally	17	10.9
Partially	50	32.1
Significantly	68	43.6
Fully	19	12.2

Table 4 (b) demonstrates that DT has generally had a favourable effect on organizations. The majority of respondents (61.5%) claimed that DT had enhanced their company's ability to capitalize on its resources and advantages, perhaps giving it a competitive edge. Similar to this, a substantial portion of respondents (44.9%) stated that DT has enabled their company to profit from its core competencies and strengths. Additionally, respondents acknowledged advancements in managing and using data and information assets (69.9%), as well as securing intellectual property and private information (37.8%). Furthermore, DT has played a big role in exploiting customer and market data to build a competitive edge, with a considerable percentage (43.6%) expressing significant enablement in this area.

(c) SCA11- SCA13

<b>To what extent has DT enabled your organization to better manage its supply chain to gain a competitive advantage? (SCA11)</b>		
Not at all	5	3.2
Minimally	17	10.9
Partially	41	26.3
Significantly	75	48.1
Fully	18	11.5
<b>To what extent has DT enabled your organization to better manage its distribution channels to gain a competitive advantage? (SCA12)</b>		
Not at all	4	2.6
Minimally	22	14.1
Partially	40	25.6

Significantly	74	47.4
Fully	16	10.3
<b>How has DT impacted your organization's ability to attract and retain customers and talent? (SCA13)</b>		
It has not made a significant difference	53	34.0
It has increased the ability to attract and retain customers and talent	103	66.0

Table 4(c) demonstrates how DT has increased firms' capacity to attract and retain talent as well as more efficiently manage their supply chains and distribution channels. The plurality of respondents (48.1%) claimed that DT had greatly enhanced their company's capacity to manage the supply chain, while another 11.5% claimed that it had done so entirely. This shows that by reducing supply chain procedures, DT might give companies a competitive edge. Similar to this, a sizeable portion of respondents (47.4%) indicated significant enablement in controlling distribution channels, while 10.3% expressed full enablement via DT. This shows that the use of digital tools and techniques has improved businesses' capacity to manage their distribution networks effectively, which may have boosted customer satisfaction and increased market reach. DT has also shown to be successful in luring and keeping talent and clients. Sixty-one percent of respondents (66%) said that DT had improved their capacity to entice and keep talent and consumers. This suggests that businesses have taken advantage of digital technology and methods to improve their competitive position by better understanding customer wants, personalizing offers, and fostering great customer and staff experiences.

### Descriptive Statistics/ T-Test

The statistical results provide information on the many study variables that were looked at. The average age of the responders is 3.38, which shows that it is within a specific range. The standard deviation of 1.144, however, indicates that the ages are relatively erratic, indicating diversity among the respondents. A specific gender category may be represented by the gender variable's mean value of 1.03. Given the dataset's low standard deviation of 0.177, there may not be much gender variation. The average education level is 4.33, which indicates a high average education level. The standard deviation of 0.746 does, however, suggest some variation in the respondents' educational backgrounds. The average employment score is 3.87, which may indicate how satisfied people are with their jobs. The

larger standard deviation of 1.159 implies that the respondents' employment is somewhat variable. The standard deviation of 0.287 indicates some variety in the respondents' statuses, and the mean status value of 1.09 may indicate a particular status category. The average degree of experience is 3.66, which denotes a modest level of experience. There seems to be a rather wide variety of experience levels among the respondents, as indicated by the standard deviation of 1.278.

### Hypotheses Testing

#### Relationship between BS and DT

**Table 6:** Impact of BS and DT

**(a)Correlations**

		<b>BS</b>	<b>DT</b>
<b>Pearson Correlation</b>	<b>BS</b>	1.000	.823
	<b>DT</b>	.823	1.000

The Pearson correlation coefficients between the two variables, BS and DT, are displayed in Table 6(a). There is a 0.823 correlation between BS and DT. This positive correlation shows that the two variables have a strong linear relationship.

**(b)ANOVA**

<b>Model</b>		<b>SS</b>	<b>DF</b>	<b>MS</b>	<b>F</b>	<b>Sig.</b>
1	Regression	55.515	1	55.515	322.224	.000 <sup>b</sup>
	Residual	26.532	154	.172		
	Total	82.047	155			

*“SS= Sum of Squares, DF=Degrees of Freedom, MS= Mean Square”*

Table 6(b) provides specifics on how well the regression model explained the data variation. The model's MS is 55.515, SS is 55.515, and there is 1 DF. The F-value of 322.224 (p.000) indicates a substantial relationship between the dependent variable and independent factors. The MS is 0.172 with 154 DF and a residual SS of 26.532. The total of all squares with 155 degrees of freedom is 82.047.

**(c) Coefficients**

<b>Model</b>	<b>UC</b>		<b>SC</b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
DT	1.002	.056	.823	17.951	.000

*“Dependent variable= BS”*

The findings of a regression analysis of DT and BS are presented in Table 6(c). The "Unstandardized Coefficients (UC)" of 1.002 denotes the relationship between a forecasted increase of 1.002 units in the BS and an increase of one unit in the DT. This coefficient's precision is estimated by the standard error of 0.056. The "Standardised Coefficients (SC)" (beta) of 0.823 indicate that the DT has a significant positive influence on the BS, with each unit increase in the DT translating into an increase in the BS of 0.823 units, assuming that other variables remain constant. The association between the DT and the BS is statistically significant, as shown by the high t-value of 17.951. A highly significant link is further supported by the exceedingly low significance level ( $p < 0.001$ ), which supports hypothesis 1.

### Relationship between BS and SCA

**Table 7:** Impact of BS and SCA

**(a)Correlations**

		SCA	BS
Pearson Correlation	SCA	1.000	.912
	BS	.912	1.000

The Pearson correlation coefficients between SCA and BS are shown in Table 7(a). SCA and BS have a 0.912 correlation. A strong linear link between the two variables is indicated by this positive correlation.

**(b)ANOVA**

Model		SS	DF	MS	F	Sig.
1	Regression	76.254	1	76.254	765.916	.000 <sup>b</sup>
	Residual	15.332	154	.100		
	Total	91.586	155			

The regression model in Table 7(b) has an SS of 76.254, a DF of 1, and an MS of 76.254. The computed F-value is 765.916, which is significantly correlated with the independent and dependent variables ( $p < 0.001$ ). The MS is 0.100 with 154 degrees of freedom and a 15.332 residual SS. total SS of 91.586 and 155 degrees of freedom.

**(c) Coefficients**

Model	UC		SC	t	Sig.
	B	Std. Error	Beta		
BS	.964	.035	.912	27.675	.000

*"Dependent variable= SCA"*



The findings of a regression analysis of SCA and BS are presented in Table 7(c). According to the predictor variable's UC (Beta), which is .964, the dependent variable should rise by .964 units for every unit increase in SCA. The SC (Beta) of 0.912 shows that a one standard deviation rise in the SCA is accompanied by a 0.912 standard deviation increase in the dependent variable. With a t-value of 27.675, it is clear that there is a strong correlation between SCA and BS. The importance is further supported by the p-value (Sig.) of 0.000. As a result, these results demonstrate that SCA has a strong beneficial effect and is a significant predictor of BS, supporting Hypothesis 2.

### Relationship between SCA, BS, and DT

**Table 8:** Impact of SCA, BS, and DT

#### (a) Correlations

		SCA	DT	BS
Pearson Correlation	SCA	1.000	.786	.912
	DT	.786	1.000	.823
	BS	.912	.823	1.000

The Pearson correlation coefficients between SCA, DT, and BS are displayed in Table 8(a). A high positive link between SCA and DT is indicated by the correlation coefficient of 0.786. SCA and BS have a very significant positive link, as indicated by the correlation coefficient of 0.912. The correlation coefficient of 0.823 shows that DT and BS have a very significant positive association.

#### (b) ANOVA

	Model	SS	DF	MF	F	Sig.
1	Regression	76.616	2	38.308	391.518	.000 <sup>b</sup>
	Residual	14.970	153	.098		
	Total	91.586	155			

The regression model has an SS of 76.616 and an MS of 38.308 with 1 DF, as shown in Table 8(b). According to the estimated F-value of 391.518 ( $p < 0.001$ ), there is a strong association between the independent and dependent variables. The MS is 0.098 with 153 degrees of freedom, a residual SS of 14.970, and 155 degrees of freedom.

**(c) Coefficients**

Model	UC		SC	t	Sig.
	B	Std. Error	Beta		
DT	.142	.074	.111	1.923	.046
BS	.868	.061	.822	14.293	.000

“Dependent variable= SCA”

The coefficients for a regression model using the two variables SCA, DT, and BS are shown in Table 8(c). The UC of 0.868 and the SC (beta) of 0.822 demonstrate a considerable beneficial effect of the IV "BS" on SCA. The t-value for this association is 14.293 and the significance level (p-value) is 0.000, both of which indicate a strong statistical significance. The UC of 0.142 and the SC of 0.111, however, show that the IV "DT" has a somewhat weakly beneficial effect on SCA. With a t-value of 1.923 and a significance level of 0.046, the relationship's statistical significance is on the edge. In conclusion, the findings show that BS significantly contributes to explaining the variation in SCA, but DT has a weaker and statistically less significant impact, supporting Hypothesis 3.

### Conclusion

This empirical investigation, in its end, offers convincing data regarding the effect of DT and BS on SCA in manufacturing firms. Increased BS activities are a result of organizations being able to connect and work with external stakeholders like suppliers and customers thanks to the development of digital technologies. SCA in industrial firms benefits from BS. Organizations can improve their competitive position in the market by utilizing relationships, knowledge, and resources from outside sources through efficient BS. By allowing BS operations, DT initiatives aid in the growth of SCA in manufacturing businesses. These results highlight the significance of building collaborations and utilizing DT initiatives to boost competitiveness and achieve long-term success in the complex business environment.

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# An Overview of Skill Development and its Connection with Atmanirbhar Bharat

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## Abstract

*Skill development is pivotal in fostering economic growth, improving employment opportunities, and enhancing the quality of life. In India, the initiative of Atmanirbhar Bharat (Self-Reliant India) underscores the importance of skill development in building a robust and self-sufficient economy. This paper provides an overview of skill development in India, examines its challenges and opportunities, and explores its intrinsic link with the Atmanirbhar Bharat initiative.*

*Keywords: Skill, Employment, Entrepreneurship, Economic Growth, Atmanirbhar Bharat*

## Introduction

Skill development has emerged as a crucial factor in the socio-economic advancement of nations. In India, a country with a vast and young population, skill development is vital for achieving sustainable growth and reducing poverty. The Atmanirbhar Bharat initiative, launched by Prime Minister Narendra Modi in 2020, emphasizes self-reliance and aims to make India a global manufacturing hub. This paper delves into the role of skill development in actualizing the vision of Atmanirbhar Bharat.

## The Importance of Skill Development

- Economic Growth:** Skill development leads to higher productivity and innovation, driving economic growth. It enables individuals to contribute effectively to the economy and supports the development of new industries.
- Employment Opportunities:** Equipping the workforce with relevant skills enhances employability, reduces unemployment rates, and addresses the issue of job mismatch in the labour market.

3. **Quality of Life:** Skilled individuals are more likely to secure better-paying jobs, leading to improved living standards and socio-economic stability.

### Challenges in Skill Development

Despite the recognized importance, skill development in India faces several challenges:

1. **Mismatch between Skills and Industry Needs:** The education and training system often fails to align with industry requirements, leading to a gap between the skills possessed by the workforce and those demanded by employers.
2. **Quality of Training:** Many training institutions lack the infrastructure, qualified trainers, and updated curriculum necessary for high-quality skill development.
3. **Accessibility:** Rural and underprivileged populations face significant barriers to accessing skill development programs, exacerbating inequalities.
4. **Awareness and Perception:** There is often a lack of awareness about the available opportunities and the perception that vocational training is inferior to formal education.

### Government Initiatives for Skill Development

The Indian government has launched several initiatives to address these challenges and promote skill development:

1. **Skill India Mission:** Launched in 2015, this mission aims to train over 400 million people in various skills by 2022. It includes programs like Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and the establishment of Sector Skill Councils.
2. **National Skill Development Corporation (NSDC):** The NSDC works in partnership with private sector entities to provide training and develop industry-relevant skills.
3. **Digital India:** This initiative promotes digital literacy and aims to make India a digitally empowered society, providing new opportunities for skill development.
4. **Make in India:** Launched in 2014, Make in India focuses on boosting manufacturing and creating jobs, which necessitates a skilled workforce.

### Atmanirbhar Bharat and Skill Development

The Atmanirbhar Bharat initiative aims to make India self-reliant through five pillars: economy, infrastructure, system, vibrant demography, and demand. Skill development is a

crucial component of this initiative, as a skilled workforce is essential for achieving self-reliance.

1. **Economic Resilience:** A self-reliant economy requires a diverse and skilled workforce capable of driving innovation and entrepreneurship. Skill development programs support the creation of small and medium enterprises (SMEs), which are vital for economic resilience.
2. **Manufacturing Hub:** To establish India as a global manufacturing hub, it is essential to have a workforce proficient in advanced manufacturing technologies, robotics, and automation. Skill development initiatives must focus on these areas to meet global standards.
3. **Technological Advancements:** The integration of technology in various sectors necessitates upskilling and reskilling of the existing workforce. Programs focusing on digital skills, artificial intelligence, and cybersecurity are crucial.
4. **Sustainable Development:** Skill development in areas such as renewable energy, waste management, and sustainable agriculture contributes to sustainable development goals and aligns with the Atmanirbhar Bharat vision.

### Case Studies and Examples

1. **Tata STRIVE:** An initiative by Tata Trusts, Tata STRIVE focuses on providing vocational training to youth from underprivileged backgrounds. It collaborates with various stakeholders to ensure the employability of trainees.
2. **Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY):** Aims to diversify the income of rural poor families and cater to the career aspirations of rural youth.
3. **Udaan Scheme:** Specifically targets the youth of Jammu and Kashmir, providing skill training and enhancing employment opportunities.

### Case Study of Tata Strive

#### Vocational Training and Skill Development

1. **Industry-Relevant Training Programs**
  - Tata STRIVE offers a wide range of vocational training programs designed to meet the specific needs of various industries. The curriculum is developed in consultation



with industry experts to ensure it is up-to-date with current market trends and technological advancements.

- Training programs cover sectors such as healthcare, automotive, construction, retail, and information technology. This diversity allows trainees to choose courses that align with their interests and the demands of the job market.

## 2. **State-of-the-Art Training Infrastructure**

- Tata STRIVE establishes modern training centres equipped with the latest technology and tools. These centres provide a conducive learning environment, enabling trainees to gain hands-on experience and practical skills.
- The emphasis on experiential learning helps bridge the gap between theoretical knowledge and real-world application, making trainees job-ready from day one.

## **Collaboration with Stakeholders**

### 1. **Public-Private Partnerships**

- Tata STRIVE collaborates with government bodies, industry associations, and educational institutions to enhance the reach and effectiveness of its training programs.
- Partnerships with government initiatives like Skill India Mission and National Skill Development Corporation (NSDC) facilitate access to resources, infrastructure, and funding, amplifying the impact of Tata STRIVE's efforts.

### 2. **Industry Engagement**

- Active engagement with industry players ensures that the training programs are aligned with the evolving needs of employers. Regular feedback from industry partners helps in continuously updating the curriculum and training methods.
- Collaboration with companies also opens up internship and apprenticeship opportunities for trainees, providing them with valuable work experience and a smoother transition into the workforce.

## Ensuring Employability

### 1. Comprehensive Skill Development

- In addition to technical skills, Tata STRIVE emphasizes the development of soft skills such as communication, teamwork, and problem-solving. These skills are essential for overall employability and career progression.
- Training modules also include sessions on digital literacy, financial literacy, and workplace ethics, ensuring holistic development of the trainees.

### 2. Placement Support

- Tata STRIVE offers robust placement support to its trainees, including resume building, interview preparation, and job placement services. Dedicated placement cells work closely with industry partners to identify job opportunities and match them with the skills and aspirations of the trainees.
- The strong industry network built by Tata STRIVE ensures high placement rates, with many trainees securing employment in reputable companies across various sectors.

## Focus on Inclusivity

### 1. Targeting Underprivileged Youth

- Tata STRIVE specifically targets youth from economically and socially disadvantaged backgrounds, including rural areas and marginalized communities. By providing them with access to quality training and employment opportunities, Tata STRIVE helps in reducing socio-economic disparities.
- Scholarships and financial assistance are available for eligible candidates, ensuring that financial constraints do not hinder access to skill development programs.

### 2. Women Empowerment

- Special initiatives are undertaken to encourage the participation of women in vocational training programs. Women-specific training centers, flexible training schedules, and support services such as childcare facilities are provided to make skill development accessible to women.
- Empowering women through skill development not only enhances their employability but also contributes to the overall socio-economic development of their families and communities.

## Entrepreneurship and Self-Reliance

### 1. Entrepreneurial Training and Support

- Tata STRIVE promotes entrepreneurship by offering training programs focused on business skills, such as business planning, financial management, and marketing. Trainees interested in starting their own businesses receive mentorship and support in developing viable business models.
- Access to startup funding and incubation services is facilitated through partnerships with financial institutions and entrepreneurship development organizations.

### 2. Creating Job Creators

- By nurturing entrepreneurial skills, Tata STRIVE not only creates job seekers but also job creators. Successful trainee entrepreneurs often go on to employ others, creating a multiplier effect in job creation and contributing to the economic development of their communities.
- Encouraging self-employment and entrepreneurship aligns with the Atmanirbhar Bharat vision of a self-reliant India, where individuals are empowered to take charge of their economic destiny.

## Case Study of Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)

Launched in 2014, the Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) is an ambitious skill development initiative by the Government of India under the Ministry of Rural Development (MoRD). The program aims to transform rural poor youth into economically independent and globally relevant skilled workforce. It targets rural youth aged 15-35 years from poor families, with a special focus on marginalized communities such as Scheduled Castes (SC), Scheduled Tribes (ST), and minorities.

### Objectives and Implementation

The primary objective of DDU-GKY is to enhance the employability of rural youth through skill training and placement. The program integrates skill training with a demand-driven approach, ensuring that the training is aligned with industry requirements. It operates through a Public-Private Partnership (PPP) model, involving Project Implementing Agencies (PIAs) that are responsible for providing training, employment, and post-placement support.

## Key Features

1. **Demand-driven Training:** Training programs are designed based on industry demands, ensuring that skills acquired are relevant and enhance employability.
2. **Inclusive Approach:** The scheme prioritizes marginalized groups, including SC/ST, women, and minorities.
3. **Comprehensive Training:** It offers a combination of soft skills, technical skills, and on-the-job training.
4. **Placement-linked:** A unique aspect of DDU-GKY is its emphasis on post-training placement, with PIAs required to secure a minimum of 70% placement for trained candidates.
5. **Quality Assurance:** The program incorporates strict monitoring and evaluation mechanisms to ensure the quality of training and placements.

## Case Study: Implementation in Uttar Pradesh

In Uttar Pradesh, DDU-GKY has made significant strides. The state government collaborated with various PIAs to establish training centres across rural areas. One notable example is the partnership with the National Skill Development Corporation (NSDC) and private training providers.

## Challenges

1. **Awareness and Mobilization:** Creating awareness among rural youth and mobilizing them for training remains a challenge.
2. **Retention and Dropouts:** Ensuring continuous engagement of trainees and reducing dropout rates is critical.
3. **Quality of Training:** Maintaining consistent quality across diverse training providers requires robust monitoring.

## Success Stories

1. **Empowerment of Women:** In districts like Gorakhpur and Varanasi, DDU-GKY has empowered women by training them in non-traditional trades such as electrical work and IT.
2. **Placement Success:** Many trained youths have secured jobs in reputable companies, contributing to their economic independence and uplifting their families from poverty.

## Case Study of Udaan Scheme

The Udaan Scheme, launched by the Government of India in 2011, is a special industry initiative aimed at addressing the employability of educated youth in Jammu and Kashmir (J&K). The scheme is part of the broader strategy to integrate the region's youth into the mainstream economy by providing them with skills and employment opportunities.

## Objectives and Implementation

The primary objective of Udaan is to provide exposure, training, and placement to the educated youth of J&K, thereby enhancing their employability. The scheme targets graduates, postgraduates, and three-year engineering diploma holders from the state. Implemented in partnership with corporates, Udaan aims to train 40,000 youth over a period of five years.

## Key Features

1. **Corporate Partnerships:** Corporates are invited to partner with Udaan, committing to recruit and train a specific number of candidates.
2. **Training and Placement:** Selected youth undergo a rigorous selection process, followed by training that includes soft skills, domain-specific skills, and on-the-job training. The training is designed to meet industry standards, ensuring high employability.
3. **Stipend and Accommodation:** Trainees receive a stipend and are provided with accommodation during the training period.
4. **Support and Monitoring:** The scheme includes continuous support and monitoring mechanisms to ensure the effective implementation and successful placement of candidates.

## Case Study: Implementation in Jammu and Kashmir

### Challenges

1. **Awareness and Mobilization:** One of the significant challenges has been creating awareness about the scheme among the youth in J&K and motivating them to participate.
2. **Retention:** Retaining trainees throughout the training period and ensuring they complete the program has been challenging due to various socio-economic factors.

3. **Cultural Adaptation:** Many candidates face difficulties adapting to different cultural and working environments outside J&K.

### Success Stories

1. **IT Sector Employment:** Many candidates trained under Udaan have secured employment in the IT sector with companies like Infosys, Wipro, and TCS. This not only provides them with stable employment but also exposes them to advanced technology and global standards.
2. **Empowering Women:** The scheme has been particularly successful in empowering women by providing them with opportunities in sectors traditionally dominated by men, such as manufacturing and services.
3. **Entrepreneurial Ventures:** Some Udaan beneficiaries have used their training to start their own businesses, contributing to local economic development and creating employment opportunities for others in their community.

### Conclusion

Skill development is a cornerstone for the realization of Atmanirbhar Bharat. It enhances economic growth, provides employment opportunities, and improves the quality of life. The government's initiatives, along with private sector participation, play a significant role in overcoming the challenges associated with skill development. By focusing on aligning skills with industry needs, improving training quality, and ensuring accessibility, India can build a skilled workforce that propels the nation towards self-reliance and global competitiveness.

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# Industry 4.0: Role of Women Entrepreneurship in Digital Transformation of Business

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## Abstract

*This study aimed to analyse women's entrepreneurial interests in business transformation. Digitalization is a catalyst for change. For industries, digital transformation brings the massive productivity, resilience, and sustainability benefits of the Industry 4.0 era. This is descriptive research with a qualitative approach. Data was collected through observation, interviews, and documentation. The data analysis techniques used were data reduction, data display, and verification of the conclusion. The result showed women have a high interest in developing businesses. Women's entrepreneurial interest in business is a strength that can lead to innovation, growth, and economic development. With the right support and resources, women entrepreneurs can make a significant impact in the business world. By making high-performance connectivity more ubiquitous and accessible, women are securely developing networks for innovation and collaboration to fuel the digital transformation of governments, societies, and businesses in Industry 4.0.*

*Keywords: business, entrepreneurial, interest, women*

## Introduction

The hidden innovative capabilities of women have continuously been changing with the developing affectability to the role and monetary status in the general public. Women's business has been known as a significant unexploited source of financial development in the last few years (Georgeta, 2012). Changing attitudes towards gender roles related to traditional gender roles are gradually breaking down, and women are no longer limited to certain types of jobs or careers. Increasing support for female entrepreneurs: There are now more resources available to help women start and grow their businesses, including mentorship programs, funding opportunities, and networking events. Flexibility and work-life balance: Entrepreneurship can provide women with more flexibility and control over their work schedule, which can be especially important for those with caregiving responsibilities. Overall, there is a growing recognition of the important role that women entrepreneurs play in driving economic growth and innovation. Entrepreneurship goes beyond simply producing and selling goods and services. It entails developing, managing, and innovating new or existing businesses with creativity, risk-taking, and the courage to succeed and grow. Moreover, entrepreneurship also involves creating value for consumers, society, and the



environment through socially responsible leadership and innovation (Zander et al, 2012). According to Drucker & Schumpeter (2012), entrepreneurship can offer several advantages for Generation Z, particularly because it has the potential to create jobs and support the economy.

Entrepreneurship also allows them to gain practical knowledge and experience, which they can apply to their studies and real-world business situations. Moreover, entrepreneurship can contribute to economic growth by creating job opportunities and boosting the economy in a particular region (SantiDiwyarthi, 2023). It is important to note that entrepreneurship is not solely about generating profits; it also involves creating significance for consumers, society, and the environment through responsible leadership and innovative strategies. Entrepreneurship has several advantages, particularly since new businesses can provide job opportunities and contribute to economic growth (Abbas et al, 2021).

Suchocka and Wolska's research focuses on women and entrepreneurship in Europe. They published the result with the title "Entrepreneurial Traits of Women in Generation Z" by Ewelina Suchocka and Katarzyna Wolska. Published in the *European Journal of Service Management* in 2020. Liu et al 2019 published "A Study on the Entrepreneurial Intention of Generation Z Women in China: From the Perspective of individual factors and family factors" by Xun Liu, Jing Xu, and Peng Cheng. Published in the *International Journal of Management and Enterprise Development* in 2019. Greene et al (2019) published "Women Entrepreneurship: A Review of Research on the Business Behavior of Women and Future Research Priorities" by Patricia G. Greene and Candida G. Brush. Published in the *Journal of Small Business Management* in 2019.

Women entrepreneurs are significant for creating employment and adding to the social and financial development of their societies, the interchange and subtleties of women's business, development, and culture are understudied (Brush et al. 2018; Hechavarria et al., 2019). Women entrepreneurs can play a vital function in the process of economic development if they have equal access to resources and opportunities. Despite the developing number of female entrepreneurs, the portion of female business ventures is still altogether low contrasted with their investment rate (Minniti & Arenius, 2003). Women's entrepreneurship is progressively significant in job creation and adds to the social and monetary development of their societies (Bullough et al., 2020). Particularly in Less Developed Countries with high female joblessness rates, for certain ladies who need to work at home, business can be a pragmatic answer for procuring pay and diminish their joblessness rate and poverty (Sarfaraz et al., 2013). Gender equality is relied upon to increase the help for female business (Baughn et al., 2006). Business venture regularly gives women the adaptability to deal with their home grown obligations at home, while additionally offering monetary help to their families (Bertaux & Crable, 2007).

According to the Global Entrepreneurship Monitor (GEM), 231 million females dispatched or operated organizations in the 59 economies throughout the planet that were studied in the most recent 2018/2019 report on women's business (Elam et al., 2019). Numerous associations and administrative organizations (ILO, 2020; UNWomen, 2020) have a long time ago perceived the significance of women during economic development, individual well-being, and cultural progression (Bullough et al. 2019). Women's entrepreneurship has increased drastically in recent years because of globalization and gender equality. However, this study aims to explore women entrepreneurs' capabilities and survival business enterprises with Industry 4.0.

## Objectives

1. To identify the key technologies and tools that are driving Industry 4.0 in women entrepreneurship and their potential impact.
2. To explore the challenges and opportunities associated with the integration of Industry 4.0 technologies in women entrepreneurship.
3. To explore the potential implications of Industry 4.0 for women entrepreneurship policy and practice, including issues related to equity, access, and inclusivity.

## Methodology

The current study has adopted the Literature Study Method which through a series of theories, findings, and previous research has been used as a basis for further research activities in preparing the framework of the problem being studied. In this study, only the recent 5 years of literature have been examined. The purpose of this research was to investigate and identify the various factors that influence the planning and application of Industry 4.0. A SWOT analysis is been used to identify ways to improve the business and maximize opportunities, while also identifying negative factors that may hinder your chances of success. Anything that requires planning can be applied to the SWOT framework, avoiding unnecessary mistakes due to lack of insight. This methodology includes the identification and analysis of key factors involved in the decision problem, as well as their categorization into strengths (S), weaknesses (W), opportunities (O), and threats (T) from the review of literature from the last 5 years. As discussed, context and task focus, as well as agility in the design process, are key elements of Industry 4.0. Technology-driven professions make a difference in how we express emotions, not only in business and school but also in our personal lives. In order to grasp Industry 4.0, it is necessary to design, develop and produce technologies in all fields. However, in addition to production, it is important to train a skilled workforce that can use this new technology. The framework of Industry 4.0 is very important in addition to knowledge, it should emphasize creative thinking and design education policy based on lifelong learning.

## Literature Review

Some research on women's entrepreneurial activities in Industry 4.0 and Women Entrepreneurship:

1. "Industry 4.0 and Women Entrepreneurship: A Review of the Literature "by M. Alemdar, M. I. B. Wibowo, and R. H. Mantiri (2021) published in the journal International Journal of Innovation, Creativity and Change. The paper provides a comprehensive review of the literature on women's entrepreneurship in the context of Industry 4.0, including the challenges and opportunities that women face in this rapidly changing technological landscape.
2. "Society 5.0 and Women Entrepreneurship: Towards an Inclusive and Sustainable Society" by N. N. Naim and N. A. Mohamad Nor (2021) published in the journal Sustainability. The article explores the potential for women's entrepreneurship to contribute to the goals of Society 5.0, which emphasizes the integration of technology and social innovation to create a more sustainable and inclusive society.
3. "Women Entrepreneurship in the Fourth Industrial Revolution: A Review and Research Agenda" by S. Yaseen and S. S. Chowdhury (2019) published in the journal International Journal of Entrepreneurship and Small Business. This paper reviews the literature on women's entrepreneurship in the context of Industry 4.0 and proposes a research agenda to better understand the factors that influence women's entrepreneurial activity in this new technological landscape.
4. "Women Entrepreneurship and Industry 4.0: Empowering Female Entrepreneurs through Digital Transformation" by M. K. Khan and K. M. A. Kabir (2020) published in the book Industry 4.0: Challenges and Opportunities. This chapter examines how digital transformation can enable and empower women.

Entrepreneurship goes beyond simply producing and promoting products or services. It encompasses generating, advancing, and handling novel or current ventures with originality, resourcefulness, the willingness to take chances, and the bravery to attain triumph and advancement. Entrepreneurship involves generating significance for consumers, society, and the environment through responsible leadership and innovative approaches. Entrepreneurship brings forth numerous benefits for been identified in research. Women entrepreneurs have a positive impact on their communities. Research has shown that women entrepreneurs can have a positive impact on their communities by creating jobs, promoting economic development, and serving as role models for other women and girls.

## Industry 4.0

Industry 4.0, also known as the fourth industrial revolution, enables enterprises, governments, and public sector agencies to use innovative digital technologies, smart automation, and advanced analytics to

transform their operating processes. This blending of technologies creates a convergence of the physical and digital worlds, enabling an era of massive industry improvements and positive impacts on societies. The journey to Industry 4.0 is powered by ubiquitous connectivity, cloud computing, and rich data. It requires high-performance networks that can integrate with legacy environments to support critical processes with strong security, 24/7 availability, high speed, and ultra-fast responsiveness. These networks must connect all machines, people, and processes and offer deep data insights that can enable agile and proactive operations.

The fourth industrial Revolution has the potential to lift worldwide income ranges and improve the quality of existence for populations around the arena. To date, those who have gained the most from it have been clients able to afford and enter the digital world; the era has made possible new services and products that increase the efficiency and price of our self-lives. In the future, technological innovation may even lead to a supply-aspect miracle, with lengthy-term profits in performance and productivity. Transportation and communiqué expenses will drop, logistics and global delivery chains turns into greater effective, and the cost of exchange will decrease.

### **Opportunities for Women and Industry 4.0**

Digitalization and Industry 4.0 might be considered as a movement whether it is on the personal, professional, or societal level. A movement that creates opportunities for women faster than ever before. Looking at different income groups, countries, or regions, the big question is to what degree and how quickly can digitalization and Industry 4.0 reach and affect individual groups and leverage the potential of women's inclusion. The use of digital platforms provides women with greater access to markets, knowledge, and more flexible working arrangements. In addition to this, there is strong and growing empirical evidence suggesting that higher levels of gender equality are associated with positive outcomes in terms of income, economic growth, and competitiveness. Companies with greater gender equality in their workforce and top management are better able to attract and retain female talent, motivate their female workers, understand and respond to the needs of female customers, and better address complex business problems by taking account of gender-informed viewpoints. Consequently, technical education and the economic empowerment of women can bring dramatic gains in human development and well-being for individuals, families, and society.

Industry 4.0 means taking digitalization from the office place to the manufacturing area. It means that production processes get digitalized, and devices, objects, and humans get connected holistically. Automated processes and robots are taking over labour-intensive and repetitive tasks, and safeguarding the more intelligent jobs for humans, which is more convenient. In this context, there is a tremendous window

of opportunity for well-educated women in the field of technical and engineering disciplines. Industry 4.0 enables new customer values, e.g. through product customization as opposed to mass production. This increases data generation and thus the need for data analysts, a job profile that was non-existent a few years ago.

### Women-Run Businesses Efficiently

Businesses that have women at the helm are considered to run very efficiently, and some of the compelling reasons to invest in such a business are:

- **Higher return potential:** Businesses led by women require less investment but generate higher net revenue. For every dollar invested, women-led start-ups provide a 78 percent return compared to 31 cents by men-led start-ups.
- **Multi-tasking:** Women are great multi-taskers as the majority of them juggle multiple things at once. These women could prove highly valuable in generating various income streams and helping to nurture start-ups. As per a survey conducted by psychologists at the University of Hertfordshire, when women and men were given two tasks at the same time, women slowed by 61%, whereas men slowed by 77%.
- **High risk appetite:** Women entrepreneurs are known to take more risks, as per a survey taken by KPMG 43% of women are willing to take more risks. Moreover, women are found to be better than men at envisioning opportunities.
- **Adaptability and higher EQ:** Women have a dynamic ability to adapt. A survey conducted by Bain & Company, Google, and AWE Foundation of 350 women solopreneurs and small company owners in urban India found that companies run by women founders were resilient and fast to adapt. The results also showed that women also had a higher emotional quotient (EQ).

### Business and Management Competencies

One of the most important elements of Industry 4.0 is horizontal networks, which refer to the value networks between businesses, suppliers, customers, and other support entities. Industry 4.0 allows for real-time information to be shared among different organizations, leading to more efficient use of resources. This will enable new types of business processes business models and digital services for consumers, industries, and public services. These connections permit communication and collaboration among machines, between machines and people, and between people. Business processes need to be integrated and automated within the company while creating value chains through horizontal integration, be it for customers, suppliers, or other companies. As task and schedule assignment becomes automated, specific tasks may no longer need to be assigned by managers, but by platforms running with algorithms. As the organizational structure

changes, the operator becomes more of a decision-maker and the manager becomes more of a facilitator, with technology also permitting the creation of new organizational teaching tools.

For Industry 4.0 to be developed, commitment is needed from top management, with a dedicated strategy and allocated resources. It is also necessary to create a technology culture within the company, in which employees are trained and familiar with the systems. The business elements that would be impacted by these changes include logistics and sourcing, quality change management, quality assurance, business processes, and the interaction with products and customers as new business models emerge and customers can become more involved in the customization process. It is important to be aware of the latest existing technology and how to apply it to processes and process integration<sup>10</sup>. Small and medium companies also must understand the business possibilities as well as the implications of technology in their business models. As business models change and new ones emerge, it is important to understand new ways of using digital products and services and integrate post-sales services and the socialization of products into the business model.

The competencies related to management are technology awareness; change management; using forecasting data and planning metrics for strategy development; and understanding technology tools for talent management. Technology and information can be leveraged to predict labour needs and create talent management strategies for attraction retention and training/lifelong education. Organizational structures can be changed to enable the exchange of knowledge, and for workers to participate and choose their tasks, making the organizational model more like a platform that enables work. Managers can help workers understand their role and value for the organisation's strategy, and at the same time empower them to make decisions in regards to their work. At the same time, they must understand their new role as facilitators, as well as technology trends such as new, tech-enabled contracts or on-demand hiring trends to integrate with talent management strategies shows in Figure 1 below shows the different business and managerial elements of Industry 4.0, to better understand the related knowledge needed.

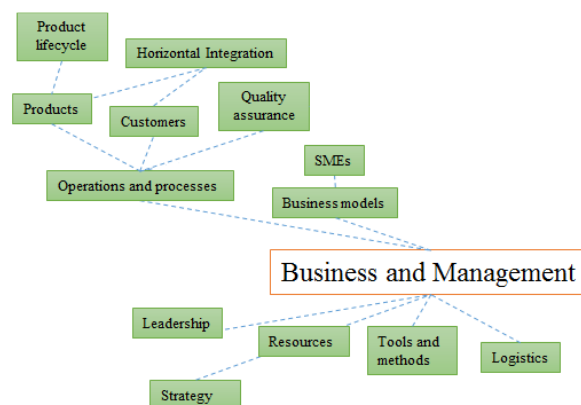


Figure 1 - Business and management elements of Industry 4.0

## Design and Innovation Competencies

The literature review yielded the least information related to design and innovation in Industry 4.0, as it seems to be a relatively new area of focus. The articles talking about Industry 4.0 and design emphasize the interaction between robots and humans, and user interfaces. Most technology fails because human use is not taken into consideration, and people utilize it in a different way than intended. Advancements in technology permit better ergonomic solutions and an improved user experience, as well as the design of customized, unique products and services. This suggests that the knowledge related to design and innovation in Industry 4.0 is related to the design of human-machine interaction, ergonomics, user interfaces, and user experience, as shown in Figure 2 below.

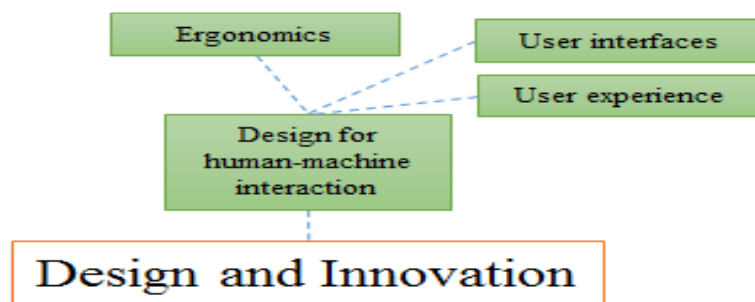


Figure 2 – Design and innovation elements of Industry 4.0

## Concept of Innovation and Creativity Woman

Innovativeness and creativity are key components in business ventures which women have been occupied with since time immemorial, they frequently come as skill acquisition whereby learners gain the abilities inborn in the family or from handy individuals around them (Alese, 2011). The job of innovation and creativity in an entrepreneurial endeavor is fundamental. Creative individuals steadily endeavor to work on their thoughts and possible solutions. They improve on their work by continuously modifying and refining the products. Innovativeness and creativity are related and cannot be isolated from business, which is shown in archives of big business (Barringer & Ireland, 2006). Innovativeness and creativity are key variables in business

SWOT analysis has some benefits such as: Providing more in-depth and qualitative information, facilitating strategic planning process, reducing research subjectivity, helps in developing recommendations. Provides more in-depth and qualitative information: By using business owners as a data source, researchers can obtain richer and deeper information about their experiences, perceptions, and views on their business. This can help to understand in more detail the internal and external situation of the company, as well as the obstacles and challenges faced in running the business. Facilitates strategic planning process: SWOT

analysis can help business owners formulate more effective business strategies based on the findings and recommendations obtained from the research. In addition, this research can also provide useful information in identifying opportunities and threats in the market. Reduces research subjectivity: In conducting qualitative research, subjectivity can be a significant problem. However, by using SWOT analysis, researchers can reduce subjectivity in evaluating the data obtained from business owners. This can provide better validity for the research. Helps in developing recommendations: This research can provide useful recommendations for business owners in developing their business further. Thus, this research can help in improving business success and assisting business owners in achieving their goals. The description explains the benefits of SWOT analysis in exploring entrepreneurial aspects.

### **Strength**

Women's entrepreneurial interest in business nowadays is the increasing support and resources available to them. There is a growing awareness and recognition of the important role that women play in the business world. As a result, there are now more programs, grants, and initiatives specifically tailored to women entrepreneurs. Women can also benefit from mentorship, networking, and training opportunities, which can help them develop the skills and knowledge needed to succeed in their ventures.

Women tend to bring unique perspectives and ideas to the table, which can be a strength in today's diverse and constantly changing market. They are also known for being great collaborators and communicators, which can lead to strong partnerships and relationships with customers, suppliers, and other stakeholders. The increasing use of technology and the internet has created new opportunities for women entrepreneurs. They can use social media and e-commerce platforms to market their businesses, reach new customers, and expand their reach globally. The digital era has also made it easier for women to access resources and connect with other entrepreneurs, regardless of their location or background.

This description is supported by Alemdar, Wibowo, and Mantiri (2021). They said that women's entrepreneurship in the context of Industry 4.0, including the challenges and opportunities that women face in this rapidly changing technological landscape. Women's entrepreneurial interest in business is a strength that can lead to innovation, growth, and economic development. With the right support and resources, women entrepreneurs can make a significant impact in the business world.

### **Weaknesses**

The weakness of women's entrepreneurial interest in business nowadays is the persistent gender biases and discrimination that they may face. Despite the progress made towards gender equality, women entrepreneurs still encounter challenges related to access to funding, networking opportunities, and



mentorship. They may also face social and cultural barriers, such as societal expectations of their roles and responsibilities.

Another weakness is the lack of representation of women in leadership positions and industries that are traditionally male-dominated. This can limit the role models and mentors available to women entrepreneurs, and hinder their ability to build strong networks and partnerships. Women entrepreneurs may struggle to balance their business responsibilities with their personal lives, particularly if they have caregiving responsibilities or face systemic barriers related to work-family balance. Lastly, women entrepreneurs may also struggle to access certain markets or industries due to factors such as geographic location or limited resources. This can limit their ability to scale their businesses and reach their full potential.

This description is supported by Yaseen & Chowdhury (2019), who that women's entrepreneurship in the context of Industry 4.0 faces some challenges and threats, and proposes a research agenda to better understand the factors that influence women's entrepreneurial activity in this new technological landscape. there are many strengths to women's entrepreneurial interest in business nowadays, but there are still several weaknesses and barriers that need to be addressed to ensure that women have equal opportunities to succeed in the business world.

## Opportunity

There are several opportunities for women's entrepreneurial interest in business nowadays. One of the biggest opportunities is the growing demand for diverse and inclusive businesses. With consumers increasingly looking for businesses that prioritize social responsibility, sustainability, and diversity, women entrepreneurs have the opportunity to create ventures that address these needs and differentiate themselves in the market.

The rise of digital technologies and e-commerce has created new opportunities for women entrepreneurs to reach global markets and access customers beyond their geographic location. They can also use digital platforms to collaborate and network with other entrepreneurs, share knowledge, and access resources. Another opportunity is the increasing number of programs and initiatives designed to support women entrepreneurs, such as mentorship programs, incubators, and funding opportunities. These resources can provide women with the skills, knowledge, and funding needed to start and grow their businesses.

There is a growing trend towards flexible and remote work arrangements, which can benefit women entrepreneurs who may face challenges related to work-family balance or geographic limitations. Women entrepreneurs have the opportunity to inspire and empower future generations of women to pursue entrepreneurship and leadership roles, creating a positive impact on society and contributing to the

advancement of gender equality. Overall, there are many opportunities for women's entrepreneurial interest in business nowadays, which can lead to innovation, growth, and economic development. Women entrepreneurs have the potential to make a significant impact in the business world and beyond.

## **Threat**

There are several threats that women entrepreneurs may face in pursuing their business. One of the most significant threats is the lack of access to funding and capital. Women-owned businesses often struggle to secure financing compared to male-owned businesses, which can limit their growth and success.

Women entrepreneurs face discrimination or bias in the business world, leading to unequal opportunities or challenges in accessing resources, networks, or mentorship. Another threat is the impact of external factors such as economic downturns, market changes, or natural disasters, which can disproportionately affect small and medium-sized businesses, including those owned by women. Women entrepreneurs may face work-family balance challenges, especially if they are also primary caregivers, which can impact their ability to dedicate time and resources to their business. The rise of automation and artificial intelligence may also pose a threat to traditional business models, including those led by women entrepreneurs.

This description is supported by Naim & Nor (2021), that women's entrepreneurship has contributed to the goals of Society 5.0, which emphasizes the integration of technology and social innovation to create a more sustainable and inclusive society. But there are some threats also, technology and social innovation make the customers don't need help in making nail art, mass product, etc. These threats can hinder the growth and success of women-owned businesses and limit their potential impact in the business world. It is essential to address these challenges through policy changes, education, and support programs to ensure that women entrepreneurs have an equal opportunity to succeed.

There is a significant level of interest among women in starting businesses, particularly in the market, which remains largely untapped, offering numerous opportunities for female entrepreneurs to thrive. Entrepreneurship presents an avenue for meeting diverse individuals. The influence of technology is a critical factor driving the interest in entrepreneurship. By leveraging innovative internet technology, such as social media and e-commerce platforms, entrepreneurs can market their businesses with ease, reach a wider audience, and enhance their competitiveness.

## **Conclusion**

Women's entrepreneurial interest in business is a strength that can lead to innovation, growth, and economic development. With the right support and resources, women entrepreneurs can make a significant impact in the business world. as a business that has survived since 2018 demonstrates that it has high

potential in improving the welfare of women entrepreneurs, has survived during the Covid-19 pandemic also, and has proven that women entrepreneurs are capable of adapting to technological advancements, and is accepted by the community. currently over 15.7 million women-owned enterprises, with women leading the start-up ecosystem. This drastic transformation underlines the potential of Indian women and their determination. In the coming decades, India is set to witness a major shift, with women dominating the workforce as well as shaping and enhancing the future of the country. It is estimated that over 30 million more women-owned businesses are expected to provide 150–170 million jobs by 2030. This could be a game changer and help the economic outlook look brighter than ever.

Opportunities for women entrepreneurs include growing demand for diverse and inclusive businesses, digital technologies enabling access to global markets and collaboration, support programs and funding, flexible work arrangements, and the potential to inspire future generations of women entrepreneurs. These opportunities can lead to innovation, growth, and economic development, making a significant impact in the business world and beyond. Threats to women entrepreneurs in pursuing their business, include limited access to funding and capital, discrimination and bias in the business world, external factors such as economic downturns, work-family balance challenges, and the impact of automation and artificial intelligence on traditional business models. Addressing these challenges through policy changes and support of Digitalization provides paths to sustainability with tools such as pervasive connectivity, cloud, advanced analytics, and industrial automation. Fuelled by the Industry 4.0 goals of efficiency, productivity, and agility, digitalization brings new ways to connect people and workplaces, accelerate the shift to more sustainable business practices, and measure environmental impacts with greater intelligence built into the entire operation. There is no green without digital. so, Industry 4.0 presents immense opportunities for businesses to drive innovation and achieve sustainable growth.

Industry 4.0 is still in the early stages for most companies and the digital transformation will require strong leadership, the right human competencies and to overcome the several barriers identified for its successful implementation. Although the literature indicates that the adoption of Industry 4.0 improves companies' performance, there are still many organizations that do not apply and don't feel comfortable about doing it. This leads to opportunities to further investigate the areas where companies should prioritize the adoption of Industry 4.0 and to consider not only the technical aspects, but also the management, organizational, and human dimensions, including what types of novel business models and people skills are required for the future, and what are the change processes to make it happen.

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# Unlocking Innovation in the Business World through Industry

## 4.0: Addressing Global Contemporary Issues

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### Abstract

*In the contemporary business landscape, companies face myriad global challenges including climate change, digital transformation, geopolitical tensions, public health crises, and social inequality. Industry 4.0 technologies, such as the Internet of Things (IoT), Artificial Intelligence (AI), robotics, big data analytics, blockchain, and Augmented Reality (AR)/Virtual Reality (VR), offer unprecedented opportunities to address these issues. This article explores how these technologies can drive innovation and create sustainable value, while highlighting the strategies for successful implementation and the associated challenges.*

*Keywords: Industry 4.0, Innovation, Climate Change, Digital Transformation, AR/VR*

### Introduction

The rapid evolution of the global business environment presents numerous challenges that demand innovative solutions. Climate change, digital transformation, geopolitical tensions, public health crises, and social inequality are significant contemporary issues that impact businesses across sectors. To navigate these challenges, companies must leverage the transformative potential of Industry 4.0 technologies. These technologies enable businesses to optimize operations, enhance decision-making, and create sustainable products and services. This article examines the role of Industry 4.0 in addressing these global issues, the strategies for effective implementation, and the challenges businesses must overcome to unlock innovation.

### Addressing Global Contemporary Issues

#### Climate Change

Climate change presents one of the most significant challenges for businesses today. The increasing regulatory pressure for sustainable practices and the risk of supply chain disruptions due to extreme weather events necessitate a shift towards more sustainable business models. According to a 2023 report by the Intergovernmental Panel on Climate

Change (IPCC), the global economy could lose up to 10% of its total economic value by 2050 if climate change impacts are not mitigated.

### Innovation Opportunities

- **Renewable Energy:** Companies like Tesla are leading the way by investing in solar and battery technology to reduce their carbon footprints and operational costs. Tesla's Gigafactory aims to produce enough batteries to store energy generated from renewable sources, making renewable energy more viable and reducing dependence on fossil fuels.
- **Sustainable Products and Services:** Unilever has committed to ensuring all of its plastic packaging is reusable, recyclable, or compostable by 2025. This commitment not only addresses environmental concerns but also meets the growing consumer demand for sustainable products.

### Digital Transformation

The shift to digital platforms and the explosion of data generation have transformed how businesses operate. However, this digital transformation also brings cybersecurity threats and the need for robust data management. The global digital transformation market is expected to grow from \$1.3 trillion in 2020 to \$2.3 trillion by 2025, highlighting the significant investments businesses are making in this area.

### Innovation Opportunities

- **AI and Machine Learning:** Amazon uses AI for advanced data analytics to enhance decision-making and predict market trends. AI helps Amazon analyze vast amounts of data to forecast demand, optimize inventory, and personalize customer experiences.
- **Block chain:** Walmart employs block chain technology to ensure secure transactions and supply chain transparency. By using block chain, Walmart can trace the origin of food products in seconds, ensuring food safety and reducing the risk of contamination.

### Geopolitical Tensions

Geopolitical tensions, such as trade wars and regulatory changes, can disrupt markets and limit business expansion. For instance, ongoing trade tensions between the US and China

have led to increased tariffs and supply chain disruptions. These tensions create uncertainty and increase operational risks for businesses operating globally.

### Innovation Opportunities

- **Regional Partnerships:** Forming strategic alliances with regional partners can help navigate regulatory landscapes and access new markets. For example, companies can establish joint ventures with local firms to mitigate the impact of trade barriers.
- **Resilient Supply Chains:** Companies like Toyota use IoT and AI for supply chain optimization, reducing dependency on single sources and enhancing flexibility. By diversifying their supply chains, businesses can better manage risks associated with geopolitical instability.

### Public Health Crises

The COVID-19 pandemic highlighted the vulnerability of businesses to public health crises. Companies must prioritize workforce health and safety while ensuring operational continuity. The global telemedicine market is expected to reach \$185.6 billion by 2026, driven by the need for remote health solutions.

### Innovation Opportunities

- **Telemedicine:** Teladoc Health offers telemedicine solutions to support employee health and wellness. Telemedicine allows employees to access healthcare services remotely, reducing the risk of infections and ensuring timely medical consultations.
- **Remote Working Solutions:** Microsoft Teams and Zoom have seen massive growth, providing advanced remote working technologies that maintain productivity during disruptions. These platforms enable seamless communication and collaboration, supporting business continuity in remote work scenarios.

### Social Inequality

Social inequality poses reputational risks and affects workforce diversity. Addressing social inequality is crucial for businesses to maintain their reputation and attract diverse talent. According to McKinsey, companies in the top quartile for gender diversity on executive teams are 25% more likely to have above-average profitability.



## Innovation Opportunities

- **Inclusive Products and Services:** Designing products that cater to diverse consumer needs can capture new market segments. For instance, Procter & Gamble's diverse range of beauty products addresses the needs of different skin tones and hair types.
- **Social Impact Investments:** Google has invested \$1 billion in racial equity initiatives to enhance corporate social responsibility and brand reputation. These investments support minority-owned businesses and educational programs, promoting social equity.

## Unlocking Innovation in Business: Industry 4.0

### Internet of Things (IoT)

IoT facilitates smart factories and predictive maintenance, optimizing operations and reducing downtime. General Electric (GE) uses IoT to enhance its manufacturing processes and equipment maintenance. IoT sensors monitor machinery in real-time, predicting failures and scheduling maintenance before breakdowns occur.

### Artificial Intelligence (AI)

AI automates tasks, enhances data analytics, and improves customer service through chatbots, boosting efficiency and customer satisfaction. Netflix uses AI to personalize content recommendations, improving user experience. AI algorithms analyze viewing habits to suggest movies and shows tailored to individual preferences.

### Robotics

Robotics streamlines manufacturing and logistics processes, increasing productivity and safety while reducing labour costs. Amazon uses robotics in its warehouses to enhance logistics efficiency. Robots transport goods within the warehouse, speeding up order fulfilment and reducing human error.

### Big Data and Analytics

Big data analytics provide insights into market trends, customer behaviour, and operational efficiency, enabling informed decision-making. Starbucks uses big data to optimize its supply chain and personalize customer experiences. By analyzing sales data, Starbucks can predict demand and ensure timely replenishment of stock.

## Blockchain

Blockchain ensures secure transactions, supply chain transparency, and the implementation of smart contracts, reducing fraud and enhancing traceability. IBM's Food Trust blockchain is used by Walmart to trace food products from farm to table, ensuring safety and quality. Blockchain records every transaction in the supply chain, providing an immutable and transparent ledger.

## Augmented Reality (AR) and Virtual Reality (VR)

AR and VR offer immersive training, product design visualization, and interactive customer engagement, enhancing learning experiences and marketing effectiveness. IKEA uses AR to allow customers to visualize furniture in their homes before purchase. The IKEA Place app lets users see how furniture will look and fit in their space, improving the shopping experience.

## Strategies for Implementation

To successfully integrate Industry 4.0 technologies, businesses should:

- 1. Invest in Technology and Infrastructure:** Upgrade systems and invest in new technologies while ensuring robust cybersecurity measures. This includes modernizing IT infrastructure, adopting cloud computing, and implementing IoT devices.
- 2. Foster a Culture of Innovation:** Encourage experimentation, risk-taking, and continuous learning. Organizations should create an environment where employees feel empowered to innovate and explore new ideas.
- 3. Collaborate with Start-ups and Tech Firms:** Partner with innovative companies for expertise and joint ventures. These collaborations can bring fresh perspectives and access to cutting-edge technologies.
- 4. Focus on Customer-Centric Solutions:** Use data to understand customer needs and develop value-driven products. By leveraging big data analytics, businesses can tailor their offerings to meet evolving consumer demands.
- 5. Emphasize Sustainability:** Integrate sustainable practices into operations and innovate with eco-friendly solutions. This includes reducing waste, optimizing resource use, and investing in renewable energy.

## Challenges and Considerations

Despite the benefits, businesses must navigate challenges such as data privacy, skill gaps, regulatory compliance, and change management. Addressing these challenges requires a strategic approach to technology adoption and organizational transformation.

### Data Privacy and Security

As businesses collect and analyze vast amounts of data, ensuring data privacy and security becomes paramount. Cybersecurity threats are a significant concern, and companies must invest in robust security measures to protect sensitive information.

### Skill Gaps

The adoption of Industry 4.0 technologies requires a workforce with advanced technical skills. Businesses must invest in training and development programs to bridge skill gaps and ensure employees are equipped to work with new technologies.

### Regulatory Compliance

Navigating complex regulatory environments can be challenging, especially when implementing new technologies. Businesses must stay abreast of regulatory changes and ensure compliance to avoid legal issues and penalties.

### Change Management

Implementing Industry 4.0 technologies involves significant organizational change. Effective change management strategies are essential to ensure smooth transitions and minimize resistance from employees.

## Conclusion

By addressing global contemporary issues and leveraging Industry 4.0 technologies, businesses can drive innovation, improve efficiency, and create sustainable value. Embracing these advancements not only ensures resilience in the face of challenges but also positions companies at the forefront of the future business landscape. As businesses continue to navigate an increasingly complex and dynamic environment, the strategic implementation of Industry 4.0 technologies will be crucial for sustained success and competitive advantage.

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# Role of HRM in Digital Marketing on Tourism and Hospitality Sectors at Tamil nadu

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## Abstract

*Digital Marketing (Computerized promoting) is revolutionizing the commerce, promoting, retailing, shopping and promoting exercises of items and administrations. In the time of globalization, where the world has gotten to be a worldwide town client benefit can be made strides essentially by taking computerized activities on a standard premise. In arrange to construct a great corporate picture and to move forward client enchant; it is critical that HR thought to teach required advanced aptitudes among representatives at all levels of organization to completely accomplish the organizational objectives of tall efficiency and worker fulfilment. The pace of innovative alter is so quick that we have to make incremental changes in our HR forms and capacities at a much quicker rate so as to accomplish trade brilliance. Human Asset Administration, a necessarily portion of an organization, regularly guarantees the victory of the shared relationship between representatives and an organization by distinguishing and fulfilling the needs of the workers starting with enrolment and proceeding all through their career. This article points to analyze the Human Asset hones in lodgings in the state of Tamilnadu. This specific geographic area of India offers human asset challenges that are interesting to this well-known traveller/tourist goal. Comes about from this consider appear that workers are fulfilled with their stipend bundles but not with the working conditions, and the representative turnover rate is generally tall. Satisfactory preparing is not frequently given by the hoteliers to create employees' operational aptitudes. Enlistment is basically through inner referrals driving to tall inbreeding and consequent other human asset issues. There is a noteworthy crevice between what is anticipated from unused workers and the expertise levels of accessible ability pool of Digitalized.*

**Keywords:** Digital Marketing, Channels, HRM, Tourism, Hospitality Industry

## Introduction

‘Digital Age’ –The Age which is helping in improving the engagement of consumers and marketers by influencing the opinions, perception, mindsets of people that helps in changing the way consumers and marketers are interpreting and predicting the market. Dynamically changing internal environment which is marked by changes in goals, company leadership, company structure, philosophy and external environment which is marked by changes in political, social, cultural and economic environment is forcing the companies to adopt innovative technologies in every sphere of economy. Digital Marketing is having a great impact in every sphere of economy, from manufacturing to service industry. Digital Marketing provides end to end solutions that transform the way the data and information is accessed and provide global interactions that helps in developing long term productive relationships with the consumers and marketers. Digital is an innovative approach to recognize new capabilities to improve communication and connections between different customers, management, service providers and the society at large. Digital Marketing consists of integrated channels and promotion of business channels such as Internet, mobile devices, TV and radio to effectively communicate the message to the target audience. Digital transformation means unlocking the growth potential through the use of diverse technology platforms such as Data analytics, Cloud Computing, data mining, artificial intelligence, mobility, e-commerce, social media in the smart embedded devices to fundamentally improve output, develop healthy mutually productive industry and customer relationships, build technologically sophisticated operating models and reform internal processes. ‘Digital India’ is a vision to transform India, into a digitally empowered society and knowledge economy. Digital Marketing is the driving force for the adoption of developmental technologies which allows effective allocation of marketing budget, linking of marketing strategy with industry cycles and design in-scale economies. Earlier people use internet to access email and searching information. But nowadays Digital marketing technologies influence the quality, price, advertisement, brand name, dealer’s network and after sales service decisions. With the rapid growth of internet marketing and social media marketing, it is imperative to build an efficient marketing strategy which can have an enduring positive influence on business results by dramatically transforming the customer experience and enhancing the productivity in operations. Digital marketers should be digitally skilled to enable real time engagement of customers and marketers in decision making process, connect different data sources to extract

consequential results, generate insights about customer preferences and future predictions about market.

### **Tourism & Hospitality Industries in Tamilnadu**

Tourism & Hospitality Industries are amongst the most visible and important aspects of a country's infrastructure. The industry is closely linked to the tourism industry. A number of factors like the promotion of tourism and the rapid industrial progress have given a boost to hotelier. The recent liberalization of trade and the opening up of the economy will further lead to revolutionary growth in this sector. Today, in Tamilnadu, tourism is recognized as an industry generating a number of economic and social benefits. It creates employment opportunities, augments foreign exchange earnings, and promotes national integration and international understanding. To meet the demand of incoming tourists, the industry has to increase the availability of hotels and rooms in Tamilnadu.

### **Objectives of the Study**

- To study on Human Resource Management in Tourism & hotel industry at Tamilnadu.
- To identify the human resource practices in hotel industry
- To analyze the effectiveness of Digital Marketing and its HRM performance in Tourism & Hospitality industries.

### **Research Design**

Since the present study focuses on the characteristics of tourists, hoteliers and customers, customer expectations and perception on the services offered by hoteliers, and the relationship between the profile of the hoteliers and their business performance, the most appropriate method would be descriptive. It is also aimed to analyse the different factors, problems etc., analytically the most suitable design would be descriptive cum diagnostic research design. Both primary and secondary data have been used in this study.

### **Channels of Digital Marketing in HRM**

#### **SEO (Search Engine Optimization)**

Marketers are trying to listen, analyse and act on the ever-changing expectations of the customers by improving the visibility of the search engines and try to create a website which is more cost-effective for both the parties through efficient keyword search. This can

be achieved through optimizing the website –by editing its content, increase in the number of back links and social book marking.

### **SEM (Search Engine Marketing)**

Company can gain a competitive edge by encompassing different options to use a search engine's technology. Such as associating with researching, submitting and positioning a website within search engines through optimization and paid listings.

### **SMM (Social Media Marketing)**

Social Media Marketing is changing the overall game of marketing by encouraging customer engagement through conversation or sharing. Electronic Word of Mouth marketing (EWoM) on the social media websites like Facebook, twitter, LinkedIn, YouTube, Google is coming out to a very impactful technique for the marketer to gain trust and satisfaction of customers.

### **MMM (Mobile Marketing)**

Nowadays, companies are investing their marketing efforts in doing marketing through mobile device. Mobile ads, websites, apps and games are specifically designed to understand the customer satisfiers and dissatisfies.

### **EMT (Email Marketing)**

In order to transform the overall sales experience, companies are focusing on providing personalized and customized targeted messages to customers at low cost.

## **Factors Influencing the HRM Decision Making on Tourism & Hospitality Industry**

As demonstrated above, the conventional view of the hotel industry is that it remains backward in its approach to HRM. Where innovative management techniques have been experimented with, they have been used primarily to intensify work effort, rather than to enhance commitment. While there has been some recent debate over the extent to which this conventional picture remains valid, with a few studies presenting anecdotal accounts of experimentation with new HRM techniques, others continue to report the industry as still failing to adopt a more strategic approach. The next section aims to develop hypotheses as to why this might be the case, considering the factors that might influence HRM policy choice



within the hotel industry. The following section also assesses the extent to which there is common ground between the influences on HRM considered important in the mainstream HRM literature and the influences considered important within the hotel industry.

### **Advantages of Digital Marketing in HRM on Tourism & Hospitality**

Digital marketing is revolutionizing the commerce, marketing, retailing, shopping and advertising activities of products and services. In the era of globalization, where the world has become a global village customer service can be improved significantly by taking digital initiatives on a regular basis. In order to build a good rapport and to improve customer delight, it is important that problems should be resolved in a transparent and quick manner. Tourism Organization of all levels have realized the advantages of Digital Marketing and thereby using it extensively to promote their products and services. Some of the advantages are:

**Reach:** Digital Marketing is focusing on extending its reach in terms of broadening target markets, enhancing customer relationships and extending tourism & hospitality product lines and services. Changing demographics, changing lifestyles, internal and external environmental pressures are forcing the companies to extend the reach of digital transformation in an extended geographical boundary at a faster pace and at low cost.

**Evaluation and Measurement** – With the new phase in technological innovation, it is mandatory to appraise the effectiveness of ad campaigns. A combination of advanced set of data analysis tools, metrics, software's and methodologies are applied to find out the cost effectiveness and Return on investment on advertising. Correlating the business goals with marketing goals acts as a useful guide to measure the increase in shareholders' return on investment coupled with improved customer satisfaction.

**Customer (Tourist) Engagement** – Corporate have now realized that digital revolution is not about just introducing new innovations and technologies. Businesses are now relating integrated information system with the consumer at core. Digitally empowered marketing information sharing systems is marked with volume, velocity and veracity of data that allows organizations to gain global synergies while remaining locally responsive. Interactive internet campaigns can encourage direct instant and trustworthy response between the users and advertisers.

**Time** – Tourists are becoming digitally aware and marketers are leveraging this opportunity to well position their brands to a diversified array of tourists at a large scale in less time. Growing importance of network forms of organizations and Increasing use of communication and digital technologies are helping the advertisers to position their tourism product effectively to a desired target group or demographic in a much shorter time frame and at low cost.

**Cost Effectiveness** – There is an attitudinal shift of the Indian consumer buying habit. In order to maximize the returns and minimize risks, various payment models are available between advertisers and publishers. When compared to traditional forms of advertising, digital advertising is cheaper and can provide economies of scale in Virtual tours and digitalized tourism marketing in HRM..

### **Role of HRM in Digital Marketing at Tourism & Hospitality Industries**

The organizations are continuously driving towards introducing innovative human resource practices in almost all the functions of HR starting from Human Resource Planning, Recruitment, Selection, Training, Development, Performance Management, Reward Management. The pace of technological change is so rapid that we have to make incremental changes in our HR processes and functions at a much faster rate so as to achieve business excellence. Because of increasing complexities and dynamically changing economic, social, cultural, legal and political environment, the management of human resources has become more complex and challenging. Conflicting priorities, scarcity of resources, mergers and acquisitions, resistance of employees towards changes etc. is causing the organizations to focus towards creating business value by transforming the role of HR in Digital Marketing processes.

Points to remember while taking a decision as to whether to buy digitally empowered talent from outside or to provide Digital training to internal candidates Whenever a decision has to be taken whether talent should be acquired from outside or organization should develop internal talent then a proper analysis of past trends and future possibilities are made to ensure that the right decision is taken at the right place and at the right time. HR is unquestionably about the acquisition, development, maintaining and rewarding of talent. Digital Marketing and HR should have to align their strategies and prioritize objectives in

order to maintain a well-developed and motivated workforce. There is an imbalance between the demand and supply of HR with the required digital skills, capabilities and abilities.

If the company wishes to acquire the talent from outside the These days, attracting the required talent is not an easy job for the company because it involves a lot of cost and effort that may affect marketing budget. Since the employees are well informed through different social media websites and job websites about the different options available to them therefore the companies have to adopt lucrative job descriptions in order to attract the right talent. In the cut throat competitive era, every employee wants to work in the environment where he can challenge his skills and develop new skills and competencies. He wants that he should get rewarded competitively for the skills that he possesses. Therefore, if the company wishes to develop the digital talent internally then it very essential to develop a comprehensive learning and development program for the employees. To successfully develop the internal talent, it is essential that companies should construct a well-structured and customized program for imparting functional, technical, statistical and interpersonal skills to the employees. Organizations can use an evidence-based approach to prioritize Key areas, departments, functions where the development programs are needed to build the skill gap. Companies are focusing on getting and developing data scientist, statisticians, candidates with sound excel and analytical skills, interpretations who can bring out inferences from the data extracted after data mining and media professionals to market their offerings. Companies should have to develop digital skills at all levels to gain a proper and effective insight into various systems and processes. It is essential for an organization to have flexible and accountable set of processes and functional infrastructure that can impart digital skills to the employees. Talent is a differentiator, brand image builder and helps in increasing the market share of the organization. Companies should have to understand the fact that learning and development programs are not a short-term process. But it requires a long-term commitment on a continuous basis. Cost, competence and compliance are some of the parameters that a forward-looking organization should look at for when they want to implement learning and development programs in the organization. Training content should be designed in such a manner that it should be more Engaging, relevant, more memorable and self-learning. To curtail costs, many companies try to make use of bare minimum programs across selected processes only.

Cost constraints should not lead to an ineffective implementation of the solution as it may lead to partially successful business outcomes. Companies should have to realize that their revamped programs need to be agile and able to evolve over time in order to incorporate new technologies and applications.

### Suggestions & Recommendations

- ✓ The recruiter should also take the references of his friends or any one he knows who looking for a Digital Marketing & HRM job from the candidate who has come for the interview in the Tourism & Hospitality Sectors.
- ✓ In today's competitive world, attitude is the factor which is the dividing line between failure and success. Thus, recruitment of the employees must be made not only on skills and knowledge but also the attitude of the employee on Digitalized. If an employee has a positive attitude, then training for him can be more effective, he has a positive effect on the climate.
- ✓ Superiors should thoroughly discuss Digital Marketing performance appraisal with their subordinates.
- ✓ Digital Marketing Performance appraisal should not be used for punishment.
- ✓ Performance appraisal should be done formally and there should be proper personal counseling by the superior with the subordinate after the appraisal.

### Conclusion

The study has been prepared to list out the operational aspects & HR Practices of different departments of Tourism & hospitality industry at Tamilnadu. After compiling the various information of different departments & providing solution to the various problems, a solution may be drawn that no department is without problems. The study partially explains the various functions and procedures of HR department of Tourism & hospitality industry at Tamilnadu. The Tourism & hospitality is running reasonably well and has a good share of business and corporate clientele but it is worthy to mention now that the system and procedures need an up gradation. A little more strain on the delegation of power should be given. I suggest a closer coordination without interference between all the departments. There should be a regular training of the staff by various section heads. This will ensure smooth running of the hotel. The Tourism & hospitality faces stiff competition posed by other

Industries. It is also comparatively for the hotel to have more satisfied staff. For this the personnel department should check the appraisal of all employees and give promotion and incentives to all the deserving people. Nowadays, Businesses are trying to develop a robust digital marketing ecosystem with a multitude of local and global players. Digital Technology is allowing the companies to gain a competitive edge by dynamically changing the way the consumer is articulating and expecting. In the new age of industrial revolution- changes in technological innovations, consumer demands and modern marketing strategies are changing the role of Human Resources in the organization. While Digital Marketing is having different advantages as reaching a wide range of consumers in less time and cost effectively. It also helps in efficient customer engagement and provides different metrics to evaluate the effectiveness of digital marketing technologies. HR should have to develop the recruitment, selection, training, development and learning programmes in such a way to develop digital skills proficiently in the employees. Periodic short-term and long-term Learning and development programmes at all levels of organization is essential to impart different digital skills to the employees. For this Cost, competence and compliance are the parameters that company should focus on while implementing them.

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## A Study on Stress at Work among Workers

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### Abstract

*Stress is typically defined as a departure from the body's and mind's typical functioning. Stress can arise in an organization for a variety of causes, including manager control over work and style, among others. A small amount of stress is good for the company and the person. It aids in achieving both individual and organizational goals. Excessive stress Quantity can negatively impact an employee's physical, mental, and emotional health. Psychological techniques that involve can be used to measure stress. Measuring different bodily physical constants, such blood pressure, is known as physical measurement. Hormone level measurements are among the physiological measures. And activities like sports, music, dancing, hobbies, etc. are ways to decompress. Professional counselors can help relieve excessive stress. Managing workplace stress is a crucial issue that must be addressed in order to make success. Human challenges are growing daily in a variety of disciplines, as if advancement leads to the emergence of new issues.*

*Keywords: Physical Stress, Counselling, Psychological Stress, Causes of Stress.*

### Introduction

Stress is a normal human reaction that motivates us to deal with difficulties and dangers in our lives. The term stress refers to a condition in which an individual's ability or motivation to meet expectations in a circumstance is not aligned, leading to a psychological or physiological imbalance. But stress isn't always a terrible thing. Stress is necessary to keep us motivated. It is advantageous that we can operate better while we are under favorable stress. Eustress is the term for this kind of stress. It supports us in setting and achieving objectives and elevating our performance. Stress, for instance, might be generated by the pressures of an impending exam, job project, or competition. This can motivate someone to put in more effort in order to succeed on the test, finish the project on time, or win the competition. But occasionally, tension becomes too much to handle. The different types of

stress. Stress that is out of the norm, as that which occurs after an assault, vehicle accident, or natural disaster, is known as acute stress. It is a very short-term form of stress that can be distressing or traumatic. Chronic stress, such as that which arises from a difficult marriage or a very demanding job, is the type of stress that most of us experience on a daily basis and which feels unavoidable. A life of constant distress is caused by episodic acute stress, which can be caused by recurrent disease, continuing spousal violence, child abuse, living through conflict and war, or by acute stress that seems to run rampant and be a way of life. Contrarily, eustress is enjoyable and thrilling. It's said to as a healthy kind of stress that helps maintain your energy levels. It is linked to highs in adrenaline, like those experienced when skiing or racing against the clock. The body's reaction to any form of demand or threat is stress. The body goes into high gear in a quick, instinctive process known as the "fight-or-flight" reaction or the "stress response" when it detects danger, whether it be imagined or real. The body defends itself by going under stress. It assists in maintaining alertness, vigilance, and focus while operating properly. Stress can save the life in an emergency by providing more strength.

### **The Problems of Stress**

Stress can lead to or worsen the following health issues

- ❖ Anxiety and depression.
- ❖ Any form of pain.
- ❖ Issues related to sleep, such insomnia.
- ❖ Illnesses prompted by antibodies.
- ❖ Digestive issues.
- ❖ Skin ailments including hives, stress rash, or eczema.
- ❖ Hypertension and heart disease.
- ❖ Issues with weight.
- ❖ Reproductive problems.
- ❖ Issues with memory and thought.



## The Common Symptoms of Excessive Stress

These include

### Cognitive Symptoms

- Memory issues.
- Distractions from concentration.
- Bad discernment.
- Focusing solely on the negative.
- Racing or anxious thoughts.
- An ongoing state of worry.

### Emotional Symptoms

- ❖ Depression or overall discontentment.
- ❖ Agitation and anxiety.
- ❖ Anger, irritation, or moodiness.
- ❖ Experiencing overload.
- ❖ Isolation and loneliness.
- ❖ Other issues related to emotional or mental health.

### Physical Symptoms

- ❖ Pains and aches.
- ❖ Constipation.
- ❖ Weakness.
- ❖ Fast heartbeat and chest discomfort.
- ❖ Recurrent flu or colds.

### Behavioral Symptoms

- ❖ Consuming more or less food.
- ❖ Getting too little or too much sleep.
- ❖ Isolating oneself from people.
- ❖ Putting off or ignoring your obligations.
- ❖ Anxious behaviors (such as pacing or biting nails).

## Causes of Stress

The situations and pressures that cause stress are known as stressors. Most people view stressors negatively, such as a hard work schedule or a problematic relationship. Still

that requires a lot of work could be stressful. Stress can also be internal or self-generated, when you worry excessively about something that may or may not happen, or have irrational, pessimistic thoughts about life. While some people operate best when faced with a tight deadline and thrive under pressure, others will become unresponsive when work expectations increase. And although you might take pleasure in providing assistance to aging parents, siblings might find the responsibilities of caregiving to be overbearing and taxing.

### **Common External Causes of Stress Include**

- ❖ significant life adjustments.
- ❖ Issues at work or in school.
- ❖ Problems with relationships.
- ❖ Financial problems.
- ❖ being overly preoccupied.
- ❖ kids and relatives.

### **Common Internal Causes of Stress Include**

- ❖ pessimism, a depressing attitude toward life.
- ❖ unwillingness to live with uncertainty.
- ❖ Lack of flexibility and inflexible thinking.
- ❖ self-talk that is negative.
- ❖ Perfectionism and unrealistic expectations.
- ❖ all or nothing mentality.

### **Stress at Work**

Stress in the office is natural, too much stress can negatively effect the performance and productivity, as well as physical and mental well-being, relationships, and home life. In fact, it has the power to distinguish between professional success and failure. May take action to safeguard well-being both within and outside of the office, enhance job satisfaction, and safeguard from the negative impacts of stress, regardless of your goals or work obligations.

### **Job Loss and Unemployment Stress**

Experiencing a job loss is among the most stressful events in life. It's acceptable to experience negative emotions like hurt, anger, or depression; to mourn the losses; and to worry about the future. The feeling of purpose and self-worth can be severely damaged by the

sudden upheaval that comes with losing the job and being unemployed. Even while the tension may seem unbearable, there are numerous things can do to go through this trying time stronger, more resilient, and with a fresh sense of purpose.

### **Financial Stress**

During this challenging time, a large number of people from all walks of life and all around the world are dealing with financial hardship and uncertainty. Financial anxiety is one of the most prevalent sources of stress in modern life, regardless of the source of issues—a job loss, mounting debt, unforeseen costs, or a mix of issues. However, there are strategies to help through these difficult financial times, reduce stress and worry, and take back control of your money.

### **Retirement**

Retiring from work can come with rewards and stress, no matter how much looking forward to it. At first, it may seem like a huge relief to be away from the daily grind and a long commute. But after working for a few months, start to miss the structure, social interaction with co-workers, and sense of identity, meaning, and purpose that comes with the job. There are healthy methods to adjust and handle this significant life shift to help get through the stress of retirement.

### **Caregiver Stress**

The responsibilities of providing care can become too much to handle, particularly if you don't feel like and control over the circumstance or are in over your head. Unmanaged caregiver stress can negatively impact your relationships, mental health, and overall well-being, ultimately resulting in burnout. May, however, take a lot of steps to lessen the burden of caring for others and restore equilibrium, happiness, and hope in life.

### **Grief and Loss**

One of life's greatest stresses is dealing with the loss of a loved one or object. Loss can frequently feel unbearably painful and stressful. Feel shocking, angry, disbelieving, guilty, or very depressed, among other challenging and unexpected feelings. It is possible to grieve in a healthy way and eventually find relief from anguish, acceptance of loss, and the ability to move on with life, even if there is no right or wrong way to grieve.

## Conclusion

This study reveals that stress at work is a pervasive issue among workers, with experiencing stress due to the sources of stress. The consequences of stress at work are far-reaching, impacting workers' physical and mental health, job satisfaction, and productivity. The result of the study highlight the need for organizations to prioritize stress prevention and management, providing a healthy work environment that supports employees' well-being.

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# Effect of Financial Management Techniques of SME's Women Entrepreneurs Performance for business survival

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## Abstract

*Small and medium-sized businesses, or SMEs, are vital to every nation's social and economic advancement. This study set out to ascertain the extent to which women entrepreneurs in SME's used financial management techniques, as well as the impact those practices had on the longevity of their businesses. The study aimed to ascertain the effects of several practices such as working capital management, investment, financial planning, accounting information systems, and finance report analysis on the expansion of small and medium-sized enterprises. Both descriptive and inferential statistics were utilised. 40 women entrepreneurs data were collected for the study. A carefully planned survey was employed to gather data from participants in the Sivakasi region. For this investigation, the researcher used a convenient sampling plan. ANOVA, Chi square testing, and basic percentage analysis are used to evaluate the data.*

*Keywords:* Working capital management, investment, financial planning, accounting

## Introduction

Entrepreneurship is the key forces behind innovation, productivity, and economic growth in the contemporary era of growing industrial development requirements is. It is the foundation of a country's economy and the most creative means of generating wealth and jobs. As part of financial management techniques, are made with both short- and long-term objectives in mind, making sure that the return on capital overcomes the cost while not taking on too much risk. The financial performance of an organization is probably going to be significantly impacted by these activities. Consequently, achieving the goal of profitable operations can be facilitated by applying appropriate financial judgments and processes.

SMEs, or small and medium-sized businesses, are a major engine of economic expansion and employment creation. By providing jobs for the expanding labor force, they significantly contribute to the economic growth of the nation and the reduction of poverty.

### **Statement of the Problem**

Micro and small businesses are crucial to a country's economic prosperity. They are the main driver of national development and a huge source of job opportunities. The degree of financial capital management and accessibility for the company is linked to the level of entrepreneurial performance. Although finance is, in theory, the lifeblood of company and cannot exist without it, the study topic may not fully explore the context in which finance has an impact. Thus, the purpose of this study is to ascertain how financial management techniques affect the entrepreneurial success of women in SME's in Sivakasi area.

### **Objective of the Study**

- To investigate the socioeconomic background of female business owners in the study region.
- To identify how financial management techniques adopted by Women Entrepreneurs business growth.
- To provide appropriate recommendations to the women entrepreneurs based on the findings of the study.

### **Hypothesis Ho: (Null Hypothesis)**

The researcher developed the following null hypothesis based on the aforementioned goals

- There is no significant relationship between the educational qualification and the frequency of assessing financial stability.
- There is no significant relationship between the Age and the Financial Management techniques of SME's Women Entrepreneurs.

### **Research Methodology**

Both primary data and secondary data used in the proposed study. A well-structured questionnaire was used to gather the primary data. The necessary secondary data gathered from journals, magazines, newspapers, the internet, opinion surveys, and interviews.

## Data Analysis and Interpretation

**Table 1 Socio Economic Status of the women entrepreneurs**

S.No	Demographic factors	No. of entrepreneurs	Percentage
<b>Age Group of the entrepreneurs</b>			
1.	Below 18 years	14	35.00
2.	19- 29 years	12	30.00
3.	30 – 39 years	5	12.50
4.	Above 40 years	9	22.50
<b>Educational background of the entrepreneurs</b>			
1.	Upto HSC	4	10.00
2.	Graduate	16	40.00
3.	Post Graduate	3	7.50
4.	Diploma	17	42.50
<b>Marital Status of the entrepreneurs</b>			
1.	Married	16	40.00
2.	Unmarried	24	60.00
<b>Business Ownership of the entrepreneurs</b>			
1.	Sole proprietorship	26	65.00
2.	Partnership	14	35.00
<b>Monthly Business Turnover</b>			
1.	Below Rs. 10000	10	25.00
2.	Rs.10001- Rs.30000	7	17.50
3.	Rs.30001 - Rs.50000	14	35.00
4.	Rs.50001 & above	9	22.50
<b>Total</b>		<b>40</b>	<b>100.00</b>

Source: Primary data

It is clear from the Table 1 that among 40 respondents, 35.00 per cent belong to the age group of Below 18 years, 42.50 per cent of the respondents are studied upto Diploma level, 60.00 per cent of the respondents are married, 65.00 per cent of the respondents are having Sole Proprietorship business, 35.00 per cent of the respondents come under Rs.30001 – Rs. 50000.

## Type of Financial Management Techniques

Table 2 presents the details of the financial management techniques accessed by working capital management practices, investment practices, financial planning practices, accounting information systems, financial reporting and analysis practices frequently used by the respondents.

**Table 2 Type of Financial Management Techniques**

S.No	Financial Management Techniques	No of Respondents	Percentage
1.	Working capital management practices	15	37.50
2.	Investment practices	9	22.50
3.	Financial planning practices	11	27.50
4.	Accounting information systems	2	5.00
5.	Analysis of finance report practices	3	7.50
<b>Total</b>		<b>40</b>	<b>100.00</b>

Source: Primary data

It is found from the Table 2 that among 40 respondents, 37.50 per cent respondents are practiced Working capital management, 27.50 per cent respondents prefer to use Financial planning practices, 22.50 per cent respondents adopted Investment practices, 7.50 per cent of the respondents assess the analysis of finance report practices, and the remaining 5.00 per cent respondents are maintains Accounting information systems.

It is concluded that majority of the respondents are using the technique of Working capital management.

### Frequency of assessing Financial Stability

Table 3 shows the details of the frequency of assessing financial stability.

**Table 3 Frequency of assessing Financial Stability**

S.No	Frequency	No of Respondents	Percentage
1.	Daily	19	47.50
2.	2-3 times a week	5	12.50
3.	Once per week	12	30.00
4.	Once every month	4	10.00
<b>Total</b>		<b>40</b>	<b>100.00</b>

Source: Primary data

Table 3 found that out of 40 women respondents, 47.50 per cent respondents were assessing financial stability on daily basis, 30.00 per cent respondents were audited once per week, 12.50 per cent were analysing 2-3 times a week, and the remaining 10.00 per cent respondents using Once every month.

It is clear that most of the respondents 47.50 per cent women entrepreneurs managing financedaily basis.

### Usage of Financial Management Techniques of SME's Women Entrepreneurs

The researcher analyze the techniques adopted by SME's Women Entrepreneurs for sustaining in business.



**Table 4 Financial Management Techniques of SME's Women Entrepreneurs**

S.No	Usage of Financial Management Techniques	Mean	Standard deviation	Variance	Rank
1.	Access daily cash reconciliation	3.6500	1.21000	1.464	VII
2.	Budget aids in the business financial management as well as my planning.	3.8500	1.05125	1.105	III
3.	Accounting department is properly staffed and operates efficiently	3.5500	1.23931	1.536	IX
4.	The financial statements are prepared semi-annually for regular flow of income analysis	3.6500	1.12204	1.259	VII
5.	Properly maintains business bank accounts and income statements	3.9000	1.05733	1.118	II
6.	The recorded value conforms with the actual value	3.8000	1.09075	1.190	IV
7.	The business engage the services of a qualified accountant	3.4750	1.19802	1.435	X
8.	Computer assisted software used in business for recording transactions	3.9000	.98189	.964	I
9.	Business uses internally generated cash and borrowed funds	3.6750	1.07148	1.148	VI
10.	The business sells only services/goods by cash	3.7000	1.28502	1.651	V

Source: Primary data

The Table 4 analyses the rank of financial management techniques used by SME's Women Entrepreneurs for business survival. Computer assisted software used in business for recording transactions secured got first rank, Properly maintains business bank accounts and income statements got second rank. The last rank goes to the business engage the services of a qualified accountant by SME's Women Entrepreneurs.

### Hypothesis 1

***Ho: There is no significant relationship between the educational qualification and the frequency of assessing financial stability. (Chi-Square)***

**Table 5 Educational qualification and the type of Services used**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.004 <sup>a</sup>	9	.834
Likelihood Ratio	6.682	9	.670
Linear-by-Linear Association	.455	1	.500
N of Valid Cases	40		

Source: Computed Primary data

The P Value is greater (0.834) than the significant value (0.05). The null hypothesis is accepted. Hence it is concluded that there is no significant relationship between the educational qualification and the frequency of assessing financial stability.

### Hypothesis 2

*Ho: There is no significant relationship between the age and Financial Management Techniques of SME's Women Entrepreneurs (ANOVA)*

**Table 6 Age and the Financial Management Techniques of SME's Women Entrepreneurs**

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Access daily cash reconciliation	Between Groups	5.033	3	1.678	1.160	<b>.338</b>
	Within Groups	52.067	36	1.446		
	Total	57.100	39			
Budget aids in the business financial management as well as my planning.	Between Groups	1.419	3	.473	.409	<b>.748</b>
	Within Groups	41.681	36	1.158		
	Total	43.100	39			
Accounting department is properly staffed and operates efficiently	Between Groups	5.886	3	1.962	1.308	<b>.287</b>
	Within Groups	54.014	36	1.500		
	Total	59.900	39			
The financial statements are prepared semi-annually for regular flow of income analysis	Between Groups	1.047	3	.349	.261	<b>.853</b>
	Within Groups	48.053	36	1.335		
	Total	49.100	39			
Properly maintains business bank accounts and income statements	Between Groups	4.955	3	1.652	1.539	<b>.221</b>
	Within Groups	38.645	36	1.073		
	Total	43.600	39			
The recorded value conforms with the actual value	Between Groups	2.583	3	.861	.707	<b>.554</b>
	Within Groups	43.817	36	1.217		
	Total	46.400	39			
The business engage the services of a qualified accountant	Between Groups	4.529	3	1.510	1.056	<b>.380</b>
	Within Groups	51.446	36	1.429		
	Total	55.975	39			
Computer assisted software used in business for recording transactions	Between Groups	.776	3	.259	.253	<b>.859</b>
	Within Groups	36.824	36	1.023		
	Total	37.600	39			
Business uses internally generated cash and borrowed funds	Between Groups	3.122	3	1.041	.899	<b>.451</b>
	Within Groups	41.653	36	1.157		
	Total	44.775	39			
The business sells only services/goods by cash	Between Groups	.654	3	.218	.123	<b>.946</b>
	Within Groups	63.746	36	1.771		
	Total	64.400	39			

Source: Computed Primary Data

The P Value of all variables is greater than the significant value (0.05). The null hypothesis is accepted. Hence it is concluded that there is no significant relationship between the age and the Financial Management Techniques of SME's Women Entrepreneurs used.

### Problems faced in financial management Practices

Table 7 examines the problems faced in financial management Practices.

**Table 7 Problems faced in financial management Practices**

S.No	Problems	No of Respondents	Percentage
1.	Improper financial planning	12	30.00
2.	Inadequate Financial Knowledge	19	47.50
3.	Poor Budgeting	6	15.00
4.	Excessive use in Debt	3	7.50
<b>Total</b>		<b>40</b>	<b>100.00</b>

Source: Primary data

From the Table 7, know the problem faced in financial management Practices. 47.50 per cent were faced Inadequate Financial Knowledge, 30.00 per cent face the Improper financial planning, 15.00 per cent respondents were having problem with Poor Budgeting and the remaining 7.50 per cent respondents faced Excessive use in Debt.

It is interpreted that 47.50 per cent were faced Inadequate Financial Knowledge issues.

### Suggestions

- The study discovered that Inadequate Financial Knowledge issues as the main drawbacks of assessing financial management techniques. The researcher recommended improving awareness about financial knowledge by participating in various training programmes also get Entrepreneurs network.
- The study indicates that regular risk assessments are necessary to identify potential financial concerns for various risk scenarios, such as significant customer losses or economic downturns. It is also advised to get insurance for protection against serious financial threats.

### Conclusions

The study results in a finding that financial management strategies—including working capital management, investment, financial planning, accounting information systems, and analysis of finance report procedures—are important factors in determining whether SMEs in Sivakasi will be able to remain in operation. Ineffective financial management practices lead to substandard financial performance, which ultimately causes SMEs to collapse. The commercial enterprise can

adapt to the different problems in its operating environment by implementing financial management practices. Therefore, SMEs ought to adopt robust financial management systems.

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# Overcoming Entrepreneurial Hurdles: A Brief Review of Challenges Encountered by Aspiring Entrepreneurs

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## Abstract

*This research delves into the evolving entrepreneurial landscape in India, highlighting a myriad of opportunities and challenges. It examines various dimensions of entrepreneurship, management education, and innovation within the Indian context. Recognized as a crucial driver of economic growth, job creation, and industrial advancement, entrepreneurship is explored through insights into gender dynamics, rural entrepreneurship, historical perspectives, and the development of India's startup ecosystem. The review also addresses financial hurdles, government initiatives, and the promotion of inclusive business practices. Collectively, these studies illuminate the complex journey of entrepreneurs and their significant contribution to India's economic and social development.*

*Keywords: entrepreneurship, India, challenges, economic growth*

## Introduction

The entrepreneurial and business development landscape in India is a dynamic mosaic of diverse challenges, opportunities, and narratives. This literature review aims to explore a wide range of studies covering various aspects of entrepreneurship, management education, and innovative ventures within the Indian context. These studies examine entrepreneurship's multifaceted roles, from driving economic growth to impacting different sectors, and shed light on the challenges faced and strategies employed by entrepreneurs in navigating the intricate web of opportunities and obstacles.

Entrepreneurship, as highlighted by Sinha (2023), acts as a catalyst for economic progress, involving innovative resource management that propels nations forward. The paper emphasizes the critical role entrepreneurs play in driving employment, technology, and industrial growth in India. Simultaneously, Shetty and Gupta (2022) analyze management education trends, challenges, and policy interventions shaping the educational landscape to produce adept business leaders and entrepreneurs.

Innovation is also pivotal in the emerging technology sector, as demonstrated by Chakrabarti et al. (2022), who explore the transformation journey of Distronix, an Indian IIoT startup, within the evolving Industry 4.0 landscape. Pangriya (2022) focuses on rural entrepreneurship, particularly in hilly areas, dissecting the motivations and challenges faced by rural entrepreneurs in Uttarakhand.

Gender dynamics in entrepreneurship are addressed by Dixit et al. (2022), highlighting the unique motivations and challenges faced by female entrepreneurs in Uttar Pradesh, while Faraz (2022) emphasizes the leadership, innovation, and risk-taking qualities of Indian entrepreneurs contributing to rural development. Shastri et al. (2022) focus on women entrepreneurs in Rajasthan, shedding light on the factors driving them and the hurdles they encounter in a patriarchal context.

The historical roots of entrepreneurship in India, as noted by Mageshwar and Jothimani (2022), stretch back centuries, showcasing its prominence even before Europe's industrial emergence. Contemporary studies delve into the challenges and opportunities faced by startups and entrepreneurs in India. Garg and Gupta (2021) examine the evolution of the Indian startup ecosystem and government efforts to foster a supportive environment. Kumari (2021) emphasizes entrepreneurship's role in India's economic growth and presents recommendations for its enhancement.

Government initiatives to support startups are a focal point in Jegadeeshwaran and Kaleeshwari (2021), analyzing the impact of the Startup India Initiative. Prakash et al. (2021) investigate the struggles of Micro, Small, and Medium Enterprises (MSMEs) in Bihar, offering insights into internal and external factors affecting their growth.

Individual entrepreneurial journeys, such as that of VG Siddhartha (Kumar, 2021), explore the factors contributing to his success and tragic downfall. Finally, Joshi and Parmar (2020) address funding challenges faced by entrepreneurs, offering insights into various funding models, including venture capital, angel investors, accelerators, and crowdfunding.

In a society evolving with global trends and unique challenges, these studies collectively shed light on the journey of entrepreneurs and the factors shaping their endeavors, highlighting their critical role in driving India's economic and societal growth.

## Data and Methods

Literature Review	Data Used
1. (Sinha.N., 2023)	No specific data mentioned focuses on challenges and opportunities for entrepreneurs in India.
2. (Shetty.D.,&Gupta.V., 2022)	No specific data mentioned, discusses trends and challenges in management education in India.
3.(Chakrabarti.D., Kumar.R., Sarkar.S., & Mukherjee.A., 2022)	Case study of Distronix, an Indian IIoT startup, includes data on their transformation journey.
4. (Pangriya.R., 2022)	Qualitative content analysis and thematic analysis of insights from 15 rural entrepreneurs in Uttarakhand, India.
5. (Dixit.J., Agarwal.S., Ramadani.V., & Agrawal.V., 2022)	Based on 22 face-to-face interviews with female entrepreneurs in Uttar Pradesh, India.
6. (Faraz.M., 2022)	No specific data mentioned, examines challenges faced by rural entrepreneurs in India's rural areas.
7. (Shastri.S., Shastri.S., Pareek.A., & Sharma.R., 2022)	Data gathered from a questionnaire survey of 347 women entrepreneurs across Rajasthan.
8. (Dr. C.R. Mageshwar. & Dr. K. Jothimani, 2022)	References the Indian Industrial Commission Report (1916-1918) but doesn't provide specific data.
9. (Garg.M., & Gupta.S., 2021)	No specific data mentioned discusses the evolution of India's startup ecosystem and challenges faced by startups.
10. (Kumari.M., 2021 )	Based on secondary sources, involves an exhaustive literature review on entrepreneurship in India.
11. (Jegadeeshwaran.M., & Kaleeshwari.S., 2021 )	Discusses challenges faced by startups in India and government initiatives without specific data.
12. (Prakash.B.,Kumar.I., &Verma.J., 2021)	Empirical investigation with a sample of 450 entrepreneurs from Bihar, India, using multivariate analysis.
13. (Kumar, 2021 )	Case study of VG Siddhartha, the Chairman and Managing Director of Coffee Day Enterprises Limited.
14. (Joshi.K., & Parmar.C., 2020)	Discusses various funding challenges faced by Indian entrepreneurs, including venture capital, crowdfunding, etc.
15. (SaranyaDevi.E. & Rajamohan.S., 2020)	Discusses challenges faced by differently-abled entrepreneurs in India, including financial constraints and marketing hurdles.

Table 1 summary of source of data collection used in the papers cited

## Summary of Data Collection Methods

This table highlights the diversity of data sources and methodologies used in the literature reviews related to entrepreneurship in India. These reviews encompass various aspects of entrepreneurship, management education, startup ecosystems, rural entrepreneurship, and gender-specific entrepreneurship. The data sources vary widely, including primary data (surveys, interviews, case studies) and secondary data (existing literature, historical records). This variation reflects the multidisciplinary nature of entrepreneurship research.

## Focus Areas

Each literature review addresses specific challenges, opportunities, or phenomena within entrepreneurship. Some focus on challenges faced by rural or women entrepreneurs, while others explore India's startup ecosystem or the impact of management education. Geographic specificity is evident, with reviews focusing on specific regions within India, providing a nuanced understanding of regional dynamics.

## Empirical vs. Conceptual Approaches

The literature reviews mix empirical data (surveys, case studies) and conceptual approaches (theories, historical records), offering a comprehensive view of entrepreneurship in India. Policy implications and practical recommendations are discussed in several reviews, emphasizing research's role in informing policy and supporting the entrepreneurial ecosystem.

## Trend Evolution of Entrepreneurship

The trend of entrepreneurship in India is dynamic and evolving. Key trends include:

- **Diverse Entrepreneurship Ecosystem:** Encompasses various sectors, including rural entrepreneurship, tech startups, and entrepreneurship among underrepresented groups.
- **Economic Progress and Resource Utilization:** Recognized as a driver of economic progress, involving innovative resource management.
- **Management Education and Entrepreneurship:** Link between management education and entrepreneurship, nurturing successful entrepreneurs.



- Technological Advancements: Influence of technology on entrepreneurship, with adaptations to emerging technologies like IIoT.
- Rural Entrepreneurship: Importance of rural entrepreneurship, with motivational drivers and challenges faced by rural youth.
- Gender-specific Entrepreneurship: Distinct motivations of female entrepreneurs, highlighting the need for unique frameworks.
- Historical Perspective: Tracing India's legacy of entrepreneurship back centuries.
- Startup Ecosystem Evolution: Transformation of India's startup ecosystem, with government efforts to foster a supportive environment.
- Policy Initiatives: Role of policy initiatives in supporting and promoting entrepreneurship.
- Financial Challenges and Funding: Importance of funding and challenges in securing capital, exploring alternative funding models.
- Inclusive Entrepreneurship: Emergence of inclusive entrepreneurship among individuals with disabilities.

## Conclusion

This study examines the dynamic entrepreneurial environment in India, covering various aspects of entrepreneurship, management education, and innovation. It acknowledges entrepreneurship as a key engine of economic expansion, job creation, and industrial advancement. The study addresses gender dynamics, rural entrepreneurship, historical perspectives, and the development of India's startup ecosystem, exploring governmental programs, financial barriers, and inclusive entrepreneurship. These studies highlight important trends and provide insights into the complex journey of entrepreneurs and their invaluable contribution to India's economic and societal progress.

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# Impact of Technology in Education Post Covid ERA

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## Abstract

*The integration of technology into education has accelerated significantly due to the COVID-19 pandemic, transforming traditional learning environments and methodologies. This study examines the development of educational technology companies before and after the pandemic, focusing on their technological advancements. The analysis reveals substantial growth in companies like Byju's, Unacademy, UpGrad, Toppr, and Eruditus, supported by statistical tests such as the Wilcoxon Signed Rank Test and Lasso Test. These findings highlight the positive impact of technological advancements in education, though challenges like equitable access to digital resources and digital literacy among educators persist. The research underscores the importance of strategic reforms in curriculum design, teacher training, and assessment methodologies to fully harness technology's potential in enhancing educational outcomes. Additionally, a survey and focus group discussions are proposed to assess AI awareness among college students in Madurai, aiming to bridge knowledge gaps and foster an informed student community.*

*Keywords:* covid, education, technology

## Introduction

Technology has revolutionized education in the wake of the COVID-19 epidemic, bringing in a new era of learning chances and dynamics. Technology evolved from a tool to a lifeline for education worldwide as virtual learning environments replaced traditional classrooms. By removing geographical restrictions and providing a variety of learning opportunities that can be customized to meet individual requirements, technology has democratized access to education. Students now have access to a wide range of resources, flexibility in their learning schedules, and interactive tools that improve understanding and engagement thanks to online platforms.

Collaborative technologies have also promoted worldwide connectivity between instructors and students, enabling previously unthinkable levels of collaboration and cultural

exchange. Virtual reality (VR) and augmented reality (AR) are two examples of digital tools that have improved learning by offering realistic simulations and useful applications in a variety of subject areas. Notwithstanding ongoing issues like the digital divide and worries about screen time, technology has enormous positive effects on education. It has given teachers the ability to measure students' progress more accurately, personalize instruction, and dynamically modify the curriculum to meet changing requirements. As we move forward in the post-COVID era, technology will continue to play a crucial role in establishing a creative, inclusive, and adaptable educational environment.

### **Statement of the Problem**

In the aftermath of the COVID-19 pandemic, technology's role in education has rapidly evolved, initially serving as a crisis response to ensure continuous learning during lockdowns. This accelerated adoption has brought both challenges and opportunities to the forefront. Issues like equitable access to digital resources, effectiveness of virtual learning environments in fostering student engagement, and adaptation of traditional teaching methods for online platforms have emerged as critical concerns. Moreover, the shift to remote learning has underscored disparities in digital literacy among educators, impacting their ability to leverage technology effectively. Beyond these logistical and pedagogical challenges, there are broader implications for educational outcomes, including potential impacts on social skills and critical thinking traditionally nurtured through in-person interactions. Post-COVID-19, educational companies have significantly bolstered their technological integration to enhance learning experiences, improve accessibility, and adapt to remote and hybrid learning environments. This transformation has seen investments in AI-powered platforms, virtual reality simulations, adaptive learning tools, and comprehensive learning management systems (LMS). These technologies aim not only to personalize learning experiences but also to optimize educational outcomes by catering to diverse student needs. However, achieving inclusive education requires more than technological investments; it necessitates strategic reforms in curriculum design, teacher training, and assessment methodologies. By addressing these multifaceted challenges, education can harness technology to enhance quality and inclusivity in a post-pandemic world, ensuring that advancements support rather than detract from educational goals.

## Research Questions

1. What metrics can be used to rank these companies based on their technological advancements since COVID-19?
2. How has the development trajectory of educational technology companies changed from pre-COVID-19 to post-COVID-19?
3. Which education technology companies have significantly expanded their technological offerings post-COVID-19?

## Research Objectives

1. To rank the notable education technology companies those have increased their technology offering after COVID-19.
2. To determine the relationship between the development of Educational technology companies pre and post Covid -19.
3. To access the impact of Educational technology companies with post COVID conditions.

## Research Hypothesis

**H<sub>0</sub>:** There is no significant difference between the development of Educational technology companies' pre and post Covid -19.

**H<sub>0</sub>:** There is no significant relationship between the development of Educational technology companies' pre and post Covid -19.

**H<sub>0</sub>:** There is no significant the impact of Educational technology companies with post COVID conditions.

## Research Design

The Research is Analytical in nature and it depends on secondary data. It is gathered from Money Control, Trendyne and Capital line throughout six years from 2017-2020 to 2021-2024. Top five companies have been identified based on the technology upsurge. The companies are Byju's, Un-academy, UpGrad, Toppr and Eruditus. The study follows the statistical tools such as Wilcoxon Signed Rank test, lessso test and Co-Integration test.

## Analysis and Interpretation

**H<sub>0</sub>: There is no significant difference between the development of Educational technology companies' pre and post Covid -19.**

**Table 1 Wilcoxon Signed Rank Test**

Variables	Prob.Value	Ws_Score (Pre)	Ws_Score(Post)
Byju's	-1.807	0.128	<b>0.03**</b>
Unacademy	2.290	1.139	<b>0.04**</b>
UpGrad	1.154	0.394	<b>0.00**</b>
Toppr	-0.048	0.927	<b>0.00**</b>
Eruditus	0.118	0.193	<b>0.00**</b>

a. Based on Positive ranks merged from SPSS

b. Wilcoxon Signed Ranks Test

c. 0.05 level of significance\*\*

Table 1 deals with the results of Wilcoxon Signed Rank test. Based on the result, it is interpreted that the select companies are significantly increases after post COVID Condition. Where, Byju's, Unacademy, UpGrad, Toppr and Eruditus are less than the significant value of 0.05, hence the null hypothesis is rejected by accepting that the significant change in the educational technology.

**H<sub>0</sub>: There is no significant the impact of Educational technology companies with post COVID conditions.**

**Table 2 Lesso test result**

Intercept	Coefficients	Std.Err	t-stat	P value
Byju's	62.101	0.759	21.838	<b>0.00**</b>
Unacademy	55.198	2.842	19.002	<b>0.00**</b>
UpGrad	23.481	0.008	18.391	<b>0.00**</b>
Toppr	11.038	1.393	28.038	<b>0.00**</b>
Eruditus	74.930	2.839	11.379	<b>0.00**</b>

**Source: Compiled and Calculated from Money Control and Trendyne**

**\*\*0.05 level of significant**

Table 2 describe the results of lessso test, which significantly the impact of educational technology companies growth with respect to pre and post covid situations. All the select companies are significantly impact during the study period. Where byju's, Unacademy, UpGrad, Toppr and Eruditus are less than the significant value 0.05 and hence it is concluded

that there is a significant effect of Educational technology companies with post COVID conditions.

**H<sub>0</sub>: There is no significant relationship between the development of Educational technology companies' pre and post Covid -19.**

**Table 3 Un integrated Co-integration test**

Companies	Trace Statistics	5% Critical value	Maximum Eigen Value	Prob***
Byju's	7.097	11.383	0.379	<b>0.00**</b>
Unacademy	3.394	4.492	1.937	<b>0.00**</b>
UpGrad	2.109	9.017	3.283	<b>0.00**</b>
Toppr	1.111	3.279	6.279	<b>0.00**</b>
Eruditus	4.928	7.392	1.890	<b>0.00**</b>

**Trace test indicates no co-integration at the level of 0.05**

**\*denotes rejection of the hypotheses at the level of 0.05**

**Max-eigenvalue test indicate no co-integration at the level of 0.05**

### Suggestion for the study

1. Create a comprehensive survey targeting various dimensions of AI awareness, such as understanding of AI concepts, familiarity with AI applications, and perceptions of AI's impact on different sectors. The survey can include questions on the frequency of encountering AI in daily life, the extent of AI-related courses taken, and opinions on AI's future role in society. This will help gather quantitative data to analyze the overall awareness and identify gaps in knowledge among college students in Madurai.
2. Organize focus group discussions with selected participants from different colleges in Madurai. These discussions can explore students' attitudes towards AI, their experiences with AI technologies, and their views on the ethical implications of AI. This qualitative approach will complement the survey data, providing a deeper understanding of the reasons behind students' awareness levels and their concerns or enthusiasm about AI.

### Conclusion

The integration of technology in education has been accelerated by the COVID-19 pandemic, leading to significant changes in learning environments and teaching methodologies. The study on the development of educational technology companies post-



COVID-19 reveals a notable upsurge in their technological offerings, as evidenced by statistical tests such as the Wilcoxon Signed Rank Test and Lasso Test. Companies like Byju's, Unacademy, UpGrad, Toppr, and Eruditus have shown substantial growth, highlighting the positive impact of technological advancements in education. However, these developments also underscore the need for addressing challenges such as equitable access to digital resources and enhancing digital literacy among educators. Moving forward, it is essential to leverage these technological advancements to create inclusive and adaptive educational environments that cater to diverse student needs. By strategically reforming curriculum design, teacher training, and assessment methodologies, education can harness the full potential of technology to enhance learning experiences and outcomes. In the context of AI awareness among college students in Madurai, a comprehensive survey and focus group discussions can provide valuable insights into their understanding and perceptions of AI. These insights will be crucial in designing targeted educational interventions to bridge knowledge gaps and foster a more informed and engaged student community.

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# Product-Wise Export Performance of Glass and Glassware

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## Abstract

*Glass rock is an organic material. It is an amorphous material. It is usually produced by rapidly cooling a molten form: some form of glass (such as volcanic glass) is formed. The Indian flat glass market is expected to be worth over \$3 billion in 2021. Growth is expected to accelerate in the second half of the forecast period. The present analysis focuses on the product-wise export performance of Glass and Glassware and its analysis of tools such as growth rate, mean, standard deviation and co-efficient of variance.*

*Keywords: Glass, Glassware, Projected value, export*

## Introduction

Glass is a fragile, hard, amorphous material used to make beverage containers, windows, and other products. It is one of the most universal and oldest tools made by humans. It is defined as an object or container made of glass. From a scientific perspective, any solid with an amorphous, non-crystalline structure that changes to a liquid state when heated is called glass. Glass products are made from opaque sand but are completely transparent. Manufacturing glass products requires the ability to balance quality control and productivity. A major factor driving the market growth in the medium term is the increasing demand from the construction industry. Glass is used in windows, facades, doors, interior partitions, railings, shop windows, stairways, and balcony railings. Buildings. In addition, the increasing demand for electronic displays and consumer electronics such as TVs, smartphones, tablets, laptops, wearables, and other devices is also driving the market growth.

## Objectives of the Study

- To study the export performance of glass and glassware product in India
- To study the export performance of selected glass and glassware product in India.

## Methodology of the Study

The study is mainly based on secondary data. The required data were collected from important publication reports which are available at the web. In order to evaluate the information collected from different sources to fulfil the objectives of present study. This study has used the statistical tools such as mean, SD, Co-efficient variance, Growth rate, and ANOVA and Projected value.

**Period of the Study:** This study has taken a period of ten years from 2013-14 to 2022-23.

## Hypotheses of the Study

The following hypotheses are formulated and tested in the present study, namely

- There is no significant difference in the values of product-wise export performance of glass and glassware products in India
- There is no significant difference in the values of product-wise export performance of glass and glassware products in India during the period of 2018-19 to 2022-23

## Share of Glass And Glassware Products in India's Total Exports

To understand the importance of glass and glassware products in India's exports. The following table 1 highlights the total export and glass and glassware export value given for the study period.

**Table 1 Share of Glass and Glassware Export in India's Total Exports (Rs, In Lacs)**

Year	Total export	Glassware export	% share of glass and glassware export export earning to total exports
2013-14	190,501,108.86	387,923.60	0.204
2014-15	189,634,841.76	428,797.60	0.226
2015-16	171,638,440.44	459,762.55	0.268
2016-17	184,943,355.34	439,144.97	0.237
2017-18	195,651,452.80	463,651.06	0.237
2018-19	230,772,619.38	665,535.40	0.288
2019-20	221,985,418.10	594,110.65	0.268
2020-21	215,904,322.13	615,244.33	0.285
2021-22	314,702,149.28	792,786.91	0.285
2022-23	362,154,987.57	840,690.16	0.252
Mean	227,788,869.57	568,764.72	
S.D	19624113.97	50367.83154	
C.V	0.08	0.09	
CAGR%	6.63%	8.04%	

Source: DGCI&S

The table 1 reveals that the total exports increased from Rs. 190,501,108.86 lacs in 2013-14 to Rs. 362,154,987.57 in 2022-23 on this glass and glassware products exports has accounted for 0.204 per cent of India's total exports in 2013-14 increased to 0.252 per cent in 2022-23 but in absolute terms, it increased from Rs. 387,923.60 to Rs. 840,690.16 lacs during the period. The co-efficient of variation for total exports as 0.08 per cent and glass and glassware products exports as 0.09 per cent. The compound annual growth rates for total exports were 6.63 per cent, for glass and glassware products exports 8.04 per cent showing a significant and consistent growth performance.

### Export Performance of Glass and Glassware Products in India

**Table 2 Export Performance of Glassware (Rs. in Lacs)**

Year	India's total exports	Glassware exports	Growth rate
2013-14	190,501,108.86	387,923.60	-
2014-15	189,634,841.76	428,797.60	10.54%
2015-16	171,638,440.44	459,762.55	7.22%
2016-17	184,943,355.34	439,144.97	-4.48%
2017-18	195,651,452.80	463,651.06	5.58%
2018-19	230,772,619.38	665,535.40	43.54%
2019-20	221,985,418.10	594,110.65	-10.73%
2020-21	215,904,322.13	615,244.33	3.56%
2021-22	314,702,149.28	792,786.91	28.86%
2022-23	362,154,987.57	840,690.16	6.04%

Source: Computed

The table 2 indicates that the export of glass and glassware was found to be at the maximum growth rate 43.54% in 2018-19 and the export of glass and glassware was at the minimum growth rate of -10.73% in 2019-20

**Table 3 Projected Value of Export**

(Rs. in Lacs)

Year	Projected value
2023-24	837665.2
2024-25	901788.3
2025-26	981691.7
2026-27	1083320.0
2027-28	1152306.7

Source: Computed

The above table 3 reveals that trend movement of overall glass and glassware export in India during the period 2023-24 to 2027-28 is increasing trend value from Rs.837665.2 to Rs. 1152306.7.

### Product-Wise Export Performance of Glass and Glassware

A glass bottle is a bottle made from glass. Glass bottles can vary in size considerably, but are most commonly found in sizes ranging between about 200 millilitres and 1.5 litres. Mirror Glass worldwide buyers and importers, procedures to export Mirror Glass, the duties and taxes applicable on export of Mirror Glass from India. The export growth of Glassware products has been achieved because of a surge in shipments of Articles of Glass Packing of Goods, Made-ups Articles of Glass Fibre, Sanitary fixtures of Porcelain, Glass Mirror, Tinted Non-Wired Glass, Glass Bead and Glass Wool.

**Table 4 Product-Wise Export Performance of Glass and Glassware in India**

(Rs in Lacs)

Year	Glass Bottle	Glass fibres	Glass Mirror	Glass beads	Glass in balls
2018-19	251406	61015	42078	57176	5344
2019-20	244811	95901	52139	38498	11458
2020-21	224692	111173	55267	29381	23682
2021-22	305800	157188	90906	38941	45714
2022-23	362980	182885	84614	35445	34753
CAGR	7.62%	24.55%	14.99%	-9.12%	45.42%
Rank	IV	II	III	V	I

Source: DGCI&S

The Compound Growth Rates of glass and glassware products are shown for the study period (2018-19 to 2022-23). Regarding glass and glassware, the maximum growth rate in exports has been observed in the case of Glass in balls (45.42 per cent). The Growth rate has been observed in the case of Glass fibres as 24.55 per cent, followed by Glass Mirror 14.99 per cent and Glass Bottle 7.62 per cent. As far as the minimum growth rate is considered in exports of glass and glassware products, it has been found in Glass beads with --9.12 per cent during the study period.

### Product-Wise Export Performance of Glass and Glassware in India During the Period 2018-19 To 2022-23

The following table presents the product-wise export performance of glass and glassware in India during the period 2018-19 to 2022-23

**Table 5 Product-Wise Export Performance of Glass and Glassware in India During the Period 2018-19 To 2022-23**

(Rs in Lacs)

Year	2018-19	2019-20	2020-21	2021-22	2022-23
<b>Glass Bottle</b>	251406	244811	224692	305800	362980
<b>Glass fibres</b>	61015	95901	111173	157188	182885
<b>Glass Mirror</b>	42078	52139	55267	90906	84614
<b>Glass beads</b>	57176	38498	29381	38941	35445
<b>Glass in balls</b>	5344	11458	23682	45714	34753
<b>Total</b>	417019	442807	444195	638549	700677

Source: DGCI&S

The table 5 reveals that the relevant details whether the product-wise export performance of glass and glassware products in India differed significantly and whether the country-wise export differed across the five years. Two-way ANOVA was used.

#### Two sets of Null Hypothesis

Set-1: Ho: There is no significant difference in the values of product-wise export performance of glass and glassware products in India

Set-2: Ho: There is no significant difference in the values of product-wise export performance of glass and glassware products in India during the period of 2018-19 to 2022-23

**Table 6 ANOVA**

	Sum of Squares	df	Mean Square	F-value	P-value	F crit
Between Column	13726845352.64	4	3431711338	4.674	0.01085	3.006
Within Row	212755810252.2	4	53188952563.06	72.453	4.81780	3.006
Residual	11745742822	16	734108926.4			
Total	238228398426.6	24				

Source: Computed

\* Significant at 5% level

## Result

Set-1: Ho: The calculated value of 'F' (4.674) is more than the critical value of 'F' (3.006), so the null hypothesis is rejected. Hence there is a significant difference in the values of product-wise export performance of glass and glassware products in India

Set-2: Ho: The null hypothesis is rejected as the calculated value of 'F' (72.453) is more than the critical value of 'F' (3.006) at 5% level of significant. Hence, it is concluded that there is a significant difference in the values of product-wise export performance of glass and glassware products in India during the period of 2018-19 to 2022-23

## Conclusion

The glass industry in India undoubtedly has the potential to continue its rapid growth. However, the industry competition is expected to increase significantly in the coming years due to the global trend towards economic liberalization in the country. Glass production is a large-scale process that converts large quantities of materials into commercial products and consumes significant amounts of non-renewable resources and energy (e.g. thermal fuels and electricity). To survive the competition, both polymer producers and processors will need to adopt fundamentally new methods and approaches to reduce costs, improve market and customer service, and manage productivity. Thus, the glass industry is likely to continue to be a growth industry with increasing prospects for new investments in polymerization and downstream processing capabilities. This contrasts with the situation in many other countries where growth prospects are limited by stagnant demand or historical restructuring, where cost reduction and capacity rationalization are key priorities, making the overall outlook much less bright.

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# A Study on Adoption of Digital Networks among Rural Entrepreneurial Ventures to Strengthen Rural Development

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## Abstract

*In the heartland of Srivilliputhur and its neighboring villages, rural entrepreneurship is on the brink of transformation through the integration of modern Digital Network. This study delves deep into the intricacies of this transformation, examining how digital technologies are reshaping the rural landscape. Through a meticulous analysis encompassing demographic profiles, ANOVA results, and key findings, this research uncovers the untapped potential and formidable challenges of Digital Network for rural development. It highlights the imperative of enhancing digital literacy, fostering collaborative partnerships, and tailoring support programs to unleash the full power of Digital Network for sustainable rural growth. Join us on this journey as we navigate the digital frontier of rural entrepreneurship and pave the way for a brighter, more inclusive future.*

**Keywords:** Rural development, digital communication, rural entrepreneurship

## Introduction

The integration of modern Digital Communication technologies is crucial for the realization of rural development, which is a fundamental component of sustainable progress. In the surrounding villages of Srivilliputhur, where rural business is thriving, the use of modern communication technologies has great potential to propel economic growth and social progress. However, in spite of this promise, there is still a need for more research and comprehension of the ways in which rural entrepreneurial ventures use Digital Network technologies to advance their development. In Srivilliputhur and the surrounding villages, this study sets out to explore



the complexities of rural entrepreneurial ventures use of digital communication. By means of thorough investigation, our objective is to reveal the obstacles, prospects, and revolutionary effects of Digital Communication technologies on rural development efforts within this area. By bringing this crucial element to light, we hope to open the door for better planned policies and interventions that will promote sustainable growth in the surrounding villages of Srivilliputhur and advance rural development.

## Review of Literature

Mardiana and Umami (2020), explore “The strategic communication of entrepreneurship education for the Digital generation”, emphasizing the significance of adapting to changing trends and learning styles. Through descriptive methods, they analyze communication strategies employed at Dian Nuswantoro University Semarang, revealing a focus on achieving creative, cognitive, collaborative, competency, and compact effects. The study underscores the importance of utilizing attractive and credible communicators, delivering informative and persuasive messages, and leveraging digital technology for effective media strategies in entrepreneurship education.

Tri Gartanti, Triwardhani, and Putra (2019) in their article listed, “The Development of Village Entrepreneurship through Digital Marketing Communication.”, showcasing its significance amid societal shifts. Focused on the Nagrog Village PKK group, the study underscores how communication, particularly in the digital realm, drives entrepreneurial success. Through a mixed-methods approach, they highlight the pivotal role of confidence, positive attitudes, and technical skills in effectively leveraging digital technology for marketing purposes. The research contributes valuable insights into the intersection of entrepreneurship, communication, and digital marketing strategies, providing guidance for fostering rural entrepreneurship in the digital age.

## Statement of the problem

Since Digital Networks present a great deal of opportunity for rural development and business, there is a lack of knowledge regarding how best to use and leverage them in places like Srivilliputhur and the surrounding villages. In particular, not enough is known about the

opportunities and difficulties experienced by rural company owners in utilizing these technologies to expand their enterprises, gain access to new markets, and empower their communities. Moreover, scant literature thoroughly investigates how Digital Communication networks impact important socio-economic problems, including resource use, unemployment, and poverty in rural areas. In order to better understand the use of Digital Communication technologies in rural entrepreneurial attempts and to identify potential, challenges, and implications for the region's rural development projects, this research will look into and analyze this topic.

### Research gap

The research gap lies in the insufficient analysis of challenges hindering the effective utilization of Digital Network by rural entrepreneurial ventures in Srivilliputhur nearby villages, thus limiting our understanding of how to address these barriers and advance rural development initiatives effectively.

### Objective

- To Examine the impact of Digital Network among Rural entrepreneurship
- To identify the Advancing rural developments by utilizing the Digital Network in rural entrepreneurship.
- To make a suitable suggestion on the bases of the study.

### Hypotheses

**Ho.** There is no significant Difference between Digital Communication tools and Impact of Digital Network among rural entrepreneurship.

**Ho.** There is no significant difference between age and the advancement of rural development through the utilization of Digital Network in rural entrepreneurship.

### Methodology

The required data has been collected through the primary and secondary sources. Primary data has been collected from the e-commerce customers through well structured Questionnaire. Secondary data has been collected from various books, journals and websites.

## Sampling design

A convenience sampling method of non-probability sampling will be adopted in this research study. The sample has been drawn from rural entrepreneurship in Srivilliputhur nearby villages

## Analysis and interpretation

### Demographic Profile of the Respondents

Table: 1 Demographic & Business profile of the respondents

S. No	Details	No of Respondents	Percentage
<b>Gender</b>			
1.	Male	24	48%
2.	Female	26	52%
<b>Age</b>			
1.	Up to 20	7	14%
2.	20-40	21	42%
3.	41-60	13	26%
4.	Above 60	9	18%
<b>Educational Qualification</b>			
1.	No Formal education	6	12%
2.	School level	9	18%
3.	Diploma	7	14%
4.	under graduate	13	26%
5.	Post graduate	11	22%
6.	Professional	4	8%
<b>Monthly Turnover</b>			
1.	Up to 10000	9	18%
2.	10001-20000	15	30%
3.	20001-30000	14	28%
4.	30001-40000	5	10%
5.	Above 40000	7	14%

Source: Primary data

Table 1 outlines the demographic profiles of the respondents. Out of 50 respondents, 52 percent (26) of the respondents are female, 42 percent (21) of the respondents are 20 to 40 years of age, 26 percent (13) of the respondents are under graduate, and 30 percent (15) of the respondents' monthly turnover is 10,001 to 20,000.

**The Digital Network tool and the impact of Digital Network on rural entrepreneurship**

**Ho.** There is no significant Difference between Digital Communication tools and Impact of Digital Network among rural entrepreneurship.

**Table.2 Digital Communication tools and Impact of Digital Network among rural entrepreneurship**

		Sum of Squares	Degree of freedom	Mean Square	F
<b>Promote Virtual Collaboration</b>	Between Groups	12.727	5	2.545	1.528
	Within Groups	73.293	44	1.666	
	Total	86.020	49		
<b>Simplifying the order processing</b>	Between Groups	6.886	5	1.377	.747
	Within Groups	81.114	44	1.843	
	Total	88.000	49		
<b>Real-time feed back</b>	Between Groups	2.808	5	.562	.464
	Within Groups	53.272	44	1.211	
	Total	56.080	49		
<b>Faster and Easier Market reach</b>	Between Groups	15.563	5	3.113	1.878
	Within Groups	72.937	44	1.658	
	Total	88.500	49		

<b>Streamlined communication with suppliers, distributors &amp; customers</b>	Between Groups	4.746	5	.949	.749
	Within Groups	55.754	44	1.267	
	Total	60.500	49		
<b>Rectifying market problems</b>	Between Groups	5.572	5	1.114	.695
	Within Groups	70.508	44	1.602	
	Total	76.080	49		

Source: Calculate Value

The ANOVA results presented in Table 2 reveal that all variables have p-values exceeding the **0.05 significance threshold**. This suggests **acceptance** of the null hypothesis, indicating that there is no significant difference between the utilization of Digital Communication tools and the impact of Digital Network among rural entrepreneurship

### Age and The advancement of rural development through the utilization of Digital Network in rural entrepreneurship

**Ho.** There is no significant difference between age and the advancement of rural development through the utilization of Digital Network in rural entrepreneurship.

**Table.3 Age and The advancement of rural development through the utilization of Digital Network in rural entrepreneurship**

		Sum of Squares	Degree of freedom	Mean Square	F	Sig.
<b>Enhancing Remote communication</b>	Between Groups	4.654	3	1.551	1.441	.243
	Within Groups	49.526	46	1.077		
	Total	54.180	49			
<b>Create employment opportunities</b>	Between Groups	1.959	3	.653	1.870	.148
	Within Groups	16.061	46	.349		
	Total	18.020	49			
<b>Reduce poverty</b>	Between Groups	.216	3	.072	.101	.959
	Within Groups	32.764	46	.712		
	Total	32.980	49			
<b>Comfortable on all</b>	Between Groups	.975	3	.325	.607	.614

<b>DFS</b>	Within Groups	24.645	46	.536		
	Total	25.620	49			
<b>Utilization of Local Resources</b>	Between Groups	3.091	3	1.030	1.128	.348
	Within Groups	42.029	46	.914		
	Total	45.120	49			

Source: Calculated Value

Based on the ANOVA results in Table 3, all variables show p-values **greater than** the 0.05 significance level, indicating the null hypothesis is **accepted**. Hence, it concludes that, is **no significant difference between** age and the advancement of rural development through the utilization of Digital Network in rural entrepreneurship.

### Finding

- Demographic Profiles: Among the 50 respondents, 52% are female, 42% are aged 20 to 40 years, 26% have an undergraduate education, and 30% have a monthly turnover ranging from 10,001 to 20,000. These insights offer a comprehensive view of respondent characteristics.
- Utilization of Digital Communication tools: ANOVA results in Table 2 indicate that all variables regarding the utilization of Digital Communication tools and their impact on rural entrepreneurship have p-values exceeding 0.05, suggesting no significant difference.
- Age and Rural Development: Similarly, ANOVA results in Table 3 show that variables related to age and rural development through Digital Network have p-values greater than 0.05, implying no significant difference.

In summary, demographic factors such as gender, age, education, and turnover do not notably influence the utilization or effectiveness of Digital Communication tools in driving rural entrepreneurship and development in the studied area.

### Suggestions

- ✓ Enhance Digital Literacy: Encourage rural entrepreneurs to improve their digital literacy skills through training programs and workshops. This will empower them to effectively utilize digital networks for business growth.

- ✓ Foster Collaboration: Facilitate collaborative efforts between government agencies, NGOs, and private sector organizations to provide access to advanced digital infrastructure and resources in rural areas.
- ✓ Tailored Support Programs: Develop tailored support programs and initiatives that address the specific needs and challenges faced by rural entrepreneurs in adopting and integrating Digital Network technologies into their businesses.

## Conclusion

The findings of this study underscore the importance of Digital Network in rural entrepreneurship and the advancement of rural development initiatives. Despite the lack of significant differences observed in the utilization of Digital Communication tools and the impact of Digital Network on rural entrepreneurship, it is evident that these technologies hold immense potential for driving economic growth and social progress in rural areas. Moving forward, concerted efforts are needed to address existing barriers and create an enabling environment that fosters the effective adoption and utilization of Digital Network among rural entrepreneurial ventures. By doing so, we can unlock new opportunities for inclusive and sustainable rural development in Srivilliputhur and nearby villages.

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# Employee Stress and Its Impact on Absenteeism

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## Abstract

*Employee stress is a pervasive issue that significantly impacts organizational performance leading to increased absenteeism and decreased productivity. This research paper explores the relationship between job stress and absenteeism by reviewing relevant literature across various sectors. The comprehensive literature review identifies key stressors including workload, administrative support, job demands, and emotional strain. The findings suggest that addressing employee stress through supportive work environments, flexible working hours, and wellness programs can substantially reduce absenteeism rates. The paper concludes with recommendations for effective stress management strategies to enhance employee well-being and organizational productivity.*

*Keywords: Employee stress, absenteeism, workplace productivity, stress management*

## Introduction

Employee stress has become an increasingly critical concern in modern workplaces with profound implications for both employee well-being and organizational outcomes. High levels of stress among employees can lead to a host of problems including physical and mental health issues, reduced job satisfaction, and ultimately increased absenteeism. Absenteeism in turn results in significant productivity losses, increased operational costs, and disrupted workflows.

The complex nature of employee stress and its myriad causes make it a challenging issue to address. This research paper seeks to delve into the intricate relationship between job stress and absenteeism. By reviewing existing literature and identifying common stressors, this study aims to provide a comprehensive understanding of how stress impacts absenteeism across various sectors. The ultimate goal is to offer actionable insights for organizations to develop and implement effective stress management strategies that can mitigate stress and reduce absenteeism, thereby enhancing overall workplace productivity and employee well-being.

## Background

The modern workplace is a dynamic environment characterized by rapid technological advancements, increased globalization, and evolving job roles. These changes have brought about numerous benefits but also significant challenges including heightened stress levels among employees. Job stress is a complex phenomenon influenced by various factors such as workload, organizational culture, job demands, and personal circumstances.

The impact of job stress on employee well-being and organizational performance cannot be understated. High levels of stress are associated with numerous negative outcomes including physical and mental health problems, reduced job satisfaction, and decreased productivity. One of the most significant and tangible consequences of job stress is increased absenteeism, which can lead to substantial economic costs for organizations.

Absenteeism, defined as the frequent absence of an employee from work, disrupts the smooth functioning of an organization. It leads to decreased productivity, increased operational costs, and can affect the morale of other employees. Understanding the factors contributing to job stress and their impact on absenteeism is crucial for developing effective interventions to improve employee well-being and organizational performance.

## Literature Review

### Understanding of Workplace Absenteeism and Stress as a Contributing Factor

Bermingham (2013) delves into employees' comprehension of workplace absenteeism and identifies stress as a significant contributing factor. This study provides a foundation for understanding how employees perceive absenteeism and the role of stress, emphasizing the need for effective stress management strategies in the workplace.

### Health-Related Absenteeism and Presenteeism Due to Stress

Brunner, Igc, Keller, and Wieser (2019) investigate the impact of working conditions on health-related absenteeism and presenteeism with a specific focus on stress at work. Their findings highlight that improving working conditions can significantly reduce absenteeism and presenteeism, suggesting a direct link between the workplace environment and employee health.

## **Job Stress and Absenteeism in the Banking Sector of Bangladesh**

Shanjabin, Khatun, and Hossain (2022) explore factors affecting job stress and its impact on absenteeism within the banking sector in Bangladesh. Their research underscores the critical influence of job stress on absenteeism, advocating for targeted interventions to mitigate stress and its adverse effects on employee attendance.

## **Stress Management and Reduction of Absenteeism**

Michie (2007) evaluates a stress counseling service aimed at reducing absenteeism. The study demonstrates that providing employees with access to stress management resources can significantly decrease absenteeism rates, supporting the implementation of similar programs in other organizations.

## **Impact of Job Stress on Employee Motivation**

Wani (2013) examines the relationship between job stress and employee motivation in a commercial bank. The study reveals that high levels of job stress negatively impact motivation, which in turn contributes to increased absenteeism, highlighting the need for stress reduction to enhance employee motivation and attendance.

## **Work-Related Stress, Quitting Intentions, and Absenteeism**

Leontaridi and Ward (2002) investigate the interplay between work-related stress, quitting intentions, and absenteeism. Their research indicates that stress not only leads to higher absenteeism but also increases the likelihood of employees considering quitting, pointing to the importance of stress management in employee retention.

## **Role of Workplace and Non-Workplace Stressors in Unplanned Absenteeism**

Mat Saruan et al. (2020) analyze the role of both workplace and non-workplace stressors in unplanned absenteeism. Their findings suggest that a holistic approach addressing both work and personal stressors is essential in effectively managing absenteeism.

## **Work-Life Balance, Stress, and Turnover Intention in the Pharmaceutical Industry**

Kerdpitak and Jernsittiparsert (2020) provide empirical evidence on the effects of workplace stress and work-life balance on turnover intention in the pharmaceutical industry in Thailand. The study highlights the significant impact of stress on both absenteeism and turnover intentions, underscoring the importance of fostering a balanced work environment.

### **Stress as a Reaction to Harmful Workplace Behavior**

Martin and Matiaske (2017) approach absenteeism from a stress theory perspective, suggesting that harmful behaviors in the workplace contribute to stress and subsequent absenteeism. Their study advocates for creating a supportive and positive work environment to reduce stress-induced absenteeism.

### **Vacation, Job Stress, and Their Effects on Burnout and Absenteeism**

Westman and Etzion (2007) explore the impact of vacation and job stress on burnout and absenteeism. Their findings indicate that regular vacations can mitigate the negative effects of job stress, thereby reducing burnout and absenteeism rates.

### **Organizational Factors Affecting Stress and Absenteeism**

Hendrix, Spencer, and Gibson (2014) examine organizational and extra organizational factors affecting stress, employee well-being, and absenteeism. The study reveals that both types of factors play a crucial role in determining stress levels and absenteeism, suggesting comprehensive strategies to address these issues.

### **Reducing Absenteeism in Health Maintenance Organizations**

Thomas et al. (2019) focus on reducing workplace absenteeism caused by work stress in a health maintenance organization. Their research demonstrates the effectiveness of targeted stress reduction programs in lowering absenteeism rates in the healthcare sector.

### **Comprehensive Study on Stress, Performance, Turnover, and Absenteeism**

Saleh and Shahidan (2023) present a comprehensive study on the impacts of workplace stress on employee performance, turnover, and absenteeism in the manufacturing sector. Their study highlights the intricate relationships between these factors and the critical need for stress management interventions.

### **Job Stress in BPOs**

Koteeswari and Sharief (2014) investigate job stress and its impact on employees' performance in Business Process Outsourcing (BPO) organizations. The study finds that job stress significantly impairs performance and increases absenteeism, advocating for effective stress management practices in the BPO industry.

### **Job Stress as a Risk Factor for Absences among Manual Workers**

Heo et al. (2015) conduct a 12-month follow-up study on job stress as a risk factor for absences among manual workers. Their longitudinal study confirms that sustained job stress

leads to higher absenteeism rates, highlighting the need for long-term stress management strategies.

### **Occupational Stress and Job Satisfaction in Malaysia**

Yahaya et al. (2010) explore the effects of various modes of occupational stress on job satisfaction, intention to leave, and absenteeism within the Companies Commission of Malaysia. Their findings suggest that high levels of occupational stress decrease job satisfaction and increase absenteeism and turnover intentions.

### **Economic Stress at Work and Its Impact on Absenteeism and Innovation**

Sanchez-Gomez et al. (2021) investigate the effects of economic stress at work on absenteeism and innovation. Their study reveals that economic stress significantly contributes to absenteeism and negatively impacts innovation, emphasizing the need for economic stability in the workplace.

### **Employees' Attitude towards Stress and Absenteeism during COVID-19**

Ashika, Ghosh, and Tabassum (2021) study employees' attitudes towards stress and absenteeism during the COVID-19 crisis in the Indian healthcare industry. The study highlights the heightened levels of stress and absenteeism during the pandemic, calling for enhanced support systems for healthcare workers.

### **Stress Factors and Absenteeism in a Corporate Employee Group**

Seamonds (1982) investigates stress factors and their effect on absenteeism in a corporate employee group. Despite the study's age, it provides valuable insights into the long-standing relationship between stress and absenteeism in corporate settings.

### **Absenteeism Due to Stress and Work-Life Balance in Pakistan**

Awan and Bangwar (2017) examine absenteeism due to stress and work-life balance in public and private sector organizations in Rawalpindi/Islamabad. Their research emphasizes the need for better work-life balance initiatives to reduce stress and absenteeism in both sectors.

### **Relationship between Absenteeism and Stress**

Manning and Osland (1989) explore the relationship between absenteeism and stress. Their study establishes a clear link between high stress levels and increased absenteeism, advocating for effective stress management practices.

### **Employee Absenteeism in Bathinda Chemicals Limited**

Bansal (2016) analyzes employee absenteeism at Bathinda Chemicals Limited, finding that stress is a primary driver of absenteeism. The study recommends organizational changes to reduce stress and improve attendance.

### **Occupational Stress and Absenteeism in Spinning Mills**

Raman and Raj (2016) examine occupational stress and absenteeism among workers in spinning mills. Their study highlights the critical role of occupational stress in driving absenteeism and calls for improved working conditions to alleviate stress.

### **Psychosocial Stress at Work and Related Disorders**

Capasso et al. (2018) review occupational stress and psychosocial stress at work and their role in work-related musculoskeletal disorders. Their study underscores the importance of addressing psychosocial stress to prevent related health issues and absenteeism.

## **Methodology**

### **Research Design**

This study utilizes a descriptive research design to explore the relationship between employee stress and absenteeism. The research involves a comprehensive review of existing literature across various sectors to identify common stressors and their impact on absenteeism. Both qualitative and quantitative data from previous studies are analyzed to provide a holistic understanding of the issue.

### **Data Collection**

Data for this research is collected from secondary sources including peer-reviewed journals, articles, and books. The literature review encompasses studies from diverse sectors including banking, healthcare, manufacturing, and the public sector to ensure a broad perspective on the relationship between stress and absenteeism.

### **Data Analysis**

The data collected from the literature review is systematically analyzed to identify recurring themes and patterns related to job stress and absenteeism. The analysis focuses on understanding the key stressors, their impact on absenteeism, and effective stress management strategies. The findings are synthesized to provide actionable insights for organizations to address employee stress and reduce absenteeism.

## Findings

The findings of this research highlight the significant impact of job stress on absenteeism across various sectors. Common stressors identified include excessive workload, lack of administrative support, high job demands, and emotional strain. The literature suggests that addressing these stressors through supportive work environments, flexible working hours, and wellness programs can substantially reduce absenteeism rates.

## Key Stressors and Their Impact

1. **Workload:** Excessive workload is a major stressor that leads to burnout and increased absenteeism.
2. **Administrative Support:** Lack of support from management exacerbates stress levels and contributes to absenteeism.
3. **Job Demands:** High job demands, including tight deadlines and high performance expectations, increase stress and absenteeism.
4. **Emotional Strain:** Emotional strain from dealing with difficult clients or patients leads to higher absenteeism rates.
5. **Job Insecurity:** Fear of job loss or instability increases stress and can lead to higher absenteeism rates.
6. **Workplace Harassment:** Negative behaviors such as bullying and harassment contribute significantly to employee stress and absenteeism.
7. **Work-Life Imbalance:** Inability to balance work and personal life effectively leads to chronic stress and increased absenteeism.
8. **Lack of Autonomy:** Limited control over job tasks and decisions can increase stress levels, resulting in higher absenteeism.

## Effective Stress Management Strategies

1. **Supportive Work Environment:** Creating a supportive work environment with open communication and recognition of employee efforts can reduce stress.
2. **Flexible Working Hours:** Allowing flexible working hours helps employees manage their work-life balance better, reducing stress and absenteeism.

3. **Wellness Programs:** Implementing wellness programs that offer stress management resources such as counseling, relaxation techniques, and fitness activities can significantly lower stress levels and absenteeism.
4. **Employee Assistance Programs (EAPs):** Providing access to EAPs can help employees deal with personal and work-related stress, thereby reducing absenteeism.
5. **Training and Development:** Offering training programs to improve skills and job confidence can reduce stress and absenteeism.
6. **Job Redesign:** Redesigning jobs to ensure a better match between job demands and employee capabilities can alleviate stress and reduce absenteeism.
7. **Regular Feedback and Support:** Providing regular feedback and support can help employees manage stress and maintain better attendance.

## Conclusion

This research underscores the critical relationship between employee stress and absenteeism. High levels of job stress lead to increased absenteeism, which in turn affects organizational productivity and performance. By identifying common stressors and implementing effective stress management strategies, organizations can mitigate stress, reduce absenteeism, and enhance overall employee well-being and productivity.

## Recommendations

Based on the findings, the following recommendations are made for organizations to effectively manage employee stress and reduce absenteeism:

1. **Develop Comprehensive Stress Management Programs:** Organizations should implement comprehensive stress management programs that address both work-related and personal stressors.
2. **Promote Work-Life Balance:** Encouraging a healthy work-life balance through flexible working hours and remote work options can help reduce stress and absenteeism.
3. **Enhance Administrative Support:** Providing robust administrative support and recognizing employee contributions can create a positive work environment that reduces stress.



4. **Implement Wellness Programs:** Offering wellness programs that include mental health resources, fitness activities, and stress management workshops can significantly lower stress levels and absenteeism.
5. **Regular Assessment of Stress Levels:** Conducting regular assessments of employee stress levels and identifying key stressors can help organizations proactively address issues before they lead to absenteeism.

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### Declaration of Interest

The authors declare that there are no conflicts of interest regarding the publication of this research paper on "Employee Stress and Its Impact on Absenteeism."

### Data Availability Statement

The data supporting the findings of this study are available upon reasonable request from the corresponding author, Madhusudhan.H email: [madhusudhan.mba22@bmsce.ac.in](mailto:madhusudhan.mba22@bmsce.ac.in). Due to ethical restrictions and participant privacy considerations, the raw data cannot be publicly shared. Summary data and additional materials are available from the corresponding author upon request.

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# A Study on the Impact of Green Marketing on Consumer Purchasing Decisions in Tiruchirappalli Town

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## Abstract

*Green marketing has emerged as an essential strategy in promoting environmentally sustainable products and practices. This paper examines the influence of green marketing on the purchasing decisions of consumers in Tiruchirappalli Town. Through a combination of quantitative and qualitative research methods, this study aims to understand consumer awareness, attitudes, and behavior towards green products. The findings reveal a growing inclination towards eco-friendly products, driven by increasing environmental consciousness and the perceived benefits of green products. The paper concludes with recommendations for businesses to effectively leverage green marketing strategies to enhance consumer engagement and drive sustainable consumption.*

*Keywords: Purchase decision, Environment friendly, Green Products, Eco-Marketing*

## Introduction

The primary aim of marketing is reaching the consumer at the point that most influences their purchase decision. Marketing attempts to educate, communicate, and influence society in addition to promoting and selling goods and services. In recent years, global warming, climate change and pollution are some of the concerns that have been raised internationally and have resulted in more consumers becoming aware of environmental challenges confronting them.

Green marketing refers to the promotion of products that are environmentally safe and sustainable. It encompasses a wide range of activities, including product modification, changes in production processes, packaging, and advertising strategies aimed at reducing the environmental impact. With growing awareness about environmental issues, consumers are increasingly considering the ecological impact of their purchasing decisions. This study

explores how green marketing influences consumer purchasing decisions in Tiruchirappalli Town, a rapidly developing urban area in Tamil Nadu, India.

### Objectives

- To study the consumer perceptions of environmental friendly products
- To determine the elements that persuades the customers to buy environmental friendly products.

### Literature Review

Mari Selvam P (2023) the purpose of this research is to determine the extent of consumer awareness of green marketing. "Green marketing" is a strategy used to promote products or services that have a low impact on the environment. The usage of eco-friendly packaging, production methods, and materials will be discussed with customers.

Jeevarathnam P. Govender & Tushya L. Govender (2021) Global warming, pollution and climate change are some of the problems that have become an increasingly concerning issue internationally. Environmental deterioration has led to businesses changing the way in which they conduct themselves, leading to the emergence of green marketing. A considerable amount of research has been conducted on green marketing and consumer behavior, mainly, in developed countries.

G.S. Kushwaha, Anil Kumar (2020) the present study is to find out the impact of green marketing practices on customer satisfaction among the leather industries' customers. The main findings of this study people perceive that high green issue has high promotion. The overall study green marketing practices gave more satisfaction to consumer and this will help to retain the consumers.

Ansar.N (2016) the main objectives of this study factors determine consumer intension towards buying of green products. The major finding of this study show that age and years of education have positive relation with Eco- literacy. Socio demographic variables are not significantly related with green purchase intention. Besides this Environmental advertisements, Price and Ecological packaging were found to be positively related with the Green purchase intention.

A.N. Sarkar (2016), this study indicate a Green marketing is a new and evolving concept of marketing green and eco-products with well-defined eco-standards consisting of

wide-ranging eco-friendly products, satisfying eco-labeling and eco-foot printing standard norms. And the article mainly focused on green branding and eco-labeling. This article examine how green consumerism is linked with eco-market and what extent this practices can be influenced cross- cultural difference in consumer behaviour. Finally, the article studies, at some length, the desirability of considering the aspects of sustainability factor and eco-innovations which can help promote green consumerism

**Sample Size:** Thus 200 respondents were chosen for this survey

### Research Design and Methodology

The research design is useful for conducting the research work. The research design adopted for this study is empirical. Primary data is the chief source for the research work. In this study, questionnaire method has been used to collect the primary data. Secondary data collected from journals, books, other projects and websites. The sampling design of the study was conducted by convenient sampling method.

#### Educational Qualification of the Respondents

Qualification	No of Respondents	Percentage
School Level	36	18
UG	77	38.5
PG	41	20.5
Others	46	23
<b>Total</b>	<b>200</b>	<b>100</b>

### Interpretation

The above table focuses on educational qualification of respondent. It shows out of 200 respondents majority of the respondents are belongs to the other type of educational qualification i.e (23%).

#### The Family size of the Respondents

No of Members	No of Respondents	Percentage
1 to 2	36	18
3 to 4	77	38.5
5 to 6	41	20.5
Above 6	46	23
<b>Total</b>	<b>200</b>	<b>100</b>

### Interpretation

The above table focuses on the family size of respondents. Out of 200 respondent's majority of the respondents belongs to 3 to 4 members in their family i.e (38.5%), in this survey the least percentage of the family size is 1 to 2 members i.e (18%).

#### Awareness level about Green products

Level of awareness	No of Respondents	Percentage
Very High	45	22.5
High	69	34.5
Moderate	47	23.5
Low	39	19.5
<b>Total</b>	<b>200</b>	<b>100</b>

### Interpretation

The above table shows that majority of the respondents are aware about green products in high level i.e (34.5%) follow that (23.5%) and (22.5%). The lowest level of aware regarding green products is only (19.5%).

#### Media Influence regarding Eco-friendly products

Level of awareness	No of Respondents	Percentage
TV (or) Radio	62	31
Newspaper (or) Magazine	41	20.5
Trade Fair (or) Exhibitions	74	37
Friends (or) Family members	23	11.5
<b>Total</b>	<b>200</b>	<b>100</b>

### Interpretation

It is inferred from the above table that, out of 200 respondents, 31% are influenced by the media of television and radio, 20.5% of the respondents are influenced by the printing media and followed by 11.5% of the peoples knowing the green products by their family and friends. It reveals that majority of the respondents are influenced by the medium of trade fairs and exhibitions.

## Correlation

### Cross Table between the Occupations with Opinion about Reason for Purchasing Eco-Friendly Products

X	Y	x	y	Xy	x <sup>2</sup>	y <sup>2</sup>
86	54	20	6	120	400	36
27	67	-15	10	-150	225	100
41	41	-5	-8	40	25	64
46	38	0	-8	0	0	64
<b>200</b>	<b>200</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>650</b>	<b>264</b>

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

$$r = \frac{10}{\sqrt{650 \times 264}}$$

$$r = \frac{10}{415}$$

$$r = 0.024$$

## Interpretation

From the above table, it could be clearly observed that the 0.024% of the respondents between the occupation and opinion on about the reason for purchasing eco-friendly products.

## Conclusion

Green marketing has a significant influence on the purchasing decisions of consumers in Tiruchirappalli Town. While there is a positive trend towards eco-friendly products, businesses need to address the challenges related to cost, trust, and availability to drive higher adoption rates. By leveraging effective green marketing strategies and addressing consumer concerns, businesses can contribute to sustainable consumption and environmental conservation.

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# A Study on Supply Chain Management Function

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## Abstract

*This paper examines the practical implications and usefulness of contemporary Supply Chain Management (SCM) research in addressing real-world challenges. By analyzing a range of recent studies, this research identifies key themes such as sustainability, risk management, and technological advancements. It highlights how SCM research contributes to optimizing logistics, enhancing efficiency, and reducing costs. The study emphasizes the critical role of SCM research in fostering collaboration across the supply chain, improving resilience against disruptions, and achieving competitive advantage. Through case studies and industry surveys, this paper demonstrates how academic insights translate into actionable strategies for businesses. The findings underscore the importance of continuous innovation and knowledge transfer between academia and industry to address emerging trends and complex supply chain dynamics. Recommendations are provided for practitioners on leveraging research outcomes to drive Recommendations strategic decisions and operational improvements. This abstract showcases the importance of SCM research in practical applications and offers insights into how businesses can benefit from academic findings.*

*Keywords: Supply Chain Management, SCM, Digital, Block chain, AI, IoT*

## Introduction

Supply Chain Management (SCM) involves the oversight and management of a network of interconnected businesses involved in providing goods or services to end customers. It encompasses the co-ordination and integration of these flows both within and among companies. The ultimate goal of SCM is to improve efficiency, reduce costs, and ensure the timely delivery of products.

## Review of Literature

Supply Chain Management is a network of facilities that produce raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system. It spans procurement, manufacturing and distribution (Lee & Billington 1995) the basic objective of supply chain management is to “optimize performance of the chain to add as much value as possible for the least cost possible”. In other words, it aims to link all the supply chain agents to jointly cooperate within the firm as a way to maximize productivity in the supply chain and deliver the most benefits to all related parties (Finch 2006).

Adoption of Supply chain management practices in industries has steadily increased since the 1980s. A number of definitions are proposed and the concept is discussed from many perspectives. However Cousins et al. (2006); Sachan and Datta (2005); Storey et al. (2006) provided excellent review on supply chain management literature. These papers define the concept, principals, nature, and development of SCM and indicate that there is an intense research being conducted around the world in this field they critically assessed developments in the theory and practice of supply management.

## Evolution of Supply Chain Management

1911: Frederick W. Taylor’s Scientific Management: Introduced principles of efficiency and labour productivity in manufacturing, laying the groundwork for modern production and inventory management.

1920s-1930s: Ford’s Assembly Line: Henry Ford’s introduction of the assembly line revolutionized manufacturing, emphasizing standardized processes and efficiency. Mid-20th Century: Emergence of Logistics and Material Handling

1940s: World War II Logistics: Advanced military logistics during WWII demonstrated the importance of efficient supply chain operations.

1950s: Economic Order Quantity (EOQ): Development of EOQ models to optimize inventory levels. Material Handling Equipment: Introduction of forklifts and conveyor belts improved warehouse efficiency.

1960s: MRP Systems: Material Requirements Planning (MRP) systems were developed to manage manufacturing processes and inventory control.

1970s: Physical Distribution Management: Focus shifted to the efficient movement of goods from factories to customers.

1980s: Just-in-Time (JIT): Popularized by Toyota, JIT manufacturing minimized inventory levels and emphasized efficiency. Logistics Management: Formal recognition of logistics as a crucial business function.

1990s: Globalization: Expansion of global trade increased the complexity and importance of SCM. Supply Chain Integration: Focus on integrating supply chain activities across functions and organizations. Enterprise Resource Planning (ERP): ERP systems integrated various business processes, including SCM, into a unified system.

2000s: E-commerce Boom: The rise of e-commerce platforms like Amazon emphasized the need for efficient and responsive supply chains. Collaborative Planning, Forecasting, and Replenishment (CPFR): Promoted collaboration between supply chain partners.

2010s: Big Data and Analytics: Advanced analytics and big data improved demand forecasting, inventory management, and decision-making. Sustainability: Growing emphasis on sustainable supply chain practices to reduce environmental impact. Supply Chain Visibility: Technologies like RFID and IOT enhanced real-time tracking and visibility.

2020s: Digital Transformation and Resilience

2020: COVID-19 Pandemic: Highlighted vulnerabilities in global supply chains and accelerated the adoption of digital technologies and resilience planning.

- Artificial Intelligence (AI) and Machine Learning (ML): AI and ML are increasingly used for predictive analytics, demand forecasting, and process automation.
- Blockchain: Adoption of blockchain technology for enhanced transparency, traceability, and security in the supply chain.
- Supply Chain 4.0: Integration of Industry 4.0 technologies, including automation, robotics, and smart factories.
- Resilient Supply Chains: Focus on building more resilient supply chains to withstand disruptions.

## Key Components of Supply Chain Management

1. **Planning:** Determining the strategies for how the supply chain should operate. This includes forecasting demand, planning inventory levels, and scheduling production.
2. **Sourcing:** Selecting suppliers that provide the necessary goods and services for the supply chain. This involves procurement processes, negotiating contracts, and managing supplier relationships.
3. **Manufacturing:** The transformation of raw materials into finished products. This includes managing production processes, quality control, and production scheduling.
4. **Delivery and Logistics:** The movement of goods from suppliers to customers. This includes warehousing, inventory management, transportation, and distribution.
5. **Returns:** Handling returned products due to defects, excess inventory, or other reasons. This includes reverse logistics processes and managing returns effectively to minimize losses.

## Benefits of Effective Supply Chain Management

- **Increased Efficiency:** Streamlining operations to reduce delays and improve workflow.
- **Cost Reduction:** Lowering operational costs through efficient resource utilization and waste reduction.
- **Improved Customer Satisfaction:** Ensuring products are available and delivered on time, enhancing customer service.
- **Competitive Advantage:** Leveraging SCM to respond quickly to market changes and customer demands.
- **Risk Mitigation:** Identifying potential risks in the supply chain and developing strategies to mitigate them.

## Challenges in Supply Chain Management:

- **Globalization:** Managing supply chains that span multiple countries with varying regulations and standards.

- **Technology Integration:** Implementing and maintaining advanced technologies for better visibility and control.
- **Sustainability:** Ensuring environmentally friendly practices and complying with sustainability regulations.
- **Supply Chain Disruptions:** Dealing with unexpected events such as natural disasters, political instability, and pandemics.

### The Primary Objectives of this Study

1. Identify the key functions of Supply Chain Management.
2. Examine the roles and significance of these functions.
3. Analyze how effective management of these functions impacts business performance.
4. To understand the consumer preferences towards Supply Chain Management.

### Functions of Supply Chain Management

Supply Chain Management (SCM) encompasses a broad range of activities and functions aimed at efficiently managing the flow of goods, services, information, and finances from suppliers to end customers. Here are the key functions of SCM:

**1. Planning Demand Forecasting:** Predicting customer demand to ensure products are available when needed. Utilizing historical data, market analysis, and predictive analytics. Supply Planning ensuring that the right amount of raw materials and components are available to meet production schedules. Balancing supply with demand to minimize excess inventory or shortages.

**2. Procurement Supplier Selection:** Identifying and evaluating potential suppliers. Negotiating contracts and terms of service. Managing purchase orders and ensuring timely delivery.

**3. Manufacturing Production Management:** Overseeing the manufacturing process to ensure efficiency and quality. Implementing lean manufacturing and continuous improvement techniques. Quality Control: Ensuring that products meet quality standards throughout the production process. Conducting inspections and testing to identify defects and improve processes.

**4. Inventory Management Inventory Control:** Monitoring inventory levels to ensure they are within optimal ranges. Stock Replenishment: Reordering inventory to prevent stock outs and overstock situations. Using inventory models such as Just-in-Time (JIT) and Economic Order Quantity (EOQ).

**5. Logistics and Distribution Transportation Management:** Planning and coordinating the movement of goods from suppliers to manufacturing sites and from manufacturing to customers. Selecting transportation modes and carriers to optimize cost and delivery times.

**6. Customer Service Customer Relationship Management (CRM):** Maintaining strong relationships with customers. Addressing customer inquiries, complaints, and feedback promptly. Handling product returns efficiently. Managing reverse logistics for returned goods and ensuring customer satisfaction.

**7. Sustainability and Compliance Sustainable Practices:** Implementing eco-friendly practices throughout the supply chain. Reducing waste, emissions, and resource consumption. Ensuring compliance with industry regulations and standards. Monitoring changes in regulations and adapting processes accordingly.

**8. Technology Integration Information Systems:** Utilizing Enterprise Resource Planning (ERP) systems to integrate and manage supply chain processes. Implementing technologies such as IoT, blockchain, and AI to enhance visibility and decision-making.

**9. Risk Management Risk Assessment:** Identifying potential risks in the supply chain. Analyzing the impact of risks and developing mitigation strategies. Developing plans to address and recover from supply chain disruptions. Building resilience to ensure continuity of operations during crises.

**10. Performance Measurement Key Performance Indicators (KPIs):** Defining and tracking KPIs to measure supply chain performance. Using metrics such as on-time delivery, inventory turnover, and order accuracy.

## Conclusion

Supply Chain Management functions span across planning, procurement, manufacturing, inventory management, logistics, customer service, sustainability, technology integration, risk management, and performance measurement. Effective SCM ensures a seamless flow of goods, services, and information, ultimately driving operational efficiency,

cost savings, and customer satisfaction. These functions collectively contribute to a more effective, efficient, and competitive supply chain.

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# Brand Preference towards Mobile Phones in Thiruvarur District

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## Abstract

*Mobile phones have become indispensable in consumers' daily lives. With rapid technological advancements, the mobile phone industry has experienced significant growth, making it crucial for marketers to understand brand preferences. Branding plays a vital role in marketing, serving as a powerful differentiator in a competitive marketplace. A strong brand enables a company to withstand competitive pressures and instills trust, confidence, comfort, and reliability in consumers. Brands exist in consumers' minds, going beyond mere identification to form the foundation of consumer relationships. They foster a bond of faith and trust between consumers and marketers. A brand consistently promises reliable quality, service, and overall psychological satisfaction. For this study, a descriptive research methodology was applied. The questionnaire method was used to get information about Smartphone users. The researcher gathered the data using the convenience sampling technique. There are 180 respondents in the sample. Using (SPSS) software, the gathered data were edited, coded, and processed. Statistical techniques are utilized for the T-Test, OneWay ANOVA, and Chi-Square statistical techniques are utilized.*

*Keywords: Brand Preference, Mobile Phones, Customer Satisfaction*

## Introduction

Currently, cell phones have a significant impact on the daily routines of individuals. In our nation, the mobile phone sector is expanding, especially when compared to more developed countries. This growth is attributed to the ongoing development of the country's economy. Today, students hold considerable influence, as their preferences and requirements evolve alongside technological advancements and increased connectivity with the global community. Essentially, a brand can be anything. Brands are prevalent across various sectors such as business, marketing, and advertising. Today, branding has become a significant aspect of people's lives and a critical factor for marketers. It signals to consumers what they can expect from your products and services and sets your offerings apart from competitors.

Your brand is derived from your identity, who you aspire to be, and how others perceive you. Consumers believe that owning a branded product provides a unique sense of belonging (Lake, 2021). Mobile phones have become not only the most widely used mode of communication but also an essential gadget for everyone, including businesspeople, employees, students, housewives, staff, officers, and professionals. They have become a fundamental necessity regardless of age, gender, income, education, occupation, or area of residence. It is hard to imagine a single day without a mobile phone, as they save time on tasks such as sending emails, making audio and video calls, video conferencing, downloading applications, playing online games and videos, accessing educational websites, checking current affairs and weather, and finding directions. People expect more from mobile phone manufacturers to make their lives easier and more efficient. Brand preference significantly influences purchase decisions and consumer behavior when choosing which brand to buy. Delighting customers is a vital challenge for businesses of all sizes, which is influenced by a customer-centric philosophy and key principles of continuous improvement strategies in contemporary corporations. Companies often adhere to the principle "the customer is always right" because satisfied customers are more likely to make future purchases. In today's highly competitive business environment, ensuring customer satisfaction is crucial for the success of an organization. A thriving business must prioritize customer satisfaction, as it is directly linked to increased profit margins, increased employee happiness, greater customer retention, customer loyalty, and repeat business. It is evident why consumer satisfaction should be the benchmark for all other financial indicators of corporate performance. Satisfied customers are more likely to make additional purchases, recommend your business to others, and be less sensitive to price. Essentially, businesses that proactively manage customer satisfaction are effectively managing their long-term profitability. Customer satisfaction serves as a metric for marketers and business owners to evaluate and improve their operations.

One effective customer retention strategy to enhance customer service and reduce churn is by fostering relationships with existing customers. However, the challenge is that customer satisfaction is rarely expressed in monetary terms. Instead of utilizing customer satisfaction assessment as a management tool to integrate the customer into their quality improvement processes and boost profitability, many organizations simply view it as a form of "marketing intelligence."

## Objectives of the Study

- To know the brand preference towards mobile phone users.
- To identify the factors that influence decision-making in purchasing a mobile phone.
- To assess consumer satisfaction with the various mobile phones.

## Hypothesis Development

- H1: There is no significant difference between age and level of satisfaction towards mobile phone users.
- H2: There is no significant difference between gender and brand preference towards mobile phone users.

## Statement of the Problem

The number of manufacturers entering the mobile phone industry has risen, intensifying the competition. Not long ago, Nokia seemed to be advancing significantly in the mobile phone market. Today, we live in a highly developed and technologically advanced society. To dominate the mobile phone industry, manufacturers must understand consumer preferences and anticipate consumer behavior. This survey aims to determine the level of consumer satisfaction among specific respondents.

## Methodology

The study's research framework is both descriptive and analytical. It involves gathering data from mobile phone users across different age brackets. The main data collection method was a well-structured questionnaire distributed among the participants who own mobile phones. Additionally, secondary data were sourced from various materials like journals, articles, websites, and prior research on the subject matter. The research sample includes 180 participants who own mobile phones. Given the large population size and the constraints of time on the project, the convenience sampling method was chosen for this research. In this approach, the sample is selected based on what is most convenient for the researcher. The study employed statistical analyses such as percentage, One-way ANOVA, and Chi-Square test to examine the data.

## Review of Literature

**Remedios and Nathwani (2014)** conducted a study titled "A Study to Examine the Brand Preferences of Students towards Apple vs. Samsung Smartphones." The key findings indicated that a strong brand image can significantly increase consumers' purchase rates. For leading smartphone manufacturers like Samsung and Apple, a high degree of brand knowledge is essential, as it can create a competitive advantage. Brand equity was found to drive higher sales. Therefore, smartphone manufacturers need to develop innovative strategies to engage smartphone consumers.

**Sajid (2015)** researched "The Impact of Brand Image on Buying Behavior Among Teenagers." The study analyzed the influence of factors such as brand choice, information sources, and satisfaction levels. The findings revealed that teenagers' buying behavior is positively influenced by advertisements, brand loyalty, and brand image. Therefore, marketers skilled in creating effective advertisements are most favored by teenagers.

**Mirsath Begum. M and Maheswari. R (2017)** the consumers' preferences for mobile phones and SIM cards, as well as to determine how satisfied they are with the different cell phone services. A total of 100 people from different nations, including Russia, China, India, Korea, Malaysia, Indonesia, the Philippines, and Taiwan, were used in this research. 62 men and 38 women completed the questionnaire, making up the sample size. The survey's findings indicate that the economy impacts mobile subscribers the greatest impact on mobile subscribers. When designing cell phones to appeal to all economic sectors, manufacturers should take this into account.

**Revathi Rajasekaran, S.CindhanaandC.AnandhaPriya (2018)** the study's theoretical framework is "Consumers perception and preferences towards the smartphone." To determine the level of customer satisfaction with smartphones, to identify the motivations behind mobile phone usage, and to comprehend consumer attitudes towards smartphones, data from 307 respondents were obtained using convenience sampling. They concluded that factors such as pricing, peer groups, product attributes, and brand image affect consumers' purchasing decisions. They also suggested concentrating more on the adolescent market to boost sales.

**G. Saranya (2019)** published a paper on "The study Brand Preference towards Smartphones among College Students in Coimbatore City" This study investigated the impact of brand preference on purchase decision-making and consumer behavior, focusing on factors influencing brand choice among college students in Coimbatore City. Primary data

was collected through questionnaires, and analysis involved percentage analysis, reliability tests, and One-Way ANOVA techniques on a sample size of 100 respondents. The study concluded that, based on the Analysis of Variance, there is no significant difference between age and brand preference, choice, and satisfaction. Overall, brand preference is crucial across various demographics, but it holds particular significance for college students. Smartphone producers and manufacturers should therefore prioritize strategies aimed at capturing the loyalty of smartphone users in this demographic.

**Dr. Vijayalakshmi P (2021)** has examined the “A study on brand preference of mobile phones among teenagers and youths”. This study aimed to identify the factors influencing brand preferences in the selection of mobile phones and to explore the relationships among these factors. Both primary and secondary data were utilized for this research. The analytical tools employed included descriptive statistical analysis, multiple regression, one-way ANOVA, and Pearson correlation. The findings suggest that compared to other factors such as mobile phone features, aesthetics, pricing, availability, advertisements, connectivity, recommendations, reviews, user-friendliness, exchange possibilities, and post-purchase services, brand image, and quality are the most significant influencers of purchasing decisions among teenage and young adult customers. The study revealed that these eight factors collectively contribute to shaping perceptions of brand image and quality among teens and young adults.

There are numerous mobile phone brands and price points available on the market. Consumers often purchase mobile phones based on their features and capabilities. Although the prices of various brands may be similar, customers may have different requirements when choosing between the same brands. The same brand may be frequently purchased. The main objective of this study is to identify the factors that influence decision-making in purchasing mobile phone users in the Thiruvarur District and to assess customer satisfaction with various mobile phones. To the best of our knowledge, there are no prior studies on mobile phone customer satisfaction in the Thiruvarur District of Tamil Nadu. The results of this study will provide valuable insights for companies, enabling them to better understand the key factors that impact mobile phone customer satisfaction. This information can be used to develop targeted marketing strategies and conduct more effective market research.

## Data Analysis

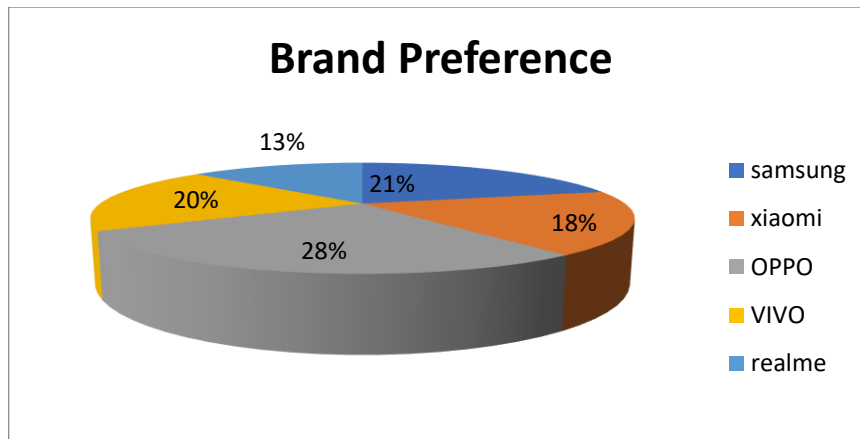
**Table 1 Demographic Factor of the Respondents**

S.No		Factors	Frequency	Percent
1.	Age	18-25 years	64	35.6
		26-35 years	51	28.3
		36-45 years	29	16.1
		Above 45 years	36	20.0
		<b>Total</b>	<b>180</b>	<b>100.0</b>
2.	Gender	Male	77	42.8
		Female	103	57.2
		<b>Total</b>	<b>180</b>	<b>100.0</b>
3.	Marital Status	Married	78	43.3
		Unmarried	102	56.7
		<b>Total</b>	<b>180</b>	<b>100.0</b>
4.	Employment Status	Private	28	15.6
		Government	40	22.2
		Professionals	43	23.9
		Housewife	37	20.6
		Business	32	17.8
		<b>Total</b>	<b>180</b>	<b>100.0</b>
5.	Education qualification	up to HSC	35	19.4
		UG	50	27.8
		PG	59	32.8
		Diploma	36	20.0
		<b>Total</b>	<b>180</b>	<b>100.0</b>

Table 1 illustrates the socio-economic conditions of the respondents, showing that 77% were male and the remaining 23% were female. Among the 180 respondents, 40 were government employees, 28 were private employees, 32 were businesspeople, 37 were housewives, and 43 were professionals.

**Table 2 Brand preference of mobile phone users**

Brand preference	Frequency	Percentage
Samsung	38	21.1
Xiaomi	33	18.3
OPPO	50	27.7
VIVO	35	19.4
Realme	24	13.3
<b>Total</b>	<b>180</b>	<b>100.0</b>



**Figure 1 Brand preference of mobile phone users**

According to Figure 1, out of the five most preferred brands by the respondents were Samsung, Xiaomi, OPPO, VIVO, Realme, etc. The majority of the respondents, i.e. 27.7 percent preferred OPPO.

H1: There is no significant difference between gender and Brand Preference of Mobile phone users.

**Table 3 X<sup>2</sup> between gender and brand preference**

X <sup>2</sup> Value	Df	Sig.(2- sided)
10.208 <sup>a</sup>	4	.037

*Source: Primary Data*

Table 3 depicts the chi-square value i.e. 0.037. Hence the researcher rejects the alternative hypothesis. It can be concluded that gender does not influence for preferring the brand of mobile phones.

## ANOVA

### Satisfaction With Usage Of Mobile Phones and Age Of The Respondents

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	9.504	4	2.376	2.775	.030
Within Groups	107.027	125	.856		
Total	116.531	129			

**Result:** Since the value is less than 0.05 (0.030), the null hypothesis is accepted and the alternative hypothesis is rejected at a 5% level of significance. Hence, it is concluded that there is no significant difference between the satisfaction level of Smartphone users and the age of the respondents.



## Discussion and Conclusion

From the findings of the study, the level of satisfaction with specific mobile phone brands in Thiruvarur District, Tamil Nadu, appears to be influenced by several factors. Many respondents view owning a mobile phone as a status symbol and enjoy using the internet and downloading new apps for entertainment purposes. A significant portion (35.6%) of respondents falls within the 18-25 age group, with unmarried individuals particularly engaged in mobile phone use for chatting and sharing information.

The majority of respondents, predominantly men, prefer using their mobile phones for social media interaction, email and SMS communication, multitasking, and downloading files. Professional respondents also engage in similar activities using their mobile devices. Quality emerges as the most critical factor influencing mobile phone choices, alongside company image and recommendations from friends, family, or word-of-mouth marketing. Therefore, maintaining overall brand quality is essential for attracting and retaining customers, emphasizing the need for effective advertising strategies.

According to the study, there is no significant difference in brand preference between genders or the satisfaction levels among different age groups of mobile phone users. Respondents generally express a high level of satisfaction with their mobile phones, suggesting potential for further increases. Overall, the sales and marketing strategies employed by mobile phone manufacturers appear to meet expectations.

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# Innovation in Business: Industry 4.0 from a Pharmaceutical Industry Perspective

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## Abstract

*Industry 4.0, the Fourth Industrial Revolution, introduces advanced digital technologies into manufacturing and industry, presenting transformative opportunities for innovation and efficiency in the pharmaceutical sector. This research article explores the key technologies driving Industry 4.0, their benefits, challenges, and real-world applications in the pharmaceutical industry. By examining case studies and future prospects, the article highlights how these innovations enhance quality control, efficiency, and patient outcomes. The integration of technologies such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain can streamline processes, reduce costs, and ensure regulatory compliance. Furthermore, this article discusses the potential for personalized medicine and improved drug development timelines. Through a comprehensive analysis, the research aims to provide valuable insights for stakeholders in the pharmaceutical industry to harness the full potential of Industry 4.0.*

*Keywords:* Industrial Revolution, pharmaceutical industry, internet of things, AI

## Introduction to Industry 4.0

Industry 4.0, also known as the Fourth Industrial Revolution, signifies a profound transformation in manufacturing and industrial processes through advanced digital integration. It builds upon the legacy of previous industrial revolutions by incorporating technologies like the Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), robotics, and augmented reality. These innovations create interconnected ecosystems where machines, devices, sensors, and people communicate in real time, fostering enhanced operational efficiency and information transparency throughout the production cycle.

Digitalization enables seamless data flow, facilitating better decision-making, predictive maintenance, and process optimization across industrial sectors.

Central to Industry 4.0 is the concept of decentralized decision-making, where autonomous systems leverage real-time data analytics to make independent decisions. This agility not only improves response times but also enhances overall operational efficiency. Moreover, smart automation goes beyond traditional robotics to encompass adaptive machines capable of customizing production to meet varying demands, thereby optimizing resource utilization and ensuring flexibility in manufacturing processes. Cyber-physical systems (CPS) play a crucial role by integrating computational algorithms with physical processes, enabling real-time monitoring and decision-making that mirrors and enhances physical operations.

The impacts of Industry 4.0 are far-reaching across diverse industries including manufacturing, healthcare, automotive, aerospace, agriculture, and pharmaceuticals. These sectors adopt digital technologies to drive innovation, improve productivity, and meet customer expectations more effectively. By embracing Industry 4.0, industries can enhance competitiveness through accelerated innovation cycles, mass customization capabilities, and sustainable practices that minimize environmental impact. This transformative shift towards smart and efficient industrial systems positions companies to thrive in a globally competitive market by harnessing the full potential of digital technologies and fostering continuous improvement in industrial processes and product offerings.

### **Pharmaceutical Industry and Industry 4.0**

The pharmaceutical industry is undergoing a significant transformation with the advent of Industry 4.0. This revolution integrates advanced technologies such as the Internet of Things (IoT), Big Data, Artificial Intelligence (AI), Machine Learning (ML), robotics, and advanced manufacturing methods into industrial processes. These technologies offer numerous benefits, including improved efficiency, enhanced quality control, and accelerated drug development. This article investigates the impact of Industry 4.0 on the pharmaceutical sector, focusing on key technologies, benefits, challenges, and future prospects.

## Objectives of the Study

- Explore the integration of advanced digital technologies such as IoT, AI, and blockchain in the pharmaceutical sector to streamline processes, reduce costs, and ensure regulatory compliance.
- Analyze the potential for personalized medicine and improved drug development timelines through the adoption of Industry 4.0 innovations.
- Provide practical insights and recommendations for stakeholders in the pharmaceutical industry to fully utilize Industry 4.0 technologies for better quality control, efficiency, and patient outcomes.

## Key Technologies in Industry 4.0 for Pharmaceuticals

**1. Internet of Things (IoT):** IoT enhances smart manufacturing and supply chain management in the pharmaceutical industry. Real-time monitoring and control improve efficiency and reduce waste, while IoT-enabled devices collect and analyze data for immediate optimization. In supply chain management, IoT provides better inventory management, reduces stockouts, and minimizes counterfeiting through real-time tracking and logistics improvements.

**2. Big Data and Analytics:** Big Data and Analytics optimize drug development and personalized medicine. Analytics predict outcomes and identify inefficiencies in drug development, streamlining operations. In personalized medicine, large datasets enable tailored treatment plans based on patient data, analyzing genetic, environmental, and lifestyle factors to improve patient outcomes and reduce adverse effects.

**3. Artificial Intelligence (AI) and Machine Learning (ML):** AI and ML revolutionize drug discovery and process optimization. AI predicts successful drug compounds, reducing time and costs. In manufacturing, AI optimizes processes and minimizes downtime through predictive maintenance, with ML algorithms predicting equipment failures and maintenance needs.

**4. Robotics and Automation:** Robotics and automation enhance laboratory operations and packaging and distribution processes. Automated laboratories increase throughput and precision by handling repetitive tasks, freeing human researchers for strategic work. In

packaging and distribution, automated systems improve efficiency and accuracy, ensuring consistent quality and timely delivery of pharmaceuticals.

**5. Advanced Manufacturing Technologies:** Advanced manufacturing technologies, like 3D printing and continuous manufacturing, drive innovation. 3D printing produces complex drug formulations and personalized doses, creating customized drugs for individual needs. Continuous manufacturing shifts from batch to continuous processes, increasing efficiency and ensuring higher consistency in product quality.

### Benefits of Industry 4.0 in Pharmaceuticals

**Improved Quality Control:** Real-time monitoring and advanced analytics ensure higher quality and consistency in drug production by identifying and addressing issues immediately. This results in fewer defects and higher standards in pharmaceutical manufacturing.

**Increased Efficiency:** Automation and IoT reduce human error and speed up manufacturing processes by enabling seamless operations. This leads to higher productivity and more efficient use of resources in the production line.

**Cost Reduction:** Efficient resource use and predictive maintenance lead to significant cost savings by minimizing waste and preventing equipment failures. Companies can allocate saved funds to further research and development initiatives.

**Faster Time-to-Market:** Streamlined processes and better data utilization shorten the development cycle for new drugs, allowing them to reach patients more quickly. This enhances a company's ability to respond to market needs and capitalize on new opportunities.

**Enhanced Compliance:** Digital technologies ensure compliance with regulatory requirements through better documentation and traceability. This helps companies avoid legal issues and maintain high standards of safety and efficacy in their products.

### Case Studies and Examples

1. **Pfizer's Digital Transformation:** Pfizer leverages digital technologies to improve manufacturing processes, using predictive analytics for equipment maintenance and IoT for real-time monitoring.

2. **GSK's Continuous Manufacturing:** GlaxoSmithKline (GSK) adopts continuous manufacturing techniques to increase efficiency and ensure consistent product quality.
3. **Novartis and AI in Drug Discovery:** Novartis partners with AI firms to enhance its drug discovery process, using machine learning to identify promising compounds faster.

## Applications of Innovations in the Indian Pharmaceutical Industry

India plays a crucial role in the global pharmaceutical industry, renowned for its extensive production of generic drugs and affordable medications. Embracing Industry 4.0 technologies offers significant opportunities for India's pharmaceutical sector to enhance efficiency, ensure quality, and maintain a competitive edge globally. Here are key applications of these innovations in the Indian pharmaceutical industry:

### 1. Internet of Things (IoT)

**Smart Manufacturing:** Companies like Dr. Reddy's Laboratories and Sun Pharmaceuticals are utilizing IoT for real-time monitoring of production processes, which enhances efficiency and minimizes waste. Predictive maintenance is another significant advantage, as IoT devices forecast equipment failures before they occur, thereby reducing downtime and maintenance costs.

**Supply Chain Management:** IoT solutions improve supply chain transparency, leading to better inventory management and reducing counterfeiting risks. Firms like Biocon use IoT for cold chain monitoring to ensure temperature-sensitive drugs are properly maintained during transport, thereby preserving product integrity and ensuring regulatory compliance.

### 2. Big Data and Analytics

**Data-Driven Decision Making:** Big data analytics are crucial for optimizing drug development by predicting outcomes and identifying inefficiencies, which shortens the time-to-market for new drugs. Additionally, market analysis through analytics helps companies like Cipla understand market trends and patient needs, aiding in the development of targeted therapies.

**Personalized Medicine:** Analyzing large datasets from diverse populations allows for the development of personalized treatment plans, significantly improving medication efficacy for individual patients. This patient data analysis ensures that treatments are tailored to the unique needs of each patient, enhancing overall healthcare outcomes.

### 3. Artificial Intelligence (AI) and Machine Learning (ML)

**Drug Discovery:** AI and ML technologies expedite the screening of vast compound libraries, identifying promising candidates for further development. Companies like Lupin are investing in AI-driven drug discovery platforms to streamline this process. Additionally, AI designs more efficient clinical trials, reducing costs and speeding up the approval process, thereby accelerating the overall drug discovery timeline.

**Process Optimization:** AI systems enhance production efficiency by predicting equipment maintenance needs, thereby reducing downtime through predictive maintenance. Furthermore, machine learning algorithms analyze production data to detect and correct anomalies in real time, ensuring consistent product quality and minimizing production errors.

### 4. Robotics and Automation

**Automated Laboratories:** Robotic systems in laboratories handle repetitive tasks, significantly boosting throughput and precision in research and development. This automation not only speeds up the R&D process but also enhances safety by reducing human error and the risks associated with handling hazardous materials.

**Packaging and Distribution:** Automated packaging lines increase the speed and accuracy of packaging processes, with companies like Aurobindo Pharma using robotic systems to improve efficiency. Additionally, automation in distribution centers enhances order fulfillment speed and accuracy, reducing lead times and improving overall customer satisfaction.

### 5. Advanced Manufacturing Technologies

**3D Printing:** Indian pharmaceutical companies are exploring 3D printing for producing complex drug formulations and personalized medication dosages, enabling precise and



tailored treatment options. Additionally, 3D printing is used to create customized implants and prosthetics, offering bespoke solutions that enhance patient care and outcomes.

**Continuous Manufacturing:** Companies like Cadila Healthcare are adopting continuous manufacturing processes, shifting from traditional batch production to continuous flow, which significantly enhances efficiency and product quality. These continuous processes provide real-time quality assurance, reducing the risk of defects and ensuring a consistent and reliable output.

### **Challenges Faced by the Indian Pharmaceutical Industry in Light of Industry 4.0 Innovations**

While the integration of Industry 4.0 technologies presents numerous opportunities for the Indian pharmaceutical sector, it also brings a unique set of challenges. These challenges must be addressed to fully realize the potential benefits of these advanced technologies.

#### **Data Security and Privacy**

The widespread use of IoT devices and interconnected systems increases the risk of cyber-attacks, data breaches, and intellectual property theft, making cyber security a significant concern. Protecting the confidentiality and integrity of sensitive patient data, proprietary formulations, and clinical trial information is paramount, requiring robust security measures and protocols.

#### **Regulatory Hurdles**

Adopting new technologies in the pharmaceutical industry necessitates compliance with stringent regulatory standards set by agencies like the FDA and India's CDSCO, which can be both time-consuming and complex. Additionally, ensuring accurate and comprehensive documentation and traceability of processes to meet these regulatory requirements is challenging with new, dynamic systems.

## **Integration with Existing Systems**

Integrating advanced Industry 4.0 technologies with existing legacy systems can be technically complex and costly. The transition to new technologies may disrupt ongoing operations and require significant changes in workflows and processes, posing risks to business continuity and efficiency.

## **High Initial Investment**

Implementing advanced technologies such as IoT, AI, and robotics involves high initial capital investment, which can be a barrier for smaller companies. Justifying the cost of these investments requires demonstrating a clear return on investment, which may take time to realize, making financial planning crucial.

## **Skill Gap and Workforce Training**

The pharmaceutical industry faces a shortage of skilled professionals proficient in digital technologies, data analytics, AI, and robotics. Continuous training and development programs are essential to up-skill the existing workforce, ensuring they can effectively use new technologies and drive innovation.

## **Data Management and Analytics**

Managing and analyzing the vast amounts of data generated by IoT devices and other digital technologies can be overwhelming. Ensuring the accuracy, consistency, and reliability of this data is crucial for effective decision-making and maintaining regulatory compliance, highlighting the need for advanced data management solutions.

## **Cultural Resistance to Change**

Employees and management may resist the adoption of new technologies due to fear of job displacement, changes in routine, or a lack of understanding of the benefits. Effective change management strategies are required to address resistance and promote a culture of innovation and continuous improvement within organizations.

## Infrastructure Limitations

Reliable and high-speed internet connectivity is essential for IoT and cloud-based applications, which may be limited in some regions, affecting the seamless operation of advanced technologies. Additionally, a consistent and uninterrupted power supply is crucial, posing challenges in certain areas where power reliability is an issue.

## Future Prospects

The continued development and implementation of Industry 4.0 technologies promise to revolutionize the pharmaceutical industry further. Innovations such as blockchain for secure supply chains, advanced robotics for more complex tasks, and increased AI integration across all processes will drive the industry toward greater efficiency, cost-effectiveness, and improved patient outcomes. These advancements will streamline operations, enhance data security, and enable more precise and automated drug development and manufacturing.

Additionally, the shift towards personalized medicine and genomics is expected to be a major catalyst for future innovation. Advances in genetic sequencing and data analytics will facilitate the creation of highly tailored therapies that cater to individual genetic profiles, improving treatment efficacy and reducing side effects. The rise of digital health technologies, including wearable devices and mobile health apps, will further enhance patient monitoring and engagement, leading to better adherence to treatment plans and overall health outcomes. This convergence of technologies will usher in a more proactive, patient-centered approach to healthcare, shaping the future of the pharmaceutical industry.

## Summary

Industry 4.0 introduces transformative advancements to the pharmaceutical industry through the integration of digital technologies such as IoT, Big Data, AI, ML, robotics, and advanced manufacturing methods. These innovations significantly enhance efficiency, quality control, and drug development processes. Despite challenges like data security, regulatory hurdles, and skill gaps, the benefits of Industry 4.0 are substantial. Real-world examples from leading pharmaceutical companies demonstrate the practical applications and advantages of these technologies. As the industry continues to embrace these innovations, the future of

pharmaceuticals promises greater efficiency, cost-effectiveness, and improved patient outcomes, heralding a new era of pharmaceutical development and manufacturing.

## Conclusion

While the Indian pharmaceutical industry stands to benefit greatly from Industry 4.0 innovations, addressing challenges is critical for successful implementation. Ensuring robust cyber security measures, meeting regulatory requirements, integrating new technologies with existing systems, managing costs, bridging the skill gap, handling big data effectively, overcoming cultural resistance, and improving infrastructure are essential steps. By tackling these challenges, the Indian pharmaceutical sector can harness the full potential of Industry 4.0, leading to greater efficiency, quality, and competitiveness in the global market.

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# Attitude of the Passenger towards Railway Services with Special Reference to Passenger Train in Sivakasi

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## Abstract

*In land transports railroads had the imposing business model before the approaching of engine transport on the world. The improvement of railroad is one of the tourist spots in the advancement of human progress. The Indian rail routes are one of greatest vehicle of traveler's traffic on the planet. As a public utility, the railways have to shoulder a lot of social responsibility because they lose a lot of suburban passenger traffic and less freight for very important commodities like food grains, coal, fodder, fruits, vegetables, salt, and others. The extent of the review covers the railroad travelers of sivakasi as it were. It examines the availability of passenger rail services provided by Indian railways. A very much organized interview plan was created on administrations presented by Railroads. The meeting plan was by and by controlled to the travelers who were venturing out to different objections. It is perceived from the review that, financial aspects possesses first situation to go in traveler train and the traveler are fulfilled in their train process. The respondent has a very positive opinion of the train's facilities.*

**Keywords:** Railway, Passenger train, amenities and facilities

## Introduction

A nation's economic growth is greatly influenced by transportation. In land transports railroads had the imposing business model before the approaching of engine transport on the world. The improvement of railroad is one of the tourist spots in the advancement of human progress. The Indian government, with assistance from the ministry of railways, owns and manages the state-owned Indian Railways. As of December 2022, it transport more than 45 Million travelers day to day (north of 9 billion on a yearly premise). In 2021, Indian Rail routes

extended 8900 million travelers every year or in excess of 24 million travelers day to day (generally 50% of which were rural travelers) and 2.8 million tons cargo day to day. Indian Railways made 104,278.79 crores in 2021 and 2022, with 28,645.52 crores coming from passenger tickets and 69,675.97 crores coming from freight.

With over 14 million employees, an Indian railway is the ninth largest commercial or utility employer in the world. Because the Indian railways operate approximately 10,000 trains each day, the trains have a five-digit naming system.

### **Scope of the Study**

The Indian rail routes are one of greatest vehicle of traveler's traffic on the planet. Since their humble beginning in 1983, the country's railways have been the primary mode of transportation for more than a century and a half.

The railroads, being a public utility comprehension need to bear the weight of weighty social obligation by losing vigorously in sub metropolitan traveler traffic, misfortune on decreased cargo chargers extremely fundamental wares, for example, food grains, coal, feed, organic products, vegetables, salt and such.

The extent of the review covers the rail line travelers of sivakasi as it were. It examines the availability of passenger rail services provided by Indian railways.

In any case, a few examinations are accessible regarding merchandise traffic, Season ticket holder, issue of doormen and so forth. In this way following clear examination holes an endeavor is being made in the current review to determine assessment on the arrangement of conveniences and subsequent fulfillment among the travelers travel in traveler train.

### **Objectives of the Study**

The objective set forth by the present research work are listed below

- a) To expose the infrastructure of the railway passenger service in the study area.
- b) To find out the passenger traffic trend of the railway station at Sivakasi.
- c) To study about the passenger amenities provide by Indian railway at the station and inside the passenger train.
- d) To analyze the problem faced by the railway passenger in Sivakasi railway station and in the passenger train.

## Review of Literature

M.V. Rama Prasad in his article “A study on Amenities in railway” has found that more general compartments will be required for short distance travellers and it has been found that most of the passengers are not happy particularly with the quality of foods should be improved and variety of items should be improved and variety of items should be introduced.

VijayDurka Prasad in his article, “A Study of passenger Amenities in Indian Railways with reference to Vijayawada Division” has found that the number of unreserved compartments of a train and public address system can be provided in all express trains.

R.Kavitha in her study, A study on passenger Amenities at Madurai Railway junction has pointed out that majority of the pay and use toilets are well maintained and kept clean.

## Methodology

The success of all research studies depends on the methodology adopted and tools developed exclusively for the particular study. In view of this, considerable data from survey research as well as analyzed secondary data were collected and presented in this research report.

## Sources of Data

The present study consist of both primary data and secondary data.

### Primary Data

The current study is an empirical one work mainly on survey method. A well-structured interview schedule was developed on services offered by Railways. The interview schedule was personally administered to the passengers who were travelling to various destinations and collected data about the following items.

1. The nature of travel undertaken by passengers in terms of purpose, distance, class of travel etc.
2. What attributes are relevant to passengers in their choice of mode of transport.
3. How passengers are satisfied with various aspects on train travel
4. What kind of problem do passengers of the study area encounter in travelling by passenger train?

### Secondary Data

The primary data were supplemented by a spate of secondary sources of data. The secondary data relevant to the study were gathered by holding personal discussions with officers

and staff in various departments of the Indian Railways and from the officials records of Sivakasi junction, circulars, annual reports, Railway budgets, yearbooks, leading journals like Indian journal of marketing, Indian journal of industrial relations which constituted a supportive literature for the purpose of making analysis and suggestion. The data from internet also was used for the study.

**Table 1 Demographic Details**

S.No			Frequency	Percentage
1.	Gender	Male	31	62.0
		Female	19	38.0
2.	Age	Below 20 years	15	30.0
		21 – 30 years	19	38.0
		31 to 40 years	11	22.0
		41 to 50 years	3	6.0
		Above 50 years	2	4.0
	Educational Qualification	Uneducated	5	10.0
		Primary Level	12	21.0
		Secondary Level	8	16.0
		Diploma Level	2	4.0
		UG Level	16	32.0
		PG Level	5	10.0
3.		Professional	2	4.0
4.	Employment Status	Employed	26	52.0
		Unemployed	24	48.0

It is clear from the above table that, majority of the respondents (62%) are male, age group 21-30 is an optimistic period and people are more eager to earn more money in this period and naturally there is a high possibility of travelling frequency for this group, it has been made with dominating group of graduates. It would facilitate the study to bring out the real perception



of the passengers in utilizing the railways services and majority of the respondents (52%) are employed

**Table 2 Level of Satisfaction towards facilities available in station**

No	Details	1	%	2	%	3	%	4	%	5	%	Total	%
1	Drinking water	11	22	15	30	9	18	8	16	7	14	50	100
2	Train timetable	27	54	12	24	5	10	6	12	-	0	50	100
3	First aid & Medical	7	14	8	16	13	26	15	30	7	14	50	100
4	Restroom	10	20	6	12	12	24	14	28	8	16	50	100
5	Parking	13	26	20	40	6	12	6	12	5	10	50	100
6	Clock	21	42	14	28	7	14	5	10	3	6	50	100
7	Waiting hall	9	18	11	22	6	12	13	26	11	22	50	100
8	Seating arrangement	8	16	12	24	15	30	7	14	8	16	50	100
9	STD&PCO	6	12	9	18	15	30	12	24	8	16	50	100
10	Ticket counters	11	22	8	16	15	30	10	20	6	12	50	100
11	Platform	13	26	15	30	10	20	7	14	5	10	50	100
12	Station Environment	9	18	18	36	10	20	7	15	6	12	50	100
13	Canteen	8	16	4	8	12	24	15	30	11	22	50	100
14	Toilet & Bathroom	4	8	11	22	9	18	6	12	20	40	50	100
15	Dustbin	13	26	15	30	10	20	7	14	5	10	50	100
	<b>Total</b>	170	22.66	178	23	154	20.5	13	18	12	16	75	100

Source: Primary Data

1- Highly satisfied; 2- Satisfied; 3- Natural; 4- Dissatisfied; 5- Highly Dissatisfied

From the above table it is found that 23.73 percent of the respondents are satisfied with various facilities available in station, 22.66 percent of the respondents are highly satisfied with various facilities available in station 20.53 percent of the respondents are neutral level towards

various facilities available in station 18.4 percent of the respondents are Dissatisfied with various facilities available in station and 16 percent of the respondents are strongly dissatisfied with various facilities available in station.

It is clear from the analysis that majority (23.73%) of the respondents are satisfied with various facilities available in station.

## Findings

- Majority of the respondents (62%) are male
- It is seen from this table age group 21-30 is an optimistic period and people are more eager to earn more money in this period and naturally there is a high possibility of travelling frequency for this group
- It has been made with dominating group of graduates. It would facilitate the study to bring out the real perception of the passengers in utilizing the railways services
- Employment status of the respondents revealed that, majority of the respondents (52%) are employed
- Occupation nature of the respondents shows that majority of the respondents (34%) are private employee
- The majority of the respondents are student in our percentage for 69%
- An analysis of marital status of the respondent shows that majority of the respondents (56%) are unmarried
- It is concrete that 64 percent of the respondents belong to less than Rs.10,000 income range group
- It is understood from the study that, Economics occupies first position, followed by free pass. Sleeper service placed third rank, followed by low risk. Safety placed fifth rank, followed by Speed Carry more luggage occupies seventh rank
- Majority of the two category respondents make a journey in frequently and occasionally, the percentage of (38%)
- Majority of the respondents (60%) stated, less than 5 times they travelled in train
- Measurement of satisfaction level in train journey revealed that, majority of the respondents (60%) are satisfied in train journey
- Majority of the respondents (42%) prefer train to meet their family members

- Majority of the respondents (62%) prefer train for both short and long distance
- Majority of the respondents (38%) are frequently travelled to Madurai in train
- Most of the respondents (54%) are travelling in train at both morning and evening time
- Majority of the respondents (90%) spent less than Rs500 per month for traveling in train
- It is clear from the analysis that majority (27.33%) of the respondents opinion about facilities available in train is very good.

## Suggestions

### Suggestions-General

- To increase frequency of train service
- To increase number of general compartments
- More than on festival season and for business people who travel from sivakasi to other states on business venture
- Separate compartments for student
- Insurance cover all the passengers.

### Suggestions-In Station

- To provide extra booking counter at crowded time
- Separate counters for ladies
- To provide ATM facilities

### Suggestions-In Train

- Cushioned seats in general compartments
- Making sleeper facilities to all class of coaches
- Fire extinguishers, tube lights, facilities in all coaches
- Mug and bucket facilities in toilet
- Drinking water in every coach

## Conclusion

The Sivakasi railway station provides the required amenities to the passengers both on the platform and inside the train. They make travel with moderate convenience and also sustain problems. Yet they are not thoroughly dissatisfied and report satisfaction and want improvements to be done in the infrastructural facilities and want to use information technology

for pleasant and safe journey. Since Sivakasi in an industrial town which attract people from all the status India, the southern railway authorities must provide all facilities to the passengers travel from Sivakasi with more convenience.

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# An Analysis of Financial Performance in Lakshmi Vilas Bank

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## Abstract

*"Financial Performance of Lakshmi Vilas Bank (LVB)" is the title of the analysis that looks at the bank's financial statistics from 2013 to 2018. Examining the bank's history and current performance, the study makes use of secondary data from LVB's annual reports. Profitability, efficiency, solvency, and asset quality are the main areas of concentration. Important conclusions draw attention to variations in ratios such advances-to-deposits, interest-earnings-to-expenditures, and non-performing assets (NPA). Improvements are required in areas such as NPA management, earnings quality, and deposit growth, according to the research. The study comes to the conclusion that even though LVB has demonstrated financial improvements, more work is still required to achieve long-term financial growth and stability.*

**Keywords:** Financial Performance, Lakshmi Vilas Bank, Non-Performing Assets

## Introduction

A financial statement is a well-structured information created using consistent and reasonable accounting practices. Its goal is to explain some financial facets of a company's operations. As with a balance sheet, it may display a position at a certain point in time, or as with an income statement, it may display a range of activities over a specified period. It is the process of determining a company's financial strengths and weaknesses using the financial statements and accounting data that are readily available. Establishing the correct relationship between the balance sheet and profit and loss account items is the first step in the analysis. Finding the information pertinent to the decision under discussion among the overall information in the financial statement is the first task of a financial analyst. Information must be arranged in the second stage to emphasize important relationships. Interpreting the data and formulating conclusions is the last phase. Financial analysis, then, is the act of choosing, linking, and assessing accounting data and information.

## Objectives of the Study

### Primary Objective

- To analyze the financial statement of the company in order to evaluate the past and present performance of the Lakshmi Vilas Bank.

### Secondary Objectives

- To interpret the profitability and efficiency of the banking sector with the help of profit and loss accounts.
- To measure short term and long term solvency of the Lakshmi Vilas bank.
- To measure the asset quality of the Lakshmi Vilas bank

## Research Methodology

The aim is to present a clear idea of the procedure followed in the study. The methodology used in this study is both analytical and descriptive. The study is primarily based on secondary data collected from Lakshmi Vilas Bank (LVB) The data are extracted from the annual reports for five year.

Research Design: The Research Design used in this study is descriptive. The study is primarily based on secondary data collected from Lakshmi Vilas Bank (LVB) the data are extracted from the annual reports for five year.

Data Collection Method: Data required for research study can be classified into direct and indirect source which are referred to as primary and secondary sources. In this study secondary data have been used.

Source of Data: Secondary financial data was collected from the audited balance sheet and published reports of the bank. The secondary information was collected during initial period of the project at Lakshmi Vilas Bank (LVB).

## Review of Literature

Sarkar, A. & Dutta, S. (2019). This study examines the financial performance of Lakshmi Vilas Bank over a decade, focusing on key financial ratios such as profitability, liquidity, and solvency. The findings highlight fluctuations in profitability due to market conditions and internal

management decisions. Chakraborty, R. (2020). Chakraborty's research delves into the impact of non-performing assets (NPAs) on the financial health of Lakshmi Vilas Bank. The study finds a significant correlation between high NPA levels and decreased profitability, suggesting the need for better risk management practices. Rao, P. V. (2018). This paper provides a comprehensive analysis of the bank's capital adequacy and its ability to meet short-term and long-term obligations. Rao concludes that while the bank maintains adequate capital, its operational efficiency needs improvement. Mishra, S. & Singh, T. (2021). The authors analyze the effect of regulatory changes on the bank's financial performance. The study reveals that compliance with new banking regulations has led to increased operational costs, affecting the overall profitability of Lakshmi Vilas Bank. Gupta, N. (2022). Gupta's research focuses on the profitability trends in Lakshmi Vilas Bank, comparing them with industry benchmarks. The findings suggest that the bank has underperformed relative to its peers, highlighting areas for strategic improvement. Patel, A. & Shah, K. (2019). This study investigates the impact of digital banking initiatives on the financial performance of Lakshmi Vilas Bank. The authors find that while digitalization has improved customer engagement, it has not yet translated into significant financial gains. Iyer, R. (2018). Iyer's paper examines the bank's asset quality and its implications for financial stability. The study shows that poor asset quality has been a persistent issue, necessitating more stringent credit appraisal processes. Verma, S. & Reddy, L. (2020). The authors analyze the influence of macroeconomic factors on the bank's performance. They conclude that economic downturns and interest rate fluctuations have had a considerable impact on the bank's profitability and growth. Kumar, D. (2020). Kumar's research assesses the effectiveness of the bank's corporate governance practices in enhancing financial performance. The study finds that strong governance is positively associated with better financial outcomes. Jain, M. & Roy, P. (2022). This study focuses on the customer deposit trends and their effect on the bank's liquidity position. The authors suggest that improving customer trust and satisfaction is crucial for maintaining a stable deposit base and ensuring financial stability.

## Data Analysis and Interpretation

**Table 1: Table Showing Advances / Deposits Ratio**

Years	Advances	Deposits	Ratio
2013-2014	10188.68	14114.14	72.18
2014-2015	11702.8	15618.98	74.92
2015-2016	12889.19	18572.88	69.39
2016-2017	16352.02	21964.21	74.44
2017-2018	19643.74	25430.96	77.24

From the table, it can be inferred that advances and deposit for the year 2014 s 10188.68. It has increased by 12889.19 in the year 2015. Then it decreased to 11702.8 in this year 2015. In the year 2013 it is decreased; it is increased 16352.02 on in the year 2015-22. Therefore, it is found that the bank has a higher advances deposits ratio and a greater possibility of bank default.

**Table 2: Interest Earned /Interest Deposited**

Years	Interest Earned	Interest Expanded	Ratio
2013-2014	1519.26	1148.03	132.33
2014-2015	1760.55	1368.55	128.64
2015-2016	1983.95	1497.94	132.44
2016-2017	2214.53	1687.88	131.20
2017-2018	2568.30	1922.99	133.55

From the table, it can be inferred that advances and deposit for the year 2014 is 10188.68. It has increased 12889.19 to in the year 2016. Then it decreased to 11702.8 in this year



2015. In the year 2014 it is decreased, it is increased 16352.02 on in the year 2016-23. Therefore, it is found that the bank has a higher advances deposits ratio and the greater the possibility of bank default

**Table 3: Table Showing Non-Performing Asset (In. Rs)**

Years	Gross NPA	Gross NPA %
2013-2014	307.73	3
2014-2015	459.91	4
2015-2016	546.46	4
2016-2017	454.62	3
2017-2018	391.25	2

From the above table, it can be inferred non-performing asset was very low to 2% in the year 2018. Then it increased to 3% in the year 2014. It increased to 4% in the year 2015. It decreased to 3% in the year 2016. Then it increased to 4% in the year 2015. then it decreased to 3% in the year 2014.

Therefore, it is found that the N-NPA of the bank is maintained at below 4% in all years with the highest 4% in the year 2015 to 2016. The bank profit is absorbed in non-performing assets.

**Table 4: Table Showing Capital Adequacy**

Years	Car ratio
2013-2014	13.10
2014-2015	12.32
2015-2016	10.90
2016-2017	11.34
2017-2018	10.67

(Source: Moneycontrol.com)

From the table, the capital adequacy ratio can be inferred that the ratio has been lowest at 10.67 in the year 2018. Then it increased to 11.34 in the year 2017. The again it started to decrease to 10.90 in 2016 and 12.32 in the year 2015. In the year 2016 it increased.

Therefore, it is found that the capital adequacy of the bank is maintained at 3% in all years with the highest is 13.10 in the year 2015.

**Table: Debt-Equity Ratio (D/E)**

Years	Debt-equity	Ratio
2013-2014	1171.06/958	1.22
2014-2015	1033.36/1014.34	1.01
2015-2016	1026.58/	0.97
2016-2017	1185.08/1556.14	0.76
2017-2018	1537.61/1763.57	0.87

From the above table debt equity ratio can be inferred that the ratio has been lowest in the year 2017 to 0.76. Then it increased to 0.87 in the year 2018. The again it started to increase to 0.97 in 2016, then 1.01 in the year 2016. In the year 2014 it increased. Therefore, it is found that the debt equity ratio of the bank is maintained bellow at 3% in all years with the highest 1.22 in the year 2014.

### Summary of Findings

- Net NPA total asset ratio can be inferred that the ratio has been lowest in the year 2018 to 0.80. Then it increased to 1.09 in the year 2014. The again it started to increasing to 2.14 in 2016 and 1.60 in the year 2015. In the year 2016, it increased.
- Net NPA total advances can be inferred that the ratio has been lowest in the year 2018 to 128.51. Then it increased to 165.47 in the year 2014. The again it started to increasing to 228.65 in 2017 and 309 in the year 2015. In the year 2016, it increased.
- Ratio of sub-parameters of, Lakshmi Vilas Bank (LVB) in this the low rank is advanced yield ratio.
- Total investment to total assets can be inferred that the ratio has been lowest in the year 2018 to 22.78. Then it increased to 24.47 in the year 2017. Then again it started to increasing to 24.70 in 2017. In the year 2016, it increased.
- Total advance in total deposits can be inferred that the ratio has been lowest in the year 2016 to 69.39. Then it increased to 74.44 in the year 2017. Again it started to increasing 74.94 in 2015 and then it is decreased to 72.18 in the year 2014. In the year 2018, it increased 77.24.
- Profit per employee in Lakshmi Vilas Bank, 2013-2014 was 1, then 3% in the year of 2014-2015 and it increased in the year 2016 is 4%, Then a low ratio at the year 2017 to 2018.

- Earnings quality the spread to total asset can be inferred that the ratio has been lowest in the year 2015 to 0.76. Then it increased to 2.98 in the year 2018. The again it started to increasing to 6.74 in 2017 and 7.20 in the year 2016. In the year 2014, it increased.
- % Growth in Net Profit can be inferred that the ratio has been lowest in the year 2018 to 2. Then it increased to 3% in the year 2014 and 2017. The again it started to increasing to 4% in the year 2015 and 2016. In the year 2016, it increased.
- The Dividend payout ratio can be inferred that the ratio has been lowest in the year 2014 to 35.66. Then it increased to 44.09 in the year 2017. Then again it is started to increase to 45.78 in 2015 and then 59.66 in the year 2016. In the year 2018, it increased.
- The interest income to total income can be inferred that the ratio has been lowest in the year 2018 to 10.80. Then it increased to 11.05 in the year 2017. Then again it is started to increase to 11.42 in 2014 and then 11.54 in the year 2016. In the year 2015 it increased.
- The Liquidity Asset to total Asset can be inferred that the ratio has been lowest in the year 2018 to 11.11. Then it increased to 14.11 in the year 2014. Then again it is started to increase to 15.77 in 2015 and then 21.33 in the year 2017. In the year 2016, it increased.
- The INTEREST EXPENDED can be inferred that the ratio has been lowest in the year 2013 to 2014. Then it increased to 9.45 in the year 2016. Again it started to increase 12.68 in 2017 and 13.92 in the year 2015. In the year 2015, it increased.
- The interest earned can be inferred that the ratio has been lowest in the year 2013 to 2014. Then it increased to 15.97 in the year 2018. Then again it started to increase to 12.67 in 2016 and 15.88 in the year 2015. In the year 2018, it increased.
- The Deposits can be inferred that the ratio has been lowest in the year 2015. Then it increased in the year 2016. The again it started to decrease to 18.91 in 2016 and 18.25 in the year 2015. In the year 2014, it increased.
- The advances can be inferred that the ratio has been lowest in the year 2013 -2014. Then it increased to 14.86 in the year 2015. The again it started to decrease to 10.13 in 2016 and then it increased to 26.86 in the year 2017. In the year 2018, it increased.

## Suggestions

- Growth in deposits has dipped in 2018. The Bank should renew its efforts to increase deposits to LVB.
- Earnings quality has declined from 6% to 2% in 2017-16. The bank should improve its income earned to improve efficiency
- The Bank should also focus on reducing Net NPA to advances ratio.

## Conclusion

Throughout its history, this bank has undergone several stages of development. The government's numerous financial reform initiatives are to blame for the banking industry's current expansion. It has made learning easier and given them more access to the corporate world. My study has benefited from the project, which has exposed me to real-world situations. Examining Lakshmi Vilas Bank's (LVB) financial performance over a five-year period, from 2013–2014 to 2017–2018, shows improved financial performance. The researcher's understanding of the several instruments used in financial performance analysis has improved as a result of the project. Additionally, the different elements that influence the concern's financial stability. Additionally, the project would assist the bank in making choices by providing information on the liquidity and general financial position of Lakshmi Villas Bank for the years 2014 to 2018.

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# Digital Marketing Skills are Vital Role for Successful Entrepreneur – An Overview

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## **Abstract**

*Digital talents are any competencies that allow you to use statistics technology and the Internet to search, access, use proportion and create content. The net has impacted every part of our existence, I consisting of entrepreneurship. Digital competencies are getting and important prerequisite for a hit entrepreneur. Although young humans are sometime referred to as “virtual connoisseurs”, the general public of them lack the essential competencies to launch their very own entrepreneurial companies wherein significant digital competencies are required. The maximum imputed organizations might be those with the bottom ranges of digital literacy and the abilities in digital entrepreneurship. Also, websites are absolute necessity for a success entrepreneur. Website will function the nucleus for a success entrepreneurship. Successful entrepreneur needs to shift toward virtual advertising and marketing with typical digital advertising and marketing techniques. Entrepreneur desires to shift towards virtual marketing techniques and marketing campaign which will survive and fulfilment in their commercial enterprise. The primary purpose of this look at is to have a look at the competences that marketers want to broaden with a view to be triumphant as virtual entrepreneurs.*

**Keywords:** *Digital skills, Entrepreneurship, internet successful, entrepreneur, marketing*

## **Introduction**

A minute and think approximately how you right now show off your alternate. If you're as it had been advancing your company thru conventional showcasing techniques, you're lost an extremely good possibility to attain profitable leads via computerized promoting. The a part of advanced showcasing is simple: provide help your alternate spend your selling budget greater viably, get more essential leads, and select up a better return on venture (ROI) on your trade. On this post, we'll look into the part of automatic selling and the way it impacts your business's development, income, and more. If you want to see how advanced showcasing can by using and by means of affect your change, touch us online or

browse our superior showcasing administrations. Learn 5 key advantages of promoting your trade, and why selling is pivotal when it comes to constructing a exchange that's possible over the long time.

For your trade to survive, it needs showcasing, and the extra grounded it's miles the extra useful your trade may be. Without showcasing, your commerce would possibly have ground-breaking, industry-remodeling gadgets and administrations that fulfil your customers' needs, however in no way have the danger to reach your target collecting of human beings. As a result, your corporation's deals won't accomplish your objectives and you are in all likelihood to discover it more difficult to create your commerce. We've chosen what we receive to be the 5 key benefits showcasing brings in your change, and how it has the manage to provide help you construct the trade you crave.

### **Digital marketing aids with business development**

In our company, Digital marketing accomplishes four takes, Here are several examples:

- Adding new customers
- Increasing sales
- Retaining existing consumers
- Lowering the cost of advertising

Two emerging media assets are the web and mobile. There are numbers advantages. On the one hand, they provide value to the total marketing programme and a cost-effective way to bring in new clients. On the other hand, they are being utilizing to keep an eye on online social media emotions or close any holes that as a feedback loop to either enhance consumer service in response to particular complaints or close any holes that may occur in the cycle of delivering customer support. The digital approach is by far the most affordable. Over 1,000 potential buyers can see your brand for less than \$ (USD).Direct mail will cost you over 20 times as much, and TV Commercial will cost you over 10 times as much to reach the number of individuals. You now have a few choices. By substituting digital marketing trends for traditional strategies, you can significantly reduce your marketing digital marketing spend, Digital marketing is successful in either case, At a cheaper cost, you may expand your consumer base, which will ultimately boost revenue. Additionally, digital marketing improves client retention. Customer service and increasing customer retention are directly related. Your cross selling and up selling tactics can now be expanding. As a result, your

company expands and your sales rise at a lesser cost. you can use your website to put up selling tactics into practice.

Follow the trends, additionally, use video in your digital marketing plan. By 2019 video traffic will make up 80% of all internet traffic globally. To expand their businesses some corporations have already begun to get ready for this trend. As a business owners you must also include this tratic in your digital marketing plan. Businesses understand that in YouTube channels to survive. the same material from your YouTube channels can also be used in your Facebook videos, with the new Instagram rules, you Can now upload movies to your profile that are upto one minute long. To improve your clients digital experience you can also employ Instagram Live videos and Instagram stories. It's a petty inexpensive strategy and fantastic method to get awareness as We've already covered. Instagram is a mobile application: therefore it will help you maintain your brand current as more people continue to consume media on their smart phones. It serves as a remainder that you cannot centre all of your efforts in digital marketing on web based platforms, Make sure your website is responsive to mobile devices. It must function well if you plan to use Smartphone applications to direct customers to your website. So how quickly should a Smartphone user be able to access your website/ less than three seconds. A website will lose 53% of its mobile user if ti takes longer than three seconds to load .If users are leaving the page, you cannot convert these mobile leads. you must continue to invest money in your website, as I have indicated .This is especially true for business owners that used a limited budget to create their website. In the end, it's crucial that will help you grow your business.

## Needs for digital skills of entrepreneurs

### 1. It spreads your name

Good advertising and marketing helps you to placed your products and services on the front of each client's thoughts. Marketing lets you establish your emblem, and makes you the first option to show to whilst in want of a particular product.

Take Apple, as an example. If someone wishes a logo-new phone, it is probably that an Apple product is one in all, if not the first, alternative that man or woman considers.

In fact, in 2020 Apple introduced that the full variety of active Apple gadgets has handed 1 billion. Because of advertising and marketing campaigns were pivotal inside the enterprise achieving this milestone and making it the worldwide giant it is today.

## **2. It boosts your sales**

Once you've got located a way into your clients' consciousness, your probabilities of being able to sell your product, service, or logo to them have drastically stepped forward. What's extra, as soon as you have grow to be seen to your target audience, your enterprise can be the name on their lips, and phrase of the excellent of your services and products will unfold. Without marketing, these sales would not had been possible.

## **3. It helps you gain and retain customers**

Once your emblem has built stable foundations and made its name, advertising and marketing will enable you to maintain your clients and create a solid following of loyal customers - a critical aspect in not losing ground to the sparkling and today's merchandise that hit the market.

## **4. It enhances your company's reputation**

Any fulfillment you attain together with your business will depend heavily on having a robust, truthful reputation. Your marketing will build logo-call popularity, and as your reputation grows so too will your business and sales. Your ever-developing reputation will therefore be built on robust and smart conversation and the pleasant of what you offer your target audience - and your advertising is a essential element in all of this.

## **5. It saves you time**

By promoting your products or services via marketing, your enterprise will improve its sales and attain your target market significantly quicker. Effective advertising lets you get found by means of your target audience and interact with them - at the same time as additionally enabling you to get on with the other obligations critical to your enterprise' fulfillment.

## **Benefits of Digital Marketing**

### **1. Digital marketing levels the playing field**

Your commercial enterprise faces steady opposition. When the ones competitors are corporations, like Walmart, Amazon, and Target, it feels not possible to attempt to compete with them. After all, they've greater assets and finances available.

Digital marketing's role levels the gambling field for small to mid-length companies. It allows your company to compete with businesses, in addition to smaller corporations, even when you have a more modest budget. For instance, many groups put money into search engine optimization (search engine optimization) to assist raise their site in search engine



results. This exercise is something that both massive and small companies can do to attract and reach extra treasured traffic.

## **2. Digital marketing helps you earn an impressive ROI**

Digital advertising's function additionally specializes in assisting you are making extra money from your marketing efforts. In contrast to standard advertising and marketing, on-line advertising and marketing is extremely value-effective, providing an impressive go back on investment (ROI). If you do digital advertising in-residence, it charges time in preference to money.

You can run a social media advertising and marketing campaign or a content material advertising and marketing campaign for your personal, however it'll fee you a whole lot of time to construct, launch, degree, and manipulate an effective marketing campaign. Even in case you put money into paid campaigns, you're in entire manipulate of the expenses. For social marketing campaigns and PPC campaigns, you set a finances that works in your enterprise. It's important to understand that what you spend is what you get, so you'll need to set a budget that's correct to your organization and industry. These virtual marketing techniques provide an extraordinary return on investment (ROI) for your business, too. Transitioning your price range to online advertising, in place of traditional advertising, enables you to earn loads in go back.

## **3. Digital marketing allows you to reach people where they are**

The function of virtual advertising and marketing also helps you connect with human beings inquisitive about your business. Traditional strategies make it tough in an effort to promote it to the human beings looking for your services or products. Digital advertising and marketing, but, allows you to consciousness on the humans interested by your products or services. Traditional techniques make it hard as a way to reach human beings interested by your enterprise. You emerge as spending money to marketplace to leads that may not want your services or products. For instance, if you post a billboard on a toll road, you're concentrated on all of us who makes use of the motorway, whether or not they want your products or services or no longer.

With digital advertising, you're attaining human beings interested by your business. These advertising methods assist you to target the people that want your services or products. If you run a PPC marketing campaign, you may goal humans mainly that you understand are interested in your services or products and attain them without delay.

#### **4. Digital marketing allows you to track its effectiveness**

As you have a look at the distinct roles of virtual marketing, you'll find out that online marketing additionally makes it smooth to be able to monitor the effectiveness of your campaigns. Whenever you run an advertising or advertising and marketing marketing campaign, you want to recognize if it's using results. Traditional advertising and marketing methods make this hard because you may't realize in case your efforts persuaded your target market.

You could should survey every person that comes into your keep or contacts your business enterprise and ask them how they heard about you, which is time-eating. With digital advertising, you may screen your campaigns in actual-time to look if they work. You can song a selection of metrics, relying at the kind of marketing campaign.

Some simple metrics encompass impressions, site visitors, clicks, live time, and conversions. These metrics come up with precious perception into the effectiveness of your marketing campaign and help you calculate your ROI. When you partner with an internet advertising organisation, like WebFX, you'll get hold of access to treasured marketing gear, like Marketing CloudFX. Tools like those permit you to assemble overall performance facts multi function location, as well as tune treasured metrics. If you like to see the effect of your campaigns, that is the most crucial function of digital marketing. You will usually know whether or not your campaign is using consequences on your commercial enterprise.

#### **Conclusion**

Entrepreneurs have diligence, sincerity, and a thirst to reach their enterprise endeavors. Digital Marketing gives just that opportunity for marketers to nurture and succeed in their enterprise in the massively bendy and dynamic international of digital advertising and marketing. Indeed, virtual marketing offers innumerable opportunities to prevail but the key component here is your power and eagerness to find out how the diverse Complex factors of virtual advertising come together to create a successful enterprise. Once you draw close the secrets to a a hit worthwhile business inside the digital domain there is no searching lower back for marketers. You have masses of examples like Amazon, Flipkart, Swiggy, Make My Trip, Trivago, Snapdeal as examples of extraordinary entrepreneurial efforts. Thus, coupled with a exceptional digital advertising method marketers can emerge as leaders in digital business.

Entrepreneurship is changing constantly and has altered .Your business will survive if you can change with times. Entrepreneurs will have a competitive advantage over their rival companies if they can change more quickly than others. The first thing you should do if your business currently lacks a digital presence is build a website. you can utilize social media and email marketing to develop your brand building a website .This will assist set you apart from other business owners who don't employ these strategies .Avoid joining the group of people who don't use websites. Social media, or internet marketing. If these folks can't adjust, their businesses will suffer, Again I'm not saying you should completely forgo traditional marketing initiatives. However, you must transfer the majority of your attention to digital marketing plans and initiatives, To survivor, must transfer the majority of your attention to digital marketing plans and initiatives. To survive, entrepreneurs must expand their enterprises. Survival will not be a problem if you can successfully reduce your costs while continuing to attract new clients and boost revenues. Compared to conventional marketing strategies, digital marketing is less expensive .This enables you to reduce your marketing spend or increase brand exposure while maintaining the same budget. to grap your audience's attention ,use videos on websites like You Tube ,Facebook video, and Instagram .the most important thigh to remember if you want to succeed as tech- savvy as you can.

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