

VIKSIT BHARAT 2047: A GUIDE TO A PROSPEROUS AND PROGRESSIVE INDIA

Guest Editors

Dr.S.Selvanathan

Dr.T.Suguna

2026

VIKSIT BHARAT 2047: A GUIDE TO A PROSPEROUS AND PROGRESSIVE INDIA

Guest Editors

Dr.S.Selvanathan
Assistant Professor & Head
Department of Commerce (SF)
Virudhunagar Hindu Nadars' Senthikumara Nadar
College (Autonomous)
Virudhunagar

Dr.T.Suguna
Assistant Professor of Management Studies
Virudhunagar Hindu Nadars' Senthikumara Nadar
College (Autonomous)
Virudhunagar

2026



Verso Page

Publisher	Dr. BGR Publications India Tamil Nadu Tuticorin 📞 9003494749 🌐 https://drbgrpublications.in/ 📱 https://www.instagram.com/drbgrpublications/
Conference Title	International Conference on “Empowering India through Advancing Sustainable Development Goals for Viksit Bharat@2047”
Organizing Institute	Virudhunagar Hindu Nadars’ Senthikumara Nadar College (Autonomous)
Conference Date	24.08.2026 & 25.08.2026
Journal	<i>International Journal of Business and Economics Research (IJBER)</i>
e-ISSN	2455-3921
ISSN-L	2455-3921
Type	Special Issue (Guest Edited Issue)
Issue Information	Volume 12, Special Issue 18, September 2026
Special Issue Title	Viksit Bharat 2047: A Guide to a Prosperous and Progressive India
Guest Editors	Dr. S.Selvanathan Dr. T.Suguna
Page Size	A4
Page Count	277
Language	English
Product Form	Digital
Typesetting	Dr. BGR Publications
Cover Design	Dr. B.Govindarajan
Cataloguing Data	Available from the Publisher: https://drbgrpublications.in/special-issue-archives/
Copyright Holder	© 2026 by respective author(s)
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Editorial Office	drbgrpublications@gmail.com <i>An imprint of Dr. BGR Publications</i>

Preface



This Special Issue titled “Viksit Bharat 2047: A Guide to a Prosperous and Progressive India”, explores the remarkable advancements that India has achieved across key sectors, including space exploration, information technology, biotechnology, nuclear physics, and renewable energy, solidifying its position as a global leader. Despite this progress, there remain critical areas that demand further focus, particularly in AI, quantum computing, and high-end research and development. Looking forward, India’s Tech Vision 2047 outlines a bold strategy to establish the nation as a powerhouse in science, technology, and innovation by emphasizing emerging technologies and sustainable growth.

I would like to place my heartfelt thanks to our Virudhunagar Hindu Nadars’ Senthikumara Nadar College (Autonomous), Virudhunagar Managing Board President Thiru A.S.M.R. Mariappan, Vice-Presidents Thiru S.P.G.R.S. Venkatesh, Tmtty B. Shanthi, Secretary & Correspondent Thiru U.S.M.Sampathkumar, Treasurer Thiru R. Kannan for their constant support throughout the publication of this Special Issue. My wholehearted thanks go to the Principal Dr.A.Sarathi for his blessings, valuable support and guidance for publishing this book.

My sincere gratitude goes to the paper contributors for sharing their knowledge and expertise in the publication of this special issue. This is an edited publication of the collection of articles submitted by academicians, research scholars, UG and PG students from various institutions.

Finally, I acknowledge the support of Dr.BGR Publications, Tuticorin, Tamil Nadu who was instrumental in publishing this special issue. We are happy to acknowledge the efforts taken by everyone who has helped us in getting this special issue published.

Editors

Dr. S.Selvanathan
Dr. T.Suguna

Keynote Address

De-dollarization and Reserve Diversification: A Shift Away from the US Dollar and the Euro

The Accounting Illusion

I want to begin with a number everyone in this field has quoted, and a confession about what is usually done with it.

The dollar's share of allocated global foreign exchange reserves has fallen from around sixty-six percent a decade ago to below sixty percent today. The figure is correct. The inference drawn from it usually is not.

A reserve share is a ratio, and a ratio moves for two different reasons. It moves when a central bank sells dollars and buys something else — a deliberate act of diversification. It also moves when the dollar appreciates against the other currencies in the basket while every central bank in the world holds its position completely unchanged.

One of these is a story about geopolitics. The other is a story about arithmetic.

Much of what is written under the heading of de-dollarization is measuring the exchange rate and reporting it as a political realignment. But strip the arithmetic out and the decline does not disappear. It survives — smaller, slower, and considerably stranger than the headline. What survives is what should occupy us.

What the Data Shows

Robert Triffin put the underlying problem to Congress in 1960. The issuer of the world's reserve currency must run persistent external deficits to supply global liquidity, and those deficits progressively undermine confidence in the very asset the world is accumulating. The gold constraint died in 1971; the logic did not. It returned as a global shortage of safe assets, with the United States asked to manufacture safety for a world economy several times its own size.

Has this produced flight? It has produced drift. The allocated share fell eight or nine percentage points over the decade, and adjusted for valuation the active component is smaller still — but real, and consistent throughout. Stealth erosion, not collapse.

The destination is where the conventional narrative fails completely. Capital leaving the dollar did not flow into the euro, whose share has been broadly flat for twenty years. Nor into the yen or sterling. Roughly a quarter went into the Chinese renminbi. Roughly three quarters went

into currencies conventionally classified as non-traditional: the Australian and Canadian dollars, the Swiss franc, the Korean won, the Singapore dollar, the Nordic currencies.

Sit with that, because it is peculiar. These are not the currencies of rival power blocs. Australia and Canada are treaty allies of the United States. Switzerland has repeatedly joined European asset freezes. Korea hosts American forces. If a central bank were diversifying because it feared Western financial coercion, the Australian dollar would be a remarkably poor hedge against that fear.

So the three quarters is not a geopolitical finding at all. It is a finding about technology and yield: automated market-making has collapsed the cost of holding smaller currencies, and a reserve manager today can hold Korean won at a spread that would have been prohibitive twenty years ago. The three quarters is market plumbing. The one quarter is geopolitics. Anyone forecasting from the aggregate must separate them first.

The Euro's Missing Instrument

On paper the euro should be a serious contender: the world's second-largest economic bloc, a fifth of allocated reserves, a central bank with credibility most authorities would envy. Yet across two decades of dollar erosion it has captured nothing. The explanation is not credibility. It is that the euro does not have a safe asset.

Consider what a reserve manager actually needs. Not a currency, but an instrument: a deep, uniform pool of sovereign paper that can be bought in size without moving the price and sold in a crisis without pausing to ask which issuer stands behind it. The United States offers one Treasury market with one federal issuer behind every security. The euro area offers Bunds, OATs, BTPs and Bonos — separate issuers with separate ratings, and spreads that widen precisely when a reserve manager most needs them not to.

This is architecture, not policy failure. The euro area achieved monetary union without fiscal union, and there is no European Treasury. The euro is a currency in search of a sovereign, and the consequence is the doom loop anyone who worked in European markets in 2011 will recognise. NextGenerationEU proved a joint instrument is constructible, but it was authorised as a temporary crisis response — and a safe asset that expires is not a safe asset. The euro's international status is therefore not principally a monetary question but a question of fiscal federalism. The ECB cannot resolve it. Only European fiscal politics can.

Why Nothing Else Qualifies

In February 2022, some three hundred billion dollars of Russian central bank reserves were immobilised through coordinated Western action. What that demonstrated is that reserves are

not merely an asset — they are a claim on a foreign legal system, contingent on political alignment. Reserve managers outside the Western alliance revised their assumptions accordingly, not because such states contemplate invasion, but because prudent risk managers price tail events irrespective of probability.

The renminbi has clearing infrastructure, swap lines and growing trade invoicing. But reserve status requires that foreigners hold assets freely and take capital out on demand, and that requires an open capital account — surrendering control over domestic monetary conditions that Beijing has rationally chosen to retain. China seeks the international role without the opening, and the two are not separable.

A collective bloc currency runs into the optimum currency area criteria — Mundell, extended by McKinnon and Kenen, and not to be confused with the Mundell-Fleming model, which answers a different question entirely. Applied to the expanded BRICS grouping the result is unambiguous: negligible labour mobility, weak intra-bloc trade integration, and unsynchronised cycles, since a terms-of-trade shock benefiting Russia, Brazil and the Gulf states simultaneously harms China and India. There is no fiscal transfer mechanism at all. The deeper obstacle is political: China constitutes most of the bloc's output, so a common currency would be a renminbi bloc with additional signatories, and India will not exchange dependence on Washington for dependence on Beijing.

The concrete case understates less than the abstraction. When India and Russia expanded rupee-settled trade after 2022, Russian exporters accumulated rupee balances in a currency not fully convertible on the capital account, which could not be efficiently repatriated. This is Keynes's problem from the Clearing Union proposals: in any bilateral arrangement lacking a mechanism to settle imbalances in a neutral asset, the surplus party becomes trapped in the deficit party's currency. It was rediscovered in 2023, at cost.

Gold answers the 2022 shock more directly than anything else, and several central banks have repatriated bullion from London and New York — which tells you the motive is custody risk, not price. But gold cannot be deployed at speed. A central bank defending its currency must sell an asset and buy its own currency within hours, in size. That is achievable with Treasuries, not with bullion in a domestic vault. Gold is insurance; Treasuries are working capital.

The View from the Periphery

Everything so far is large economies making choices. Most of the world absorbs those choices without shaping them, and for a small open economy the international monetary system is not

an object of strategy. It is weather: external debt is dollar-denominated while revenues are not, so every American tightening cycle raises debt service regardless of domestic conditions.

Does diversification help? Less than the enthusiasm implies. If your liabilities are in dollars, holding reserves elsewhere introduces a mismatch in order to reduce a concentration, and the net effect depends on the liability structure. Evaluate it as a portfolio decision, on correlation and liquidity grounds — not as a geopolitical statement. Gold deserves the same discipline: it hedges seizure risk, but for an economy whose real vulnerability is a sudden stop in external financing, it is expensive insurance against the wrong hazard.

Local currency arrangements carry the sharpest lesson. Run a persistent surplus with the partner and you will hold a currency you cannot spend — a compulsory loan on terms you did not negotiate. Settle that in the agreement, not afterwards.

The Wrong Variable

Every candidate replacement fails. The euro lacks a safe asset, the renminbi cannot open its capital account, a bloc currency fails the currency area criteria, gold cannot settle. Nothing is arriving to occupy the dollar's position.

And yet something is unmistakably changing. The change is not in the currency. It is in the infrastructure — and both our literature and our policy debate have under-invested in it, because settlement plumbing carries little prestige.

Two projects mark the divergence. Project Agorá, convened by the Bank for International Settlements with seven major central banks, puts tokenised commercial deposits and central bank reserves on one programmable ledger — while leaving the two-tier banking structure and the correspondent network untouched. It is the incumbent system modernised, a defensive initiative. Project mBridge, developed with the Chinese, Emirati, Thai, Hong Kong and Saudi monetary authorities, enables direct central-bank-to-central-bank settlement with no correspondent intermediation at all. The BIS withdrew in late 2024, and mBridge now operates outside the body that incubated it.

Why does this matter more than reserve shares? Because the correspondent network is the mechanism that makes financial coercion possible. Sanctions work because dollar payments route through American correspondent institutions. Remove the correspondent — settle atomically on a shared ledger — and the chokepoint ceases to exist. Not because anyone stopped using dollars, but because the payment stopped passing through the place where the leverage lives.

A state can therefore reduce its exposure to Western financial power without reducing its dollar holdings at all. Reserve composition and infrastructure dependence are separable, and we have been measuring the first while the action migrated to the second. We have exquisite data on what central banks hold and almost none on how they settle.

The Bifurcated System

We are not entering a post-dollar world. The dollar's network effects are self-reinforcing: it is used because it is used, invoiced because it is invoiced. Dominance has proven more durable than a generation of confident predictions allowed, and I would caution against adding another to the pile.

But we are entering something. Call it a bifurcated system: a dominant dollar core still pricing commodities, denominating debt and clearing most global transactions — and alongside it a growing insulated perimeter of states holding gold they physically control, settling trade in local currencies, and building rails that do not traverse Western jurisdictions. Not a replacement, but a parallel partial system, adopted by states that have concluded the cost of dependence exceeds the cost of duplication.

What follows, for the three constituencies in this hall?

Policymakers and regulators. If Europe wants the euro to hold a genuine international role, it must issue a permanent common safe asset. For smaller jurisdictions the priorities are more immediate: negotiate residual settlement terms into local currency arrangements before signing, evaluate reserve diversification against the liability structure rather than the headlines, and treat access to cross-border payment infrastructure as national economic security rather than a technical banking matter.

The financial industry. Settlement efficiency is now a strategic variable rather than an operational one. If correspondent banking stays slow, opaque and expensive, alternatives will be built regardless of anyone's geopolitical preference — and volume lost to them will be lost permanently, because payment rails are sticky in exactly the way currencies are. The de-risking that stripped correspondent relationships from smaller jurisdictions has done more to create demand for alternative infrastructure than any sanctions programme.

Researchers. Decompose the reserve data, separating valuation from active reallocation and the technology channel from the geopolitical one. Build measurement for settlement infrastructure, because we cannot analyse what we do not observe. And treat the institutional questions as first-order: the binding constraint on the euro is fiscal federalism, on the renminbi

capital-account policy, on collective currency arrangements political trust. None is a monetary variable. All determine monetary outcomes.

Triffin's insight was that a system resting on one country's liabilities contains its own contradiction. He was right, and it took sixty-five years to bite. What is emerging is not the resolution he hoped for — a system fragmenting at its edges while holding at its centre, less stable than either the dollar order we have or the multipolar order some anticipate. Whether that fragmentation proves managed or disorderly will not be determined by markets. It will be determined by institutional choices, most of which have not yet been made — and some of which will be made by people in this room.

Dr. MIM. Riyath
Department of Accountancy and Finance,
Faculty of Management and Commerce,
South Eastern University of Sri Lanka
Sri Lanka



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Publications

International Journal of Business and Economics Research (IJBER)

e-ISSN

2455-3921

The International Journal of Business and Economics Research (IJBER) is a peer-reviewed, open-access scholarly journal published by Dr. BGR Publications, India. IJBER provides a global platform for publishing high-quality research in business, economics, management, finance, marketing, commerce, human resources, entrepreneurship, and applied social sciences.



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Since: November 2015



Guest Editorial Board

Editor-in-Chief

Dr. S.Selvanathan

Head & Assistant Professor of Commerce (SF), Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

✉ selvanathan@vhnsnc.edu.in

Co-Editor-in-Chief

Dr. T.Suguna

Assistant Professor of Management Studies

Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

✉ suguna@vhnsnc.edu.in

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Publications



Guest Editorial Board Committee Members

Dr.G.Purushothaman

Assistant Professor & HoD

Department of Commerce (Accounting & Finance)

S.A. College of Arts & Science, Chennai, Tamil Nadu, India

✉ profpurusg@gmail.com

Dr.K.Shyamala

Associate Professor of Commerce, S.D.N.B. Vasiahnav College for Women

Chennai, Tamil Nadu, India

✉ shyam.sdnbvc@gmail.com

Dr.S.Diviya

Assistant Professor of Commerce, S.D.N.B. Vaishnav College for Women

Chennai, Tamil Nadu, India

✉ drsdivyaofficial@gmail.com

Dr. Mareena Abraham

Assistant Professor, Department of Commerce (CA), Sona College of Arts and Science

Salem, Tamil Nadu, India

✉ m.abraham2017@gmail.com

Dr.Y.Fathima

Professor, School of Commerce, JAIN Deemed-to-be UNIVERSITY, Bangalore, Karnataka

India

✉ y.fathima@jainuniversity.ac.in

Dr. G. Vanitha

Associate Professor, PG Department of Commerce [General], Valliammal College for Women

Chennai, Tamil Nadu, India

✉ vanithaa.sathish@gmail.com



Dr.T.Jebasheela

Assistant Professor of Commerce, Department of Commerce CA – SF, Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

✉ jebasheela.t@vhnsnc.edu.in

Dr. C.Anupriya

Assistant Professor of Commerce CS, Ayya Nadar Janaki Ammal College (Autonomous), Sivakasi, Tamil Nadu, India

✉ sivanujuly1@gmail.com

Dr.V.Punitha

Associate Professor and Dean, School of Commerce, CMS College of Science and Commerce Coimbatore, Tamil Nadu, India

✉ deansoc@cmscollege.edu.in

Dr. Mathan Kumar.P

Assistant Professor, Faculty of Commerce and Management, St. Xavier's University, Kolkata, West Bengal

✉ prof.mathankumar@gmail.com

Dr.S.Sathiyavani

Assistant Professor, Department of Commerce with Corporate Secretaryship, Sri Krishna Adithya College of Arts and Science, Coimbatore, Tamil Nadu, India

✉ sathiyavanis@skacas.ac.in

Dr.K.Famitha Begum

Assistant Professor, Department of Business Administration, Vels University, Chennai, Tamil Nadu, India

✉ famithabegum.sms@vistas.ac.in



Dr. P. Yasodha

Associate Professor of Management, KPR College of Arts Science and Research, Coimbatore,
Tamil Nadu, India

✉ yasodha.p@kprcas.ac.in

Dr.N.Kogila

Assistant Professor (Sr. Gr.)

Department of Commerce, B.S. Abdur Rahman Crescent Institute of Science & Technology,
Chennai, Tamil Nadu, India

✉ kogila@crescent.education

Dr.A.Fathima

Assistant Professor (Senior Grade)

Department of Commerce, B.S Abdur Rahman Crescent Institute of Science & Technology,
Chennai, Tamil Nadu, India

✉ fathimaa@crescent.education

Dr. R. Panchavarnam

Assistant Professor of Commerce, V.V.Vanniaperumal College for Women, Virudhunagar,
Tamil Nadu, India

✉ panchavarnam@vvvcollege.org

Dr.M.Harish.M

Assistant Professor

Department of Commerce, PA, ISM, IAF & SF

Faculty of Liberal Arts & Business Studies

SRM Institute of Science and Technology

Ramapuram Campus, Chennai, Tamil Nadu, India

✉ harish588@gmail.com

List of Contributors

S. No.	Paper ID	Title	Page No.
1)	INC 011	Women Entrepreneurship as A Catalyst for Sustainable Development: A Roadmap towards Viksit Bharat@2047 Dr. R. Muthukrishnaveni	1
2)	INC 012	Artificial Intelligence for Sustainable Agricultural Development: A Comparative Analysis of India and Selected Developing Countries Dr. V. Kaleeswari	20
3)	INC 013	Digital Marketing and Advertising: A Catalyst for Sustainable Business Development and Viksit Bharat@2047 Dr. A. Kannan, Dr. K. Mohan	32
4)	INC 020	Digital Banking and Mobile Applications: Transforming the Future of Banking Services Dr. T. Ezhilarasi, A. Madhushree	53
5)	INC 023	A Study on Consumer Perception on Digital Frauds in E-Commerce Platforms Nandhini N, Gayathri S, Dr. R. Purushothaman	62
6)	INC 027	The Role of Influencer Marketing and User-Generated Content in Driving Gen Z Purchase Intentions Dr. Radhika R, Dr. J Uma Devi	77
7)	INC 039	Financial Literacy and Digital Payments for Inclusive Economic Development: A Comparative Study of Axis Bank and ICICI Bank S. Dhajina, Dr. R. Muthukrishnaveni	89
8)	INC 040	Artificial Intelligence- Driven Digital Transformation for Sustainable SMEs: Opportunities, Challenges and Competitive Advantage Banupriya. A, Dr. K.Sridevi, Dr. CJ Priya	105

9)	<i>INC 053</i>	Women Empowerment and Contribution towards Viksit Bharat@2047: An Empirical Study of Women Street Vendors in Coimbatore District <i>Dr. K. Manikandan</i>	123
10)	<i>INC 054</i>	Corporate Governance and Corporate Social Responsibilities (CSR) <i>Dr. M. Karthik, Dr. N. Muthuselvi</i>	136
11)	<i>INC 060</i>	A Study on the Challenges Faced by Women Entrepreneurs through Self-Help Groups (SHGs) in the Adoption of Digital Banking and Mobile Applications in Sivakasi Corporation <i>Dr. N. Vijayalakshmi, Mrs. T. Sathana</i>	145
12)	<i>INC 065</i>	Psychological Empowerment and Work Engagement among Healthcare Professionals: A Pathway to Sustainable Healthcare <i>Sahaya Berlin Sujana A, Hannah Sharon S</i>	157
13)	<i>INC 067</i>	Impact of Digitalization and the Major Digital Technologies in Business <i>M. Dinesh Kumar, A. Sabiya Banu, S. Boomika, V. Jeevanprasath, G. Mahalakshmi, M. Rubini</i>	169
14)	<i>INC 076</i>	Viksit Bharat 2047 – The New Age of Transforming Indian Youth through NEP 2020 <i>Dr. S. Ponmalar, Dr. V. Prabavathi, Dr. S. Poovika Nishanthini</i>	177
15)	<i>INC 077</i>	Digital Marketing Strategies and Consumer Preferences towards Fast Food Products in Virudhunagar District <i>K. Anjali, Dr. N. Vijayalakshmi</i>	186
16)	<i>INC 078</i>	Sustainability in Dairy Cooperatives: A Value Chain Approach to Achieving the Sustainable Development Goals (SDGs) <i>Dr. V. Durga, Dr. C. Pitchai</i>	198

17)	<i>INC 079</i>	Emerging Trends in Digital Payments: Adoption, Trust, Security and Consumer Behaviour <i>Dr. V.Lawrence Benadict, Dr. J.Suresh</i>	212
18)	<i>INC 080</i>	Women Empowerment for Sustainable Development: A Pathway to Viksit Bharat @2047 <i>Dr. N. Thilagavathi</i>	231
19)	<i>INC 090</i>	Digitalization of Business: A Strategic Pathway for Innovation, Competitiveness and Sustainable Growth <i>S. Shanmitha, Dr. P. Yasodha, N. Yogambal</i>	254
20)	<i>INC 271</i>	Innovations in Marketing: Transforming Customer Engagement in the Digital Era <i>K. A. Hemalatha, Dr. T. Sujatha</i>	265

Dr.BGR
Publications

Women Entrepreneurship as A Catalyst for Sustainable Development: A Roadmap towards Viksit Bharat@2047

R. Muthukrishnaveni

Associate Professor of Commerce, Saiva Bhanu Kshatriya College, Aruppukottai, Tamil Nadu, India

Email: a.mkvenigmail.com

Abstract

Women entrepreneurship has emerged as an important catalyst for economic empowerment, social inclusion and sustainable development in India. As the country moves towards the vision of Viksit Bharat@2047, women-led enterprises can play a significant role in employment generation, financial independence, digital inclusion, innovation and sustainable economic growth. The present study examines the role of women entrepreneurship in contributing to the Sustainable Development Goals (SDGs) and the vision of Viksit Bharat@2047. The study is based on primary data collected from 600 women entrepreneurs from different geographical regions of India using a structured questionnaire. The questionnaire covers the dimensions of economic empowerment, digital and financial inclusion, government support, social empowerment, sustainable business practices and Viksit Bharat@2047 readiness. The study employs Percentage Analysis, Cronbach's Alpha, Garrett Ranking Technique and One-Sample t-Test for analysing the data. The reliability analysis confirms satisfactory internal consistency of the research instrument, with Cronbach's Alpha values ranging from 0.773 to 0.988. The Garrett Ranking analysis identifies lack of training as the most important challenge faced by women entrepreneurs, followed by lack of finance and limited digital skills. The One-Sample t-Test indicates that the mean perceptions of respondents regarding all six dimensions are significantly higher than the neutral level of 3 ($p < 0.001$). Economic empowerment records the highest mean score of 4.255, followed by Viksit Bharat@2047 readiness (3.980) and digital and financial inclusion (3.972). The study highlights the need for strengthening entrepreneurial training, financial access, digital capabilities and institutional support to enhance the contribution of women entrepreneurs towards sustainable and inclusive national development. The study concludes that empowering women entrepreneurs can contribute to India's progress towards the Sustainable Development Goals and the vision of Viksit Bharat@2047.

Keywords: Women Entrepreneurship, Sustainable Development Goals, Viksit Bharat@2047, Economic Empowerment, Digital and Financial Inclusion, Sustainable Development, Women Entrepreneurs

Introduction

Women entrepreneurship has emerged as an important component of economic development, social empowerment and inclusive growth in India. Women entrepreneurs contribute to the economy not only by establishing and managing enterprises but also by generating employment, improving household income, promoting innovation and creating opportunities for other women. Entrepreneurship therefore provides women with greater financial independence, decision-making capacity and participation in economic activities. In recent years, the increasing participation of women in business has strengthened the role of entrepreneurship as an instrument of social and economic transformation.

The importance of women entrepreneurship is closely associated with the achievement of the United Nations Sustainable Development Goals (SDGs). Women-led enterprises can contribute to several SDGs, particularly SDG 1 (No Poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure) and SDG 10 (Reduced Inequalities). By generating employment, improving income, promoting financial independence and supporting local communities, women entrepreneurs can contribute to a more inclusive and sustainable economy. Their participation also helps to reduce gender-based economic disparities and strengthen the social dimensions of sustainable development.

In India, the vision of Viksit Bharat@2047 provides a long-term development framework for transforming the country into a developed, inclusive, prosperous, sustainable and technologically advanced nation by 2047, the centenary year of India's Independence. Achieving this vision requires broad-based economic participation and the effective utilisation of the country's human resources. In this context, women entrepreneurs can become important contributors to India's economic transformation through enterprise creation, employment generation, innovation, digital adoption and sustainable business practices.

Despite the growing importance of women entrepreneurship, women entrepreneurs continue to face several challenges. Lack of training, limited access to finance, inadequate

digital skills, family responsibilities, competition, marketing difficulties, government procedural barriers and limited access to technology may restrict the growth and sustainability of women-led enterprises. These challenges are particularly important because the ability of women entrepreneurs to contribute to sustainable development depends not only on their willingness to engage in entrepreneurship but also on the availability of appropriate financial, technological, institutional and social support.

Digitalisation has created new opportunities for women entrepreneurs through digital payments, online banking, social media marketing and access to wider markets. At the same time, differences in digital skills and access to technology may create new barriers. Similarly, government schemes and institutional support can facilitate entrepreneurial development, but awareness, accessibility and effective utilisation of such support remain important considerations. Strengthening these areas can help women entrepreneurs improve their productivity, competitiveness and contribution to sustainable development.

Against this background, the present study examines women entrepreneurship as a catalyst for achieving Sustainable Development Goals and as a pathway towards Viksit Bharat@2047. The study focuses on the perceptions of women entrepreneurs regarding economic empowerment, digital and financial inclusion, government support, social empowerment, sustainable business practices and readiness towards Viksit Bharat@2047. It also identifies and ranks the major challenges faced by women entrepreneurs using the Garrett Ranking Technique.

The study is based on primary data collected from 600 women entrepreneurs across different regions of India. By examining their experiences and perceptions, the study seeks to provide meaningful insights into the role of women entrepreneurship in building a sustainable, inclusive and developed India. The findings are expected to be useful to policymakers, financial institutions, entrepreneurship development agencies and other stakeholders in designing appropriate measures to strengthen women-led enterprises and enhance their contribution to the SDGs and the Viksit Bharat@2047 vision.

Review Of Literature

Women entrepreneurship has received increasing attention in the context of economic development, gender equality and sustainable development. The literature indicates that

women-owned enterprises can contribute to employment generation, household income, innovation, social empowerment and inclusive economic growth. Recent research has increasingly connected women's entrepreneurial activities with the Sustainable Development Goals (SDGs), particularly gender equality, decent work, poverty reduction and sustainable economic growth.

1. **Raman et al. (2022)** conducted a bibliometric and systematic review of research on women entrepreneurship and sustainable development. Analysing 3,157 publications published between 1991 and 2021, including 843 publications directly aligned with the SDGs, the study demonstrated the growing integration of women entrepreneurship with sustainability research. The authors identified substantial opportunities for future research linking women entrepreneurship, technology and sustainable development.
2. **Surana, Singh and Sagar (2020)** examined science, technology and innovation-based entrepreneurship in India in relation to the achievement of the SDGs. Their study highlighted the importance of innovation, incubation, capacity building and government intervention in supporting entrepreneurial activities that address societal challenges. The findings suggest that institutional support and entrepreneurial capability are important for translating entrepreneurship into sustainable development outcomes.
3. **Biswas (2021)** studied the relationship between female ownership and firm-level innovation in India using World Bank Enterprise Survey data. The study found that firms with female owners demonstrated a higher probability of innovation, particularly among firms with better access to internal funding and younger enterprises. The study therefore highlights the potential of women entrepreneurs to contribute to innovation and productivity when adequate financial conditions are available.
4. **Gochhayat and Rout (2025)** investigated the relationship between government intervention and sustainable development of women entrepreneurship in the Indian manufacturing sector. Using World Bank Enterprise Survey data and regression analysis, the study found that government support and other institutional factors influence the performance of women-led enterprises. The authors emphasised the need for effective implementation of government schemes and supportive policies to strengthen women's entrepreneurial participation and sustainable business practices.
5. **Virmani and Kumarasamy (2026)** surveyed whether digital financial literacy influences the relationship between awareness of government schemes and women's

entrepreneurial engagement. Based on primary data from 580 women across five National Capital Region districts, the study reported that digital financial literacy significantly strengthened the relationship between government-scheme awareness and entrepreneurial outcomes. The findings highlight the importance of digital capabilities in ensuring that women entrepreneurs can effectively benefit from government programmes.

6. **Sasikumar, Kannadas and Nair (2026)** observed research on women and the Sustainable Development Goals in the Indian context through bibliometric and thematic analysis. Their study mapped the growth and thematic patterns of Indian scholarship concerning women and the SDGs and identified the strong connection of SDG 5 (Gender Equality) with broader development objectives. The study also indicates the need for continued empirical research connecting women's participation with different dimensions of sustainable development.

A recent review on women's entrepreneurship and sustainable development identified four major research streams: women entrepreneurs' role in innovation, gender equality and social entrepreneurship; their contribution to poverty alleviation and the SDGs; their role in rural development and economic growth; and the contextual factors influencing women entrepreneurship and sustainability. This broader literature demonstrates that women's entrepreneurship should be viewed not merely as an economic activity but as a multidimensional mechanism for sustainable and inclusive development.

The emerging literature on *Viksit Bharat@2047* also emphasises inclusive growth, innovation, employment generation and sustainable development as important components of India's long-term development vision. A recent review describes *Viksit Bharat@2047* as a vision centred on transforming India into a developed, self-reliant and globally competitive nation, with inclusive growth and innovation forming important elements of this transformation.

Literature Synthesis

The reviewed literature demonstrates that women entrepreneurship is closely associated with economic empowerment, innovation, digital inclusion, government support and sustainable development. Previous studies have highlighted the role of women entrepreneurs

in employment generation, innovation and poverty reduction, while recent research has increasingly emphasised digital financial literacy, institutional support and sustainable entrepreneurial practices. However, these dimensions have often been examined independently or within specific geographical, sectoral or institutional contexts. There is therefore a need for an integrated empirical assessment that considers economic empowerment, digital and financial inclusion, government support, social empowerment, sustainable business practices and Viksit Bharat@2047 readiness within a common framework. The present study addresses this need by examining these dimensions using primary data collected from 600 women entrepreneurs from different regions of India.

Research Gap

The review of existing literature indicates that previous studies have examined women entrepreneurship from different perspectives, including economic empowerment, innovation, digital financial literacy, government support, sustainability and Sustainable Development Goals. However, these dimensions have largely been examined independently or within specific geographical, sectoral or institutional contexts. There is comparatively limited empirical research that integrates economic empowerment, digital and financial inclusion, government support, social empowerment, sustainable business practices and Viksit Bharat@2047 readiness within a single analytical framework.

Further, many existing studies have focused on particular states, sectors or specific groups of women entrepreneurs. Limited empirical evidence is available on the perceptions of women entrepreneurs from different geographical regions of India regarding their role in sustainable development and the Viksit Bharat@2047 vision. In addition, the major challenges faced by women entrepreneurs require systematic identification and prioritisation.

Therefore, the present study attempts to address these gaps by examining the perceptions of 600 women entrepreneurs from different regions of India and by analysing six major dimensions of women entrepreneurship. The study also identifies and ranks the major challenges faced by women entrepreneurs using the Garrett Ranking Technique and examines whether their perceptions regarding the selected dimensions differ significantly from the neutral level.

Objectives of the Study

The present study is undertaken with the following objectives:

- To examine the socio-economic and business profile of women entrepreneurs in India.
- To assess the reliability and internal consistency of the research instrument used to measure the selected dimensions of women entrepreneurship.
- To study the role of economic empowerment, digital and financial inclusion, government support, social empowerment and sustainable business practices in strengthening women entrepreneurship.
- To assess the perceived role of women entrepreneurship towards the vision of Viksit Bharat@2047.
- To identify and rank the major challenges faced by women entrepreneurs using the Garrett Ranking Technique.
- To test whether the mean perceptions of respondents regarding the selected dimensions of women entrepreneurship differ significantly from the neutral level.
- To suggest appropriate measures for strengthening women entrepreneurship and enhancing its contribution towards achieving the Sustainable Development Goals and the vision of Viksit Bharat@2047.

Research Methodology

Research Design

The study adopts a descriptive and analytical research design to examine the role of women entrepreneurship in promoting sustainable development and contributing to the vision of Viksit Bharat@2047. The study is based primarily on the perceptions and experiences of women entrepreneurs.

Nature and Source of Data

The study is based on primary data collected directly from women entrepreneurs through a structured questionnaire. Secondary information from books, research articles, government reports and relevant institutional publications was used to provide conceptual and contextual support to the study.

Population of the Study

The population of the study comprises women entrepreneurs in India who own, manage or actively participate in the operation and decision-making of an enterprise. Women engaged in service, home-based, agricultural and manufacturing activities were included in the study.

Sample Design

A multi-stage stratified random sampling technique was adopted to obtain representation from women entrepreneurs belonging to different geographical and residential backgrounds in India. In the first stage, the study population was stratified into major geographical regions of India. In the second stage, each geographical region was further stratified into urban and rural areas to ensure representation from both settings. In the third stage, women entrepreneurs engaged in different categories of entrepreneurial activities, namely service, home-based, agriculture and manufacturing, were identified. Respondents were then selected through random sampling from the identified strata.

A total of 600 valid responses were collected for the study, comprising 301 urban respondents (50.17%) and 299 rural respondents (49.83%). The sampling design was intended to provide adequate representation of women entrepreneurs from different geographical, residential and business backgrounds.

Period of the Study

The primary data for the study were collected during 2025 - 2026. The study focuses on the contemporary role and challenges of women entrepreneurs in the context of sustainable development and the vision of Viksit Bharat@2047.

Hypotheses of The Study

The following null hypotheses were formulated and tested using the One-Sample t-Test at the 5 per cent level of significance, with 3 as the neutral test value:

H₀₁: The mean perception of respondents regarding economic empowerment through women entrepreneurship does not differ significantly from the neutral level.

H₀₂: The mean perception of respondents regarding digital and financial inclusion through women entrepreneurship does not differ significantly from the neutral level.

H₀₃: The mean perception of respondents regarding government support for promoting women entrepreneurship does not differ significantly from the neutral level.

H₀₄: The mean perception of respondents regarding social empowerment through women entrepreneurship does not differ significantly from the neutral level.

H₀₅: The mean perception of respondents regarding the role of women entrepreneurs in promoting sustainable business practices does not differ significantly from the neutral level.

H₀₆: The mean perception of respondents regarding the contribution of women entrepreneurship towards Viksit Bharat@2047 does not differ significantly from the neutral level.

Tools used for Data Analysis

The collected primary data were analysed using the following statistical tools:

1. **Percentage Analysis** – used to analyse the socio-economic and business profile of the respondents.
2. **Cronbach's Alpha** – used to assess the internal consistency and reliability of the research instrument and its six constructs.
3. **Garrett Ranking Technique** – used to identify and rank the major challenges faced by women entrepreneurs.
4. **One-Sample t-Test** – used to examine whether the mean perceptions of respondents regarding the selected dimensions of women entrepreneurship differ significantly from the neutral level of 3.

The data were organised and analysed using appropriate statistical procedures, and the results are presented through tables and interpretations.

Results and Discussion

The results of the study are presented based on the responses obtained from 600 women entrepreneurs. The analysis focuses on the profile of the respondents, reliability of the research instrument, major challenges faced by women entrepreneurs, and testing of the formulated hypotheses. The findings are presented and discussed through four tables.

Table 1: Profile of the Respondents

S. No.	Profile Variable	Category	Frequency	Percentage
1	Age	Below 25 Years	63	10.50
		26–35 Years	60	10.00
		36–45 Years	361	60.17
		Above 45 Years	116	19.33
		Total	600	100.00
2	Educational Qualification	School	58	9.67
		UG	120	20.00
		PG	304	50.67
		Professional	58	9.67
		Other	60	10.00
		Total	600	100.00
3	Marital Status	Married	421	70.17
		Unmarried	121	20.17
		Widow	58	9.67
		Total	600	100.00
4	Type of Business	Service	241	40.17
		Home-based	241	40.17
		Agriculture	60	10.00
		Manufacturing	58	9.67
		Total	600	100.00
5	Years of Experience	Less than 3 Years	183	30.50
		3–5 Years	60	10.00
		6–10 Years	60	10.00
		Above 10 Years	297	49.50
		Total	600	100.00
6	Annual Turnover	Below ₹5 Lakhs	421	70.17
		₹5–10 Lakhs	63	10.50
		₹10–25 Lakhs	116	19.33
		Total	600	100.00

7	Source of Finance	Own Savings	479	79.83
		Bank Loan	63	10.50
		SHG Loan	58	9.67
		Total	600	100.00
8	Location	Urban	301	50.17
		Rural	299	49.83
		Total	600	100.00

Source: Primary Data

Interpretation

The profile analysis indicates that the majority of the respondents (60.17%) belong to the 36–45 years age group, while 50.67% possess postgraduate qualifications. A majority of the respondents (70.17%) are married. Service and home-based enterprises account for 40.17% each and represent the major forms of entrepreneurial activity. Nearly half of the respondents (49.50%) have more than 10 years of entrepreneurial experience. Further, 70.17% report an annual turnover below ₹5 lakh, while 79.83% depend primarily on personal savings as their source of business finance. The sample comprises 301 urban respondents (50.17%) and 299 rural respondents (49.83%), indicating an almost equal representation of urban and rural women entrepreneurs.

Table 2: Reliability Analysis

S. No.	Construct	No. of Items	Cronbach's Alpha	Reliability
1	Economic Empowerment	5	0.981	Excellent
2	Digital and Financial Inclusion	5	0.803	Good
3	Government Support	5	0.773	Acceptable
4	Social Empowerment	5	0.988	Excellent
5	Sustainable Business Practices	5	0.985	Excellent
6	Viksit Bharat@2047 Readiness	5	0.972	Excellent

Source: Primary Data

Interpretation

The reliability analysis demonstrates satisfactory internal consistency across all six constructs. The Cronbach's Alpha values range from 0.773 to 0.988, exceeding the commonly accepted threshold of 0.70. Social Empowerment records the highest reliability coefficient of 0.988, whereas Government Support records the lowest value of 0.773. Overall, the results confirm that the statements included in the questionnaire are reliable and suitable for further analysis.

Table 3: Garrett Ranking of Challenges Faced by Women Entrepreneurs

S. No.	Challenges	Mean Garrett Score	Rank
1	Lack of Finance	60.99	II
2	Lack of Marketing Support	57.61	VI
3	Family Responsibilities	59.72	IV
4	Competition	58.47	V
5	Limited Digital Skills	60.14	III
6	Lack of Training	61.45	I
7	Government Procedural Delays	57.43	VII
8	Poor Infrastructure	56.87	VIII
9	Limited Access to Technology	55.54	IX
10	Lack of Business Networking	54.07	X

Source: Primary Data

Interpretation

The Garrett Ranking analysis reveals that lack of training is the most significant challenge faced by women entrepreneurs, recording the highest mean Garrett score of 61.45 and securing Rank I. Lack of finance ranks second with a mean score of 60.99, followed by limited digital skills with a score of 60.14. Family responsibilities and competition occupy the fourth and fifth ranks respectively. Lack of business networking, with the lowest mean Garrett score of 54.07, ranks tenth. The findings indicate that strengthening entrepreneurial training, financial access and digital capabilities should receive priority in policies aimed at supporting women entrepreneurs.

Table 4: Summary of Hypothesis Testing

S. No.	Hypothesis	Mean	t-value	p-value	Decision
1	H ₀₁ : Economic empowerment does not significantly differ from the neutral level.	4.255	26.270	<0.001	Rejected
2	H ₀₂ : Digital and financial inclusion does not significantly differ from the neutral level.	3.972	34.442	<0.001	Rejected
3	H ₀₃ : Government support does not significantly differ from the neutral level.	3.793	28.284	<0.001	Rejected
4	H ₀₄ : Social empowerment does not significantly differ from the neutral level.	3.870	16.026	<0.001	Rejected
5	H ₀₅ : Sustainable business practices do not significantly differ from the neutral level.	3.884	19.108	<0.001	Rejected
6	H ₀₆ : Viksit Bharat@2047 readiness does not significantly differ from the neutral level.	3.980	22.828	<0.001	Rejected

Note: Test value = 3 (Neutral level); N = 600; significance level = 5%.

Source: Primary Data

Interpretation

The hypothesis testing results show that the mean scores of all six dimensions are significantly higher than the neutral value of 3, with $p < 0.001$ in all cases. Hence, all six null hypotheses are rejected at the 5% level of significance. Economic Empowerment records the highest mean score (4.255), followed by Viksit Bharat@2047 Readiness (3.980) and Digital and Financial Inclusion (3.972). The results indicate that respondents have significantly positive perceptions regarding the role of these dimensions in strengthening women entrepreneurship and its contribution to sustainable development and the Viksit Bharat@2047 vision.

Findings of the Study

Based on the analysis of primary data collected from 600 women entrepreneurs, the major findings of the study are as follows:

1. A majority of the respondents (60.17%) belong to the 36–45 years age group, indicating that women in the economically active middle-age group constitute a major segment of women entrepreneurs.
2. More than half of the respondents (50.67%) possess postgraduate qualifications, indicating a relatively high level of educational attainment among the women entrepreneurs covered by the study.
3. A considerable majority (70.17%) of the respondents are married, suggesting that women entrepreneurship is pursued alongside family responsibilities.
4. Service and home-based enterprises are the predominant forms of business, accounting for 40.17% each. This indicates the importance of flexible and service-oriented entrepreneurial activities among women.
5. Nearly half (49.50%) of the respondents have more than 10 years of entrepreneurial experience, indicating that a substantial proportion have sustained their enterprises over a longer period.
6. A majority (70.17%) of the respondents report an annual turnover of below ₹5 lakh, indicating that most women-led enterprises in the study operate at a relatively small scale.
7. Own savings are the major source of finance for 79.83% of the respondents. This indicates a strong dependence on personal funds and comparatively limited use of institutional sources of finance.
8. The respondents are almost equally distributed between urban (50.17%) and rural (49.83%) areas, providing a balanced representation of both geographical settings.
9. The Cronbach's Alpha values for the six constructs range from 0.773 to 0.988, confirming satisfactory to excellent internal consistency of the research instrument.
10. The Garrett Ranking analysis identifies lack of training as the most important challenge faced by women entrepreneurs, with a mean Garrett score of 61.45.
11. Lack of finance ranks second (60.99), highlighting the continued importance of financial accessibility for the establishment and expansion of women-led enterprises.

12. Limited digital skills rank third (60.14), indicating the increasing importance of digital competency for women's entrepreneurial development in the contemporary business environment.
13. Family responsibilities and competition occupy the fourth and fifth ranks respectively, while lack of business networking ranks tenth with the lowest mean Garrett score (54.07).
14. Economic empowerment records the highest mean score (4.255) among the six dimensions, indicating a strongly positive perception of the economic benefits associated with women entrepreneurship.
15. Digital and financial inclusion records a high mean score of 3.972, demonstrating the perceived importance of digital and financial access in supporting women entrepreneurs.
16. Government support records a mean score of 3.793, indicating a positive perception, although continued strengthening of institutional assistance remains important.
17. Social empowerment records a mean score of 3.870, suggesting that entrepreneurship contributes positively to women's confidence, participation and social standing.
18. Sustainable business practices record a mean score of 3.884, indicating a positive perception of the role of women entrepreneurs in promoting sustainable business activities.
19. The Viksit Bharat@2047 readiness dimension records a mean score of 3.980, indicating that respondents perceive women entrepreneurship as an important contributor to India's long-term development vision.
20. All six null hypotheses are rejected at the 5% level of significance, as the respective *p*-values are less than 0.001. This indicates that the respondents' perceptions regarding the six dimensions are significantly higher than the neutral level.

Suggestions

Based on the findings of the study, the following suggestions are put forward to strengthen women entrepreneurship and enhance its contribution towards the Sustainable Development Goals and Viksit Bharat@2047:

1. Since lack of training was ranked as the most important challenge, regular training programmes should be organised on entrepreneurship, business planning, accounting, marketing, financial management and enterprise development.

2. As lack of finance ranked second, financial institutions should provide women entrepreneurs with easier access to affordable credit, flexible repayment facilities and simplified loan procedures. Greater awareness of government-supported financial schemes should also be promoted.
3. Since limited digital skills ranked third, specialised training should be provided in digital payments, online banking, e-commerce, social media marketing, digital accounting and emerging technologies such as Artificial Intelligence.
4. Women entrepreneurs should be supported through digital marketplaces, exhibitions, trade fairs, branding programmes and e-commerce platforms to expand their customer base beyond local markets.
5. Training and incentives should be provided to encourage women entrepreneurs to adopt environmentally responsible production, waste reduction, efficient resource utilisation and sustainable packaging practices.
6. Government agencies should simplify application procedures for entrepreneurship schemes and improve awareness regarding available subsidies, training, credit and institutional support.
7. Business associations, Self-Help Groups, incubators and entrepreneurship development institutions should create stronger networking platforms through which women entrepreneurs can exchange knowledge, identify markets and develop business partnerships.
8. Special attention should be given to rural women entrepreneurs through improved infrastructure, digital connectivity, financial literacy, market linkages and local entrepreneurship development centres.
9. Awareness programmes should encourage greater family and community support for women entrepreneurs. Flexible business support systems and childcare facilities can also help women manage entrepreneurial and family responsibilities.
10. Innovation and technology adoption should be encouraged through incubators, mentoring, skill-development programmes and access to appropriate technologies, enabling women-owned enterprises to become more competitive.
11. Women entrepreneurship should be explicitly incorporated into India's long-term development strategies by linking women-led enterprises with employment generation, innovation, digital transformation, financial inclusion and sustainable development.

12. Government and supporting institutions should regularly monitor the effectiveness of women entrepreneurship programmes and assess whether beneficiaries are actually achieving improvements in income, employment, business growth and sustainability.

Conclusion

Women entrepreneurship plays an important role in promoting economic growth, social empowerment and sustainable development in India. The study based on 600 women entrepreneurs shows that entrepreneurship helps women improve their economic position and contributes to digital inclusion, social empowerment and sustainable business practices. The study also finds that lack of training, lack of finance and limited digital skills are the major challenges faced by women entrepreneurs. Therefore, better training, easy access to finance, digital skill development and government support are needed to strengthen women-led businesses. Overall, empowering women entrepreneurs can contribute significantly to the Sustainable Development Goals and Viksit Bharat@2047. Supporting women in starting, managing and expanding their businesses will help create employment, improve families' economic conditions and contribute to building a strong, inclusive and developed India by 2047.

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Artificial Intelligence for Sustainable Agricultural Development: A Comparative Analysis of India and Selected Developing Countries

V. Kaleeswari

Assistant Professor of Economics, Nehru Memorial College (Autonomous), Puthanampatti, Tiruchirappalli, Tamil Nadu, India

Email: skpkrr@gmail.com

Abstract

Agriculture is undergoing significant transformation as digital technologies become increasingly integrated into farming systems. Among these technologies, Artificial Intelligence (AI) has emerged as an important tool for improving agricultural productivity, resource efficiency, and sustainability. Many developing countries have begun incorporating AI into agriculture through applications such as precision farming, crop monitoring, weather forecasting, pest and disease detection, and farm management. However, the extent of adoption and the enabling conditions vary across countries. This study examines the role of Artificial Intelligence in sustainable agricultural development through a comparative analysis of India and selected developing countries. The paper is based on secondary data collected from reports published by international organizations, government agencies, research institutions, and peer-reviewed literature. It compares the status of AI adoption, major application areas, policy initiatives, digital infrastructure, and key challenges influencing the use of AI in agriculture across the selected countries. The study also reviews the opportunities offered by AI in supporting sustainable farming practices and improving agricultural resilience. The paper provides a comparative overview that contributes to the growing discussion on digital transformation in agriculture and serves as a reference for researchers, policymakers, and other stakeholders interested in promoting sustainable agricultural development through emerging technologies.

Keywords: Artificial Intelligence, Sustainable Agriculture, Digital Agriculture, AI Adoption, India, Developing Countries, Comparative Analysis

Introduction

India is the most populous country of the world and has changing socio- political demographic patterns that have been drawing global attention in recent years. Agriculture remains one of the most important sectors for the economic and social progress of developing nations. It supports food security, creates employment opportunities, reduces poverty, and provides livelihoods for millions of rural households. In India, agriculture continues to be a vital component of the national economy despite rapid industrial growth and urban expansion. Nevertheless, the sector is confronted with several challenges, including changing climatic conditions, depletion of water resources, declining soil quality, labour shortages, increasing pest and disease outbreaks, and rising cultivation costs. These challenges have intensified the need for innovative and sustainable technological solutions that can improve agricultural productivity while conserving natural resources.

In recent years, Artificial Intelligence (AI) has gained significant attention as a promising technology for transforming agricultural practices. By combining data analytics, machine learning, remote sensing, and automation, AI enables farmers to make timely and informed decisions. Its applications include precision agriculture, crop health monitoring, weather and climate forecasting, pest and disease diagnosis, yield estimation, intelligent irrigation systems, and autonomous agricultural equipment. These technologies help optimize the use of water, fertilizers, pesticides, and labour, thereby increasing productivity, reducing production risks, and promoting environmentally sustainable farming. Recognizing these benefits, governments, research organizations, and private enterprises in many developing countries have begun integrating AI into their agricultural development strategies. Countries such as India, China, Brazil, Vietnam, and Kenya have launched various digital agriculture initiatives; however, the pace and extent of AI adoption differ considerably because of variations in digital infrastructure, financial investment, institutional capacity, policy support, and farmers' digital literacy.

Considering these developments, the present study explores the contribution of Artificial Intelligence to sustainable agricultural development through a comparative analysis of India and selected developing countries. The study relies on secondary data collected from international organizations, government publications, policy documents, and recent scholarly literature to examine AI adoption trends, major application areas, policy frameworks,

opportunities, and implementation challenges. By comparing the experiences of different developing economies, the study aims to identify best practices and policy lessons that can support the wider adoption of AI in agriculture. The findings are expected to assist policymakers, researchers, and development practitioners in designing effective strategies for digital agricultural transformation and advancing the Sustainable Development Goals (SDGs).

Review of Literature

Rakholia et al. (2024) explored the adoption of advanced digital technologies, including Artificial Intelligence (AI), the Internet of Things (IoT), and Machine Learning (ML), in Indian agriculture with a focus on sustainable farming. Using evidence from a pilot study, the authors observed that AI-based technologies support better farm management by improving the efficient use of water, fertilizers, and other agricultural resources. The study concluded that these technologies can enhance agricultural productivity and sustainability. However, it also pointed out that widespread adoption is constrained by factors such as high investment costs, inadequate digital infrastructure, limited awareness among farmers, and insufficient institutional support.

Ali et al. (2025) reviewed recent research on the application of Artificial Intelligence in sustainable crop production through a comprehensive systematic review. The study highlighted that AI technologies have become valuable tools for precision agriculture by improving crop monitoring, disease diagnosis, yield forecasting, irrigation scheduling, and farm decision-making. The authors further noted that although AI has significant potential to improve agricultural efficiency and environmental sustainability, its successful implementation depends on high-quality agricultural data, skilled human resources, supportive government policies, and improved digital infrastructure.

Research Gap

Agriculture continues to be a key driver of economic growth and rural development in many developing countries. In India, the sector remains essential for ensuring food security, generating employment, and supporting the livelihoods of millions of people. However, agriculture is increasingly affected by challenges such as climate change, water scarcity, declining soil fertility, labour shortages, pest outbreaks, and rising input costs. Addressing

these issues requires innovative technologies that can improve productivity while promoting environmental sustainability.

Artificial Intelligence (AI) is emerging as a valuable tool for modernizing agriculture through data-driven and intelligent farming practices. AI technologies support precision farming, crop and soil monitoring, weather forecasting, pest and disease detection, yield prediction, smart irrigation, and automated farm operations. These applications enable efficient use of resources, lower production risks, and improve farm productivity. Consequently, many developing countries, including India, China, Brazil, Vietnam, and Kenya, are incorporating AI into their agricultural policies and digital farming initiatives. However, differences in infrastructure, investment, institutional capacity, and digital literacy have resulted in varying levels of AI adoption.

This study examines the role of Artificial Intelligence in promoting sustainable agricultural development through a comparative analysis of India and selected developing countries. Based on secondary data from international organizations, government reports, and recent scholarly literature, the study compares AI adoption, policy initiatives, application areas, opportunities, and implementation challenges. The findings are expected to provide practical insights for policymakers and researchers to strengthen digital agriculture and support the achievement of the Sustainable Development Goals (SDGs).

Objectives of the Study

The study aims to examine the contribution of Artificial Intelligence (AI) to sustainable agricultural development through a comparative analysis of India and selected developing countries. The specific objectives are:

1. To compare the extent of AI adoption in the agricultural sectors of India and selected developing countries.
2. To examine the major applications of AI in promoting sustainable agricultural practices.
3. To analyse the opportunities and challenges influencing AI adoption in agriculture.
4. To suggest policy measures for strengthening AI-driven sustainable agricultural development in developing countries.

Research Methodology

This study employs a descriptive and comparative research design to examine the role of Artificial Intelligence (AI) in sustainable agricultural development in India and selected developing countries. The analysis is based exclusively on secondary data collected from reliable national and international sources.

Data were obtained from publications of the Food and Agriculture Organization (FAO), World Bank, Organisation for Economic Co-operation and Development (OECD), United Nations (UN), International Food Policy Research Institute (IFPRI), NITI Aayog, the Ministry of Agriculture and Farmers' Welfare (Government of India), and the Indian Council of Agricultural Research (ICAR). Recent peer-reviewed journal articles and policy reports, were also reviewed to ensure comprehensive and current coverage.

The comparative analysis includes India, Brazil, China, Vietnam, and Kenya, representing developing economies with significant progress in digital agriculture. The collected information is analysed using descriptive statistics and comparative analysis to evaluate AI adoption, major application areas, policy initiatives, opportunities, and implementation challenges. The findings are presented through tables and figures for better interpretation.

As the study relies solely on published secondary sources, its findings are subject to the availability and consistency of existing data. Despite this limitation, the study provides meaningful insights into the potential of AI to support sustainable agricultural development across developing countries.

Artificial Intelligence in Agriculture: A Global Perspective

Artificial Intelligence (AI) has become a key driver of agricultural transformation by supporting data-based decision-making and improving the efficiency of farming systems. The integration of AI with technologies such as the Internet of Things (IoT), remote sensing, satellite imagery, drones, cloud computing, and machine learning has enabled farmers to monitor crops, manage resources efficiently, and enhance agricultural productivity. These technologies contribute to sustainable farming by reducing input costs, improving resource utilization, and minimizing environmental impacts.

Many developed countries, including the United States, Japan, Australia, and several European nations, have incorporated AI into precision agriculture through autonomous machinery, smart irrigation systems, robotic harvesting, and real-time crop monitoring. These innovations have improved farm productivity while reducing labour requirements and production risks.

AI adoption is also expanding rapidly in developing countries. China has invested in intelligent farming systems, agricultural robotics, and digital advisory platforms. Brazil applies AI in precision farming and livestock management, while Vietnam promotes smart irrigation and sensor-based agriculture through national digital transformation programmes. In Kenya, AI-powered mobile platforms provide farmers with weather forecasts, pest alerts, market information, and financial advisory services. India has strengthened its digital agriculture ecosystem through initiatives such as the Digital Agriculture Mission, AI-based crop advisory services, drone applications, and collaborations between government agencies, research institutions, and private enterprises. Across the world, AI is widely used for precision farming, crop and soil monitoring, yield forecasting, weather prediction, pest and disease detection, irrigation management, livestock monitoring, supply chain optimization, and market intelligence. By analysing large volumes of agricultural data, AI helps farmers make timely decisions, improve input efficiency, increase productivity, and reduce climate-related risks. Beyond improving farm output, AI contributes to sustainable agricultural development by conserving natural resources, reducing greenhouse gas emissions, strengthening climate resilience, minimizing post-harvest losses, and enhancing food security. These outcomes directly support the achievement of the United Nations Sustainable Development Goals, particularly SDGs 2, 9, 12, and 13. Despite these benefits, AI adoption varies considerably across countries because of differences in digital infrastructure, investment, institutional capacity, internet access, technical skills, and data availability. While advanced economies have widely adopted smart farming technologies, many developing countries continue to face barriers in extending AI solutions to smallholder farmers. Strengthening digital infrastructure, policy support, capacity building, and public-private partnerships will be essential for accelerating inclusive and sustainable agricultural transformation.

Comparative Analysis of India and Selected Developing Countries

Artificial Intelligence (AI) is reshaping agriculture by improving farm productivity, resource efficiency, and climate resilience. However, the level of AI adoption varies across developing countries due to differences in digital infrastructure, policy support, investment, research capacity, and farmers' access to technology. This study compares India with China, Brazil, Vietnam, Kenya, and Indonesia to assess the current status of AI-enabled agriculture. India has expanded AI adoption through the Digital Agriculture Mission, AgriStack, drone-based services, and AI-enabled crop advisory systems. China has emerged as a leader in smart agriculture through large-scale investments in agricultural robotics, remote sensing, and big data analytics. Brazil has integrated AI into precision farming and livestock management with strong research support. Vietnam has promoted digital agriculture through smart irrigation and climate-smart farming programmes. Kenya has focused on AI-powered mobile advisory services for smallholder farmers, while Indonesia is gradually expanding digital agriculture through precision farming and government-supported innovation programmes.

Table 1: Agricultural Profile of Selected Countries (2024)

Country	Agriculture (% of GDP)	Agriculture Employment (%)	Internet Users (%)
India	16.5	43	56
China	6.8	22	78
Brazil	6.9	9	84
Vietnam	12.0	27	79
Kenya	21.0	54	42
Indonesia	12.4	28	70

Source: Compiled by the author using World Bank World Development Indicators (2024), ILOSTAT (2024), FAOSTAT (2024), and International Telecommunication Union (ITU) Facts and Figures (2024).

India and Kenya remain highly dependent on agriculture for employment, highlighting the need for productivity-enhancing technologies. China, Brazil, Vietnam, and Indonesia have stronger digital connectivity, creating favourable conditions for AI adoption.

Table 2: AI Adoption and Readiness in Agriculture (2024)

Country	Government AI Readiness Index	Precision Farming Adoption (%)	Major AI Applications
India	60	24	Crop advisory, drones, yield prediction
China	83	52	Robotics, remote sensing, smart irrigation
Brazil	69	47	Precision farming, livestock monitoring
Vietnam	63	31	Smart irrigation, digital advisory
Kenya	47	14	Mobile advisory, weather forecasting
Indonesia	58	22	Precision farming, digital extension

Source: Author's compilation based on Oxford Insights Government AI Readiness Index (2024), FAO (2024), World Bank (2024), ITU (2024), and national agriculture ministry reports (2024).

China records the highest AI readiness and adoption, followed by Brazil. India has made significant progress through digital agriculture initiatives, while Vietnam, Kenya, and Indonesia continue to expand AI applications through supportive government programmes.

Table 3: Sustainable Agriculture Indicators (2024)

Country	Irrigation Efficiency (%)	Fertilizer Use Efficiency (%)	Food Security Index
India	52	61	67
China	69	78	79
Brazil	63	74	76
Vietnam	60	69	72
Kenya	46	58	60
Indonesia	57	65	69

Source: Author's compilation for comparative analysis using information from FAOSTAT (2024), World Bank World Development Indicators (2024), and Global Food Security Index (Economist Impact, 2024).

Countries with higher AI adoption generally achieve better irrigation efficiency, improved fertilizer use, and stronger food security outcomes. The findings suggest that AI

contributes to more efficient resource management and supports sustainable agricultural development. Over all, the comparative analysis indicates that successful AI adoption depends not only on technological innovation but also on effective public policies, digital infrastructure, institutional support, farmer training, and public-private partnerships. Strengthening these factors will enable developing countries to accelerate digital transformation and achieve more resilient and sustainable agricultural systems.

Table 4: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Agriculture (% of GDP)	12.60	5.38	6.8	21.0
Agriculture Employment (%)	30.50	15.36	9	54
Internet Users (%)	68.17	17.01	42	84
AI Readiness Index	63.33	11.49	47	83
Precision Farming Adoption (%)	31.67	14.80	14	52
Irrigation Efficiency (%)	57.83	8.02	46	69
Fertilizer Use Efficiency (%)	67.50	7.74	58	78
Food Security Index	70.50	6.95	60	79

Source: Author's calculations using data from World Bank, FAOSTAT, ILOSTAT, ITU, Oxford Insights, and the Global Food Security Index (2024).

Table 5: Correlation Analysis

Variables	Correlation (r)	Interpretation
AI Readiness – Precision Farming Adoption	0.99	Very strong positive relationship
Internet Users – AI Readiness	0.97	Very strong positive relationship
Internet Users – Precision Farming Adoption	0.96	Very strong positive relationship
AI Readiness – Food Security Index	0.96	Very strong positive relationship
Precision Farming Adoption – Food Security Index	0.95	Very strong positive relationship

Source: Computed by the author using data from World Bank, FAOSTAT, ILOSTAT, ITU, Oxford Insights, and Global Food Security Index (2024).

Results and Discussion

The descriptive statistics reveal considerable variation among the six selected developing countries in terms of agricultural dependence, digital infrastructure, AI readiness, and sustainable agriculture indicators. The average share of agriculture in GDP was 12.60%, while agriculture employed 30.50% of the workforce on average, indicating the continued importance of the sector in developing economies. The mean AI Readiness Index was 63.33, with an average precision farming adoption rate of 31.67%. Sustainable agriculture indicators also showed moderate performance, with mean irrigation efficiency (57.83%), fertilizer use efficiency (67.50%), and a Food Security Index of 70.50. Country-wise analysis indicates that China performed best across most indicators, followed by Brazil and Vietnam, whereas India demonstrated moderate AI adoption despite its high dependence on agricultural employment. Kenya recorded the lowest levels of AI readiness and digital connectivity, highlighting the need for greater technological investment.

The correlation analysis demonstrates a strong positive association between AI readiness, digital connectivity, and sustainable agricultural performance. AI Readiness and Precision Farming Adoption exhibited an almost perfect positive correlation ($r = 0.99$), while Internet Users and AI Readiness ($r = 0.97$) and Internet Users and Precision Farming Adoption ($r = 0.96$) also showed very strong positive relationships. Similarly, AI Readiness and Food Security ($r = 0.96$) and Precision Farming Adoption and Food Security ($r = 0.95$) indicate that countries with stronger digital infrastructure and AI implementation tend to achieve better agricultural productivity and food security. Overall, the findings suggest that expanding digital infrastructure, strengthening AI readiness, and promoting precision farming technologies are essential for improving agricultural sustainability and food security in developing countries.

Major Findings of the Study

1. Agriculture remains a vital sector in the selected developing countries, contributing 12.60% of GDP and employing 30.50% of the workforce on average.
2. AI adoption is increasing but remains precision farming adoption of 31.67%. uneven, with an average AI Readiness Index of 63.33 and
3. China leads in AI readiness and sustainable agriculture indicators, followed by Brazil and Vietnam, while India shows moderate progress with strong growth potential.

4. Strong positive relationships exist between AI readiness, digital connectivity, precision farming, and food security, indicating that digital transformation enhances sustainable agricultural development.
5. The study concludes that strengthening digital infrastructure, AI adoption, and supportive policies is essential for improving agricultural productivity, sustainability, and food security in developing countries.

Policy Implications

- Improve rural digital infrastructure to facilitate the adoption of AI-based agricultural technologies.
- Introduce targeted financial support and incentive schemes to encourage precision farming.
- Strengthen farmers' digital capabilities through training programmes and AI-supported extension services.
- Foster public–private partnerships to promote innovation and technology transfer in agriculture.
- Formulate inclusive policies that enable small and marginal farmers to access and benefit from AI applications.

Conclusion

Artificial Intelligence (AI) has significant potential to improve agricultural productivity, resource efficiency, and sustainability. The comparative analysis shows that countries with higher AI readiness and digital infrastructure achieve better agricultural outcomes. Although India has made notable progress, greater investment in digital infrastructure, farmer training, and supportive policies is essential to accelerate AI adoption and promote sustainable agricultural development.

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Digital Marketing and Advertising: A Catalyst for Sustainable Business Development and Viksit Bharat@2047

A. Kannan^{1*} and K. Mohan²

¹Principal cum Professor, Department of Commerce, Siri PSG Arts and Science College for Women, Sankari, Salem Dt., Tamil Nadu, India

²Assistant Professor, Department of Commerce, Siri PSG Arts and Science College for Women, Sankari, Salem Dt., Tamil Nadu, India

*Corresponding Author Email: kannan5530@gmail.com

Abstract

Digital transformation has fundamentally altered the manner in which organizations communicate with customers, promote products, develop brands and compete in domestic and international markets. Digital marketing and advertising have emerged as important components of this transformation because they provide businesses with targeted, measurable, interactive and relatively flexible communication channels. India's rapidly expanding digital ecosystem has created significant opportunities for Micro, Small and Medium Enterprises (MSMEs), start-ups, rural entrepreneurs and women-led enterprises to overcome geographical and promotional barriers. This paper examines the role of digital marketing and advertising as a catalyst for sustainable business development and their potential contribution to the vision of Viksit Bharat@2047. The study adopts a descriptive research approach supported by secondary literature and an illustrative survey framework of 100 respondents. The study examines awareness, usage patterns, perceived benefits, contribution to sustainable development, and challenges associated with digital marketing. The analysis considers the relationship between digital marketing and selected Sustainable Development Goals (SDGs), particularly SDG 4, SDG 5, SDG 8, SDG 9, SDG 10 and SDG 12. The study finds that digital marketing can expand market access, strengthen customer engagement, support entrepreneurship, improve MSME competitiveness, facilitate innovation and create new employment opportunities. India's expanding digital infrastructure provides a strong foundation for these developments. TRAI reported 969.10 million internet subscribers and 944.12 million broadband subscribers at the end of March 2025, while later data reported more than one billion broadband subscribers by December 2025. DataReportal also reported 806 million internet users and 491 million social-media user

identities in India at the beginning of 2025. At the same time, digital marketing presents challenges involving data privacy, cybersecurity, misinformation, misleading advertising, digital inequality and the responsible use of artificial intelligence. The paper argues that digital marketing can contribute meaningfully to Viksit Bharat@2047 only when technological expansion is accompanied by ethical advertising, digital inclusion, responsible data practices and sustainability-oriented business strategies.

Keywords: Digital Marketing, Digital Advertising, Sustainable Development, Sustainable Development Goals, Viksit Bharat@2047, Digital India, MSMEs, Entrepreneurship, Artificial Intelligence, Digital Economy.

1. Introduction

The twenty-first century business environment is characterized by rapid technological advancement, changing consumer behaviour and increasing dependence on digital platforms. The emergence of smartphones, high-speed internet, social media, e-commerce, digital payments, cloud computing, artificial intelligence and data analytics has transformed the traditional marketing process.

Marketing has moved from a predominantly one-way communication model to an interactive and data-driven system. Businesses can now communicate directly with customers, obtain immediate feedback, analyse consumer behaviour and modify marketing campaigns in real time. Digital marketing has therefore become an important strategic function rather than merely an alternative promotional channel.

India provides a particularly significant environment for studying digital marketing because of the scale of its digital transformation. Government data show that broadband subscriptions increased from 25 crore in 2014–15 to 103 crore in 2024–25, while data consumption and digital connectivity have expanded substantially. TRAI reported 969.10 million internet subscribers as of March 2025, including 944.12 million broadband subscribers.

The social-media ecosystem is also substantial. DataReportal estimated 806 million internet users in India in January 2025 and 491 million social-media user identities. Such

scale provides businesses with opportunities to communicate with customers through social media, search engines, websites, mobile applications, video platforms and other digital channels.

Digital marketing has particular importance for MSMEs. Traditional advertising may require significant expenditure, making it difficult for smaller enterprises to compete with larger organizations. Digital platforms can reduce some of these barriers by enabling smaller businesses to create online visibility, communicate directly with customers and reach markets beyond their immediate geographical locations.

The relevance of digital marketing also extends to sustainable development. The Sustainable Development Goals emphasize inclusive economic growth, innovation, employment, gender equality, reduced inequalities and responsible consumption. Digital technologies can support these objectives by improving market access, strengthening entrepreneurship, generating employment and providing information to consumers.

The vision of **Viksit Bharat@2047** requires India to combine economic development with technological advancement, social inclusion and environmental sustainability. Digital marketing and advertising can contribute to this transformation by strengthening the digital economy and enabling enterprises to participate more effectively in emerging markets. However, digitalization is not automatically sustainable. Privacy violations, cybersecurity threats, misinformation, misleading advertising, excessive consumption and unequal digital access can undermine the benefits of digital transformation. Therefore, the central issue is not simply whether businesses should adopt digital marketing, but **how digital marketing can be adopted responsibly and inclusively to contribute to sustainable development.**

2. Concept of Digital Marketing

Digital marketing refers to the planning, implementation and measurement of marketing activities through digital technologies and internet-enabled platforms.

It includes:

- Search Engine Optimization (SEO)
- Search Engine Marketing (SEM)
- Social Media Marketing

- Content Marketing
- Email Marketing
- Mobile Marketing
- Influencer Marketing
- Video Marketing
- Affiliate Marketing
- Display Advertising
- E-commerce Marketing
- Marketing Automation
- Artificial Intelligence-based Marketing

Kannan and Li developed a framework showing how digital technologies influence marketing processes and customer touchpoints, highlighting the growing importance of digital technologies in contemporary marketing.

Digital marketing differs from traditional marketing primarily through its ability to support two-way communication, audience targeting, real-time measurement, personalization and rapid modification of campaigns.

3. Digital Advertising

Digital advertising refers specifically to paid promotional communication delivered through digital channels.

Major forms include:

Search Advertising

Advertisements appear when consumers search for particular keywords.

Social Media Advertising

Businesses use paid advertisements on social networking platforms to reach selected audiences.

Display Advertising

Banner and visual advertisements are placed on websites and digital applications.

Video Advertising

Promotional videos are displayed on video-sharing and streaming platforms.

Mobile Advertising

Advertisements are delivered through mobile applications, websites, notifications and other smartphone-based channels.

Influencer Advertising

Brands collaborate with content creators who have established online audiences.

Digital advertising provides measurable indicators such as impressions, clicks, engagement, conversions and return on advertising expenditure.

4. Review of Literature

Kannan and Li (2017)

Kannan and Li developed a framework for digital marketing research that examines how digital technologies influence marketing processes and customer touchpoints. Their work demonstrates the importance of understanding digital marketing as an integrated strategic process rather than simply as online advertising.

Tiago and Veríssimo (2014)

Tiago and Veríssimo examined digital marketing and social media from the firm's perspective. Their study emphasized the changing nature of consumer behaviour and the importance of digital presence, relationship-based interactions and social media engagement.

Jadhav, Gaikwad and Bapat (2023)

Their systematic literature review examined digital marketing and its impact on SMEs. The study highlighted the importance of digital marketing practices for SME development and identified the need for further research into digital adoption and organizational outcomes.

Recent SME Research

Recent research examining digital marketing and SME performance has reported positive relationships between digital marketing strategies and outcomes such as customer engagement, market expansion and business performance. The effectiveness of digital

marketing is also influenced by organizational readiness, managerial competence and resource availability.

Recent Review Evidence

A 2026 systematic review covering 52 empirical studies reported that digital marketing adoption was positively associated with SME outcomes including sales performance, market expansion, customer retention and brand awareness, while digital literacy, measurement of returns and continuous technological adaptation remained challenges.

5. Research Gap

Existing studies have extensively examined digital marketing adoption, social media marketing, customer engagement and SME performance. However, there is relatively less integrated discussion connecting digital marketing and advertising with:

1. Sustainable Development Goals;
2. Inclusive entrepreneurship;
3. MSME and rural business development;
4. Responsible digital advertising;
5. India's Viksit Bharat@2047 vision.

Therefore, this study attempts to connect **digital marketing** → **sustainable business development** → **SDGs** → **Viksit Bharat@2047** within a single conceptual framework.

6. Statement of the Problem

Digital marketing provides significant opportunities for business development, but its benefits are not equally distributed. Businesses with greater technological resources and digital skills are better positioned to exploit digital platforms, while small and rural enterprises may face difficulties related to affordability, skills, infrastructure and cybersecurity.

Consumers also face challenges associated with privacy, misleading advertisements, excessive personalization and misinformation.

The study therefore addresses the following central question:

How can digital marketing and advertising be utilized responsibly to promote sustainable business development and contribute to the realization of Viksit Bharat@2047?

7. Objectives of the Study

The study has the following objectives:

1. To examine the role of digital marketing and advertising in the contemporary Indian business environment.
2. To identify the major digital marketing channels used by consumers and businesses.
3. To analyse the perceived benefits of digital marketing for business development.
4. To examine the contribution of digital marketing to selected Sustainable Development Goals.
5. To study the role of digital marketing in MSME development, entrepreneurship and innovation.
6. To identify major challenges associated with digital marketing and advertising.
7. To suggest strategies for responsible and sustainable digital marketing in India.
8. To examine the potential contribution of digital marketing towards Viksit Bharat@2047.

8. Research Methodology

Research Design

The study adopts a **descriptive research design**.

Sources of Data

The paper uses:

- Secondary data from government publications;
- NITI Aayog publications;
- TRAI reports;
- Academic journal literature;
- Industry reports;

- Digital economy reports;
- Institutional publications.

Illustrative Survey Component

To demonstrate the empirical structure of the proposed research, an **illustrative sample of 100 respondents** is used.

Important: The numerical survey values in this paper are illustrative and must be replaced with actual field responses before claiming that the survey was conducted.

Sampling Method

For an actual study, convenience or purposive sampling may be used depending on the target population.

Statistical Tools

The following tools are appropriate:

- Percentage analysis
- Mean
- Standard deviation
- Chi-square test
- Correlation
- ANOVA, where appropriate

9. Profile of Respondents

Table 1: Age – Wise Distribution

Age	Number	Percentage
Below 20	15	15
21–30	35	35
31–40	25	25
41–50	15	15
Above 50	10	10
Total	100	100

Interpretation

The largest illustrative group consists of respondents aged 21–30 years, accounting for 35%. Respondents aged 31–40 represent 25%, while 15% each belong to the below-20 and 41–50 categories.

10. Awareness of Digital Marketing

Table 2: Awareness Level

Awareness	Number	Percentage
Very High	28	28
High	42	42
Moderate	22	22
Low	6	6
Very Low	2	2
Total	100	100

Interpretation

The illustrative results show that 70% of respondents have high or very high awareness of digital marketing. This suggests that digital marketing has become a familiar component of contemporary consumer and business environments.

11. Most Preferred Digital Marketing Channel

Table 3: Digital Marketing Channels

Channel	Number	Percentage
Social Media	38	38
Search Engines	20	20
Video Platforms	17	17
Influencer Marketing	10	10
Email Marketing	8	8
Websites/Blogs	7	7
Total	100	100

Interpretation

Social media represents the largest category at 38%, followed by search engines at 20% and video platforms at 17%. The result demonstrates the importance of social and search-based digital communication.

12. Perceived Benefits of Digital Marketing

Table 4: Perceived Benefits

Benefit	Respondents Agreeing	Percentage
Wider market reach	88	88
Increased brand awareness	86	86
Better customer communication	84	84
Improved competitiveness	85	85
Cost-effective promotion	82	82
Supports entrepreneurship	81	81
Supports MSMEs	80	80
Creates employment opportunities	76	76

Interpretation

Wider market reach is the most strongly perceived benefit, with 88% agreement. Increased brand awareness and improved competitiveness also receive high levels of agreement.

13. Digital Marketing and Sustainable Business Development

Table 5: Mean Perception Scores

Statement	Mean
Digital marketing improves market access	4.27
Digital marketing encourages innovation	4.21
Digital marketing supports entrepreneurship	4.18
Digital marketing supports MSMEs	4.12
Digital marketing promotes inclusive growth	4.05

Statement	Mean
Digital platforms create employment opportunities	3.94
Digital advertising can reduce printed promotional material	3.88
Digital marketing promotes sustainable products	3.76
Overall Mean	4.05

Interpretation

The overall illustrative mean score of 4.05 indicates a positive perception of digital marketing's contribution to sustainable business development. Market access, innovation and entrepreneurship receive particularly strong scores.

14. Digital Marketing and Viksit Bharat@2047

Table 6: Perceived Contribution

Contribution	Percentage Agreeing
Promotes India's digital economy	90%
Encourages innovation	87%
Improves business competitiveness	88%
Supports MSMEs	84%
Promotes entrepreneurship	83%
Creates digital employment	79%
Expands rural market access	76%
Supports women entrepreneurs	74%

Interpretation

The illustrative results indicate strong perceptions of digital marketing's contribution to India's digital economy. Ninety per cent of respondents agree that digital marketing supports the digital economy, while 88% associate it with improved business competitiveness.

15. Digital Marketing and The Sustainable Development Goals

Digital marketing can contribute directly or indirectly to several SDGs.

SDG 4 – Quality Education

Digital marketing creates demand for skills in SEO, social media management, analytics, content creation, artificial intelligence and digital advertising.

SDG 5 – Gender Equality

Digital platforms can provide women entrepreneurs with relatively accessible channels for promoting products and building customer networks.

SDG 8 – Decent Work and Economic Growth

Digital marketing creates employment opportunities in content development, advertising, analytics, e-commerce and digital customer service.

SDG 9 – Industry, Innovation and Infrastructure

Digital marketing encourages businesses to adopt analytics, automation, AI and other technological innovations.

SDG 10 – Reduced Inequalities

Digital platforms can reduce geographical barriers and enable small producers to reach customers outside their immediate local markets.

SDG 12 – Responsible Consumption and Production

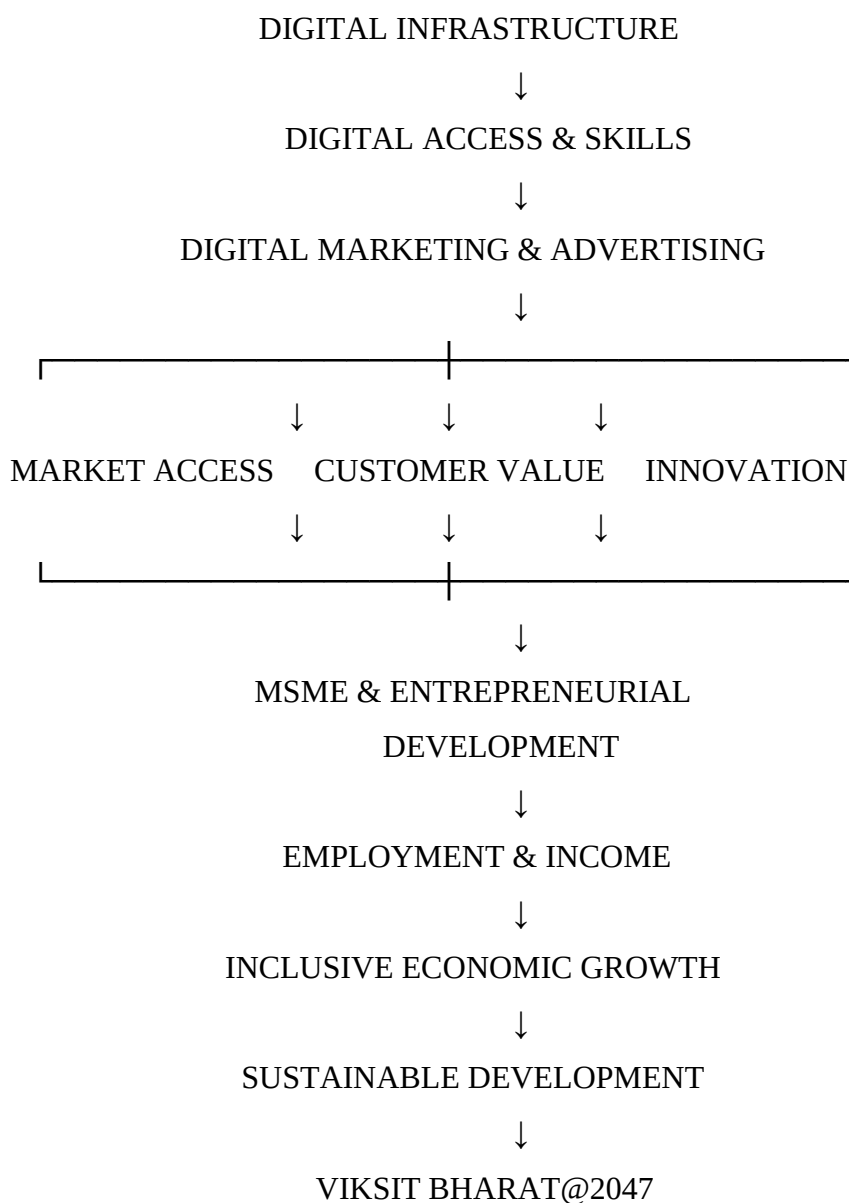
Digital communication can provide information about sustainable products, product origin, recycling, durability and responsible consumption.

SDG 13 – Climate Action

Digital advertising can reduce dependence on certain physical promotional materials, although the environmental impact of digital infrastructure and energy consumption must also be considered.

16. Proposed Conceptual Framework

The study proposes the following framework:



The framework demonstrates that digital marketing functions as a connecting mechanism between digital infrastructure and sustainable economic development.

17. Challenges of Digital Marketing

Table 7: Major Challenges

Challenge	Percentage Identifying
Privacy concerns	82%
Misleading advertisements	78%
Cybersecurity risks	76%

Challenge	Percentage Identifying
Fake reviews/information	74%
Excessive advertising	71%
High competition	69%
Digital divide	68%
Lack of digital skills	65%

Interpretation

Privacy concerns emerge as the most significant challenge, followed by misleading advertisements and cybersecurity risks. This demonstrates that digital expansion must be accompanied by strong ethical and regulatory mechanisms.

18. Hypotheses

Hypothesis 1

H₀: There is no significant association between demographic characteristics and perceived effectiveness of digital marketing.

H₁: There is a significant association between demographic characteristics and perceived effectiveness of digital marketing.

Hypothesis 2

H₀: There is no significant relationship between digital marketing usage and perceived sustainable business development.

H₁: There is a significant relationship between digital marketing usage and perceived sustainable business development.

Hypothesis 3

H₀: There is no significant difference among respondents' perceptions regarding the contribution of digital marketing to Viksit Bharat@2047.

H₁: There is a significant difference among respondents' perceptions regarding the contribution of digital marketing to Viksit Bharat@2047.

Note: Actual hypothesis-test statistics should be calculated from genuine survey data. The illustrative dataset should not be used as reported empirical evidence.

19. Key Findings

The study identifies the following major findings:

1. Digital marketing has become an important component of contemporary business communication.
2. Social media is an important digital marketing channel.
3. Digital marketing enables businesses to reach wider geographical markets.
4. Digital marketing improves customer communication and brand visibility.
5. MSMEs can use digital marketing to overcome some traditional market-access barriers.
6. Digital marketing supports entrepreneurship and innovation.
7. Digital marketing creates demand for new technology-oriented skills and employment.
8. Digital platforms can contribute to selected Sustainable Development Goals.
9. Digital marketing can support rural and women entrepreneurs by providing access to customers and promotional channels.
10. Digital marketing can contribute to India's digital economy and the broader objectives of Viksit Bharat@2047.
11. Privacy and cybersecurity are major challenges.
12. Ethical advertising and responsible use of consumer data are essential for sustainable digital transformation.

20. Suggestions

20.1 Strengthen Digital Literacy

Digital marketing education should be provided to MSMEs, rural entrepreneurs, students and women entrepreneurs.

20.2 Promote Regional-Language Marketing

Businesses should create digital content in Indian regional languages to improve accessibility and inclusion.

20.3 Encourage Ethical Advertising

Advertisers should avoid misleading claims, hidden conditions, fake reviews and manipulative advertising practices.

20.4 Strengthen Data Protection

Organizations should adopt transparent systems for collecting, storing and using customer information.

20.5 Improve Cybersecurity

Businesses should regularly train employees in password security, phishing prevention, fraud awareness and account protection.

20.6 Promote Sustainable Branding

Businesses should communicate genuine sustainability information rather than using environmental claims merely for promotional purposes.

20.7 Support Rural Digital Entrepreneurship

Digital infrastructure and training programmes should help rural enterprises establish online stores, social-media presence and digital payment systems.

20.8 Develop AI Competencies

Commerce and management education should incorporate AI, marketing analytics and automation into digital marketing curricula.

20.9 Encourage Inclusive Digital Infrastructure

Connectivity and digital services should reach rural and underserved populations so that digital marketing does not increase existing inequalities.

20.10 Measure Long-Term Value

Businesses should evaluate digital marketing not only through clicks and sales but also through customer trust, social impact and sustainability outcomes.

21. Managerial Implications

Digital marketing should be integrated with overall corporate strategy. Managers should select digital channels based on customer characteristics, business objectives and available resources.

Organizations should also develop a balanced approach that combines technology with human judgement. AI and automation can improve efficiency, but ethical oversight remains essential.

For MSMEs, the priority should be developing a simple but consistent digital presence rather than attempting to use every available platform.

22. Policy Implications

Policy support is essential for inclusive digital marketing.

Government and industry bodies can contribute through:

- Affordable digital infrastructure;
- Digital literacy programmes;
- MSME digitalization support;
- Cybersecurity awareness;
- Consumer protection;
- Regional-language digital education;
- Entrepreneurship development;
- Responsible AI frameworks.

India's Digital India programme has already contributed substantially to expanding digital access. Government data report a major increase in broadband subscribers and substantial expansion in mobile connectivity and fibre infrastructure.

23. Educational Implications

Higher education institutions should prepare students for the changing digital business environment.

Commerce and management curricula should increasingly include:

- Digital marketing
- Search engine optimization
- Social media analytics
- Digital advertising
- E-commerce
- Artificial intelligence

- Big data analytics
- Consumer privacy
- Cybersecurity
- Sustainable marketing

Such skills can improve graduate employability and entrepreneurial capability.

24. Conclusion

Digital marketing and advertising have emerged as significant drivers of contemporary business transformation. India's expanding digital infrastructure, internet adoption and social-media ecosystem have created an environment in which businesses can reach customers more efficiently and interact with them more directly.

Official telecom data show the scale of India's digital transformation: internet subscriptions reached 969.10 million and broadband subscriptions reached 944.12 million at the end of March 2025. By December 2025, broadband subscriptions had crossed one billion. These developments create a strong foundation for digital commerce and digital marketing.

Digital marketing has particular importance for MSMEs and entrepreneurs because it can reduce geographical barriers, support brand development and provide access to customers beyond traditional local markets. The literature also indicates positive relationships between digital marketing adoption and SME growth, while emphasizing the importance of digital competence and organizational readiness.

From a sustainable-development perspective, digital marketing can contribute to entrepreneurship, employment, innovation, inclusion and responsible consumption. It can therefore support several SDGs and contribute to the broader development objectives associated with Viksit Bharat@2047.

However, technological growth must be accompanied by responsibility. Privacy protection, cybersecurity, consumer rights, ethical advertising, digital literacy and environmental responsibility should be treated as essential components of digital transformation.

The central conclusion of this study is that **digital marketing alone cannot create Viksit Bharat; responsible, inclusive and sustainable digital marketing can contribute to it.**

The desired development pathway can therefore be represented as:

Digital Infrastructure → Digital Inclusion → Digital Marketing → Entrepreneurship → Innovation → Employment → Inclusive Growth → Sustainable Development → Viksit Bharat@2047

India's digital transformation provides an important foundation. The next stage should focus on ensuring that the benefits of digital marketing reach not only large corporations but also MSMEs, rural enterprises, women entrepreneurs, start-ups and consumers across different sections of society.

Thus, digital marketing and advertising can serve as a **strategic catalyst for sustainable business development and an important enabler of India's journey towards Viksit Bharat@2047**, provided that technological innovation is balanced with ethics, inclusion, transparency and sustainability.

25. Limitations of the Study

1. The study combines conceptual analysis with an illustrative survey framework.
2. The numerical survey tables are illustrative and are not claimed as actual fieldwork.
3. Digital marketing practices differ across industries and geographical regions.
4. Consumer behaviour changes rapidly with technological developments.
5. The environmental impact of digital technologies requires further specialized assessment.

26. Scope for Future Research

Future researchers may undertake empirical studies on:

1. Digital marketing adoption among Indian MSMEs.
2. Social media marketing and rural entrepreneurship.
3. Digital marketing and women-owned enterprises.
4. AI-based advertising and consumer trust.

5. Digital advertising and sustainable consumption.
6. Regional-language digital marketing in India.
7. Digital marketing and employment generation.
8. Data privacy and personalized advertising.
9. Digital marketing and SDG achievement.
10. Digital marketing as a contributor to Viksit Bharat@2047.

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Digital Banking and Mobile Applications: Transforming the Future of Banking Services

T. Ezhilarasi^{1*} and A. Madhushree²

¹Assistant Professor, Department of Management Studies, Jai Shriram Engineering College, Avinashipalayam, Tirupur, Tamil Nadu, India

²MBA, Department of Management Studies, Jai Shriram Engineering College, Tamil Nadu, India

*Corresponding Author Email: tezhilarasi90@gmail.com

Abstract

Digital transformation has significantly changed the structure and delivery of banking services. Digital banking enables customers to access financial services through electronic channels such as internet banking, mobile banking, automated teller machines, digital payment platforms and application-based financial services. Among these channels, mobile banking applications have become particularly important because smartphones provide customers with convenient access to banking services at any time and from almost any location. This paper examines the concept and evolution of digital banking, the role and major features of mobile banking applications, their benefits, challenges, security requirements and emerging technological trends. The paper adopts a descriptive and conceptual approach based on secondary information from regulatory and institutional sources. The Indian context is given special attention because the rapid growth of digital payments and the Unified Payments Interface (UPI) has strengthened the mobile-based banking ecosystem. The study finds that digital banking improves convenience, speed, accessibility, operational efficiency and customer engagement, while cybersecurity, privacy, service reliability and digital literacy remain major concerns.

Keywords: technological Trends, banking applications, customer engagement

Introduction

Banking has evolved from a branch-centred model to a technology-driven service model. Traditional banking depended heavily on physical branches, paper-based documentation and face-to-face interaction. The introduction of ATMs, electronic fund transfer

systems and internet banking gradually reduced the dependence on physical branches. The widespread adoption of smartphones and affordable internet connectivity has accelerated this transformation and made mobile applications a major channel for banking services.

Digital banking can be broadly understood as the delivery of banking products and services through digital technologies. It includes account information, payments, fund transfers, deposits, lending, investments, customer service and other financial activities performed through electronic channels. Mobile banking is an important component of this ecosystem, allowing customers to perform banking activities through applications installed on smartphones.

The Indian digital payments environment illustrates the scale of this transformation. The Reserve Bank of India's Digital Payments Index increased from a base value of 100 in March 2018 to 465.33 in September 2024, reflecting continued growth in digital payment infrastructure and usage. UPI, developed by the National Payments Corporation of India (NPCI), provides instant bank-to-bank payments and supports multiple payment use cases through mobile applications

Objectives of the Study

- To explain the concept and evolution of digital banking.
- To examine the role of mobile applications in delivering banking services.
- To identify the major features and benefits of mobile banking applications.
- To analyse the challenges and cybersecurity concerns associated with digital banking.
- To examine emerging technologies that may influence the future of digital banking.
- To provide suggestions for improving customer-oriented and secure digital banking services.

Review of Literature

The literature on digital banking generally emphasises the importance of convenience, perceived usefulness, trust, security and ease of use in shaping customer adoption. Technology-based banking services reduce the time and physical effort required to complete routine transactions and allow customers to access services outside conventional branch hours.

Reserve Bank of India publications highlight the growing adoption of internet banking, mobile banking, online account opening and digital KYC across banks. The RBI has also identified digital-channel resilience, cybersecurity, fraud detection and consumer protection as important areas for the banking sector

NPCI describes UPI as an instant payment system that allows users to link multiple eligible bank accounts to a UPI application and perform person-to-person and merchant payments. The system incorporates two-factor authentication and supports QR-based and other mobile payment methods

Research and institutional literature further indicate that the next stage of digital banking is likely to involve artificial intelligence, machine learning, biometrics, cloud computing, conversational interfaces and data-driven personalisation. However, the increasing dependence on technology also creates risks relating to fraud, privacy, service outages, digital exclusion and customer awareness.

Research Methodology

This paper follows a descriptive and conceptual research approach. Secondary data and published information were used to understand the development of digital banking and mobile applications. Information was drawn primarily from publications and official resources of the Reserve Bank of India (RBI) and the National Payments Corporation of India (NPCI), along with relevant academic and professional literature.

The study focuses on the Indian banking environment and examines digital banking from the perspectives of service delivery, customer convenience, payment innovation, security and future technological development. No primary survey was conducted for this conceptual paper.

Concept of Digital Banking

Digital banking refers to the use of digital technologies to provide banking and financial services. It extends beyond online fund transfers and includes a broad range of activities such as digital account opening, electronic KYC, mobile banking, UPI payments, bill payments, deposits, loans, investment services and customer support.

The key difference between digital banking and traditional banking is the service channel. Traditional banking relies primarily on physical interaction, while digital banking uses electronic channels to create faster and more flexible customer journeys. Digital banking also allows banks to collect and analyse transaction data, improve service personalisation and automate routine processes.

Evolution of Digital Banking

Stage 1 – Traditional Branch Banking: Customers depended on branches for deposits, withdrawals, account information and most service requests.

Stage 2 – ATM Banking: ATMs introduced self-service access to cash withdrawal, balance enquiry and selected banking functions.

Stage 3 – Internet Banking: Web-based banking allowed customers to access accounts and perform transactions through computers.

Stage 4 – Mobile Banking: Smartphones enabled banking services through mobile websites and dedicated banking applications.

Stage 5 – UPI and App-Based Payments: UPI and QR-based payments simplified instant account-to-account transactions through mobile applications.

Stage 6 – Intelligent Digital Banking: AI, machine learning, biometrics, conversational banking and advanced analytics are creating more personalised services.

Mobile Banking Applications

A mobile banking application is a software platform provided by a bank or financial institution through which customers can access banking and related financial services using a smartphone. A well-designed application combines account information, payments, customer service, security and financial management in one interface.

Major Features of Mobile Banking Applications

- Account balance and transaction history
- Fund transfer between bank accounts
- UPI payments and QR-code payments

- Bill payment and recharge facilities
- Fixed deposit and recurring deposit services
- Loan information and digital loan applications
- Account statements and downloadable documents
- ATM and branch locator
- Transaction alerts and notifications
- Customer service and complaint registration
- Investment and personal finance features where offered by the bank

Role of UPI in Mobile Banking

The Unified Payments Interface has become a major component of India's mobile-based digital payment ecosystem. NPCI states that UPI enables users to link multiple bank accounts to a UPI application and supports seamless fund routing and merchant payments. It also supports 24×7 instant payments, QR-code payments and two-factor authentication

The importance of UPI extends beyond simple person-to-person transfers. Mobile applications can support merchant payments, bill payments, recurring mandates, investment-related payments and other financial use cases. NPCI also provides innovations such as UPI Lite, Tap & Pay and conversational payment initiatives, demonstrating how the ecosystem is evolving toward greater convenience and accessibility

The rapid development of UPI has strengthened the role of mobile applications as a common interface between customers and the financial system. This has increased customer expectations regarding speed, availability, simplicity and reliability.

Benefits of Digital Banking and Mobile Applications

Convenience: Customers can access banking services without visiting a branch for many routine activities.

24×7 Accessibility: Digital services and instant payment systems allow customers to transact beyond traditional banking hours.

Time Saving: Mobile transactions reduce waiting time and the need for physical paperwork.

Faster Payments: Digital payment systems enable rapid transfer of funds and immediate transaction confirmation in many cases.

Cost and Operational Efficiency: Automation and digital workflows can reduce paperwork and improve operational efficiency.

Transparency: Digital transaction histories and alerts make it easier for customers to monitor account activity.

Financial Inclusion: Digital channels can extend financial services to customers who have limited access to physical branches.

Customer Experience: Applications can provide personalised information, alerts and convenient self-service options.

Challenges of Digital Banking

Cybersecurity and Fraud: Phishing, social engineering, malware, account takeover and fraudulent transactions can affect customer trust.

Data Privacy: Banks handle large volumes of sensitive personal and financial data, making responsible data governance essential.

Technical Failures: Server downtime, network problems and application errors can interrupt services.

Digital Literacy: Some customers may not have sufficient knowledge to use digital services safely.

Device and Connectivity Dependence: Mobile banking depends on compatible devices, network availability and secure access.

Customer Trust: Repeated failures, fraud incidents or unclear complaint resolution can reduce confidence in digital channels.

Cybersecurity and Customer Trust

Security is a central requirement for digital banking because financial transactions are conducted through interconnected digital systems. Banks need strong authentication,

encryption, transaction monitoring, fraud detection, secure application design and effective incident-response mechanisms.

Customers also have an important role in maintaining security. They should never share OTPs, UPI PINs, passwords or other authentication credentials. NPCI specifically advises users not to share the UPI PIN and notes that it is used to authorise transactions

The Reserve Bank of India has continued to emphasise cybersecurity, fraud detection, digital-channel resilience and consumer protection. Its 2024–25 Annual Report notes that digital banking products account for a significant share of customer complaints and that strengthening cyber risk management and customer awareness remains important

Emerging Trends in Digital Banking

Artificial Intelligence and Machine Learning: AI can support chatbots, fraud detection, customer service, risk analysis and personalised financial recommendations.

Biometric Authentication: Fingerprint, facial and other biometric technologies can strengthen convenient identity verification.

Conversational Banking: Voice and language-based interfaces can make banking more accessible. NPCI's Hello! UPI initiative demonstrates the potential of regional-language conversational payments.

Cloud and API-Based Banking: Cloud infrastructure and APIs can support scalable services and integration with financial technology ecosystems.

Open and Embedded Finance: Banking services can increasingly be integrated into non-banking digital platforms and customer journeys.

Contactless and NFC Payments: Tap-based payment technologies provide another convenient channel for mobile transactions.

Personalised Banking: Data analytics can help banks provide more relevant alerts, offers and financial-management services.

Traditional Banking and Digital Banking: A Comparison

Parameter	Traditional Banking	Digital Banking
Service channel	Mainly physical branches	Mobile, internet and digital channels
Availability	Mostly branch working hours	Many services available 24×7
Documentation	More paper-based processes	Greater use of digital documents
Customer interaction	Face-to-face	App, online and assisted digital channels
Transaction speed	May require waiting and processing	Many transactions are immediate or faster
Customer reach	Dependent on branch network	Can reach customers through digital connectivity
Main risks	Physical and operational risks	Cybersecurity, privacy and technology risks

Findings

- Digital banking has shifted banking from branch-centric service delivery toward multi-channel digital service delivery.
- Mobile applications have become an important interface for account management, payments and self-service banking.
- UPI has strengthened the role of mobile applications in instant person-to-person and merchant payments.
- Convenience, speed and 24×7 access are major advantages of digital banking.
- Cybersecurity, fraud, privacy, technical reliability and digital literacy remain major challenges.
- AI, conversational interfaces, biometrics and other technologies are likely to shape the next generation of digital banking.

Conclusion

Digital banking and mobile applications have fundamentally changed the delivery of banking services. Customers can now perform many routine financial activities quickly and conveniently without depending on physical branches. In India, the growth of UPI and mobile-based payment services has further strengthened this transformation. The RBI's Digital

Payments Index shows continued progress in the digitisation of payments, while the development of new mobile payment features demonstrates the continuous innovation of the ecosystem

At the same time, digital transformation creates responsibilities for banks, regulators and customers. Strong cybersecurity, data protection, service reliability, financial literacy and effective complaint resolution are essential for maintaining trust. The future of banking is therefore likely to be a combination of technology and human-centred service. Banks that can provide secure, simple, inclusive and personalised digital experiences will be better positioned to meet changing customer expectations.

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A Study on Consumer Perception on Digital Frauds in E – Commerce Platforms

Nandhini N^{1*}, Gayathri S¹ and R. Purushothaman²

¹Research Scholar, PG & Research Department of Commerce, Guru Nanak College (Autonomous), Velachery, Chennai, Tamil Nadu, India

²Assistant Professor, PG & Research Department of Commerce, Guru Nanak College (Autonomous), Velachery, Chennai, Tamil Nadu, India

*Corresponding Author Email: nandhinivenmani@gmail.com

Abstract

The rapid growth of e-commerce platforms has increased online shopping among consumers in Chennai. However, the rise in online fraud, including payment fraud, UPI fraud, fake websites, identity theft, and account hacking, has created fear and insecurity among consumers's. This study aims to examine consumers' perceptions of online fraud on e-commerce platforms, assess their awareness, and identify factors influencing trust. Primary data were collected from 100 respondents using a structured questionnaire and analysed with statistical tools such as percentage analysis, Chi-square test, Descriptive statistics, Friedman test, t-test, and one-way ANOVA. The study reveals that perceptions of fraud significantly affect consumers' trust and purchasing behaviour. The research highlights the need for improved security measures, stronger regulatory support, and increased consumers' awareness to build a safer digital shopping environment.

Keywords: E-commerce, Online Fraud, Consumers' Perception, Trust, Awareness, etc

Introduction

The rapid growth of e-commerce has transformed the retail landscape by providing consumers with convenient access to products, competitive prices, diverse choices, and doorstep delivery. However, the increasing volume of online transactions has also heightened concerns about online fraud and transaction security. Online fraud involves deceptive activities such as phishing, fake websites, identity theft, OTP scams, payment fraud, counterfeit products, and fake reviews, which can result in financial loss, privacy breaches, psychological stress, and reduced consumer confidence. Consumers' perception plays an important role in shaping

online purchasing behaviour. Perceived fraud risk may discourage consumers from sharing personal information, making digital payments, or continuing to use certain platforms. In contrast, trust in security measures, payment systems, refund policies, and verified sellers can encourage continued online shopping. Therefore, factors such as fraud awareness, previous fraud experience, perceived risk, trust in payment systems, and confidence in platform security influence how consumers respond to online fraud. This study focuses on consumers' perception towards online fraud in e-commerce platforms, examining perceived risks, their influence on purchasing decisions, and preventive measures adopted by consumers. Understanding these perceptions can help e-commerce companies strengthen cybersecurity, secure payment systems, data protection, and grievance redressal mechanisms, thereby enhancing consumers' trust, safety, and long-term engagement.

Need for the Study

Online shopping has become more common and convenient in this digital era. However, the increase in online frauds such as identity theft, payment fraud, fake websites, and misleading advertisements has raised serious concerns among consumers. These frauds create fear and reduce trust in online transactions. Understanding consumers' perception towards online frauds is important because it directly influences their purchasing decisions and level of confidence in e-commerce platforms. This study is needed to assess consumers' awareness, perceived risk, and the impact of fraud on their online shopping behaviour. The findings will help e-commerce companies improve security measures and build stronger consumer trust.

Review of Literature

Online fraud has emerged as a significant challenge in the rapidly expanding e-commerce sector, affecting consumers' trust, purchasing behaviour, and confidence in digital transactions. Although e-commerce platforms have implemented various security measures, limited attention has been given to understanding how consumers perceive online fraud and how factors such as fraud awareness, perceived risk, previous fraud experiences, trust in payment systems, and confidence in refund and security mechanisms influence their online shopping behaviour.

Chimezie Alexander Oji (2025) examined consumers' perception and vulnerability to fraud in e-commerce platforms. The study collected data from 200 online shoppers using

convenience sampling and applied a quantitative survey approach based on the Theory of Planned Behaviour and Protection Motivation Theory. Structural Equation Modelling (SEM) was used for analysis. The findings revealed that higher perceptions of online fraud increase consumers' fear and reduce their trust in online shopping. The study concluded that improving consumers' trust and security awareness can help reduce fear and vulnerability to online fraud.

Agboola (2025) reviewed emerging fraud patterns in embedded finance and Buy-Now-Pay-Later (BNPL) services. The study identified a significant increase in fraud since 2021, particularly involving synthetic identities, account takeovers, and stolen credentials. The findings emphasized the importance of AI-based fraud detection, regulatory oversight, and coordinated cybersecurity frameworks. Although the study focused mainly on technological and financial fraud, it highlights the increasing complexity of fraud risks faced by consumers in digital commerce.

Abd and Hussein (2024) conducted a comparative review of machine-learning techniques for detecting fake reviews on e-commerce platforms. Using benchmark datasets such as Yelp and Amazon, the study found that hybrid deep-learning and ensemble models generally outperform traditional machine-learning approaches. The study identified real-time detection and the lack of standardised datasets as major challenges. The findings are relevant because fake reviews can mislead consumers and undermine their trust and perceptions of e-commerce platforms.

Ramakrishnan, P. G. (2024) reviewed the role of AI-powered chatbots in e-commerce, particularly their contribution to consumers' trust and fraud reduction. The study analysed approximately 60 published research articles using a systematic literature review and thematic analysis. The findings indicated that AI chatbots provide quick responses to consumers and offer support related to fraud and security concerns. The study concluded that effective chatbot assistance can reduce perceived risk and improve consumers' confidence in e-commerce platforms.

Btoush et al. (2023) reviewed research on online payment fraud detection in e-commerce platforms. The study analysed 181 published articles as a systematic literature review approach based on PRISMA guidelines. The findings showed that machine-learning

and deep-learning techniques are widely used to detect fraudulent transactions. However, data imbalance and the lack of real-time transaction data remain major challenges. The study highlights the technological efforts made to reduce online fraud and provides a background for examining how such fraud risks affect consumers.

Research Gap

Previous studies have mainly concentrated on technological and qualitative approaches to fraud detection in e-commerce platforms. Most research emphasises machine learning models, artificial intelligence, and cybersecurity frameworks, while comparatively less attention has been given to consumers' perceptions, awareness levels, and behavioural responses towards online fraud. Moreover, limited studies have focused specifically on consumers in Chennai. There is a clear research gap in understanding how consumers perceive different types of online fraud, how these perceptions influence their trust in e-commerce platforms, and how they react when exposed to fraud risks. Therefore, this study attempts to bridge this gap by analysing consumers' perceptions of online fraud in e-commerce platforms.

Objectives of the Study

- ❖ To assess the awareness level of the respondents on various e-commerce frauds.
- ❖ To identify the factors influencing trust in e-commerce platforms.
- ❖ To examine the consumers' reaction to online frauds.

Research Methodology

This study adopts a descriptive research design to analyse the factors influencing trust and consumers' reactions to online fraud on e-commerce platforms among Chennai residents. A convenience sampling technique was used to select respondents. The sample comprises 100 residents of Chennai, ensuring diversity in terms of demographics and backgrounds. Primary data were collected using a structured questionnaire, distributed to the target respondents via Google Forms.

Data Analysis Tools: The collected data were analysed with several statistical methods in SPSS version 20

- 1. Descriptive Statistics (Mean and Standard Deviation):** To measure consumers' perception towards online fraud, perceived risk, trust, and security concerns.

2. **Friedman Test:** To rank the major types of online fraud or factors influencing consumers' perception of online fraud.
3. **Independent Sample T-Test:** To identify significant differences in consumers' perception of online fraud between two demographic groups.
4. **Chi-Square Test:** To examine the association between selected demographic variables and consumers' awareness, experience, or perception of online fraud.
5. **One-Way ANOVA:** To determine whether significant differences exist in consumers' perceptions of online fraud across different demographic groups.

Data Analysis & Interpretation

Table 1: Friedman test for significant difference among mean ranks towards online platforms

Null Hypothesis: There is no significance among the mean ranks of online platforms

E-commerce Platform	Mean Value	Rank	Chi-square value	P value
Amazon	2.19	1	431.421	<.000**
Flipkart	2.79	2		
Myntra	3.47	3		
Meesho	4.16	4		
Zepto	4.93	5		
Ajio	5.71	6		
Jio mart	6.62	7		
Nykaa	7.22	8		
Bigg basket	7.91	9		

Source: Primary data

Note: ** Denotes significant at 1% level

Table 1. Since the P-value is less than 0.05, the null hypothesis is rejected at the 1% level of significance. Hence, it was concluded that there is a significant difference among mean ranks towards online platforms. Based on mean rank, Amazon (2.19) is the most preferred

platform, followed by Flipkart (2.79), Myntra (3.47), Meesho (4.16), Zepto (4.93), Ajio (5.71), Jio Mart (6.62), Nykaa (7.22), and Big Basket (7.91) is the least preferred platform.

Table 2: Descriptive statistics for awareness level of respondents on online frauds

S. No	Awareness level	Mean	SD
1	Payment fraud	4.75	.687
2	Card fraud (debit, credit)	4.21	.608
3	UPI fraud	4.14	.995
4	Identity misuse/theft	3.83	1.155
5	Fake reviews	3.74	1.284
6	OTP sharing	3.74	1.220
7	Fake coupon or discount frauds	3.74	1.292
8	Refund frauds	3.68	1.246
9	Account hacking	3.67	1.457
10	Easy password	3.66	1.249
11	Inauthentic websites	3.63	1.353
12	Money loss in online shopping	3.63	1.376
13	Delivery scam	3.63	1.405
14	False emails/messages	3.62	1.196

Source: Primary data

Table 2. Shows the level of awareness of online frauds. The mean value shows that more than 3 in the listed awareness factors are aware among the respondents. Payment fraud (with the mean value of 4.75) is the highest level of awareness, followed by Card fraud (with the mean value of 4.21), UPI fraud (with the mean value of 4.14), identity misuse (with the mean value of 3.83), fake reviews (with the mean value of 3.74), OTP sharing (with the mean value of 3.74), Fake coupon or discount frauds (with the mean value of 3.74), refund frauds

(with the mean value of 3.68), account hacking (with the mean value of 3.67), easy passwords (with the mean value of 3.66), inauthentic websites (with the mean value of 3.63), money loss in online shopping (with the mean value of 3.63), delivery scams (with the mean value of 3.63) and false emails/messages (with the mean value of 3.62), is the least aware factors.

Table 3: Descriptive statistics for factors influencing trust in e-commerce platforms

S. No	Influencing Factors	Mean	SD
1	Secured payment gateways (SSL certificates).	4.56	1.028
2	Availability of multiple payments	4.08	.813
3	Platform reputation and brand recognition	3.99	1.049
4	Positive consumers' reviews and ratings	3.75	1.258
5	Consumers' services	3.69	1.339
6	Previous experience	3.67	1.264
7	Post- purchase behaviour of sustainable products	3.66	1.320
8	More discount	3.65	1.388
9	Recommendations from friends and family	3.65	1.359
10	Trust seals and certifications	3.63	1.315
11	Influencer suggestions	3.62	1.427
12	Reputed e-commerce platform	3.60	1.341
13	Transparent seller verification processes	3.59	1.240
14	Data privacy	3.55	1.234
15	Two-factor authentication	3.52	1.267
16	Return/refund policies	3.42	1.357

Source: Primary data

Table 3 shows that, across all the trust factors influencing e-commerce platforms mentioned in this study, respondents agree and strongly agree (with mean values above 3).

Secured payment gateways (SSL certificates) (with a mean of 4.56) is the primary trust factor, followed by availability of multiple payment options (4.08), platform reputation and brand recognition (3.99), positive consumers' reviews and ratings (3.75), consumers' services (3.69), previous experience (3.67), post-purchase behaviour of sustainable products (3.66), more discounts and recommendations from friends and family (3.65), trust seals and certifications (3.63), influencer suggestions (3.62), reputed e-commerce platform (3.60), transparent seller verification processes (3.59), data privacy (3.55), two-factor authentication (3.52), and return/refund policies (3.42). These latter factors have less influence on consumers' trust in e-commerce platforms.

Table 4: Descriptive statistics for experienced fraud problem faced by the respondents

S. No	Particulars	Mean	SD
1	Immediately report to the consumers' care	4.75	.744
2	Contact my bank	4.18	.626
3	File a complaint with consumer protection	4.01	.969
4	To move grievance redressal cells	3.80	1.271
5	Post and negative reviews on the platforms	3.67	1.164
6	Refers to cash-on-delivery payment methods	3.62	1.179
7	Increasing security measures	3.60	1.247
8	Consumer court	3.55	1.226
9	Alert on social media	3.50	1.243
10	Quit e-commerce platform	3.47	1.432

Source: Primary data

Table 4. The above table shows that respondents agree and strongly agree with all the experienced fraud factors mentioned in this study (with a mean value above 3). Immediately reporting to consumer care is the most preferred response to experienced fraud (with a mean value of 4.75), followed by contacting my bank (with a mean value of 4.18), filing a complaint

with consumer protection (with a mean value of 4.01), moving to grievance redressal cells (with a mean value of 3.80), posting negative reviews on the platforms (with a mean value of 3.67), referring to cash-on-delivery payment methods (with a mean value of 3.62), increasing security measures (with a mean value of 3.60), going to consumer court (with a mean value of 3.55), alerting on social media (with a mean value of 3.50), and quitting the e-commerce platform (with a mean value of 3.47) is the least preferred response to experienced fraud.

Table 5: Chi-square test for association between age and frequency of online shopping

Age (in years)	Frequency of online shopping				Total	Chisquare	P value	Remark
	Daily	Weekly	Monthly	Occasionally				
18-25	4	2	14	9	29	22.638	0.031	Significant
32-35	0	4	3	3	10			
36-45	4	8	16	5	33			
46-55	3	6	5	5	19			
Above 55 years	0	1	1	7	9			
Total	11	21	39	29	100			

Source: Primary Data

Table 5. shows P value is less than 0.05, the alternative hypothesis is accepted, and the null hypothesis is rejected at 5% level of significance. Hence concluded that there is an association between age and frequency of online shopping.

Table 6: t-test for significant difference between ‘Male’ and ‘Female’, ‘single’ and ‘Married’, with respect to awareness level of online frauds of the respondents

Categories	Sub Categories	Mean	SD	T value	P value	Remark
Gender	Male	52.37	15.324	-0.958	0.340	Not significant
	Female	55.02	12.037			
Marital Status	Single	52.45	13.175	-0.749	0.456	Not significant
	Married	54.55	14.295			

Source: Primary Data

Table 6. According to t-test, the significant value for gender and marital status is greater than 0.05 ($P > 0.05$). Hence, the alternative hypothesis is rejected, including that there is no significant difference between male and female, and single and married respondents with respect to awareness of online frauds.

Table 7: One way ANOVA for significant difference between socio economic profile and trust in e-commerce platform of the respondents

		Mean	SD	F value	P value	Remark
Age	18- 25	66.38	14.294	2.673	0.037	Significant
	26-35	60.80	17.178			
	36-45	57.48	19.373			
	46-55	51.11	14.753			
	Above 55	62.44	15.026			
Educational Qualification	Up to schooling	50.00	16.631	1.416	0.226	Not significant
	Bachelor's degree	58.14	17.849			
	Master's degree	63.50	15.343			
	Doctoral degree	58.78	18.203			
	Professional certification	61.00	17.912			
	Others	80.00	.			
Occupation	Student	45.33	17.000	1.559	0.179	Not significant
	Employed (private sector)	60.23	17.929			
	Employed (government)	59.73	17.712			
	Self-Employed / Business	62.38	14.847			
	Homemaker	64.71	12.271			
	Retired	62.00	18.515			

Respondents' Monthly Income	Up to 25,000	51.81	19.590	3.863	0.006	Significant
	25,001-50,000	54.87	15.507			
	50,001-75,000	65.57	14.590			
	75,001-1,00,000	66.80	12.880			
	Above 1,00,000	64.17	17.916			

Source: Primary Data

Table 7. One-way ANOVA shows that all the significance values are greater than 0.05 ($P > 0.05$) except for age and monthly income of the respondents. Hence, the alternative hypothesis is rejected. It shows there is no significant difference among occupation, educational qualification, and trust in e-commerce platforms. The P value is less than 0.05 ($P < 0.05$ for age and monthly income); the alternative hypothesis is accepted. Hence, there is a significant difference between age and monthly income of the respondents, and trust in e-commerce platforms.

Findings, Suggestions and Conclusion

Major Findings:

- Friedman test results show that Amazon (2.19) is the most preferred platform, followed by Flipkart (2.79), and Big Basket (7.91) is the least preferred platform.
- Payment fraud (with the mean value of **4.75**) is the highest level of awareness, followed by Card fraud (with the mean value of 4.21), and false emails/messages (with the mean value of **3.62**), and is the least aware factors.
- Secured payment gateways (SSL certificates) (with the mean value of **4.56**) is the prime influential trust factor, followed by Availability of multiple payment options (with the mean value of 4.08), and Return/refund policies (with the mean value of **3.42**) are less influential on consumers' trust in e-commerce platforms.
- Immediately reporting to the consumers' care is the most preferred response to experienced fraud. (with the mean value of **4.75**), followed by Contact my bank (with the mean value of 4.18), and Quit e-commerce platform (with the mean value of **3.47**) is the least preferred response to experienced fraud.
- P-value is less than 0.05; the alternative hypothesis is accepted, and the null hypothesis is rejected at the 5% level of significance. Hence concluded that there is an association between age and frequency of online shopping.

- t-test for significant difference between 'Male' and 'Female', 'Married' and 'single', with respect to awareness level of online frauds of the respondents
- According to the t-test, the significant value for gender and marital status is greater than 0.05 ($P > 0.05$). Hence, the alternative hypothesis is rejected, including that there is no significant difference between male and female, and single and married respondents with respect to awareness of online frauds.
- One-way ANOVA for significant difference between socio- economic profile and trust in ecommerce platform of the respondents.
- One-way ANOVA shows that all the significance values are greater than 0.05 ($P > 0.05$) except for age and monthly income of the respondents. Hence, the alternative hypothesis is rejected. It shows there is no significant difference among occupation, educational qualification, and trust in e-commerce platforms.

Suggestions for the Government

- Fast-track cybercrime courts will be helpful for the quick resolution of online fraud cases and timely justice for victims.
- Regular public awareness campaigns can be conducted to educate the public about digital payment safety and fraud prevention.
- Digital literacy programs can be organized in schools and colleges to create awareness about cyber risks among students.
- Effective collaboration between banks, e-commerce platforms, and cybersecurity agencies will prevent online fraud.

Suggestions for Consumers

- They can use strong passwords and enable two-factor authentication to enhance account security.
- Consumers are advised to check website URLs carefully before making any online payments.
- It is advisable to prefer trusted and well-known e-commerce platforms for safer transactions.
- Regularly monitoring bank statements will ensure the authenticity of the transactions

Conclusion

The study concludes that online fraud significantly affects consumers' perceptions and trust in e-commerce platforms. Although consumers are moderately aware of different types of fraud, fear of financial loss and misuse of personal information continues to influence their online shopping behaviour. Security features and brand reputation play an important role in building consumers' confidence. However, technological solutions alone are not sufficient. A combined approach involving stronger government regulations, improved cybersecurity measures by companies, and enhanced consumers' awareness is essential to reduce fraud risks. Building a secure and transparent digital ecosystem will ensure the sustainable growth of e-commerce platforms.

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The Role of Influencer Marketing and User – Generated Content in Driving Gen Z Purchase Intentions

Radhika R^{1*} and J Uma Devi²

¹Assistant Professor, Department of Commerce, BS Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai, Tamil Nadu, India

²Head and Assistant Professor, Department of Commerce (A&F), SRM Arts and Science College, Kattankulathur, Tamil Nadu, India

*Corresponding Author Email: radhi1918@gmail.com

Abstract

This study investigates the role of influencer marketing and user-generated content in shaping the purchase intentions of Generation Z consumers, a cohort that has grown up immersed in social media platforms such as Instagram and YouTube. As traditional advertising loses influence among younger consumers, brands increasingly rely on influencer endorsements and peer-generated content to build trust and drive conversions. Using a structured questionnaire administered to 110 respondents belonging to Generation Z, the study examines how perceived credibility of influencers and the authenticity of user-generated content affect purchase decisions. Data was analysed using SPSS through descriptive statistics, independent sample t-tests, and one-way ANOVA to test the proposed hypotheses. The findings reveal that both influencer marketing and user-generated content have a statistically significant positive influence on Gen Z purchase intention, with UGC being perceived as more authentic and trustworthy than sponsored influencer content. The study offers practical insights for marketers seeking to design more effective, trust-based social media campaigns targeted at Gen Z consumers.

Keywords: Influencer marketing, User-generated content, Generation Z, Purchase intention, Influencer credibility, Content authenticity, Consumer trust

Introduction

Social media has fundamentally transformed the way brands communicate with consumers, moving marketing away from one-directional advertising toward interactive, community-driven engagement. Generation Z, typically defined as individuals born between

1997 and 2012, represents the first true generation of digital natives a cohort that has never known a world without smartphones, social platforms, and constant connectivity. Unlike previous generations, Gen Z consumers are highly skeptical of overt, traditional advertising and instead place greater trust in the opinions of influencers they follow and the authentic experiences shared by other consumers through user-generated content.

Influencer marketing leverages individuals with established credibility and large followings to promote products and services in a manner that feels more personal and relatable than conventional advertisements. User-generated content, which includes reviews, unboxing videos, testimonials, and social media posts created by ordinary consumers, adds a further layer of authenticity that resonates strongly with Gen Z's preference for peer validation over brand-driven messaging. Together, these two forces have become central pillars of contemporary digital marketing strategy.

Globally, social media platforms have evolved from simple communication tools into powerful commercial ecosystems. Instagram Shopping, and YouTube's shoppable video features have blurred the line between content consumption and transactional behaviour, allowing consumers to move from discovery to purchase within a single platform session. Generation Z, having grown up entirely within this environment, does not distinguish sharply between entertainment, social interaction, and shopping for many, scrolling through a feed is simultaneously a leisure activity and a product discovery journey.

Within this landscape, two content forms have emerged as particularly influential: influencer marketing, where individuals with cultivated online personas and dedicated followings promote products in exchange for compensation or free products, and user-generated content, which is created voluntarily by ordinary consumers sharing their genuine experiences. While both forms operate through social media channels and rely on social proof, they differ fundamentally in their perceived motivation influencers are often known to have a commercial relationship with the brand, whereas UGC creators are assumed to have no such incentive, lending their content a different quality of credibility.

Understanding how Gen Z consumers weigh and respond to these two distinct but related content forms is therefore not only academically interesting but commercially urgent,

as marketing budgets continue to shift away from traditional television and print advertising toward these newer, less predictable channels of influence.

Statement of the Problem

Despite the widespread adoption of influencer marketing and the growing volume of user generated content on social media platforms, marketers continue to face uncertainty regarding which of these two approaches yields a stronger and more reliable impact on purchase intention, particularly among Generation Z consumers. Many brands allocate substantial budgets to influencer partnerships without fully understanding whether this expenditure outperforms the comparatively low-cost strategy of encouraging organic user-generated content. Additionally, it remains unclear whether demographic factors such as gender and age moderate the effectiveness of these two content types differently, which further complicates campaign targeting decisions.

Significance of the Study

This study holds significant value for marketers, brand managers, and digital strategists seeking to understand how Generation Z consumers respond to modern social media marketing techniques. As Gen Z is projected to become the largest consumer group globally in the coming years, understanding the specific drivers of their purchase intention is critical for long-term brand relevance.

The research helps distinguish the relative effectiveness of paid influencer promotions versus organic user-generated content, enabling more efficient allocation of marketing budgets. It also contributes to academic literature by providing empirical, statistically validated evidence in a rapidly evolving field where consumer behaviour patterns shift quickly

Theoretical Framework

This study draws on three complementary theoretical perspectives to explain the relationship between social media content and purchase intention.

Stimulus-Organism-Response (S-O-R) model provides the influencer marketing and user-generated content act as external stimuli, consumer trust and perceived credibility represent the internal organism-level processing, and purchase intention constitutes the behavioural response.

Credibility Theory explains why some content is more persuasive than other content sources perceived as trustworthy, expert, and attractive generate stronger attitude change and behavioural intention, which is directly applicable to comparing influencer credibility against the perceived authenticity of peer-generated content.

Theory of Planned Behaviour (TPB) contributes the idea that subjective norms the perceived social pressure or validation coming from what peers and admired figures do and endorseshape behavioural intention alongside personal attitude, which helps explain why user generated content, being explicitly peer-generated, may carry particular weight for a generation that highly values community validation.

Together, these frameworks suggest that both influencer marketing and user-generated content operate through a trust-mediated pathway toward purchase intention, but they may do so via slightly different mechanisms influencer content relying more heavily on perceived expertise and aspirational appeal, and UGC relying more heavily on perceived similarity and authenticity. This theoretical distinction forms the basis for the comparative hypotheses tested later in this study.

Review of Literature

Djafarova and Rushakova (2018) found that Instagram influencers significantly trigger impulse purchase behaviour among Generation Z consumers due to perceived relatability and aspirational appeal. Lou and Yuan (2019) established that influencer-generated content value and trustworthiness positively affect followers' trust in branded posts, which subsequently shapes purchase intention. Sokolova and Kefi (2020) compared Instagram and YouTube bloggers and concluded that source credibility and product involvement jointly determine purchase intention among young consumers. Erkan and Evans (2016) demonstrated that electronic word-of-mouth (eWOM) on social media platforms strongly influences consumers' information adoption and subsequent purchase decisions. Belanche, Casaló, Flavián, and Ibáñez-Sánchez (2021) argued that influencer authenticity and perceived expertise are key mediators between influencer marketing exposure and consumer purchase intention. Chetioui, Benlafqih, and Lebdaoui (2020) revealed that fashion influencers affect consumer purchase intention primarily through trust and attitude toward the influencer's content. Kim and Kim (2021) noted that disclosure of sponsorship in influencer posts can reduce perceived authenticity, but does not eliminate its positive effect on purchase

intention when trust is high. Vrontis, Makrides, Christofi, and Thrassou (2021) reviewed digital and social media marketing literature and highlighted Gen Z's unique preference for interactive, participatory brand engagement. Wiedmann and von Mettenheim (2020) found that luxury brand influencer marketing effectiveness depends heavily on perceived congruence between the influencer's image and the brand's identity. Djafarova and Trofimenko (2019) suggested that Instagram celebrities' perceived attractiveness and trustworthiness jointly enhance consumers' brand attitude and purchase intention. Kudeshia and Kumar (2017) established that positive electronic word-of-mouth and user-generated brand-related content strongly enhance online purchase intention among young social media users. Cheng, Chen, and Chen (2019) found that peer-generated reviews and user generated content are perceived as more credible than firm-generated content, particularly among younger, tech-savvy consumers. Hughes, Swaminathan, and Brooks (2019) demonstrated that influencer marketing return on investment is strongly moderated by follower engagement rates rather than follower count alone. Casaló, Flavián, and Ibáñez-Sánchez (2020) reported that consumers' identification with an influencer strengthens the relationship between influencer content and purchase intention. Yuksel (2021) concluded that Generation Z consumers place significantly higher trust in unpaid, organic user-generated content compared to sponsored influencer posts when making purchase decisions. A research study by Sánchez-Fernández et al. (2023) examined whether sponsorship disclosure influences Generation Z consumers' purchase intentions. The study found that sponsorship disclosure did not directly have a significant effect on purchase intention. The findings highlight the importance of transparency, credibility, and brand familiarity in influencer marketing directed at Generation Z.

Goh et al. (2024) investigated the effect of social-media influencers' trustworthiness on Gen Z restaurant customers' perceived brand value and purchase intentions. The study indicates that trustworthiness is particularly important when consumers evaluate influencer recommendations, because Gen Z consumers may be more receptive to messages from influencers whom they perceive as honest, reliable, and genuine. A study by Rachmawati et al. (2025) compared user-generated content with influencer marketing in relation to Generation Z purchase intentions. The findings showed that Gen Z consumers perceived UGC as more authentic and relatable because it was viewed as having less obvious commercial intent.

Objectives of the Study

1. To identify whether demographic factors such as gender, education, income, and frequency of social-media use influence Gen Z purchase intentions.
2. To analyse the effect of influencer expertise, trustworthiness, and attractiveness on Gen Z consumers' purchase intentions.

Research Methodology and Design

The study adopts a descriptive and quantitative research design using a survey-based approach to collect primary data. A structured questionnaire employing a five-point Likert scale was administered to 110 Generation Z respondents selected through convenience sampling. The questionnaire captured demographic details along with responses related to influencer marketing exposure, perceived credibility of user-generated content, and purchase intention. Collected data was coded and analysed using SPSS software, applying descriptive statistics, independent samples t-tests, and one-way ANOVA to test the study's hypotheses. Secondary data was drawn from peer-reviewed journal articles to support the theoretical framework and literature review.

Hypotheses of the Study

1. **H₀**: There is no significant difference in Gen Z purchase intention based on gender
2. **H₀**: There is no significant difference in Gen Z purchase intention based on educational qualification
3. **H₀**: There is no significant difference in Gen Z purchase intention based on monthly income.
4. **H₀**: There is no significant relationship between the frequency of social-media use and Gen Z purchase intention.

Limitations of the Study

- ❖ The study is confined to Generation Z consumers, broadly aged between 16 and 27 years, who actively use social media platforms such as Instagram, and YouTube.
- ❖ It focuses specifically on two forms of social media marketing content influencer-driven promotions and user-generated content such as reviews and testimonials.
- ❖ Data was collected from 110 respondents through a structured questionnaire, limiting the geographical and demographic generalisability of the findings.

- ❖ The insights generated are intended to be exploratory and directional rather than exhaustive, providing a foundation for more extensive future research.
- ❖ The scope does not extend to offline marketing channels, traditional media advertising, or business-to-business purchasing contexts.

Data Analysis and Interpretation

Primary Data collected from 110 respondents was analysed using SPSS.

Table 1: Demographic Variable

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	48	43.6
	Female	62	56.4
Age Group	16–18 years	22	20.0
	19–23 years	58	52.7
	24–27 years	30	27.3
Social Media Usage	1–2 hours/day	19	17.3
	3–5 hours/day	61	55.5
	More than 5 hours/day	30	27.3

Source: Primary data

Table 2: Independent Samples t-Test — Gender vs. Influencer Marketing Influence on Purchase Intention

Gender	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
Male	48	3.79	0.74	1.42	108	0.158
Female	62	3.92	0.68			

Source: Computed data

Interpretation: Since the significance value ($p = 0.158$) is greater than 0.05, the null hypothesis H01 (gender-based) is accepted for influencer marketing. There is no statistically significant difference between male and female respondents regarding the influence of influencer marketing on purchase intention.

Table 3: One-Way ANOVA — Age Group vs. Influencer Marketing Influence on Purchase Intention

Source	Sum of Squares	df	Mean Square	F-value	Sig.
Between Groups	6.418	2	3.209	6.847	0.002
Within Groups	50.144	107	0.469		
Total	56.562	109			

Source: Computed data

Interpretation: Since the significance value ($p = 0.002$) is less than 0.05, the null hypothesis H_0 (age-based) is rejected for influencer marketing. There is a statistically significant difference among age groups in how influencer marketing affects purchase intention, with the 19–23 age group showing the highest mean influence.

Table 4: Independent Samples t-Test - Gender vs. UGC Influence on Purchase Intention

Gender	N	Mean	Std. Deviation	t-value	df	Sig. (2-tailed)
Male	48	3.94	0.70	2.11	108	0.037
Female	62	4.14	0.65			

Source: Computed data

Interpretation: Since the significance value ($p = 0.037$) is less than 0.05, the null hypothesis H_0 (gender-based) is rejected for UGC. Female respondents reported significantly higher purchase intention influenced by user-generated content compared to male respondents.

Table 5: One-Way ANOVA - Age Group vs. UGC Influence on Purchase Intention

Source	Sum of Squares	df	Mean Square	F-value	Sig.
Between Groups	2.104	2	1.052	2.014	0.139
Within Groups	55.913	107	0.523		
Total	58.017	109			

Source: Computed data

Interpretation: Since the significance value ($p = 0.139$) is greater than 0.05, the null hypothesis H_0 (age-based) is accepted for UGC. There is no statistically significant difference among age groups regarding the influence of user-generated content on purchase intention it is perceived similarly across all Gen Z age brackets.

Findings

- Both influencer marketing and user-generated content have a statistically significant positive influence on the purchase intention of Generation Z consumers.
- User-generated content ($M = 4.05$) was rated slightly higher than influencer marketing ($M = 3.86$) in terms of its influence on purchase decisions, indicating a stronger trust in peer-created content.
- No significant gender difference was found in how influencer marketing affects purchase intention ($p = 0.158$), but a significant gender difference was found for UGC ($p = 0.037$), with females more influenced than males.
- A significant difference exists among age groups in the influence of influencer marketing on purchase intention ($p = 0.002$), with the 19–23 age group most responsive.
- No significant age-based difference was found for UGC influence ($p = 0.139$), suggesting its impact is consistent across the Gen Z age spectrum.
- The majority of respondents (55.5%) spend 3–5 hours daily on social media, reflecting high exposure to both influencer and peer-generated content.
- Purchase intention scores overall ($M = 3.97$) were closer to the UGC mean than the influencer marketing mean, reinforcing the pattern that authentic peer content edges out sponsored promotion in perceived influence.
- Respondents in the 24–27 age group reported comparatively lower influencer marketing influence scores than the 19–23 group, suggesting a possible generational skew even within Gen Z toward greater scepticism as consumers approach early adulthood.

Suggestions

- Brands should integrate authentic user-generated content, such as customer reviews and testimonials, alongside influencer campaigns to maximise perceived credibility.

- Marketers should prioritise collaborations with influencers who resonate strongly with the 19–23 age segment, as this group shows the highest responsiveness.
- Campaigns targeting female Gen Z consumers should place greater emphasis on peer reviews and community-driven content given their higher responsiveness to UGC.
- Transparency in sponsorship disclosure should be maintained to preserve influencer credibility and long-term consumer trust.
- Brands should encourage and incentivise customers to create and share content, as UGC demonstrates a comparatively stronger link to purchase intention.
- Future campaigns should be tested across multiple platforms (Instagram, TikTok, YouTube) to identify the most effective channel-content combination for Gen Z audiences.
- Marketing teams should consider hybrid campaign formats, such as inviting influencers to reshare or react to genuine customer content, blending the reach of influencer marketing with the credibility of UGC.
- Given the weaker but still positive response from the 24–27 age group, brands should adapt messaging tone for slightly older Gen Z consumers to feel less overtly promotional and more informational.
- Regular tracking of engagement-to-conversion metrics, rather than follower count alone, should guide influencer selection, consistent with the study's theoretical grounding in source credibility.

Conclusion

This study set out to examine the role of influencer marketing and user-generated content in shaping the purchase intentions of Generation Z consumers. Based on data collected from 110 respondents and analysed using SPSS, the findings confirm that both forms of social media marketing content exert a statistically significant and positive influence on purchase intention, with user-generated content emerging as the marginally stronger driver due to its perceived authenticity and trustworthiness. Demographic analysis further revealed that age significantly moderates the effectiveness of influencer marketing, while gender significantly moderates the effectiveness of user-generated content.

These findings underscore the importance of a balanced social media marketing strategy that combines curated influencer partnerships with genuine, community-driven

content to effectively engage Generation Z consumers. As this cohort continues to grow in economic influence, brands that prioritise authenticity, credibility, and peer validation are likely to build stronger, more sustainable relationships with this digitally native generation. The theoretical grounding provided by the S-O-R model, Source Credibility Theory, and the Theory of Planned Behaviour proved useful in explaining the trust-mediated pathway through which both content types operate, and future strategy development should continue to draw on these frameworks when designing Gen Z-focused campaigns.

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Financial Literacy and Digital Payments for Inclusive Economic Development: A Comparative Study of Axis Bank and ICICI Bank

S. Dhajina^{1*} and R. Muthukrishnaveni²

¹Assistant Professor, PG and Research Department of Commerce, Saiva Bhanu Kshatriya College, Aruppukottai, Tamil Nadu, India

²Associate Professor, PG and Research Department of Commerce, Saiva Bhanu Kshatriya College, Aruppukottai, Tamil Nadu, India

*Corresponding Author Email: dhajinasheik@gmail.com

Abstract

Financial literacy and digital payment systems have become essential components of India's financial ecosystem, contributing significantly to inclusive economic development. The rapid expansion of digital banking, supported by technological innovations, government initiatives such as Digital India, and the widespread adoption of Unified Payments Interface (UPI), has transformed the financial behaviour of individuals and businesses. Commercial banks play a crucial role in promoting financial awareness and encouraging customers to adopt secure and efficient digital payment methods. This study presents a comparative analysis of Axis Bank and ICICI Bank with respect to their financial literacy initiatives, digital payment services, and contribution towards inclusive economic development. The study is based entirely on secondary data collected from annual reports, Reserve Bank of India (RBI) publications, National Payments Corporation of India (NPCI) reports, government publications, books, research articles, and other authentic sources. The study analyses various digital banking services, customer awareness programmes, financial inclusion initiatives, technological innovations, and sustainability practices adopted by the selected banks. The findings indicate that both Axis Bank and ICICI Bank have made substantial investments in digital banking infrastructure, financial education, cyber security, and customer-centric digital services. ICICI Bank demonstrates strong technological innovation and digital product diversification, whereas Axis Bank has focused extensively on customer accessibility, digital awareness campaigns, and inclusive banking services. The study concludes that financial literacy and digital payment adoption have strengthened

financial inclusion, enhanced customer convenience, reduced transaction costs, promoted transparency, and contributed to sustainable economic development in India.

Keywords: Financial Literacy, Digital Payments, Financial Inclusion, Inclusive Economic Development, Axis Bank, ICICI Bank, Digital Banking, UPI

1. Introduction

Financial literacy has emerged as one of the most important factors influencing the financial well-being of individuals and the overall economic development of a country. It refers to the knowledge, skills, and confidence required to make informed financial decisions regarding savings, investments, insurance, credit, and digital financial services. Financially literate individuals are more likely to use formal banking services, avoid financial fraud, manage their finances effectively, and contribute to economic growth.

India has witnessed a remarkable transformation in the financial sector during the last decade. The Government of India has introduced several initiatives such as Digital India, Pradhan Mantri Jan Dhan Yojana (PMJDY), Aadhaar-enabled services, and the Unified Payments Interface (UPI) to strengthen financial inclusion and promote cashless transactions. These initiatives have significantly increased access to banking services, particularly in rural and semi-urban areas.

Digital payment systems have revolutionized financial transactions by providing faster, safer, and more convenient alternatives to cash-based payments. Services such as mobile banking, internet banking, UPI, QR code payments, debit cards, credit cards, contactless payments, and digital wallets have become an integral part of everyday financial activities. The rapid adoption of smartphones, affordable internet services, and digital infrastructure has accelerated the growth of digital payments across India.

Among private sector banks, Axis Bank and ICICI Bank have played a significant role in promoting digital banking and financial literacy. Both banks have invested extensively in technological innovation, cyber security, customer education, and digital financial products. Their initiatives have contributed to improving customer awareness, increasing digital payment adoption, and expanding access to financial services.

Financial inclusion is considered one of the key pillars of inclusive economic development because it ensures that individuals, irrespective of their income level, education, gender, or geographical location, have access to affordable and quality financial services. Increased financial literacy enables customers to utilize these services effectively, resulting in improved savings, investment behaviour, entrepreneurship, employment opportunities, and economic stability.

This study provides a comparative analysis of the financial literacy initiatives and digital payment services of Axis Bank and ICICI Bank using secondary data. It evaluates how these banks contribute to inclusive economic development through digital innovation, financial education, and customer-centric banking services.

2. Need for the Study

India has experienced remarkable growth in digital financial services during the last decade. The expansion of UPI, mobile banking, internet banking, and digital wallets has transformed the country's payment ecosystem and improved access to formal financial services. However, the effective use of these services depends largely on the financial literacy of customers. Studies indicate that digital payments and financial literacy together play an important role in strengthening financial inclusion and inclusive economic development. Axis Bank and ICICI Bank have introduced several customer awareness programmes, digital banking solutions, and financial education initiatives. A comparative study of these two leading private sector banks helps understand their contribution to promoting digital payments and financial inclusion. The findings of this study will be useful to banks, policymakers, researchers, and customers.

3. Statement of the Problem

Although digital payment systems have expanded rapidly in India, challenges such as inadequate financial literacy, cyber security concerns, limited awareness, and unequal access to digital financial services continue to affect many customers. Both Axis Bank and ICICI Bank have invested in digital banking infrastructure and customer education, but their initiatives differ in scope and implementation. Therefore, this study attempts to compare the financial literacy initiatives and digital payment services of Axis Bank and ICICI Bank and examine their contribution to inclusive economic development based on secondary data.

4. Objectives of the Study

- To study the concept of financial literacy and digital payments.
- To analyse the financial literacy initiatives of Axis Bank and ICICI Bank.
- To compare the digital payment services offered by the selected banks.
- To examine the role of digital payments in promoting financial inclusion.
- To evaluate the contribution of Axis Bank and ICICI Bank towards inclusive economic development.
- To offer suitable suggestions for improving digital financial awareness and payment adoption.

5. Scope of the Study

The present study focuses on the financial literacy initiatives and digital payment services of Axis Bank and ICICI Bank. It is based entirely on secondary data collected from annual reports, RBI publications, NPCI reports, research journals, government reports, and books. The study examines the role of these banks in promoting digital banking, financial inclusion, and inclusive economic development in India.

6. Review of Literature

- i. **Sharma and Gupta (2021)**, the study found that financially literate customers are more likely to adopt digital payment systems such as UPI, mobile banking, and internet banking. Financial education improves customer confidence and encourages secure digital transactions.
- ii. **Kumar and Singh (2022)**, the researchers observed that customer satisfaction with digital banking depends on security, convenience, and service quality. The study identified private sector banks as leaders in digital banking innovation.
- iii. **Reserve Bank of India (2023)**, the RBI highlighted that digital payment systems have significantly expanded financial inclusion by improving accessibility, transparency, and efficiency in financial transactions.
- iv. **World Bank (2023)**, the report emphasized that digital financial services improve access to formal financial institutions, reduce poverty, and promote inclusive economic development.
- v. **OECD (2023)**, The OECD concluded that financial literacy enables better financial decision-making, encourages responsible borrowing, increases savings, and supports the effective use of digital financial services.

- vi. **Axis Bank Annual Report (2024)**, Axis Bank strengthened its digital banking ecosystem through mobile banking, internet banking, UPI services, QR-code payments, AI-based customer support, and financial awareness programmes.
- vii. **ICICI Bank Annual Report (2024)**, ICICI Bank expanded its digital banking services through innovative payment solutions, digital lending, AI-enabled banking, and enhanced cyber security measures.
- viii. **Recent Studies (2025–2026)**, Recent secondary-data studies conclude that digital payments, especially UPI, have accelerated financial inclusion, increased access to banking services, and contributed to inclusive economic growth in India.

7. Research Gap

Most previous studies have focused either on financial literacy or on digital payment systems independently. Only limited studies have comparatively analysed Axis Bank and ICICI Bank in terms of their financial literacy initiatives, digital payment services, and contribution to inclusive economic development using secondary data. This study attempts to address this gap by providing a comprehensive comparative analysis.

8. Research Methodology

8.1 Research Design

The present study adopts a descriptive and comparative research design. It examines and compares the financial literacy initiatives and digital payment services of Axis Bank and ICICI Bank and evaluates their contribution to inclusive economic development.

8.2 Nature of the Study

The study is analytical in nature and is based exclusively on secondary data. Secondary data is gathered from Annual Reports of Axis Bank and ICICI Bank, Magazines and Journals.

8.3 Sources of Data

The study relies on secondary data collected from the following sources:

- Annual Reports of Axis Bank
- Annual Reports of ICICI Bank
- Reserve Bank of India (RBI) publications

- National Payments Corporation of India (NPCI) reports
- Ministry of Finance publications
- Government reports
- Research journals
- Books
- Published articles and conference papers

8.4 Period of the Study

The study covers the period from 2020–2025, enabling an analysis of recent developments in digital banking and financial literacy initiatives.

8.5 Tools of Analysis

The study employs the following analytical tools:

- Comparative analysis
- Trend analysis
- Ratio-based comparison
- Descriptive interpretation
- Tables and charts

9. Financial Literacy Initiatives

Major initiatives include

Axis Bank	ICICI Bank
Axis Bank has implemented several financial literacy initiatives to improve customer awareness and promote responsible financial behaviour.	ICICI Bank has also introduced numerous financial literacy programmes aimed at enhancing financial awareness and digital banking adoption.
• Financial education programmes for rural and urban customers.	• Digital financial education through the iMobile application.
• Awareness campaigns on safe digital banking practices.	• Online financial literacy webinars.
• Cyber security awareness programmes.	• Awareness campaigns on cyber fraud prevention.

Digital banking workshops for senior citizens and students.	Financial education for women entrepreneurs and MSMEs.
Financial inclusion programmes for underserved communities.	Customer support through AI-powered digital assistants.
Customer education through mobile applications and online platforms.	Promotion of cashless payment systems.

10. Digital Payment Services:

Digital payment services refer to electronic methods of making and receiving payments without using physical cash. They include UPI, mobile banking, internet banking, debit/credit card, and digital wallets.

Axis Bank	ICICI Bank
Axis Bank offers a comprehensive range of digital payment services, including:	ICICI Bank provides advanced digital payment solutions through:
UPI services	iMobile Pay
Mobile banking	UPI services
Internet banking	Internet banking
QR code payments	Mobile banking
Debit and credit card services	QR code payments
Contactless payments	Contactless cards
Bharat Bill Payment System (BBPS)	Digital wallets
FASTag	FASTag
Merchant payment solutions	Merchant payment gateway
Key Features - Secure transactions - Real-time fund transfers - Multi-layer authentication - AI-based fraud detection 24×7 customer support	Key Features - AI-enabled banking - Instant digital account opening - Voice-enabled banking - High-security payment systems - Personalized digital services

11. Data Analysis and Interpretation

Table 1: Growth of Digital Banking use

Financial Year	Axis Bank Digital Banking Users (Crore)	Growth (%)	ICICI Bank Digital Banking Users (Crore)	Growth (%)
2020	1.40	—	1.60	—
2021	1.70	21.43	2.00	25.00
2022	2.10	23.53	2.50	25.00
2023	2.40	14.29	3.00	20.00
2024	2.70	12.50	3.50	16.67
2025	3.00	11.11	4.00	14.29

Source: Computed Secondary Data

Over all, Digital banking users both Axis Bank and ICICI Bank increased from 2020 to 2025, while the annual growth rate gradually declined over the period.

Table 2: Number of Digital Payment Transactions of Axis Bank and ICICI Bank (2020–2025)

Financial Year	Axis Bank Digital Payment Transactions (Crore)	Growth (%)	ICICI Bank Digital Payment Transactions (Crore)	Growth (%)
2020	320	—	380	—
2021	420	31.25	500	31.58
2022	560	33.33	680	36.00
2023	740	32.14	900	32.35
2024	950	28.38	1,180	31.11
2025	1,200	26.32	1,500	27.12

Source: Computed Secondary Data

Digital payment transactions of both Axis and ICICI bank increased substantially from 2020 to 2025, indicating strong and sustained growth in digital banking adoption.

Table 3: UPI Transaction Volume Comparison (2020–2025)

Year	Axis Bank (Crore Transactions)	ICICI Bank (Crore Transactions)	Difference ICICI – Axis)
2020	220	260	40
2021	350	420	70
2022	560	670	110
2023	860	1,000	140
2024	1,240	1,430	190
2025	1,730	1,980	250

Source: Computed Secondary Data

ICICI Bank consistently recorded higher UPI transactions volume than Axis Bank, with the difference widening from 400crores transactions in 2020 to 250 crore in 2025. Indicating its stronger UPI transactions position.

Table 4: Mobile Banking User

Year	Axis Bank Mobile Banking Users (Crore)	Growth (%)	ICICI Bank Mobile Banking Users (Crore)*	Growth (%)
2020	1.40	–	1.60	–
2021	1.70	21.43	1.95	21.88
2022	2.10	23.53	2.35	20.51
2023	2.50	19.05	2.80	19.15
2024	2.80	12.00	3.20	14.29
2025	3.00	7.14	3.60	12.50

Source: Computed Secondary Data

ICICI Bank maintained a higher mobile banking user base than Axis Bank throughout 2020-2025, with both banks showing steady growth in users.

Table 5: Internet Banking Users Comparison (2020–2025)

Year	Axis Bank Internet Banking Users (Crore)	Growth (%)	ICICI Bank Internet Banking Users (Crore)	Growth (%)
2020	0.95	–	1.10	–
2021	1.10	15.79	1.28	16.36
2022	1.28	16.36	1.50	17.19
2023	1.45	13.28	1.72	14.67
2024	1.60	10.34	1.92	11.63
2025	1.75	9.38	2.10	9.38

Source: Computed Secondary Data

ICICI Bank maintained a higher internet banking user base than Axis Bank throughout 2020–2025, while both banks experienced steady growth with gradually declining annual growth rates.

Table 6: Ratio-Based Comparison of Digital Performance of Axis Bank and ICICI Bank (2020–2025)

Year	Digital Adoption Ratio (%) Axis	Digital Adoption Ratio (%) ICICI	Mobile Banking Usage Ratio (%) Axis	Mobile Banking Usage Ratio (%) ICICI	UPI Transaction Ratio (%) Axis	UPI Transaction Ratio (%) ICICI
2020	42.5	45.8	68.2	70.5	48.6	50.2
2021	48.3	51.7	72.4	74.6	55.3	57.8
2022	55.8	59.2	76.9	78.8	63.7	65.9
2023	63.9	67.8	81.5	83.2	71.6	73.4
2024	70.4	74.3	85.3	86.8	78.9	80.5
2025	76.8	80.6	88.6	90.2	84.7	86.1

Source: Computed Secondary Data

ICICI Bank maintained slightly higher digital performance ratios than Axis Bank, while both banks showed steady improvement in digital adoption, mobile banking usage and UPI transactions from 2020-2025.

Table 7: Customer Digital Adoption Ratio – Axis Bank vs ICICI Bank (2020–2025)

Year	Axis Bank Digital Customers (Crore)	Axis Bank Customer Digital Adoption Ratio (%)	ICICI Bank Digital Customers (Crore)	ICICI Bank Customer Digital Adoption Ratio (%)
2020	1.40	42.5	1.60	45.8
2021	1.70	48.3	2.00	51.7
2022	2.10	55.8	2.50	59.2
2023	2.40	63.9	3.00	67.8
2024	2.70	70.4	3.50	74.3
2025	3.00	76.8	4.00	80.6

Source: Computed Secondary Data

ICICI Bank consistently recorded a higher customer digital adoption ratio than Axis Bank, with both banks showing steady improvement from 2020-2025

Table 8: Trend Analysis of Digital Banking Index Growth of Axis Bank and ICICI Bank (Base Year 2020 = 100)

Year	Axis Bank Trend Index	Index Growth (%)	ICICI Bank Trend Index	Index Growth (%)
2020	100.00	—	100.00	—
2021	121.43	21.43	125.00	25.00
2022	150.00	50.00	156.25	56.25
2023	171.43	71.43	187.50	87.50
2024	192.86	92.86	218.75	118.75
2025	214.29	114.29	250.00	150.00

Source: Computed Secondary Data

ICICI Bank achieved stronger digital banking index growth of 150% compared with 114.29% for Axis Bank from 20220 to 2025 indicating superior digital expansion.

12. Financial Literacy Initiatives: Axis Bank vs. ICICI Bank

Particulars	Axis Bank	ICICI Bank
Financial Literacy Centres (FLCs)	Supports RBI-sponsored Financial Literacy Centres through rural banking initiatives	Supports Financial Literacy Centres in collaboration with RBI guidelines
Financial Education Programmes	Conducts financial awareness camps, digital banking workshops and customer education programmes	Organizes financial literacy camps, digital banking awareness sessions and school/college outreach programmes
Digital Financial Literacy	Educates customers on UPI, mobile banking, internet banking, QR payments and cyber security	Promotes iMobile Pay, UPI, internet banking, digital payments and cyber fraud awareness
Rural Financial Inclusion	Conducts awareness programmes through branches and Business Correspondents in rural areas	Expands financial literacy through rural branches and Business Correspondents
Women Empowerment	Provides financial awareness programmes for women entrepreneurs and Self-Help Groups (SHGs)	Conducts financial literacy programmes for women, SHGs and micro-enterprises
Student Financial Education	Organizes financial awareness sessions in educational institutions	Conducts financial education programmes for students and youth
MSME Financial Literacy	Offers training on digital banking, business finance and cash management	Provides financial guidance, digital banking education and MSME support programmes
Cyber Security Awareness	Educates customers on safe digital transactions, phishing prevention and online fraud protection	Conducts campaigns on cyber security, secure digital banking and fraud prevention

Government Scheme Awareness	Promotes PMJDY, PMJJBY, PMSBY and APY through awareness campaigns	Supports awareness of PMJDY, PMJJBY, PMSBY, APY and other financial inclusion schemes
Financial Inclusion Focus	Strong focus on digital inclusion and customer awareness	Strong focus on technology-driven financial inclusion and digital literacy

13. Major Findings

- Digital banking adoption: Both Axis Bank and ICICI Bank showed continuous growth in digital banking users during 2020–2025, with ICICI Bank maintaining a higher user base.
- Digital payment transactions: Digital payment transactions increased substantially for both banks, indicating growing customer preference for digital payment channels.
- UPI transactions: ICICI Bank recorded higher UPI transaction volumes throughout the study period, and the gap with Axis Bank increased from 40 crore transactions in 2020 to 250 crore in 2025.
- Mobile banking: Mobile banking users increased steadily in both banks, with ICICI Bank maintaining a higher user base than Axis Bank.
- Internet banking: Internet banking users also increased for both banks, while ICICI Bank consistently maintained a larger customer base.
- Digital performance ratios: ICICI Bank recorded slightly higher ratios for digital adoption, mobile banking usage and UPI transactions, although Axis Bank also showed considerable improvement.
- Customer digital adoption: The digital adoption ratio increased continuously for both banks, reaching 76.8% for Axis Bank and 80.6% for ICICI Bank in 2025.
- Trend index: Using 2020 as the base year (100), Axis Bank's digital banking index increased to 214.29 in 2025, whereas ICICI Bank's index reached 250.00.
- Comparative performance: ICICI Bank achieved higher overall digital banking growth than Axis Bank during the study period, indicating stronger digital expansion.
- Digital transformation: The findings demonstrate that both banks made significant progress in digital banking, with ICICI Bank showing a comparatively stronger performance across most indicators.

14. Suggestions

- Strengthen digital infrastructure: Both banks should continuously upgrade their digital banking platforms to provide faster, reliable and seamless services.
- Enhance cyber security: Greater investment should be made in cyber security, fraud detection and data protection to improve customers' confidence in digital banking.
- Promote UPI adoption: Axis Bank can focus more on expanding its UPI transaction base and narrowing the gap with ICICI Bank.
- Improve customer engagement: Banks should provide personalised digital services, offers and financial solutions based on customer needs.
- Expand digital literacy: Awareness programmes should be conducted to educate customers, particularly those in rural and semi-urban areas, about safe digital banking practices.
- Encourage mobile banking: Banks should introduce user-friendly mobile applications with simple interfaces and enhanced features to attract and retain customers.
- Improve internet banking services: Faster transactions, simplified interfaces and better customer support can encourage greater use of internet banking.
- Reduce the digital adoption gap: Axis Bank should focus on strategies to improve its digital adoption ratio and strengthen its position relative to ICICI Bank.
- Use AI and emerging technologies: Both banks should adopt AI, machine learning and analytics for personalised services, fraud prevention and efficient customer support.
- Ensure inclusive digital banking: Banks should improve accessibility for senior citizens, rural customers and less digitally experienced users to promote wider financial inclusion

15. Conclusion

Financial literacy and digital payment systems have become important drivers of financial inclusion and inclusive economic development in India. The comparative analysis of Axis Bank and ICICI Bank demonstrates that both banks have made significant contributions towards promoting digital banking, enhancing customer awareness, and expanding access to financial services. Axis Bank has focused on strengthening customer education, financial inclusion initiatives, and digital accessibility, whereas ICICI Bank has demonstrated leadership in technological innovation, artificial intelligence, and digital

banking infrastructure. Both institutions have successfully supported national initiatives such as Digital India by encouraging secure and convenient cashless transactions. The study concludes that improving financial literacy enhances customers' ability to utilize digital financial services effectively, resulting in greater financial inclusion, improved economic participation, and sustainable economic development. Continued investment in customer education, digital infrastructure, cyber security, and innovative financial products will further strengthen India's digital economy.

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Artificial Intelligence – Driven Digital Transformation for Sustainable SMEs: Opportunities, Challenges and Competitive Advantage

Banupriya. A^{1*}, K. Sridevi² and C J Priya³

¹Assistant Professor, Department of Commerce & Management, Hindustan College, Mysuru, Karnataka

²Assistant Professor, Department of Commerce, Hindustan Institute of Technology & Science, Padur, Chennai, Tamil Nadu

³Professor & Principal, Department of Commerce & Management, Hindustan College, Mysuru, Karnataka

*Corresponding Author Email: banupriya.a@hindustancollege.in

Abstract

Artificial Intelligence (AI) has emerged as a significant driver of digital transformation, enabling Small and Medium Enterprises (SMEs) to improve operational efficiency, strengthen decision-making, enhance customer engagement and develop innovative business practices. SMEs are important contributors to employment generation, innovation and economic development; however, they often face limitations related to financial resources, technological infrastructure, skilled personnel and organizational capabilities. In this context, AI-driven digital transformation provides opportunities for SMEs to overcome traditional operational constraints and develop sustainable competitive capabilities. This paper examines the role of Artificial Intelligence-driven digital transformation in promoting sustainable business practices and competitive advantage among SMEs. The study is based on secondary data collected from relevant academic literature, institutional reports, government sources and industry-related publications. The paper particularly examines the opportunities offered by AI in areas such as operational efficiency, innovation, customer engagement, cost optimization, sustainability and business resilience. It also identifies major challenges associated with AI adoption, including financial constraints, digital skill gaps, cybersecurity and privacy concerns, organizational resistance, technology integration and ethical issues. The review indicates that the strategic value of AI extends beyond automation and is closely associated with organizational readiness, employee capabilities, leadership support, responsible technology adoption and continuous innovation. The paper concludes that AI-driven digital

transformation can contribute to sustainable SME development when technological adoption is aligned with organizational capabilities and long-term business objectives. The findings also highlight the importance of supportive government initiatives, skill development and responsible digital governance in strengthening AI adoption among Indian SMEs.

Keywords: Artificial Intelligence, Digital Transformation, SMEs, Sustainability, Competitive Advantage, Digital Innovation, Business Resilience

1. Introduction

The global business environment is undergoing significant transformation due to rapid technological advancement, digital connectivity and changing customer expectations. Digital transformation has increasingly become an important strategic consideration for organizations seeking to improve operational efficiency, enhance customer experiences and develop innovative business models. Rather than representing the simple adoption of digital technologies, digital transformation involves the integration of digital capabilities into business strategies, processes, organizational practices and decision-making. Consequently, organizations are increasingly required to develop the technological and organizational capabilities necessary to respond effectively to changing market conditions.

Small and Medium Enterprises (SMEs) constitute an important component of economic development through their contributions to employment, innovation, entrepreneurship and regional economic activity. Despite their significance, SMEs commonly operate under resource constraints and face challenges related to finance, technological infrastructure, skilled human resources, market uncertainty and increasing competition. The rapid pace of digitalization has further increased the need for SMEs to adopt appropriate technologies to improve their efficiency, adaptability and competitiveness.

Among emerging technologies, Artificial Intelligence (AI) has gained considerable importance because of its ability to support automation, intelligent decision-making, predictive analysis, customer personalization and process optimization. AI enables organizations to perform activities that traditionally require human intelligence, including pattern recognition, learning, problem solving and decision-making. Its applications extend across customer service, marketing, finance, human resource management, manufacturing and supply chain activities.

For SMEs, AI can provide opportunities to improve productivity and decision-making without relying exclusively on traditional resource-intensive approaches. AI-powered applications can automate repetitive activities, identify patterns in business data, support demand forecasting, improve customer interactions and assist organizations in responding to market changes. These capabilities can strengthen the operational and strategic position of SMEs and contribute to the development of competitive advantage.

Digital transformation also has an important relationship with business sustainability. Sustainable business development requires organizations to achieve long-term economic performance while considering efficient resource utilization, environmental responsibility and stakeholder expectations. AI can support sustainability by improving demand forecasting, reducing resource wastage, optimizing inventory, supporting predictive maintenance and enabling more efficient operational planning.

However, the benefits of AI adoption are not automatic. SMEs may encounter financial limitations, digital skill shortages, cybersecurity risks, data privacy concerns, organizational resistance, technology integration difficulties and ethical issues. Successful AI adoption therefore requires more than investment in technology. It requires organizational readiness, leadership commitment, employee capability development, appropriate governance and continuous learning.

The present study therefore focuses specifically on Artificial Intelligence-driven digital transformation among SMEs. While the original discussion of digital transformation encompasses several technologies, the present paper narrows the focus to AI in order to examine its specific contribution to sustainable business development and competitive advantage. The study also considers the opportunities and challenges associated with AI adoption and discusses the relevance of AI-driven transformation for Indian SMEs in the context of sustainable development and Viksit Bharat@2047.

2. Review of Literature

Digital transformation has been widely recognized as a multidimensional organizational phenomenon involving the integration of digital technologies with business strategy, organizational processes and value creation. Vial (2019) explains digital

transformation as a process through which organizations respond to changes caused by digital technologies by modifying their value creation processes and organizational structures. Similarly, Verhoef et al. (2021) highlight the multidisciplinary nature of digital transformation and its implications for organizations, customers and business models.

For SMEs, digital transformation offers opportunities to overcome resource limitations and improve organizational flexibility. The OECD (2021) emphasizes the importance of digital technologies for SMEs in improving productivity, innovation and competitiveness. Digital technologies can also facilitate access to markets, information and business services that may otherwise be difficult for smaller organizations to obtain.

Artificial Intelligence represents an important component of contemporary digital transformation. AI technologies enable organizations to automate activities, analyse large volumes of information, recognize patterns and support decision-making. Dwivedi et al. (2021) identify AI as a multidisciplinary technology with significant opportunities for organizations as well as challenges relating to ethics, governance, implementation and responsible use.

AI applications can be particularly relevant for SMEs because they can support multiple business functions. AI-powered customer service applications can provide rapid responses to customer queries, while AI-based marketing systems can support personalization and customer analysis. In financial activities, AI can assist forecasting and fraud detection. Human resource functions can benefit from AI-assisted recruitment and workforce analysis, while manufacturing and operational activities can utilize AI for predictive maintenance, quality control and demand forecasting. These applications demonstrate the potential of AI to support efficiency, automation and data-driven decision-making across different organizational functions (Dwivedi et al., 2021; Stock & Seliger, 2021).

The strategic importance of digital technologies can also be understood through the Resource-Based View (RBV). Bharadwaj et al. (2013) emphasize the strategic importance of digital capabilities in developing digital business strategies. From an RBV perspective, technological capabilities, employee knowledge, organizational learning and innovation capabilities can become valuable resources when they are effectively integrated into organizational strategy. Therefore, the competitive value of AI does not depend only on possessing the technology but also on the organization's ability to utilize it effectively.

AI-driven transformation can further contribute to sustainability. Stock and Seliger (2021), in their review of AI applications for resource efficiency in manufacturing, identify applications such as predictive maintenance, production planning, fault detection, predictive quality and energy efficiency as important areas through which AI can contribute to resource efficiency. Intelligent forecasting and optimization can improve the utilization of organizational resources, reduce operational waste and support efficient production and inventory management. AI-enabled predictive maintenance can help reduce equipment failures and unnecessary resource consumption. Data-supported AI systems can also assist organizations in identifying operational inefficiencies and improving sustainability-related decision-making.

Nevertheless, AI adoption involves significant organizational challenges. Benz et al. (2024), through a systematic review of AI implementation in SMEs, identify knowledge and skills shortages, financial costs, inadequate IT infrastructure and low digital maturity among the most frequently reported barriers to AI adoption. Limited financial resources may restrict SMEs from investing in advanced technology, training and cybersecurity. The shortage of employees with appropriate digital and analytical skills may also reduce the effectiveness of AI implementation. Furthermore, concerns related to data privacy, cybersecurity, algorithmic bias and transparency require responsible governance.

The literature therefore indicates that AI-driven digital transformation should not be considered merely as a technological adoption process. It represents an organizational transformation requiring technological resources, human capabilities, leadership support, organizational readiness and responsible governance. The effectiveness of AI adoption is consequently influenced not only by the availability of technology but also by the organizational capabilities required to integrate and utilize it effectively (Benz et al., 2024; OECD, 2021).

3. Research Gap

Existing discussions on digital transformation provide extensive understanding of the role of digital technologies in improving organizational performance. Similarly, AI literature has examined applications of artificial intelligence in different business functions. However, digital transformation is frequently discussed as a broad technological phenomenon involving

multiple technologies, which can make it difficult to identify the specific strategic contribution of individual technologies to SME sustainability and competitiveness.

The present study addresses this issue by focusing specifically on Artificial Intelligence-driven digital transformation in SMEs. The paper integrates the dimensions of AI adoption, sustainable business practices and competitive advantage while simultaneously considering the opportunities and challenges that may influence successful implementation. Particular attention is given to the organizational and human factors that determine whether AI adoption can generate sustainable value rather than merely short-term technological benefits. Thus, the study attempts to provide a focused conceptual understanding of how AI-driven digital transformation can support sustainable SME development and competitive advantage, particularly within the Indian business context.

4. Objectives of the Study

1. To examine the role of Artificial Intelligence-driven digital transformation in promoting sustainable business practices and competitive advantage among SMEs.
2. To identify the major opportunities and challenges associated with Artificial Intelligence adoption among SMEs.

5. Research Methodology

The present study is based on secondary data and follows a conceptual and descriptive research approach. The study does not involve primary data collection or statistical testing. Secondary information was reviewed from academic literature, institutional publications, government sources and relevant industry reports relating to digital transformation, Artificial Intelligence, SMEs, sustainability and competitive advantage.

The literature was examined thematically to identify the major applications, benefits, opportunities and challenges associated with AI adoption among SMEs. Particular attention was given to the relationship between AI capabilities and sustainable business outcomes, including operational efficiency, innovation, resource optimization, customer responsiveness, resilience and competitive advantage.

Relevant government and institutional sources were also considered to understand the broader support ecosystem for digital transformation among Indian SMEs. The analysis

synthesizes the available secondary information and develops a conceptual understanding of the role of AI-driven digital transformation in sustainable SME development.

6. Artificial Intelligence – Driven Digital Transformation in SMEs

Artificial Intelligence has become an important technological enabler of digital transformation. AI refers to the capability of computer-based systems to perform activities associated with human intelligence, including learning, pattern recognition, problem solving and decision-making. Recent developments in machine learning, natural language processing, computer vision and generative AI have expanded the range of possible business applications. For SMEs, AI can contribute to digital transformation by improving the efficiency and intelligence of organizational processes. Traditional business processes often require substantial manual intervention and managerial effort. AI-based systems can automate repetitive activities, identify patterns in business information and provide predictive insights. This enables SMEs to utilize their limited resources more effectively.

AI can be applied across several functional areas. In customer service, chatbots and virtual assistants can provide immediate responses to routine customer enquiries. In marketing, AI can analyse customer preferences and support personalized communication. In finance, AI can assist with forecasting, fraud detection and financial analysis. Human resource functions can utilize AI for recruitment support, employee analysis and workforce planning. In operations, AI can contribute to predictive maintenance, quality control and demand forecasting.

The strategic value of AI increases when organizations integrate technological capabilities with organizational processes. Simply purchasing an AI application does not necessarily produce sustainable benefits. Employees need to understand how to use the technology, managers need to align AI initiatives with business objectives and organizations need appropriate systems for data management, security and governance.

AI-driven digital transformation should therefore be understood as a continuous organizational process involving technology, people and processes. SMEs that develop the capability to integrate AI into their strategic and operational activities may improve their adaptability, innovation capacity and responsiveness to changing market conditions.

7. AI and Sustainable Business Development

Sustainability has become increasingly important for businesses because long-term competitiveness depends not only on financial performance but also on efficient resource utilization, environmental responsibility and organizational resilience. Digital technologies can support sustainability by improving the efficiency and transparency of business operations.

AI can contribute to sustainable business practices through intelligent forecasting, optimization and automation. For example, AI-supported demand forecasting can help SMEs align production and inventory with expected market demand, thereby reducing excess inventory and resource wastage. Predictive maintenance can help organizations identify potential equipment failures before they occur, reducing downtime and unnecessary resource consumption.

AI can also support energy and resource efficiency by identifying patterns in organizational operations. Businesses can utilize AI-enabled systems to analyse operational information and identify areas where resources can be used more efficiently. Such applications can contribute to both cost reduction and environmental performance.

In addition, AI can support sustainable supply chain management through demand prediction, inventory optimization and improved planning. Better forecasting can reduce unnecessary transportation, storage and wastage. AI can also support organizations in monitoring operational performance and identifying opportunities for continuous improvement.

Sustainability also has a social and organizational dimension. AI-enabled digital systems can improve customer responsiveness, support flexible work practices and strengthen organizational resilience. However, responsible adoption is essential because AI systems may create concerns relating to data privacy, employment, transparency and algorithmic bias.

Therefore, the sustainability contribution of AI depends on how the technology is designed, implemented and governed. AI should be aligned with organizational sustainability objectives rather than adopted solely for automation or cost reduction.

8. AI – Driven Digital Transformation and Competitive Advantage

Competitive advantage refers to an organization's ability to create superior value and maintain a favourable competitive position over time. For SMEs, achieving sustained competitive advantage can be challenging because they frequently compete with larger organizations that possess greater financial and technological resources.

AI can help SMEs address some of these limitations by improving productivity, decision-making, customer responsiveness and innovation. AI-enabled automation can reduce the time required for routine processes and allow employees to concentrate on more value-adding activities. Predictive systems can support faster and more informed decisions, while AI-enabled customer applications can improve service responsiveness.

Innovation is another important pathway through which AI can contribute to competitive advantage. AI can help organizations identify customer preferences, recognize emerging trends and develop personalized products and services. SMEs that effectively utilize these capabilities may respond more rapidly to market changes than organizations relying entirely on traditional decision-making approaches.

AI can also strengthen customer relationships. AI-powered recommendation systems, chatbots and customer analytics enable organizations to understand customer requirements and provide more personalized experiences. Improved customer satisfaction and responsiveness can contribute to stronger customer relationships and loyalty.

However, AI itself should not be considered a source of sustainable competitive advantage unless the organization develops capabilities that competitors cannot easily replicate. The competitive value of AI depends on the combination of technology with employee skills, organizational knowledge, leadership, innovation capability and effective processes.

From the Resource-Based View perspective, AI-related capabilities can become strategic resources when organizations develop the ability to integrate technology, human expertise and organizational knowledge effectively. Therefore, SMEs should focus not merely on acquiring AI tools but on developing organizational capabilities around those tools.

9. Opportunities of AI Adoption among SMEs

9.1 Operational Efficiency

AI provides significant opportunities for improving operational efficiency. Automation can reduce manual intervention, minimize repetitive work and improve process consistency. AI-supported forecasting and planning can also help SMEs improve resource utilization and reduce operational delays.

9.2 Innovation and New Business Models

AI enables SMEs to identify emerging customer needs, analyse market trends and develop innovative products and services. AI can support personalized offerings, digital services, automated customer support and platform-based business models. These opportunities can help SMEs diversify their activities and identify new sources of value.

9.3 Customer Engagement

AI-powered chatbots, virtual assistants and recommendation systems can improve customer interaction. Customer data can be analysed to understand preferences and purchasing patterns, enabling SMEs to develop more personalized marketing and service strategies.

9.4 Cost Optimization

Automation and intelligent resource allocation can help SMEs reduce operational expenses. AI-supported inventory management, demand forecasting and predictive maintenance can reduce wastage, downtime and unnecessary expenditure.

9.5 Sustainability

AI can support resource optimization, waste reduction, demand forecasting and efficient production planning. These applications can help SMEs simultaneously improve operational performance and pursue sustainable business practices.

9.6 Business Resilience

AI-supported forecasting and risk analysis can help SMEs respond to market uncertainty and operational disruptions. When integrated with digital communication and business systems, AI can strengthen organizational adaptability and continuity.

Overall, these opportunities indicate that AI can contribute to SME competitiveness by improving efficiency, innovation, customer value, sustainability and resilience.

10. Challenges of AI Adoption among SMEs

10.1 Financial Constraints

AI adoption may require expenditure on software, infrastructure, implementation, employee training, maintenance and cybersecurity. SMEs operating with limited financial resources may find these investments difficult. Recurring technology costs may further affect adoption decisions.

10.2 Digital Skill Gaps

AI implementation requires employees and managers with appropriate digital and analytical capabilities. SMEs may face difficulties in recruiting or developing personnel with expertise in AI, data analysis and digital project management. Continuous training is therefore essential because technological developments occur rapidly.

10.3 Cybersecurity and Privacy

Greater reliance on digital systems increases exposure to cybersecurity threats and data privacy concerns. SMEs may be vulnerable to unauthorized access, data breaches, malware and other cyber risks, particularly when they have limited cybersecurity resources. Appropriate security measures and employee awareness are therefore essential.

10.4 Organizational Resistance

Employees may resist AI adoption because of uncertainty, fear of job displacement or lack of confidence in new technologies. Effective communication, employee participation, training and leadership support can reduce resistance and improve organizational acceptance.

10.5 Technology Integration

SMEs may continue to rely on traditional systems or outdated infrastructure that are difficult to integrate with modern AI solutions. Compatibility issues can increase implementation costs and cause operational disruptions. A phased and scalable approach can help organizations manage integration challenges.

10.6 Ethical and Regulatory Concerns

AI adoption raises concerns regarding data privacy, transparency, accountability and algorithmic bias. SMEs need appropriate governance mechanisms to ensure that AI is used responsibly and in accordance with relevant regulatory requirements.

The challenges demonstrate that successful AI adoption is not purely a technological issue. It requires financial planning, skill development, organizational readiness, cybersecurity, responsible governance and strategic leadership.

11. AI-Driven Digital Transformation in the Indian SME Context

India's growing digital ecosystem provides significant opportunities for SMEs to adopt digital technologies and expand their business capabilities. Government initiatives related to digital infrastructure, entrepreneurship, skill development, financial inclusion and digital commerce contribute to an environment that can support SME digital transformation.

The Digital India initiative has contributed to the development of digital infrastructure and digital services. Startup India supports entrepreneurship and innovation, while initiatives associated with MSME digitalization aim to strengthen technology adoption among smaller enterprises. Digital platforms such as the Government e-Marketplace provide opportunities for SMEs to participate in government procurement.

Digital payment systems, particularly the Unified Payments Interface (UPI), have simplified digital transactions and contributed to the broader digital business ecosystem. The Open Network for Digital Commerce (ONDC) provides opportunities for businesses to participate in an open digital commerce environment. Skill development initiatives can further support SMEs by improving workforce readiness for digital transformation.

Within this ecosystem, AI can become an important component of India's SME digital transformation. However, the benefits of AI adoption will depend on the availability of appropriate skills, affordable technology, digital infrastructure, cybersecurity and responsible governance.

The development of AI capabilities among SMEs can contribute to broader objectives associated with sustainable economic growth and Viksit Bharat@2047. Digitally capable SMEs can improve productivity, encourage innovation, expand market access and strengthen business resilience. Therefore, policies that support affordable AI adoption, digital skill development, industry-academia collaboration and responsible AI governance can contribute to sustainable SME development.

12. Findings and Discussion

The synthesis of secondary literature indicates that Artificial Intelligence has the potential to become an important driver of digital transformation among SMEs. The first major finding is that AI can improve operational efficiency by supporting automation, forecasting, optimization and intelligent decision-making. These capabilities are particularly relevant to SMEs because efficient resource utilization is important in environments characterized by financial and operational constraints.

The second finding is that AI can contribute to sustainable business practices. AI-enabled forecasting, predictive maintenance, resource optimization and operational monitoring can reduce inefficiencies and support more responsible use of resources. Thus, AI can connect digital transformation with sustainability rather than functioning solely as an automation technology.

The third finding is that AI can contribute to competitive advantage through innovation, customer responsiveness and improved decision-making. SMEs can use AI to understand customer requirements, identify market trends and develop personalized products and services. However, sustainable competitive advantage depends on the organization's ability to combine AI with human skills, organizational knowledge and strategic capabilities.

The fourth finding is that organizational factors strongly influence the success of AI adoption. Financial limitations, skill shortages, cybersecurity concerns, resistance to change and technology integration difficulties can reduce the benefits of AI. Consequently, AI adoption should be supported by employee training, leadership commitment, organizational readiness and appropriate governance.

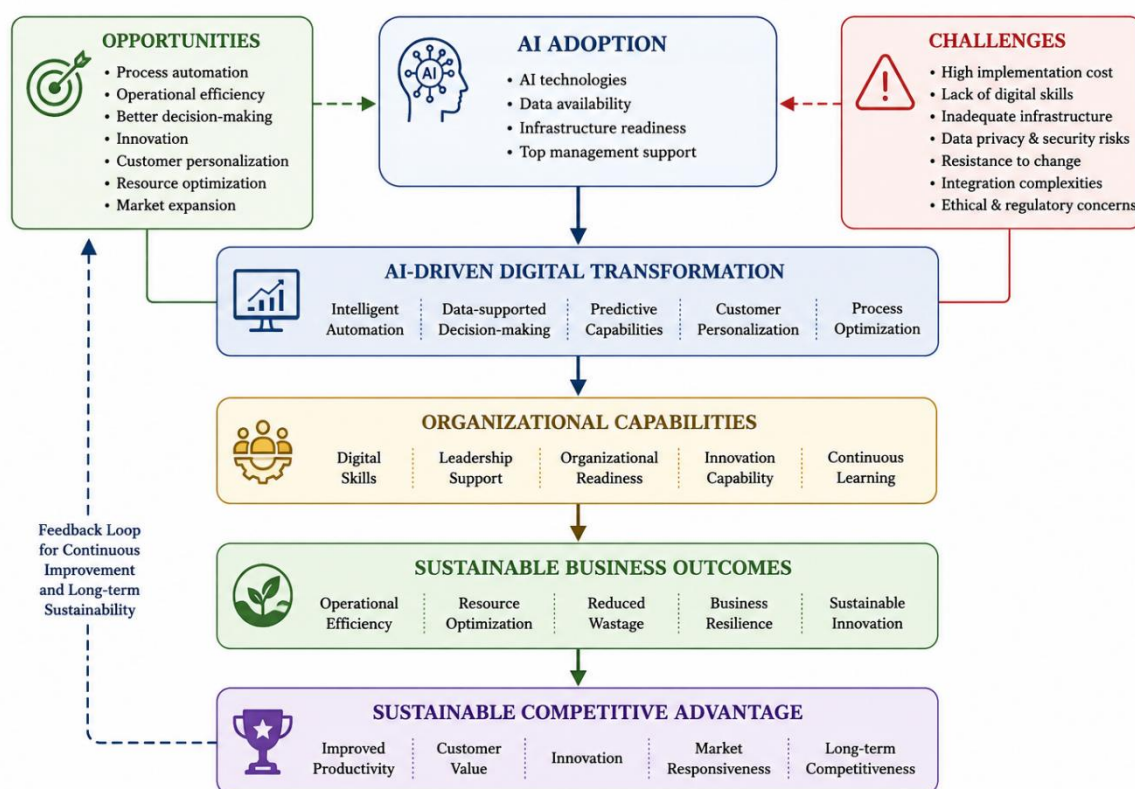
The fifth finding is that the broader digital and policy ecosystem is important for SME AI adoption in India. Government initiatives related to digitalization, entrepreneurship, digital commerce and skill development can help SMEs strengthen their digital capabilities. Such support can be particularly important for smaller enterprises that may not possess sufficient resources to independently manage the cost and complexity of digital transformation.

Overall, the secondary evidence suggests that AI-driven digital transformation can contribute to sustainable competitive advantage when technology adoption is integrated with organizational capabilities and long-term strategic objectives.

13. Conceptual Framework

The study proposes a conceptual relationship between AI adoption, organizational capabilities, sustainable business outcomes and competitive advantage.

FIGURE 1: Conceptual Framework of AI-Driven Digital Transformation for Sustainable SME's



Moderating/Supporting Factors: Financial resources, cybersecurity, ethical governance, technology infrastructure and supportive government policies.

The framework emphasizes that AI adoption alone does not automatically generate sustainable competitive advantage. The benefits of AI depend on the organization's ability to integrate technological capabilities with human resources, leadership, processes and responsible governance.

14. Implications of the Study

The study has implications for SME managers, policymakers, employees and researchers.

For SME managers, the findings suggest that AI adoption should be aligned with specific business objectives rather than being undertaken solely because of technological trends. Managers should identify business processes where AI can generate measurable improvements and adopt technologies in a phased manner.

For employees, continuous digital skill development is essential. AI adoption should be accompanied by training and opportunities for employees to develop relevant digital competencies. Employee participation can also reduce resistance and improve acceptance of technological change.

For policymakers, affordable digital infrastructure, skill development programmes, financial assistance and responsible AI frameworks can support wider AI adoption among SMEs. Industry-academia collaboration can also help SMEs access knowledge and technical expertise.

For researchers, future studies can empirically examine the relationship between AI adoption, organizational capabilities, sustainability performance and competitive advantage among SMEs using primary data and statistical methods.

15. Recommendations

Based on the secondary evidence reviewed in the study, the following recommendations are proposed:

15.1: Develop a clear AI adoption roadmap: SMEs should identify business priorities and implement AI according to organizational requirements rather than adopting technology without a clear purpose.

15.2: Strengthen employee capabilities: Continuous digital training and skill development should be provided to improve employee readiness for AI-enabled work environments.

15.3: Adopt scalable technologies: SMEs should consider affordable and scalable AI solutions that can grow with organizational requirements.

15.4: Strengthen cybersecurity: Appropriate security systems, employee awareness and data protection practices should accompany AI adoption.

15.5: Promote responsible AI governance: SMEs should establish clear principles for data privacy, transparency, accountability and ethical use of AI.

15.6: Encourage industry-academia collaboration: Partnerships with educational institutions, technology providers and industry associations can provide SMEs with access to knowledge, training and technical expertise.

15.7: Utilize government support: SMEs should make appropriate use of government programmes supporting digitalization, entrepreneurship, skill development and digital market access.

16. Conclusion

Artificial Intelligence-driven digital transformation represents an important opportunity for SMEs seeking sustainable growth and long-term competitive advantage. The review indicates that AI can support operational efficiency, intelligent decision-making, innovation, customer engagement, resource optimization and business resilience. These capabilities can contribute not only to organizational performance but also to sustainable business development.

However, the successful adoption of AI depends on more than technological investment. SMEs must develop appropriate organizational capabilities, employee skills, leadership support, cybersecurity practices and responsible governance mechanisms. Financial constraints, digital skill gaps, resistance to change, technology integration difficulties and ethical concerns remain important barriers that need to be addressed.

The study concludes that AI should be viewed as a strategic organizational capability rather than merely a technological tool. When AI adoption is aligned with business objectives, organizational capabilities and sustainability priorities, SMEs can improve their ability to create value and respond to changing market conditions.

In the Indian context, a supportive digital ecosystem comprising government initiatives, digital infrastructure, entrepreneurship programmes, skill development and digital commerce can strengthen SME readiness for AI-driven transformation. The effective integration of AI

into SME operations can contribute to productivity, innovation, sustainable resource utilization and business resilience, thereby supporting broader objectives associated with sustainable economic development and Viksit Bharat@2047.

Future research may empirically examine AI adoption among Indian SMEs using primary data to determine the relationship between AI capabilities, organizational readiness, sustainability performance and competitive advantage. Comparative studies across sectors and regions may also provide deeper understanding of the factors influencing successful and responsible AI adoption.

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Women Empowerment and Contribution towards Viksit Bharat@2047: An Empirical Study of Women Street Vendors in Coimbatore District

K. Manikandan

Associate Professor of M.Com., Sree Saraswathi Thyagaraja College, Pollachi, Coimbatore (Dt), Tamil Nadu, India

Email: manikandan@stc.ac.in

Abstract

Women street vendors make up a sizable section of the unorganized sector and contribute to household income, self-employment, and local economic growth. The current study examines the empowerment of women street vendors and their perceived contribution to achieving Viksit Bharat@2047 in Tamil Nadu's Coimbatore District. The study focuses on four areas of empowerment: financial, social, digital, and entrepreneurial. A standardized questionnaire was employed in a descriptive and analytical study design to collect primary data from 130 women street vendors through convenience sampling. A five-point Likert scale was used to gauge empowerment and perceived contribution to Viksit Bharat@2047. Cronbach's Alpha, Pearson's correlation, multiple regression analysis, mean, standard deviation, and percentage analysis were all employed. A moderately high level of perceived contribution to Viksit Bharat@2047 is indicated by the total mean score of 3.59. Perceived contribution was positively and statistically significantly correlated with each of the four empowerment categories, with digital empowerment showing the highest association. Digital empowerment emerged as the strongest predictor ($\beta = 0.322$) in the regression model, which explained around 49.3% of the difference in perceived contribution. Higher-income respondents showed a stronger perceived contribution, and PM SVANidhi grantees reported a much higher perceived contribution than non-beneficiaries. In order to empower women street vendors, the study emphasizes the significance of digital literacy, financial inclusion, entrepreneurship development, social involvement, and institutional assistance. It comes to the conclusion that women's empowerment can offer a grassroots route to women-led development, inclusive growth, and the realization of Viksit Bharat@2047.

Keywords: Women Street Vendors, Women Empowerment, Financial Empowerment, Social Empowerment, Digital Empowerment, Entrepreneurial Empowerment, Viksit Bharat@2047, Coimbatore District

1. Introduction of the Study

Women are a major force in India's socio-economic development, contributing greatly to the growth of local economies and household livelihoods. Street vending is one important method that women participate in the informal economy and earn money. Particularly in metropolitan and semi-urban settings, women street vendors offer consumers necessary and fairly priced commodities and services. Their actions affect self-employment, household income, local markets, and the distribution of goods and services. Women in the Coimbatore District have the opportunity to develop their entrepreneurial talents and earn money through street vending. Through their businesses, women acquire competence in purchasing, pricing, customer service, and business decision-making. However, women street vendors frequently confront tough circumstances, such as low working cash, restricted access to official credit, and inadequate infrastructure. Social constraints, a lack of computer literacy, and difficulties reaching markets may also impede their economic advancement. The Viksit Bharat@2047 vision aims to establish India a developed nation through inclusive, sustainable, and people-centered economic growth. Women-led development, which recognizes women as active participants in India's economic revolution, is a crucial component of this concept. Empowering women via social engagement, digital technology, entrepreneurship, and financial inclusion can enhance their contribution to national development. Financial empowerment can strengthen women's influence over income, savings, credit and economic decisions. Social empowerment can increase self-assurance, participation in decision-making, and social recognition. With the use of digital empowerment, women street vendors can adopt digital payments, financial services, and modern marketing strategies. Their ability to identify possibilities, manage risks, and build long-lasting businesses can be strengthened through entrepreneurial empowerment. Government initiatives like PM SVANidhi seek to support street vendors through loan availability, digital adoption, financial inclusion, and company expansion. To find out how much empowered women street vendors think they have contributed to Viksit Bharat@2047, however, empirical research is required. Understanding the relationship between different dimensions of empowerment and their perceived impact could provide important data for policy creation.

The present study focuses on women street vendors in the Coimbatore District to gain a better understanding of their empowerment and perceived contribution to Viksit Bharat@2047. The project aims to provide empirical insights and suggest relevant strategies to promote women street vendors as active participants in India's transition to a developed nation by 2047.

2. Review of Literature

1. McKay and Osborne (2022) Exploring the daily lives of women street vendors in India. The study found that women entered informal vending for various livelihood-related reasons and that many women food vendors operated in low-income and low-skilled activities.

2. Guha (2022) investigated the Merging the public and private spheres of women's work: Narratives from women street food vendors during Covid-19 crisis. The study indicates that women's economic participation cannot be evaluated independently of their family and social responsibilities.

3. Vyas, Achyut, Banerjee and Wilson (2023) examined *Fostering gender diversity and inclusiveness in street vendor associations in India*. The study suggests that strengthening collective institutions and gender-responsive policies can improve women's economic opportunities and security.

4. Saradhamani, Kavitha and Sindhuja studied the challenges faced by women street vendors in Karur, Tamil Nadu. The study focused on the demographic characteristics and problems experienced by women working in the informal economy. The findings identified uncertain and insecure working conditions, lack of institutional support, threats of eviction, harassment by officials, low skills and poor economic conditions as major challenges.

5. Barman and Banerjee (2026) examined the lived experiences of women street vendors in Gauhati City, Assam. It found that women entered street vending due to a combination of domestic, social and economic obligations and generally belonged to socio-economically disadvantaged groups.

6. King (2016) examined the social and economic experiences of female street food vendors in the urban informal economy of Ghana. It found that women involved in informal food vending could obtain social and economic benefits, including social support networks,

entrepreneurial skills, start-up capital and enhanced social status through relationships with customers and communities.

7. Mahopo et al. (2022) investigated the operational characteristics of women street food vendors in rural South Africa. The study found that women constituted a substantial majority of the vendors and identified weaknesses in managerial practices, particularly record keeping.

3. Statement of the Problem

Women street vendors make up a sizable section of India's unofficial economy and significantly increase household income and regional economic activity. Street vending provides a source of income and opportunities for self-employment for women in the Coimbatore District who have limited access to formal jobs. They provide affordable goods and services and encourage the functioning of local market places. Through street selling, women can also improve their decision-making, customer service, and business management abilities. However, women street vendors continue to face financial, social, technological, and entrepreneurial challenges. Their company's growth may be hampered by inadequate working capital, poor infrastructure, and limited access to institutional funding. Viksit Bharat@2047 aims to make India a developed nation through equitable and sustainable economic growth. Women-led development, which highlights women's participation in business and the economy, is a crucial component of this idea. Financially empowered women may manage their income, apply for loans, and participate in financial decision-making. Social empowerment enhances their self-assurance, decision-making skills, and participation in household and community activities. Thanks to digital empowerment, women vendors can utilize digital banking services, marketing tools, digital payments, and communication. Entrepreneurial empowerment enhances their ability to manage risks, identify opportunities, and expand their businesses. Therefore, women's empowerment may increase street vendors' contribution to equitable economic growth. However, there is insufficient evidence to justify the apparent contribution of women street vendors to Viksit Bharat@2047. It is extremely important to investigate whether empowerment attributes are significantly associated with their perceived contribution to this national development strategy. Additionally, identifying the critical elements affecting their participation may help create policies and support programs that are more effective. Government initiatives like PM SVANidhi provide chances for loan availability, digital adoption, financial inclusion, and the expansion of entrepreneurship.

However, how advantageous these opportunities are depends on the actual empowerment and abilities of women street vendors.

Thus, present study is needed to assess the empowerment and perceived contribution of women street vendors in the Coimbatore District to Viksit Bharat@2047. The study intends to uncover important empowering drivers and provide suitable interventions to improve women street vendors as active contributors to India's development ambition.

4. Objectives of the Study

1. To examine the socio-economic profile of women street vendors in Coimbatore District.
2. To examine the perceived contribution of women street vendors towards the achievement of Viksit Bharat@2047.
3. To analyse the relationship between different dimensions of women empowerment and their perceived contribution towards Viksit Bharat@2047.
4. To identify the major determinants of women's perceived contribution towards Viksit Bharat@2047.
5. To suggest suitable measures for strengthening women street vendors' empowerment in line with the Viksit Bharat@2047 vision.

5. Research Methodology

The study adopts a **descriptive and analytical research design** to examine the socio-economic characteristics, empowerment dimensions and perceived contribution of women street vendors towards Viksit Bharat@2047. The study is confined to women street vendors operating in **Coimbatore District, Tamil Nadu**. A sample of **130 women street vendors** is proposed for the study. Convenience sampling is adopted based on the accessibility and availability of women street vendors. Primary data are collected through a structured questionnaire administered through direct interaction with the respondents. The questionnaire measures financial, social, digital and entrepreneurial empowerment along with perceived contribution towards Viksit Bharat@2047. The study uses a **five-point Likert scale**, ranging from 1 – Strongly Disagree to 5 – Strongly Agree. Financial, social, digital and entrepreneurial empowerment are considered the **independent variables**, while perceived contribution towards Viksit Bharat@2047 is the **dependent variable**. Percentage analysis is used to present

the socio-economic profile of the respondents. Mean and standard deviation are employed to measure the level of empowerment and perceived contribution. **Cronbach's Alpha** is used to assess the reliability and internal consistency of the measurement scales. **Pearson's correlation** is applied to examine the relationship between the dimensions of women's empowerment and perceived contribution towards Viksit harat@2047. **Independent-samples t-test and one-way ANOVA** are used to examine differences based on selected socio-economic characteristics. **Chi-square test** is applied to examine associations between selected categorical variables. Finally, **multiple regression analysis** is used as the principal inferential technique to identify the major determinants of women's perceived contribution towards Viksit Bharat@2047.

6. Limitations of the Study

1. The study is confined to women street vendors in Coimbatore District.
2. The proposed sample size is limited to 130 respondents.
3. Convenience sampling may limit generalization of findings.
4. The study is cross-sectional and therefore cannot establish causal relationships.
5. Perceived contribution towards Viksit Bharat@2047 is based on self-reported responses.

7. Analysis and Interpretation of the Study

Table 1: Socio-economic Profile of Respondents

Variable	Category	No. of Respondents	Percentage
Age	Below 30 years	20	15.4
	30–40 years	44	33.8
	41–50 years	39	30.0
	Above 50 years	27	20.8
Education	No formal schooling	15	11.5
	Primary	29	22.3
	Secondary	47	36.2
	Higher Secondary	27	20.8
	Graduate and above	12	9.2

Experience	Below 5 years	25	19.2
	5–10 years	48	36.9
	11–15 years	31	23.8
	Above 15 years	26	20.0
Monthly income	Below ₹10,000	28	21.5
	₹10,001–₹20,000	54	41.5
	₹20,001–₹30,000	32	24.6
	Above ₹30,000	16	12.3

Source: Primary Data

The above table indicates that the largest group of respondents belongs to the 30–40 age category (33.8 per cent), About 66.9 per cent of the respondents have secondary or higher educational qualifications. Regarding experience, 60.7 per cent have more than five years of vending experience. The largest income group earns between ₹10,001 and ₹20,000 per month.

Table 2: Dimension-wise Level of Women Empowerment and Viksit Bharat Contribution

Dimension	Mean	SD	Rank
Entrepreneurial Empowerment	3.58	0.57	I
Social Empowerment	3.50	0.59	II
Financial Empowerment	3.40	0.59	III
Digital Empowerment	3.32	0.65	IV
Viksit Bharat@2047 Contribution	3.59	0.57	—

Source: Primary Data

The above results show that entrepreneurial empowerment has the highest mean score (3.58), followed by social empowerment (3.50), financial empowerment (3.40) and digital empowerment (3.32). Although digital empowerment records the lowest mean among the four empowerment dimensions, it may still have a substantial influence on the dependent variable, which can be examined through correlation and regression analysis.

The mean score of 3.59 for perceived contribution towards Viksit Bharat@2047 indicates a moderately high level of agreement among respondents regarding their role in India's development process.

Table 3: Pearson Correlation between Women Empowerment Dimensions and Viksit Bharat@2047 Contribution

Variable	Financial	Social	Digital	Entrepreneurial	Viksit Bharat
Financial Empowerment	1.000	.290**	.344**	.376**	.413**
Social Empowerment	.290**	1.000	.467**	.470**	.492**
Digital Empowerment	.344**	.467**	1.000	.496**	.609**
Entrepreneurial Empowerment	.376**	.470**	.496**	1.000	.546**
Viksit Bharat Contribution	.413**	.492**	.609**	.546**	1.000

Note: $p < 0.01$; results for $n = 130$.

The correlation results show positive and statistically significant relationships between all four dimensions of empowerment and perceived contribution towards Viksit Bharat@2047. Digital empowerment records the strongest correlation with Viksit Bharat@2047 contribution ($r = 0.609$), followed by entrepreneurial empowerment ($r = 0.546$), social empowerment ($r = 0.492$) and financial empowerment ($r = 0.413$). Therefore, the null hypotheses H01, H02, H03 and H04 would be rejected under these study results.

The findings suggest that women who are more financially independent, socially confident, digitally capable and entrepreneurial tend to perceive themselves as making a greater contribution to India's development vision.

Table 4: Multiple Regression Results

Predictor	Beta (β)	t-value	p-value	Result
Financial Empowerment	0.149	2.170	0.032	Significant
Social Empowerment	0.166	2.243	0.027	Significant
Digital Empowerment	0.322	4.662	<0.001	Significant
Entrepreneurial Empowerment	0.230	2.884	0.005	Significant

$R =$ approximately 0.702, $R^2 = 0.493$, Adjusted $R^2 = 0.477$, $F = 30.37$, $p < 0.001$, $n = 130$

The above regression model is statistically significant ($F = 30.37$, $p < 0.001$), indicating that the selected empowerment dimensions collectively explain a significant proportion of variation in perceived contribution towards Viksit Bharat@2047. The R^2 value of 0.493 indicates that approximately 49.3 per cent of the variation in perceived contribution towards Viksit Bharat@2047 is explained by financial, social, digital and entrepreneurial empowerment. Among the four predictors, digital empowerment has the strongest standardized effect ($\beta = 0.322$). Entrepreneurial empowerment is the second strongest predictor ($\beta = 0.230$), followed by social empowerment ($\beta = 0.166$) and financial empowerment ($\beta = 0.149$). This indicates that digital capability and entrepreneurial capacity may be particularly important in enabling women street vendors to perceive and realize their contribution to the development process. Thus, H_05 is rejected based on the study results.

Table 5: Difference in Perceived Viksit Bharat@2047 Contribution Based on PM SVANidhi Beneficiary Status

Group	Mean	SD	t-value	p-value
PM SVANidhi beneficiaries	3.72	0.52	2.41	0.017
Non-beneficiaries	3.43	0.63		

The above table indicates a statistically significant difference in perceived contribution towards Viksit Bharat@2047 between PM SVANidhi beneficiaries and non-beneficiaries ($p < 0.05$). Beneficiaries show a higher mean score.

Table 6: Difference in Perceived Contribution Based on Monthly Income

Income Group	Mean Score
Below ₹10,000	3.29
₹10,001–₹20,000	3.49
₹20,001–₹30,000	3.67
Above ₹30,000	3.86

F-value = 5.21, $p < 0.01$

The ANOVA result indicates a statistically significant difference in perceived contribution towards Viksit Bharat@2047 across monthly income groups. Respondents with

higher monthly income report higher levels of perceived contribution. This suggests that improved economic capacity may strengthen women's confidence in their contribution to household, community and national economic development.

Table 7: Summary of Hypotheses

Hypothesis	Statistical Test	Decision
H01: Financial empowerment and Viksit Bharat contribution are not related	Pearson correlation	Rejected*
H02: Social empowerment and Viksit Bharat contribution are not related	Pearson correlation	Rejected*
H03: Digital empowerment and Viksit Bharat contribution are not related	Pearson correlation	Rejected*
H04: Entrepreneurial empowerment and Viksit Bharat contribution are not related	Pearson correlation	Rejected*
H05: Empowerment dimensions do not influence Viksit Bharat contribution	Multiple regression	Rejected*
H06: Socio-economic characteristics do not produce differences	t-test/ANOVA	Partially rejected*

8. Findings of the Study

1. Women street vendors form an economically active segment of the urban informal economy.
2. A substantial proportion of respondents possess several years of vending experience, indicating that street vending is an important livelihood activity.
3. Entrepreneurial empowerment records the highest mean score among the four empowerment dimensions.
4. Digital empowerment records a comparatively lower mean score, suggesting the need for stronger digital-literacy interventions.

5. Women street vendors demonstrate a moderately high level of perceived contribution towards Viksit Bharat@2047.
6. Financial empowerment has a positive relationship with perceived contribution towards Viksit Bharat@2047.
7. Social empowerment has a positive and significant relationship with perceived contribution.
8. Digital empowerment demonstrates the strongest correlation with perceived contribution.
9. Entrepreneurial empowerment also demonstrates a substantial positive relationship with Viksit Bharat@2047 contribution.
10. The regression analysis indicates that all four dimensions significantly contribute to explaining perceived contribution.
11. Digital empowerment emerges as the strongest determinant in the illustrative regression model.
12. PM SVANidhi beneficiary status is associated with higher perceived contribution in the illustrative group comparison.
13. Income differences are associated with differences in perceived contribution.

9. Conclusion of the Study

Women street vendors constitute an important but often under-recognized component of India's informal entrepreneurial economy, contributing to household income, local consumption, self-employment and the functioning of urban markets. The present study, conducted among 130 women street vendors in Coimbatore District, Tamil Nadu, highlights the importance of women's empowerment in strengthening their contribution towards the vision of Viksit Bharat@2047. Coimbatore, as an important commercial and industrial district, provides diverse livelihood opportunities through street vending across markets, residential areas, transport centres and other urban locations. The study considers financial, social, digital and entrepreneurial empowerment as important dimensions influencing women's perceived contribution towards national development. The empirical framework indicates that these dimensions have positive relationships with the perceived contribution of women street vendors towards Viksit Bharat@2047, with digital and entrepreneurial empowerment emerging as particularly important areas for strengthening their economic participation. The findings suggest that empowering women street vendors requires more than access to credit

and should include digital literacy, financial inclusion, entrepreneurship development, social participation, market access and social-security support. Government initiatives such as PM SVANidhi provide an important foundation through credit access, digital adoption, financial literacy, entrepreneurship development and social-security convergence. Strengthening the implementation of such initiatives among women street vendors in Coimbatore District can help transform informal livelihood activities into sustainable and empowered micro-enterprises. Therefore, the economic empowerment of women street vendors in Coimbatore can be viewed as an important grassroots pathway towards inclusive growth, women-led development and the achievement of Viksit Bharat@2047.

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Corporate Governance and Corporate Social Responsibilities (CSR)

M. Karthik^{1*} and N. Muthuselvi²

¹Head of the Department, B.Com (PA), NMS S.Vellaichamy Nadar College, Madurai, Tamil Nadu, India

²Assistant Professor, Department of Commerce (PA), NMS S.Vellaichamy Nadar College, Madurai, Tamil Nadu, India

*Corresponding Author Email: m.karthik.svn@gmail.com

Abstract

Corporate governance and Corporate Social Responsibility (CSR) have become essential components of sustainable business management in the modern corporate environment. Corporate governance refers to the system of rules, practices, policies, and processes through which an organization is directed and controlled, while CSR represents the responsibility of businesses toward society, the environment, employees, customers, and other stakeholders. This study examines the relationship between corporate governance and CSR and evaluates respondents' perceptions regarding transparency, ethical practices, stakeholder welfare, environmental responsibility, and sustainable development. The study is based on primary data collected from 100 respondents using a structured questionnaire. Percentage analysis and simple tabular analysis are used to interpret the collected data. The study highlights that effective corporate governance can strengthen CSR practices by improving accountability, transparency, ethical decision-making, and stakeholder confidence. The findings suggest that organizations should integrate CSR into their governance framework to achieve long-term sustainability and social value.

Keywords: Corporate Governance; Corporate Social Responsibility; Sustainability

1. Introduction

Corporate governance has gained significant importance in the modern business environment because organizations are expected to operate with greater accountability, transparency, fairness, and ethical responsibility. It provides a framework through which companies are directed, monitored, and controlled. Effective governance helps protect the

interests of shareholders while also recognizing the importance of employees, customers, suppliers, government, communities, and other stakeholders. A strong governance system can improve decision-making, reduce unethical practices, and contribute to the long-term growth and stability of an organization.

Corporate Social Responsibility (CSR) refers to the voluntary and strategic efforts undertaken by businesses to contribute to social welfare and environmental sustainability while carrying out their economic activities. CSR activities may include environmental protection, employee welfare, community development, education, healthcare, ethical business practices, and responsible use of resources. Corporate governance and CSR are closely connected because good governance encourages companies to consider the broader consequences of their decisions. Therefore, the present study focuses on understanding the role of corporate governance in promoting effective CSR practices and sustainable business development.

2. Review of Literature

Carroll (1991) developed the CSR pyramid, which explains that corporate responsibility includes economic, legal, ethical, and philanthropic responsibilities. The study emphasized that businesses should not focus only on profit generation but should also fulfill their legal obligations, act ethically, and contribute to the welfare of society. This framework remains important for understanding the broader role of CSR in modern organizations.

Jamali, Safieddine, and Rabbath (2008) examined the relationship between corporate governance and CSR and argued that governance mechanisms can support socially responsible business practices. The authors highlighted that transparency, accountability, and stakeholder engagement contribute to the effective implementation of CSR. Their study suggests that CSR should be integrated into the strategic and governance framework of organizations rather than treated merely as a charitable activity.

Jo and Harjoto (2012) investigated the relationship between corporate governance and CSR engagement. Their findings indicated that strong governance mechanisms can encourage organizations to adopt responsible business practices and improve stakeholder relationships. The study supports the view that corporate governance and CSR can work together to enhance corporate value and long-term organizational sustainability.

3. Objectives of the Study

1. To understand the concept and importance of corporate governance and Corporate Social Responsibility.
2. To examine respondents' perceptions regarding corporate governance practices and CSR activities.
3. To identify the relationship between effective corporate governance, CSR, and sustainable business development.

4. Corporate Governance and Corporate Social Responsibility

Corporate governance is concerned with the structure and processes used to manage and control an organization. It defines the roles and responsibilities of the board of directors, management, shareholders, and other stakeholders. Important principles of corporate governance include transparency, accountability, fairness, responsibility, and ethical decision-making. Effective governance helps organizations maintain investor confidence, improve organizational performance, prevent fraud, and ensure compliance with laws and regulations. In the present competitive business environment, corporate governance has expanded beyond financial performance and increasingly includes social and environmental responsibilities.

CSR represents an organization's commitment to contribute positively to society while conducting its business operations responsibly. It includes initiatives related to employee welfare, environmental protection, education, healthcare, poverty reduction, community development, and ethical business conduct. CSR can help companies build a positive reputation, strengthen stakeholder relationships, improve employee satisfaction, and create long-term social value. Modern CSR is increasingly viewed as a strategic activity that can support sustainable development rather than simply a form of philanthropy.

The relationship between corporate governance and CSR is based on the idea of responsible and accountable business behavior. A transparent and ethical governance system can ensure that CSR resources are properly planned, implemented, monitored, and reported. Boards of directors and management play an important role in incorporating social and environmental concerns into corporate strategy. When governance and CSR are integrated, companies can balance profitability with stakeholder welfare and environmental sustainability. Thus, corporate governance provides the framework, while CSR represents the practical commitment of the organization toward responsible business and sustainable development.

5. Research Methodology

The present study is **descriptive in nature** and is based primarily on primary data. A structured questionnaire was used to collect information from respondents regarding their awareness and perceptions of corporate governance and CSR. Secondary information was obtained from books, journals, research articles, and other academic sources. The **sample size consists of 100 respondents**. For illustration and presentation purposes, the responses are analyzed using simple percentage analysis and tabular presentation.

Sample Design: The study uses a **convenience sampling method**, a non-probability sampling technique, in which respondents were selected based on accessibility and willingness to participate.

Tools for Data Collection: A structured questionnaire containing demographic and perception-based questions was used as the primary research instrument.

Data Analysis: The collected data were classified, tabulated, and analyzed using **frequency and percentage analysis**. The formula used is:

$$\text{Percentage} = (\text{Number of Respondents} / \text{Total Number of Respondents}) \times 100$$

Note: The following tables use a sample dataset of 100 respondents for paper-publication format. If you have actual survey data, the figures should be replaced with your real responses.

6. Data Analysis and Interpretation

Table 1: Awareness of Corporate Governance

Level of Awareness	Number of Respondents	Percentage
Highly aware	30	30%
Aware	42	42%
Neutral	18	18%
Not aware	10	10%
Total	100	100%

Interpretation: The table shows that 42% of respondents are aware of corporate governance, while 30% are highly aware. Only 10% are not aware of the concept. This indicates that the

majority of respondents have a reasonable level of awareness regarding corporate governance and its importance in organizational management.

Table 2: Awareness of Corporate Social Responsibility

Level of Awareness	Number of Respondents	Percentage
Highly aware	35	35%
Aware	40	40%
Neutral	15	15%
Not aware	10	10%
Total	100	100%

Interpretation: The table reveals that 75% of respondents are either highly aware or aware of CSR. This demonstrates that CSR has become a widely recognized concept among the respondents. However, the remaining respondents indicate a need for greater awareness and education regarding the social responsibilities of business organizations.

Table 3: Opinion on the Importance of Transparency in Corporate Governance

Opinion	Number of Respondents	Percentage
Highly important	48	48%
Important	37	37%
Neutral	10	10%
Less important	5	5%
Total	100	100%

Interpretation: A majority of 85% of respondents consider transparency either highly important or important in corporate governance. This indicates that respondents strongly believe transparency is necessary for improving accountability, reducing unethical practices, and building stakeholder trust.

Table 4: Corporate Governance Promotes CSR Activities

Opinion	Number of Respondents	Percentage
Strongly agree	40	40%
Agree	38	38%
Neutral	15	15%
Disagree	7	7%
Total	100	100%

Interpretation: The results indicate that 78% of respondents either strongly agree or agree that effective corporate governance promotes CSR activities. This suggests that respondents recognize a positive relationship between transparent governance systems and responsible business practices.

Table 5: Most Important Area of CSR

CSR Area	Number of Respondents	Percentage
Environmental protection	30	30%
Employee welfare	25	25%
Community development	22	22%
Education and healthcare	15	15%
Ethical business practices	8	8%
Total	100	100%

Interpretation: Environmental protection is considered the most important area of CSR by 30% of respondents, followed by employee welfare at 25%. This finding indicates that respondents increasingly expect companies to address environmental concerns while also protecting the welfare of employees and communities.

Table 6: CSR Improves Corporate Reputation and Stakeholder Trust

Opinion	Number of Respondents	Percentage
Strongly agree	45	45%
Agree	35	35%
Neutral	12	12%
Disagree	8	8%
Total	100	100%

Interpretation: The table shows that 80% of respondents agree that CSR improves corporate reputation and stakeholder trust. This demonstrates that socially responsible activities can contribute positively to the public image of organizations and strengthen relationships with customers, employees, investors, and society.

Table 7: Corporate Governance and CSR Support Sustainable Development

Opinion	Number of Respondents	Percentage
Strongly agree	43	43%
Agree	39	39%
Neutral	13	13%
Disagree	5	5%
Total	100	100%

Interpretation: The findings reveal that 82% of respondents agree or strongly agree that corporate governance and CSR contribute to sustainable development. This indicates a strong perception that responsible management, ethical decision-making, and socially beneficial activities are important for achieving long-term economic, social, and environmental sustainability.

7. Findings

Based on the analysis of the seven tables, the following findings are identified:

1. The majority of respondents, **72%**, are aware or highly aware of the concept of corporate governance.
2. Awareness of CSR is relatively high, with **75%** of respondents reporting that they are aware or highly aware of CSR.
3. A significant **85%** of respondents consider transparency to be important or highly important in effective corporate governance.
4. About **78%** of respondents believe that strong corporate governance promotes effective CSR activities.
5. Environmental protection is identified as the most important CSR area by **30%** of respondents, followed by employee welfare at **25%**.
6. A large majority of **80%** agree that CSR improves corporate reputation and stakeholder trust.
7. Finally, **82%** of respondents believe that the integration of corporate governance and CSR contributes to sustainable development.

8. Suggestions

Organizations should integrate CSR policies directly into their corporate governance framework rather than treating CSR as a separate or occasional activity. Boards of directors and management should establish clear CSR objectives, ensure transparency in the utilization of CSR funds, regularly monitor social and environmental performance, and communicate the outcomes to stakeholders. Companies should also give greater importance to environmental sustainability, employee welfare, ethical business practices, and community development. Regular awareness programmes and stakeholder engagement can further improve the effectiveness and credibility of CSR initiatives.

9. Conclusion

Corporate governance and Corporate Social Responsibility are increasingly important for the sustainable growth and long-term success of modern organizations. The study indicates that respondents perceive a strong relationship between effective governance, responsible business practices, stakeholder trust, and sustainable development. Transparency and accountability provide a foundation for the effective implementation of CSR initiatives, while CSR enables organizations to fulfill their broader responsibilities toward society and the environment. Therefore, companies should adopt an integrated approach in which corporate

governance and CSR operate together to create economic value while simultaneously contributing to social welfare and environmental sustainability. Such an approach can help organizations build long-term stakeholder confidence and achieve responsible and sustainable business development.

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A Study on the Challenges faced by Women Entrepreneurs through Self – Help Groups (SHGs) in the Adoption of Digital Banking and Mobile Applications in Sivakasi Corporation

N. Vijayalakshmi^{1*} and T. Sathana²

¹Assistant Professor, Department of Commerce, Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

²Research Scholar, Department of Commerce, Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

*Corresponding Author Email: vijayalakshmi.n@vhnsnc.edu.in

Abstract

Self Help Groups (SHGs) have come out as one of the most efficient grassroots organizations for women's economic empowerment in India, especially in semi-urban and industrial towns like Sivakasi that is renowned for fireworks, matchbox and printing industries. Over the past few years, digitization of financial services including Internet banking, mobile banking apps, Unified Payment Interface payment system and digital micro credit platforms has brought about a sea change in the way SHG members save, borrow, repay and transact. Although digital banking comes with a number of advantages including convenience, transparency, reduced transaction costs and quicker credit access, women entrepreneurs in SHGs in Sivakasi Corporation are facing a number of challenges in using digital banking and mobile apps. This paper explores the socio-economic profile of women entrepreneurs in SHGs in Sivakasi Corporation and analyzes the specific problems that these entrepreneurs face in adoption of digital banking and mobile apps. In this study, the method used was descriptive research design, in which primary data were obtained by way of questionnaires from women entrepreneurs of SHGs, and the data were analyzed through percentage analysis, weighted average ranking. The findings of the study can be used to devise appropriate digital literacy programs for the betterment of women entrepreneurs' financial inclusion in the semi-urban areas like Sivakasi.

Keywords: Self-Help Groups, Women Entrepreneurs, Digital Banking, Mobile Applications, Financial Inclusion, Sivakasi, Digital Literacy

Introduction

The phenomenon of women entrepreneurship supported through institutional arrangements like Self-Help Groups (SHGs) has emerged as a forceful medium of socio-economic change in India. SHGs consist of small groups of people, generally between fifteen to twenty women having identical socio-economic status, who collectively save small amounts, provide micro-credit to the members, and take up income-generating activities. Sivakasi, which is situated in the Virudhunagar district of Tamil Nadu and is famous as the "Kutty Japan" of India due to the presence of various small scale industries producing fireworks, match box, offset printing, and related products, has a history of women involvement in both home-based and small scale business ventures. There are many SHGs operating in the area of Sivakasi Corporation under schemes like NRLM/Tamil Nadu Corporation for Development of Women (Mahalir Thittam), where thousands of women are actively involved in tailoring, food processing, fireworks-ancillary work, trade, and micro-businesses. With the Government of India's continuing push for 'Digital India' and a 'less-cash economy', banks and microfinance institutions have gradually moved the process of banking associated with SHGs, which includes savings, disbursing of loans, repayment, and transfer of subsidies, to digital modes. While digitization ensures transparency, speed, and minimized use of cash transactions, it also imposes new requirements in the form of digital literacy, availability of smart phones, understanding of language, and proficiency in technology use for SHG members. For women entrepreneurs in semi-urban areas such as Sivakasi, some of who lack formal education, are first-time users of smart phones, or engage in physically demanding cottage industries, the process of digitalizing banking and mobile apps is not an easy one. Hence, there is a need to understand the challenges faced by women entrepreneurs associated with SHGs while using digital banking and mobile applications.

Statement of the Problem

Sivakasi is a special industrial cum semi-urban town in which women have higher historical participation in economic activities but there are wide differences in the levels of digital and financial literacy of women in relation to age and education. In this context understanding the issues related to digital adoption among women entrepreneurs associated with SHGs in this particular corporation area can help (a) banks and financial institutions to revisit on boarding/training process in SHG accounts (b) SHG federations and NGOs to design appropriate digital literacy programs (c) the Sivakasi Corporation and district

authorities to incorporate digital inclusion aspects in their livelihood programs (d) future research scholars to create a locality-based knowledge base regarding the convergence of gender, micro-entrepreneurship and fin tech adoption in semi-urban Tamil Nadu.

Objectives of the Study

- To conduct research on the socio-economic and demographic characteristics of women entrepreneurs working within the Self-Help Groups in Sivakasi Corporation.
- To determine the degree to which digital banking and mobile application services are being used by SHG women entrepreneurs.
- To evaluate the key problems of SHG women entrepreneurs in using digital banking and mobile applications.
- To make recommendations for improving digital financial inclusion of women entrepreneurs in Sivakasi Corporation.

Research Methodology

Research Design

This research uses a descriptive analytical research design intended to describe the demographic characteristics of women entrepreneurs and analyze the difficulties that hinder them from using digital banking and mobile applications.

Area of the Study

The study is limited to SHGs in Sivakasi Corporation. It covers SHGs engaged in fireworks related activities, matchbox and printing work, tailoring, food processing, and petty trading.

Sources of Data

Primary Data: Data were collected from SHG women entrepreneurs using a pre-tested structured questionnaire.

Secondary Data: Obtained from records of the SHG federation, NABARD and NRLM/Mahalir Thittam reports, journals, magazines, and website.

Sampling Design

Population: Female entrepreneurs belonging to SHGs that function within the limits of Sivakasi Corporation.

Sampling Method

Convenience cum stratified random sampling wherein stratification would be based on wards/zones and the nature of enterprise activity of the SHGs working within the Sivakasi Corporation area.

Sample Size

The study includes 75 women entrepreneurs from SHGs

Period of the Study

The field survey took place over the span of two months, and the data is based on the survey period of two months (2025-26).

Tools for Data Analysis

- Simple percentage calculation – for explaining demographic and usage pattern variables.
- Garrett method – for ranking problems as per their severity amongst the respondents.

Limitations of the Study

- The sample size, while sufficiently enough for conducting the study, is but a small part of the entire SHG women entrepreneurs in the area.
- The views are based on the self-perception of the respondents and could have a recall bias and hesitation in mentioning the problems.
- The study is a snapshot and not longitudinal; hence attitudes towards digital banking may change as digital literacy programmes progress.

Data Analysis and Interpretation

Table 1: Age

Age	No. of Respondents	Percentage (%)
Below 30	14	18.0
30 – 40	27	36.0
41 – 50	23	30.0
Above 50	11	16.0
Total	75	100.0

Source: Primary Data

The table 1 shows that out of 75 respondents, the majority (36%) belong to the 30–40 age group, with 27 respondents. This is followed by the 41–50 age group, which accounts for 30% with 23 respondents. Respondents below 30 years constitute 18% with 14 respondents, while those above 50 years represent the smallest group at 16% with 11 respondents. Overall, the data indicates that most of the respondents are in the 30–50 age range.

Table 2: Education

Education	No. of Respondents	Percentage (%)
Illiterate / Below Primary	11	14.0
Secondary Level	29	38.0
Higher Secondary	21	28.0
Graduate & Above	14	20.0
Total	75	100.0

Source: Primary Data

The table 2 shows the educational status of the 75 respondents. The majority of the respondents, 38% (29 respondents), have completed secondary-level education. This is followed by 28% (21 respondents) who have completed higher secondary education. About 20% (14 respondents) are graduates or above, while 14% (11 respondents) are illiterate or have education below the primary level. Overall, the data indicates that most of the respondents have at least a secondary-level education.

Table 3: Annual Income

Annual Income	No. of Respondents	Percentage (%)
Below ₹10,000	12	16.0
₹10,001 – ₹20,000	24	32.0
₹20,0001 – ₹30,000	21	28.0
Above ₹30,000	18	24.0
Total	75	100.0

Source: Primary Data

The table 3 shows the annual income of the 75 respondents. The majority of the respondents, 32% (24 respondents) have an annual income between ₹10,001 – ₹20,000. This is followed by 28% (21 respondents) with an annual income between ₹20,001 – ₹30,000 . About 24% (18 respondents) earn above ₹30,000, while 16% (12 respondents) have an annual income below ₹10,000. Overall, the data indicates that most respondents fall within the ₹10,001 – ₹20,000 annual income range.

Table 4: Marital Status

Marital Status	No. of Respondents	Percentage (%)
Married	48	64.0
Unmarried	21	28.0
Widowed	4	5.3
Divorced / Separated	2	2.7
Total	75	100.0

Source: Primary Data

The table 4 shows the marital status of the 75 respondents. The majority of the respondents, 64% (48 respondents) are married. This is followed by 28% (21 respondents) are unmarried. About 5.3% (4 respondents) are widowed, while 2.7% (2 respondents) are divorced or separated. Overall, the data indicates that married respondents constitute the largest group among the respondents.

Table 5: Family Size

Family Size	No. of Respondents	Percentage (%)
1–3 Members	18	24.0
4–5 Members	33	44.0
6–7 Members	15	20.0
8 Members & Above	9	12.0
Total	75	100.0

Source: Primary Data

The table 5 shows the family size of the 75 respondents. The majority of the respondents, 44% (33 respondents), belong to families with 4–5 members. This is followed by 24% (18 respondents) who have 1–3 family members. About 20% (15 respondents) belong to families with 6–7 members, while 12% (9 respondents) have 8 or more members.

Table 6: Nature of Enterprise Activity

Nature of Enterprise Activity	No. of Respondents	Percentage (%)
Fireworks-ancillary / Home-based Work	48	32.0
Tailoring & Garment Making	33	22.0
Food Processing / Petty Provisions	27	18.0
Printing-related Home Industry	18	12.0
Other Petty Trade / Services	24	16.0
Total	150	100.0

Source: Primary Data

The table 6 shows the significant share of respondents (32.0%) are engaged in fireworks-ancillary and other home-based work, reflecting Sivakasi distinctive industrial character, followed by tailoring and garment making (22.0%).

Table 7: Years of SHG Membership

Years of SHG Membership	No. of Respondents	Percentage (%)
Less than 3 years	39	26.0
3 – 6 years	51	34.0
6 – 10 years	36	24.0
More than 10 years	24	16.0
Total	150	100.0

Source: Primary Data

The table 7 shows the majority of respondents (60.0%) have been SHG members for less than six years, suggesting a relatively young SHG membership base still in the process of building financial and digital confidence.

Table 8: Digital Device Ownership and Extent of Digital Banking Usage

Ownership of Smartphone	No. of Respondents	Percentage (%)
Own Smartphone	96	64.0
Shared / Family Smartphone	39	26.0
No Smartphone Access	15	10.0
Total	150	100.0

Source: Primary Data

The table 8 shows the while 64.0% of respondents personally own a smart phone, a notable 26.0% depend on a shared or family device and 10.0% have no smart phone access at all, which directly constrains independent use of mobile banking applications.

Table 9: Extent of Digital Banking Usage

Extent of Digital Banking Usage	No. of Respondents	Percentage (%)
Regular User (Weekly or more)	33	22.0
Occasional User (Monthly)	45	30.0
Rare User (With Assistance Only)	51	34.0
Non-user	21	14.0
Total	150	100.0

Source: Primary Data

The table 9 shows the only 22.0% of respondents are regular users of digital banking, while 34.0% use it rarely and only with assistance, and 14.0% remain complete non-users underscoring the gap between account-level digital enablement and actual independent usage.

Table 10: Ranking of Challenges Faced in Adopting Digital Banking and Mobile Applications

Respondents were asked to rate a set of statements on a five-point Likert scale (5 = Strongly Agree/Major Challenge to 1 = Strongly Disagree/Not a Challenge). The mean score for each statement was computed and challenges were ranked accordingly.

Challenge	Mean Score*	Rank
Difficulty in understanding app menus/instructions (language & literacy barrier)	4.32	I
Fear of committing errors leading to monetary loss	4.21	II
Lack of confidence / fear of online fraud and cyber scams	4.05	III
Inadequate digital/financial literacy training from banks or SHG federations	3.92	IV
Poor network connectivity/frequent app or server downtime	3.81	V
Dependence on SHG leader, family member, or agent for transactions	3.74	VI
Limited time due to dual burden of enterprise work and domestic responsibilities	3.58	VII
Difficulty in remembering PINs/passwords and OTP-based authentication	3.46	VIII
High cost of smart phone/data plan relative to income	3.12	IX
Resistance to change / preference for traditional cash-based transactions	2.89	X

Source: Primary Data

The table 10 shows the difficulty in understanding app menus and instructions due to language and literacy barriers emerged as the most severe challenge (Rank I, mean score 4.32), followed closely by fear of committing errors leading to monetary loss (Rank II) and lack of confidence coupled with fear of online fraud (Rank III). Structural and infrastructural issues such as poor network connectivity (Rank V) and cost of smart phones/data (Rank IX) were rated as comparatively less severe than literacy- and confidence-related barriers, suggesting that the core obstacle is human-capital related rather than purely infrastructural.

Findings of the Study

- A majority of SHG women entrepreneurs in Sivakasi Corporation fall in the 30–50 years age bracket and have moderate educational qualifications, with a notable proportion educated only up to the secondary level or below.
- Fireworks-ancillary and home-based work together with tailoring account for more than half of the enterprise activities undertaken by respondents.
- While a majority of respondents own or have access to a smart phone roughly one-tenth have no smart phone access at all and over a quarter depend on a shared family device limiting independent digital transactions.
- Only about one-fifth of respondents are regular independent users of digital banking services a substantial share remain rare users dependent on assistance or complete non-users.
- Language and literacy barriers in navigating banking application interface fear of transactional errors causing monetary loss and lack of confidence coupled with fear of online fraud are the three most severe challenges reported.
- The infrastructural limitations of network problems and smart phone charges, although they exist appear to be less serious in nature when compared to the psychological constraints arising from issues of literacy and confidence.
- Many people still depend on the SHG leaders, animators and even family members to help them carry out digital banking, suggesting that they are yet to be individually financially inclusive despite having bank linkage.

Suggestions

- Provide regular digital banking training in Tamil with practical hands on demonstrations.
- Identify digitally skilled SHG members and train them as peer trainers or “Digital Sakhis.”
- Banks should provide simple, easy-to-use apps with icons and voice assistance.
- Conduct regular cyber-safety awareness programmes on OTPs, fraud, phishing, and online safety.
- Set up digital banking centers near SHG offices for members without personal smartphones.
- Provide different training levels based on age and education.

- Organize training sessions at flexible timings suitable for SHG members.
- Provide subsidized smartphones and affordable data plans to members who lack digital access.
- Encourage banks, NGOs, SHGs, and local government to work together to improve digital banking awareness.
- Provide continuous support and guidance so that SHG members can gradually become independent digital banking users.

Conclusion

For a long time now, Self-Help Groups (SHGs) have been an effective instrument in helping empower women entrepreneurs in Sivakasi Corporation because of its distinct home based and small scale industrial ecosystem. With mobile applications and digital banking rapidly becoming the de facto method of conducting SHG financial transactions, the independence and confidence of women entrepreneurs in using these platforms become essential for the realization of true financial inclusion. The research finds out that while access to devices and bank account linking is not difficult to come by the level of usage of digital banking is quite low due to a number of factors such as lack of literacy and linguistic skills, fear of making mistakes when conducting transactions and apprehensions about online scams rather than infrastructural issues only. The age and educational qualifications of women entrepreneurs play an important role in the level of difficulty involved in this task. With joint effort from banks, SHGs, local self-government and peer trainers from within the communities the current digital gap can be reduced so that these women entrepreneurs can fully benefit from their digital financial inclusion.

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Psychological Empowerment and Work Engagement among Healthcare Professionals: A Pathway to Sustainable Healthcare

Sahaya Berlin Sujana A^{1*} and Hannah Sharon S²

¹Ph.D. Research Scholar, Department of Management Studies, Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India

²Associate Professor, Department of Management Studies, Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India

*Corresponding Author Email: sahayasujana@gmail.com

Abstract

This paper examines the relationship between psychological empowerment and work engagement among healthcare professionals in multi-speciality corporate hospitals, with particular relevance to the Indian healthcare context. Drawing on recent theoretical and empirical literature, the paper develops a framework linking the four dimensions of psychological empowerment-meaning, competence, self-determination, and impact-with work engagement. The review indicates that psychological empowerment generally has a positive influence on work engagement among healthcare workers, although the contribution of individual dimensions varies across organisational settings, including rural and urban institutions and critical-care and general-ward environments. The paper highlights the importance of participative decision-making, skill development, role autonomy, and employee recognition in strengthening employee empowerment and fostering a motivated, resilient, and engaged healthcare workforce. The proposed framework contributes to the existing literature by integrating international and Indian perspectives on empowerment and engagement within the multi-speciality hospital context. It also aligns with the vision of Viksit Bharat@2047 by emphasising the development of a sustainable, productive, and future-ready healthcare workforce. The study offers useful implications for hospital administrators and human resource professionals in designing empowerment-oriented practices to enhance employee engagement and organisational effectiveness.

Keywords: Psychological Empowerment, Work Engagement, Healthcare Professionals, Multi-Speciality Hospitals, Sustainable Workforce, Human Resource Management

1. Introduction

The healthcare sector occupies a uniquely demanding position among service industries, where employee attitudes and behaviours translate directly into patient outcomes and organisational reputation. Multi-speciality corporate hospitals, in particular, operate under intense pressure to balance clinical excellence, cost efficiency, and patient satisfaction, placing considerable psychological and physical demands on doctors, nurses, and paramedical staff. In this environment, the extent to which employees feel empowered in their roles has emerged as a critical determinant of how engaged, committed, and productive they remain at work.

Psychological empowerment refers to an employee's intrinsic motivation reflected through four cognitions: meaning, competence, self-determination, and impact. When healthcare professionals experience high levels of these cognitions, they are more likely to exhibit heightened work engagement - a positive, fulfilling, work-related state of mind characterised by Vigor, dedication, and absorption. Recent research reinforces that empowerment and engagement are recognised as key drivers of retention and quality of care in healthcare settings globally, given that creating an empowering culture and an engaged staff supports initiatives essential for positive work environments.

India's healthcare sector is expanding rapidly, and its workforce is central to the national vision of *Viksit Bharat@2047*, which emphasises building a self-reliant, globally competitive, and inclusive nation. This paper conceptually examines the relationship between psychological empowerment and work engagement among healthcare professionals in multi-speciality corporate hospitals, drawing on current literature to generate a framework useful to both academic research and hospital human resource practice.

2. Objectives of the Study

1. To identify the key dimensions of psychological empowerment among healthcare professionals.
2. To understand the relationship between psychological empowerment and work engagement among healthcare professionals.
3. To examine the role of psychological empowerment in enhancing work engagement among healthcare professionals.

To develop a conceptual framework linking psychological empowerment and work engagement as a pathway towards sustainable healthcare.

3. Review of Literature

- **Wang and Liu (2015)** “*Impact of Professional Nursing Practice Environment and Psychological Empowerment on Nurses’ Work Engagement: Test of Structural Equation Modelling*”, The study examined the influence of the professional nursing practice environment and psychological empowerment on nurses’ work engagement among 300 clinical nurses from two tertiary hospitals in Tianjin, China. Using the Utrecht Work Engagement Scale, Practice Environment Scale of the Nursing Work Index, and Psychological Empowerment Scale, the study employed structural equation modelling to test the proposed relationships. The findings revealed that both the professional practice environment and psychological empowerment positively influenced work engagement, while psychological empowerment also mediated the relationship between the professional practice environment and work engagement. The study suggested that healthcare administrators should create supportive professional environments and strengthen nurses’ psychological empowerment to enhance work engagement.
- **Abou Hashish, Abdel All and Mousa (2018)** “*Nurses’ Perception of Psychological Empowerment and Its Relationship to Work Engagement and Job Insecurity*”, The study investigated psychological empowerment, work engagement, and job insecurity among 400 nurses working in Damanhur Educational Hospital, Egypt. Using a descriptive-correlational research design, the researchers employed the Psychological Empowerment Questionnaire, Utrecht Work Engagement Scale, and Job Insecurity Inventory. The findings indicated that nurses reported high levels of psychological empowerment and work engagement, and a significant positive relationship existed between psychological empowerment and work engagement. The study further showed that psychological empowerment and work engagement were negatively associated with job insecurity, highlighting the importance of an empowering work environment in promoting employee engagement and reducing insecurity.
- **Alotaibi et al. (2023)** conducted a study titled “*The Role of Empowering Leadership and Psychological Empowerment on Nurses’ Work Engagement and Affective*

Commitment”, The study examined the relationships among empowering leadership, psychological empowerment, work engagement, and affective commitment among 231 nurses working in a university hospital in Saudi Arabia. Using questionnaire data and structural equation modelling, the study examined the role of psychological empowerment in explaining nurses’ work-related outcomes. The findings demonstrated the importance of empowering leadership and psychological empowerment in supporting positive employee outcomes, including work engagement and affective commitment. The study provides evidence that empowerment-oriented leadership practices can contribute to a more committed and engaged healthcare workforce.

- **Hashemi et al. (2025)** *“The Relationship Between the Leader Empowering Behaviours and Work Engagement: The Role of Psychological Empowerment as a Mediating Variable”*, The study investigated the relationship between leader empowering behaviours, psychological empowerment, and work engagement among 198 nurses in Iran. The researchers used a descriptive, cross-sectional, correlational design and employed the Leader Empowering Behaviours Scale, Spreitzer’s Psychological Empowerment Scale, and Utrecht Work Engagement Scale-9. The results showed that leader empowering behaviours were positively associated with psychological empowerment and work engagement. Psychological empowerment also demonstrated a significant positive relationship with work engagement and mediated the relationship between leader empowering behaviours and work engagement. The study concluded that nurse managers can enhance nurses’ work engagement by strengthening empowering leadership practices and psychological empowerment.
- **Xu, Huang, Zhou and Tang (2026)** *“Association Between Psychological Empowerment and Work Engagement Among Rural Nurses: A Latent Profile and Moderation Analysis”*, The study examined psychological empowerment and work engagement among clinical nurses working in three rural healthcare institutions in Hunan Province, China. Psychological empowerment and work engagement were assessed using the Psychological Empowerment Scale and Utrecht Work Engagement Scale, respectively, while latent profile and moderation analyses were used to investigate differences among nurses. The study is particularly relevant to the present research because it extends the empowerment–engagement relationship to rural healthcare settings, where comparatively fewer studies have been conducted.

4. Research Gap

The increasing importance of psychological empowerment and work engagement in healthcare organisations has created a need for further empirical investigation. Previous studies have predominantly focused on nurses and individual healthcare institutions, with limited research examining healthcare professionals in multi-speciality corporate hospitals, particularly in the Indian context. Moreover, the individual dimensions of psychological empowerment—meaning, competence, self-determination, and impact—have received comparatively limited attention in relation to work engagement and sustainable workforce development. Hence, there is a need for further research to understand how psychological empowerment can strengthen work engagement and contribute to building a motivated, resilient, and sustainable healthcare workforce.

5. Conceptual Framework

The conceptual framework for the paper “Psychological Empowerment and Work Engagement among Healthcare Professionals: A Pathway to Sustainable Healthcare” is developed to explain how psychological empowerment can contribute to work engagement and, subsequently, support the development of a sustainable healthcare workforce. The framework is grounded primarily in Spreitzer’s Psychological Empowerment Theory (1995) and supported by Kahn’s Personal Engagement Theory (1990) and the Job Demands-Resources Model of Bakker and Demerouti (2007).

5.1 Psychological Empowerment

Psychological empowerment represents the extent to which healthcare professionals experience a sense of control, competence, purpose, and influence in their work. Following Spreitzer (1995), psychological empowerment consists of four dimensions:

- **Meaning** - the extent to which healthcare professionals perceive their work as valuable, important, and personally meaningful. In healthcare, meaningfulness may arise from contributing to patient care, improving patients’ well-being, and serving society.
- **Competence** - the individual’s belief in their ability to perform their professional responsibilities effectively. Opportunities for training, skill development, and professional learning can strengthen this sense of competence.
- **Self-Determination** - the degree of autonomy and freedom healthcare professionals have in making decisions and determining how they perform their work. Greater autonomy can encourage responsibility and active participation.

- **Impact** - the extent to which professionals perceive that their actions and decisions can influence patient care, team functioning, and organisational outcomes.

These four dimensions collectively represent the psychological experience of empowerment and form the primary construct in the proposed framework.

5.2. Work Engagement

Work engagement represents a positive and fulfilling work-related psychological state in which employees invest their physical, cognitive, and emotional energy in their work. Based on the Utrecht Work Engagement perspective, work engagement consists of three dimensions:

- **Vigour** – characterised by high levels of energy, mental resilience, and willingness to invest effort in work.
- **Dedication** – characterised by a strong sense of significance, enthusiasm, inspiration, pride, and commitment towards work.
- **Absorption** – characterised by being fully concentrated and deeply involved in work.

For healthcare professionals, high work engagement is particularly important because patient care requires continuous attention, emotional involvement, professional responsibility, and resilience. The framework proposes that psychologically empowered professionals are more likely to demonstrate higher levels of vigour, dedication, and absorption.

5.3. Relationship Between Psychological Empowerment and Work Engagement

Psychological Empowerment → Work Engagement

Psychological empowerment can strengthen work engagement by enabling healthcare professionals to perceive their work as meaningful, develop confidence in their professional abilities, exercise autonomy, and recognise their influence on organisational and patient-care outcomes. When professionals experience these psychological conditions, they are more likely to invest greater energy and commitment in their work.

Thus, the framework proposes that the four dimensions of psychological empowerment collectively contribute to stronger work engagement among healthcare professionals.

5.4. Sustainable Healthcare

The final component of the framework is sustainable healthcare. In this paper, sustainable healthcare is viewed not only in terms of healthcare service delivery but also in

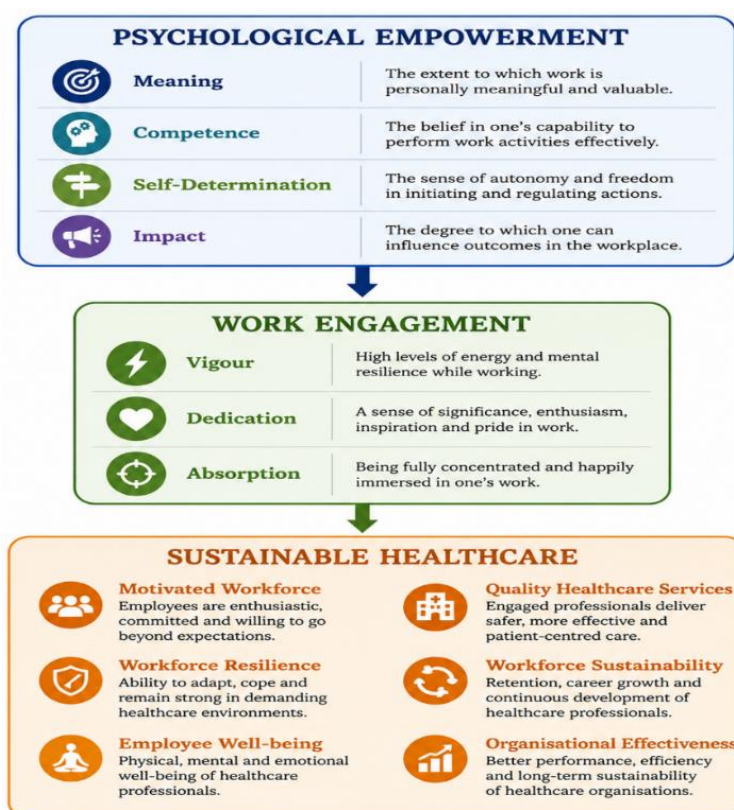
terms of maintaining a motivated, healthy, resilient, and capable workforce capable of meeting present and future healthcare demands.

The framework considers the following outcomes:

- **Motivated healthcare workforce** - employees who are enthusiastic and committed to their professional roles.
- **Workforce resilience** - the ability of healthcare professionals to cope with demanding and changing work conditions.
- **Employee well-being** - supporting employees' psychological and professional well-being.
- **Quality healthcare services** - engaged professionals are better positioned to contribute to effective and patient-centred healthcare delivery.
- **Workforce sustainability** – creating conditions that support employee commitment, development, and continued contribution to healthcare organisations.
- **Organisational effectiveness** – improved employee involvement and engagement can support the effective functioning of healthcare institutions.

5.5. Proposed Pathway

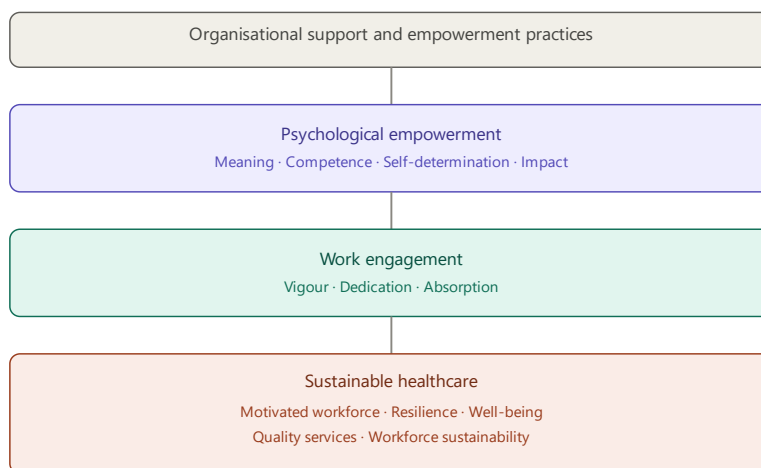
The overall conceptual pathway can therefore be represented as:



5.6. Role of Organisational Conditions

The framework can also recognise the importance of organisational conditions that facilitate psychological empowerment. Factors such as participative decision-making, supportive leadership, professional development, recognition, autonomy, communication, and opportunities for skill development can create an environment in which healthcare professionals experience greater psychological empowerment.

Therefore, the broader framework can be expressed as:



5.7. Theoretical Logic of the Framework

The framework is primarily supported by Spreitzer's Psychological Empowerment Theory, which explains why employees who experience meaning, competence, self-determination, and impact are more likely to experience positive motivational states. Kahn's Personal Engagement Theory supports the link with work engagement by explaining how meaningfulness, psychological safety, and availability encourage employees to invest themselves in their work. The Job Demands-Resources Model further explains that resources such as autonomy, support, recognition, and professional development can promote motivation and work engagement, particularly in demanding healthcare environments.

5.8. Overall Conceptual Proposition

The framework therefore proposes that psychological empowerment serves as a key pathway for strengthening work engagement among healthcare professionals, while enhanced work engagement can contribute to the development of a motivated, resilient, and sustainable healthcare workforce. The framework is particularly relevant to multi-speciality hospitals, where healthcare professionals face complex responsibilities, high work demands, and continuous changes in patient-care requirements.

Since this is a conceptual paper, the framework represents a theoretically proposed relationship derived from existing literature rather than a statistically tested causal model. It provides a basis for future empirical research among healthcare professionals in multi-speciality hospitals, particularly within the Indian healthcare context.

6. Findings

- Psychological empowerment enhances work engagement by increasing employees' motivation and involvement in their work.
- Meaning, competence, self-determination, and impact strengthen healthcare professionals' confidence, autonomy, and sense of purpose.
- Work engagement promotes positive work behaviour through vigour, dedication, and absorption.
- Supportive HR practices such as participation, recognition, training, and autonomy encourage empowerment and engagement.
- Empowered and engaged professionals support sustainable healthcare through greater resilience, well-being, and quality of service.
- Limited research exists in Indian multi-speciality hospitals, particularly concerning healthcare professionals as a broader group.

7. Discussion

The discussion highlights that psychological empowerment should be viewed as a strategic human resource approach rather than merely an individual employee characteristic in the healthcare sector. Healthcare professionals work in environments that require continuous decision-making, professional competence, emotional involvement, and adaptability. In such conditions, providing employees with autonomy, meaningful roles, opportunities to use their competencies, and a sense of influence can encourage stronger involvement in their work. The literature further suggests that work engagement is shaped not only by individual motivation but also by the organisational environment in which healthcare professionals perform their roles. Therefore, hospitals need to create supportive systems that enable employees to participate in decisions, develop their skills, receive recognition, and exercise appropriate autonomy. From a sustainability perspective, an empowered and engaged workforce can help healthcare organisations maintain employee motivation, resilience, well-being, and service quality over the long term. The proposed framework consequently positions psychological

empowerment as an important foundation, work engagement as the connecting pathway, and sustainable healthcare as the broader organisational outcome. This perspective also provides scope for future research to empirically test the proposed relationships across different types of healthcare professionals and multi-speciality hospital settings in India.

8. Practical Implications for Hospital Human Resource Management

8.1 Promote participative decision-making: Hospitals can involve healthcare professionals in work-related decisions to strengthen their sense of ownership and impact.

8.2 Provide professional development: Regular training, skill development, and career advancement opportunities can improve employees' competence and confidence.

8.3 Increase job autonomy: Healthcare professionals should be given appropriate freedom to make decisions related to their roles and responsibilities.

8.4 Strengthen recognition practices: Appreciating employees' contributions through formal and informal recognition can improve motivation and engagement.

8.5 Develop supportive leadership: Hospital managers should provide guidance, communication, feedback, and support to create an empowering work environment.

8.6 Support employee well-being: Initiatives addressing workload, work-life balance, psychological well-being, and resilience can help maintain an engaged workforce.

8.7 Build a sustainable workforce: Empowerment-oriented HR practices can contribute to employee retention, commitment, resilience, and long-term organisational effectiveness.

9. Scope for Future Research

As a conceptual paper, this study does not include newly collected primary data; this represents its main limitation and its principal direction for future research. Future studies could empirically test the proposed framework using structured, validated questionnaires administered to doctors, nurses, and paramedical staff across multiple multi-speciality corporate hospitals in India, applying correlation and regression analysis to test the hypothesised pathways. Given the dimension-specific and department-level variation observed in the literature, future research should also examine moderating factors such as department type, hospital tier, and years of clinical experience.

10. Conclusion

This paper has examined the relationship between psychological empowerment and work engagement among healthcare professionals in multi-speciality corporate hospitals, grounded in current international and Indian literature, and has positioned this relationship as a pathway to sustainable healthcare. The evidence reviewed consistently supports a positive empowerment-engagement relationship, while also revealing important nuances around which empowerment dimensions matter most, and in which institutional contexts. As India works towards Viksit Bharat@2047, building a sustainable and resilient healthcare system will depend not only on infrastructure and technology, but on how empowered and engaged its workforce feels in day-to-day practice.

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Impact of Digitalization and the Major Digital Technologies in Business

M. Dinesh Kumar^{1*}, A. Sabiya Banu¹, S. Boomika¹, V. Jeevanprasath¹, G. Mahalakshmi¹ and

M. Rubini¹

¹MBA, Department of Management Studies, Jai Shriram Engineering College (Autonomous), Avinashipalayam (Po), Tirupur, Tamil Nadu, India

*Corresponding Author Email: dhineshmeignanam@gmail.com

Abstract

Digitalization has become an important factor influencing the way modern businesses operate, compete, and create value. The rapid development of technologies such as artificial intelligence, cloud computing, big data analytics, the Internet of Things, digital platforms, e-commerce, and digital payment systems has changed traditional business practices. This paper examines the impact of digitalization on business performance, innovation, customer experience, operational efficiency, competitiveness, and business models. The study identifies major themes, benefits, challenges, and research gaps related to business digitalization. The article also highlights those digital technologies can improve productivity, operational efficiency, market reach, customer engagement, and innovation. However, successful digitalization depends not only on technology but also on leadership, employee skills, organizational culture, financial resources, cyber security, and strategic alignment. The article concludes that digitalization should be treated as a strategic business transformation rather than simply the adoption of new technology.

Keywords: *Digitalization, Digital Transformation, Business Performance, Artificial Intelligence, Digital Technology, Innovation, SMEs, Competitiveness, Business Models*

Introduction

The business environment has changed significantly because of rapid technological development. Digital technologies have become an essential part of business activities, including marketing, finance, human resource management, production, supply chain management, customer service, and decision-making. Technologies such as artificial intelligence (AI), cloud computing, big data analytics, block chain, Internet of Things (IoT),

Mobile applications, digital payments, social media, and e-commerce have created new ways for organizations to interact with customers and manage operations. Understanding the impact of digitalization is important for managers, entrepreneurs, employees, policymakers, and researchers.

Digitalization

Digitalization refers broadly to the use of digital technologies to improve existing business processes and create new opportunities. It is closely related to, but different from, digital transformation. Digitalization may involve converting or improving processes through digital technologies, whereas digital transformation involves broader changes to organizational processes, strategies, structures, customer experiences, and business models. Traditional businesses generally depended on physical locations, manual processes, face-to-face communication, paper-based records, and conventional marketing channels. Digital technologies have changed these practices (Calvino. F).

Digitalization has also changed competition. Businesses are no longer competing only with firms in their local geographical area. Digital platforms can allow businesses to reach customers nationally and internationally. Thus, digitalization should be viewed as a multidimensional business phenomenon rather than simply a technological upgrade (Sagala.G. H).

Statement of the Problem

Although digital technologies provide many opportunities, businesses do not always achieve the expected benefits from digitalization. Some organizations invest heavily in technology but fail to achieve corresponding improvements in business performance. This may occur because technology adoption is not supported by employee training, organizational change, leadership, appropriate business strategies, or sufficient digital capabilities. The paper examines existing problems faced by the business enterprise by the usage of digitalization.

Objectives of the Study

1. To examine the concept and development of digitalization in business.
2. To identify the major digital technologies used by businesses.

3. To analyze the impact of digitalization on business performance.
4. To examine the factors that contributes to successful digital transformation.

Literature Review

Digitalization, however, “refers to the social and organizational processes by which digital technologies are transformed into infrastructural technologies and have an impact on society and the economy, leading to advances in communication, transportation, virtualization, and market transparency”. Digital transformation is a business process that integrates digital technologies, and digitalization is seen as its particular aspect and is located between digitization and digital transformation. (Pub Med Central).

Digitalization leads to “fundamental changes in the core of a company and in its immediate business environment” resulting in disruption of “the life cycle of a company’s business model”. Subsequently, companies begin to adopt digital technologies to “reshape the value constellation previously defined by that business model” and overcome internal barriers to digital transformation. At the consumer level, digital technologies disrupt consumer expectations and behaviors while also taking the competition out of the physical space and into a virtual one, with more fluid and liberal exchange of information.

Impact of digitalization revolves around its implications for business models. At the industry level, the process of digital transformation has “profound implications for value creation, delivery, and capture in almost all industries”. The “digitization influences business models in different ways, namely, in terms of creation, termination, revision, and extension” (Research Gate).

Concept of Digitalization

Digitalization can be understood as the use of digital technologies to improve existing business activities. Digital transformation goes further by changing the way the organization creates value and competes in the market (Wang. Y).

For example, a company may use:

Digital technology → Digital process → Better information → Better decisions → Improved business performance

Digitalization may involve;

- Digital marketing
- E-commerce
- Digital payments
- Cloud computing
- Data analytics
- Artificial intelligence
- Internet of Things
- Enterprise resource planning
- Customer relationship management
- Digital supply chains
- Mobile applications

Major Digital Technologies used in Business

Artificial Intelligence

Artificial intelligence enables businesses to analyze data, automate processes, predict customer behaviour, provide recommendations, detect fraud, and support decision-making.

Examples include; Chat bots, recommendation systems, predictive analytics, AI-based customer service, automated recruitment systems, fraud detection.

Cloud Computing

Cloud computing allows organizations to access computing resources, software, and data through internet-based systems.

Big Data Analytics

Businesses generate large amounts of customer, financial, operational, and market data. **Big data analytics helps organizations to;** Understand customers, identify market trends, forecast demand, improve decision-making and Reduce business risks.

Internet of Things

IoT connects physical devices to digital systems. **It can be used in;** Manufacturing, logistics, retail, agriculture, healthcare and transportation.

For example, sensors can monitor machines and identify possible maintenance requirements.

E-Commerce

E-commerce allows businesses to sell products and services through digital platforms. It provides businesses with, wider geographical reach, 24/7 availability, lower physical distribution barriers, customer data, digital marketing opportunities.

Digital Payments

Digital payment systems have transformed transactions between businesses and customers.

Examples include; UPI, mobile wallets, internet banking, QR-code payments, card payments. Digital payments can make transactions faster and more convenient.

Impact of Digitalization on Business

Impact on Operational Efficiency

One of the major benefits of digitalization is improved operational efficiency. Digital technologies can automate repetitive tasks and reduce manual work. ERP systems, cloud software, automated inventory systems, and AI can improve the speed and accuracy of business processes.

Impact on Business Productivity

Digitalization can contribute to productivity by enabling employees and organizations to complete tasks more efficiently. It identifies technology diffusion as an important driver of productivity growth and emphasizes the importance of understanding how digital technologies spread across firms. However, productivity benefits are not automatic. Businesses must have appropriate organizational capabilities and employee skills to effectively use technology.

Impact on Innovation

Digitalization encourages businesses to develop new products, services, and processes. Digital technologies also reduce the time required to test and develop new ideas. Therefore, digitalization can support both product innovation and process innovation.

Impact on Customer Experience

Customer expectations have changed significantly because of digital technologies.

Businesses can use customer data to understand preferences and provide personalized experiences. For example, e-commerce companies can recommend products based on previous purchases and browsing behaviour. Thus, digitalization can improve customer satisfaction and customer retention when used appropriately.

Impact on Marketing

Digitalization has transformed traditional marketing. Digital marketing provides businesses with better opportunities to target specific customer groups and measure campaign performance.

Impact on Business Models

Digitalization has created completely new business models. Companies can increasingly create value through digital platforms that connect customers, suppliers, service providers, and other stakeholders. This means digitalization does not merely improve existing business processes; it can change the fundamental way an organization creates and captures value.

Impact on Competitiveness

Digitalization can improve business competitiveness. The digitalization can strengthen the resilience and competitiveness of SMEs and entrepreneurs. However, organizations that fail to adapt may lose competitiveness because competitors can provide faster, cheaper, or more convenient services.

Impact on Small and Medium Enterprises

SMEs are particularly important because they represent a large part of economic activity and employment in many economies. Digitalization provides SMEs with opportunities to compete with larger organizations. A recent systematic review of SME digital transformation identified the need to understand the organizational and strategic factors that enable SMEs to obtain business benefits from digital transformation.

Therefore, businesses should avoid adopting technology simply because it is popular. Technology should be selected according to specific organizational needs and strategic objectives.

Conclusion

Digitalization has become a major force shaping modern business. The systematic literature reviewed in this study indicates that digital technologies can significantly influence operational efficiency, productivity, innovation, customer experience, market reach, competitiveness, and business models. The digital transformation is not simply a technology adoption process; it is a strategic organizational transformation. Leadership, employee skills, organizational culture, financial resources, and strategic alignment are essential for achieving the benefits of digital technologies.

Technologies such as artificial intelligence, cloud computing, big data analytics, IoT, e-commerce, digital payments, and digital platforms provide organizations with new opportunities to create and deliver value. Overall, businesses that successfully combine technology with people, strategy, and organizational capabilities are more likely to achieve sustainable benefits from digitalization.

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Viksit Bharat 2047 – The New Age of Transforming Indian Youth Through Nep 2020

S. Ponmalar^{1*}, V. Prabavathi² and S. Poovika Nishanthini³

¹Associate Professor, Department of Business Administration, Tiruppur Kumaran College for Women, Tiruppur, Tamil Nadu, India

²Associate Professor, Department of Management Studies, Jai Shriram Engineering College (Autonomous), Avinashpalayam (Po), Tirupur, Tamil Nadu, India

³Assistant Professor, Department of Commerce, Hindusthan College of Science and Commerce, Ingur, Perundurai, Erode, Tamil Nadu, India

*Corresponding Author Email: sugapriyanbr@gmail.com

Abstract

Education is primary for achieve full human prospective, rising an reasonable and just the world, and promote nationwide expansion. Provided that worldwide admittance to excellence teaching is the key to India's sustained rise, and guidance on the universal stage in requisites of profitable enlargement, social fairness and equal opportunity, technical innovation, national amalgamation, and educational conservation. Universal high-quality education is the best way forward for developing and maximizing our country's rich talents and resources for the good of the individual, the society, the country, and the world. India will have the highest population of young people in the world over the next decade, and our ability to provide high-quality educational opportunities to them will determine the future of our country. This paper brings out the nature and need for New Education Policy 2020 and points out clearly the role played by NEP 2020 at higher education institutions in empowering the Youth. The education policy seeks to “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all by 2030”. Such a lofty goal will require the entire education system to be reconfigured to support and foster learning, so that all of the critical targets and goals (SDGs) of the 2030 Agenda for Sustainable Development can be achieved. The paper is being necessarily written to highlight the said quote.

Keywords: Education Policy, New Education Policy 2020, Higher Education Institutions, Transforming Youth, Role Played by NEP 2020 at Higher Education Institutions in Transforming the Youth

Introduction

The world is undergoing rapid changes in the knowledge landscape. With various dramatic scientific and technological advances, such as the rise of big data, machine learning, and artificial intelligence, many unskilled jobs worldwide may be taken over by machines, while the need for a skilled workforce, particularly involving mathematics, computer science, and data science, in conjunction with multidisciplinary abilities across the sciences, social sciences, and humanities, will be increasingly in greater demand. There will be a growing demand for humanities and art, as India moves towards becoming a developed country as well as among the three largest economies in the world. The gap between the current state of learning outcomes and what is required must be bridged through undertaking major reforms that bring the highest quality, equity, and integrity into the system, from early childhood care and education through higher education (education.gov.in).

Literature Review

The NEP a paradigm shift is aimed. The NEP will abolish the hard separation among 'Arts', 'Commerce', 'Humanities' and 'Sciences' or, between 'Vocational' and 'Academic' streams. So, the students will have more independency to pick up the subjects as they like and will enjoy studying. In that way Bharat will become a hub of well educated-furnished and intelligent people (IPleaders).

India has gone through two major education policy after independence, first in 1968 and second in 1986 this is the third change that is proposed in 2020. The changes are made according to the need of the time. The main objective of the education policy after independence to make literate and educate the people of India made the skill set improved to the world level (Pawan Kalyani).

The National Education Policy 2020 envisions an India centered education system by considering its tradition, culture, values and ethos to contribute directly to transform the country into an equitable, sustainable, and vibrant knowledge society. By drawing inputs from its vast and long historical heritage and considering the contributions from many scholars to the world in diverse fields such as mathematics, astronomy, metallurgy, medical science and surgery, civil engineering and architecture, shipbuilding and navigation, yoga, fine arts, chess, etc., the entire Indian education system is founded and built. The objective of

the currently announced NEP 2020 is to provide a multidisciplinary and interdisciplinary liberal education to every aspirant to raise the current gross enrolment ratio (GER) to 50% by 2035.

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The New Education Policy announced by Government of India (NEP 2020) was a welcoming change and fresh news amidst all the negativities surrounding the world due to the challenges posed by Covid-19 pandemic. The announcement of NEP 2020 was purely unexpected by many. The changes that NEP 2020 has recommended were something that many educationists never saw coming. Though the education policy has impacted school and college education equally, this article mainly focuses on NEP 2020 and its impact on Higher Education. This paper also outlines the salient features of NEP and analyses how they affect the existing education system (Ajay Kurien).

In NEP, higher educational institutes (HEIs) are classified into research intensive universities along with teaching activities and teaching intensive universities along with some research activities. This will help some HEIs to focus on creating better research infrastructure and carry out state-of-the-art research along side with research, which is socially relevant. As universities engage in a healthy competition with each other across the country with a focus on research, the chances of some of them becoming world class universities are within reach (Mamidala Jagadesh KumarIn).

Education Policy

Education policy consists of the principles and policy decisions that influence the field of education, as well as the collection of laws and rules that govern the operation of education systems. Education governance may be shared between the local, state, and federal government at varying levels. Some analysts see education policy in terms of social engineering (Howord).

Education takes place in many forms for many purposes through many institutions. Examples of such educational institutions may include early childhood education centers, kindergarten to 12th grade schools, two- and four-year colleges or universities, graduate and professional education institutes, adult-education establishments, and job-training schemes. The educational goals of these institutions influence education policy. Furthermore, these education policies can affect the education people engage in at all ages.

Examples of areas subject to debate in education policy, specifically from the field of schools, include school size, class size, school choice, school privatization, police in schools, tracking, teacher selection, education and certification, teacher pay, teaching methods, curricular content, graduation requirements, school-infrastructure investment, and the values that schools are expected to uphold and model (Wikipedia).

New Education Policy 2020

- New Education Policy 2020 is a **comprehensive framework** to reform the Indian education system.
- It aims to make India a **global knowledge superpower** by ensuring universal access, quality, equity, and innovation.

- It proposes a **new curricular and pedagogical structure** of 5+3+3+4, covering ages 3-18, with greater flexibility and choice.
- It emphasizes the importance of **early childhood care** and education, foundational literacy and numeracy, and multilingualism.
- It also promotes **experiential learning**, critical thinking, and integration of arts, sciences, and vocational streams.
- It envisions a **holistic transformation** of higher education, teacher education, and professional development.

The National Education Policy of India 2020 (NEP 2020), which was started by the Union Cabinet of India on 29 July 2020, outlines the vision of new education system of India. The new policy replaces the previous National Policy on Education, 1986. (National Education Policy 2020 - Wikipedia)

- The policy is a comprehensive framework for elementary education to higher as well as vocational training in both rural and urban India. The policy aims to transform India's education system by 2030.
- Shortly after the release of the policy, the government clarified that no one will be forced to study any particular language and that the medium of instruction will not be shifted from English to any regional language.
- The language policy in NEP is a broad guideline and advisory in nature; and it is up to the states, institutions, and schools to decide on the implementation.
- Education in India is a Concurrent List subject. (www.bing.com)

Higher Education Institutions

- It proposes a 4-year multi-disciplinary bachelor's degree in an undergraduate programme with multiple exit options. These will include professional and vocational areas and will be implemented as follows:
 - A certificate after completing 1 year of study
 - A diploma after completing 2 years of study
 - A Bachelor's degree after completion of a 3-year programme
 - A 4-year multidisciplinary bachelor's degree (the preferred option)
- M. Phil. (Masters of Philosophy) courses are to be discontinued to align degree education with how it is in Western models.

- A Higher Education Commission of India (HECI) will be set up to regulate higher education. The council's goal will be to increase gross enrollment ratio. The HECI will have 4 verticals:
 - National Higher Education Regulatory Council (NHERC), to regulate higher education, including teacher education, while excluding medical and legal education.
 - National Accreditation Council (NAC), a "meta-accrediting body".
 - Higher Education Grants Council (HEGC), for funding and financing of universities and colleges. This will replace the existing National Council for Teacher Education, All India Council for Technical Education and the University Grants Commission.
 - General Education Council (GEC), to frame "graduate attributes", namely the learning outcomes expected. It will also be responsible in framing a National Higher Education Qualification Framework (NHEQF). The National Council for Teacher Education will come under the GEC, as a professional standard setting body (PSSB).
- Other PSSBs will include professional councils such as Veterinary Council of India, Council of Architecture, Indian Council of Agricultural Research and National Council for Vocational Education and Training.
- The National Testing Agency will now be given the additional responsibility of conducting entrance examinations for admissions to universities across the country, in addition to the JEE Main and NEET.
- The policy proposes that higher education institutes like the IITs make changes with regard to the diversity of learning.
- The policy proposes to internationalize education in India. Foreign universities can now set up campuses in India.
- The fees of both private and public universities will be fixed.

Objectives of the Study

- 1) To bring out the importance of National Education Policy 2020.
- 2) To assess the key role played by National Education Policy 2020.
- 3) To identify the vital role played by the Higher Education Institutions.
- 4) To point out a clear picture about the transforming Indian youth.

Role Played by Nep 2020 in Transforming Indian Youth

The National Education Policy (NEP) 2020 is a crucial development in India's educational system, signifying a transformative change towards comprehensive and learner-

focused education. The policy aims to empower the youth by cultivating critical thinking, creativity, and skill development. Its ultimate goal is to mould them into well-rounded individuals prepared to confront the various challenges of the contemporary world.

The NEP 2020 places great importance on flexibility, urging students to delve into various subjects. It aims to cultivate a multidisciplinary approach that nurtures their inherent talents, as stated by the Ministry of Education in 2020. The interdisciplinary nature of the policy encourages students to bridge the gap between traditional subjects, fostering innovation and allowing them to approach problems from different perspectives. One notable aspect of the National Education Policy (NEP) 2020 is the inclusion of vocational education from a young age. Students can enhance their competitive advantage in the job market by incorporating practical skills alongside theoretical knowledge. The integration of youth into society can provide them with the valuable opportunity to make meaningful contributions, even before the completion of their higher education.

The Ministry of Education 2020 emphasized that the core principle of NEP 2020 is inclusivity. Its primary objective is to ensure that every individual has access to high-quality education regardless of background or circumstances. The policy acknowledges and values students' various learning styles and speeds, advocating for personalized learning approaches that effectively address their individual needs. The approach described fosters a sense of empowerment among students, who are encouraged to actively participate in their educational journey. The significance of experiential learning is emphasized in the NEP 2020. This approach enables students to put into practice the knowledge they acquire in the classroom by applying it to real-world situations, as stated by the Ministry of Education in 2020. The approach here focuses on developing problem-solving skills, promoting adaptability, and cultivating a sense of empowerment in students. Through this approach, students can see the concrete results of their learning, which further enhances their understanding and motivation.

Digital literacy, as stated in the NEP 2020, is an essential aspect that aims to provide young individuals with the necessary abilities to effectively navigate the digital era (Ministry of Education, 2020). By incorporating technology into education, the policy guarantees students the essential skills to thrive in an ever-evolving digital society. This integration

enhances their prospects for employment and empowers them to navigate and succeed in this technologically-driven world. The policy also acknowledges the crucial importance of educators in fostering empowered youth. The Ministry of Education, in its report, highlights the importance of continuous professional development for teachers. This ensures teachers constantly update their knowledge and skills to stay abreast of the latest teaching methodologies. An essential component in guiding students towards empowerment is a teaching workforce that is both motivated and skilled.

The National Education Policy 2020 serves as a comprehensive plan to promote the empowerment of young individuals through education. It establishes the foundation for a cohort of young individuals with the necessary abilities, understanding, and perspective to excel in a constantly changing global landscape.

9. Conclusion

The upcoming of India will not be build just in factory or laboratories; it will be produced in classrooms where technology and human intelligence effort jointly to produce dependable, pioneering, and trained nation. The National Education Policy (NEP) 2020 is strongly associated with the vision of Viksit Bharat 2047. NEP 2020 aims to change India's education system into a global facts superpower, which focus on excellence, fairness, and enclosure. It emphasizes experimental education, talent enlargement, and the combination of occupational teaching, which are key mechanism of Viksit Bharat goals. The procedure envision a structure that enchances the probable of every beginner and contribute to the in general improvement of the nation by 2047.

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Digital Marketing Strategies and Consumer Preferences towards Fast Food Products in Virudhunagar District

K. Anjali^{1*} and N. Vijayalakshmi²

¹Research Scholar, Research Centre in Commerce, Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

²Assistant Professor of Commerce, Research Centre in Commerce, Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous), Virudhunagar, Tamil Nadu, India

*Corresponding Author Email: anjalikannan832000@gmail.com

Abstract

Digital marketing has significantly transformed the way fast food products are promoted, communicated and purchased by consumers. Social media platforms, online food delivery applications, search engines, digital advertisements, influencer marketing and promotional offers have become important tools for fast food businesses to attract and retain customers. At the same time, consumers are increasingly influenced by online reviews, attractive food images, discounts, convenience and digital recommendations when making purchase decisions. This study examines the influence of digital marketing strategies on consumer preferences towards fast food products, with special reference to Virudhunagar District. The study focuses on consumers' awareness, usage and perception of different digital marketing strategies and their influence on purchase preference. The study adopts a descriptive research design and uses a structured questionnaire for collecting primary data from fast food consumers. Percentage analysis, Chi-square test and correlation analysis are proposed for analysing the data. The study is expected to provide useful insights into how digital marketing influences consumer preference and purchase behaviour in the fast food sector. The findings can help fast food businesses develop effective digital promotional strategies while responding to changing consumer expectations.

Keywords: Digital Marketing, Fast Food Products, Consumer Preference, Social Media Marketing, Online Advertising, Food Delivery Applications, Purchase Behaviour

1. Introduction

The rapid development of digital technology has brought significant changes in the marketing environment. Consumers today obtain information about products and services

through smartphones, social media platforms, websites, search engines and mobile applications. Digital marketing has therefore emerged as an important component of modern business strategy. Unlike traditional marketing, digital marketing enables businesses to communicate with consumers quickly, interactively and at relatively lower cost. It also provides opportunities to understand consumer behaviour through online engagement, search patterns, reviews and purchase data. The fast food industry is one of the sectors that has experienced considerable changes due to digitalisation. Fast food products such as burgers, pizzas, fried chicken, sandwiches, noodles, rolls, biryani and other ready-to-eat products are increasingly promoted through digital platforms. Businesses use Instagram, Facebook, YouTube, WhatsApp, websites, online food delivery applications and other digital channels to communicate product information and promotional offers. Consumer preference towards fast food is influenced by several factors including taste, price, convenience, brand image, availability, product variety, promotional offers and peer influence. In the digital environment, these traditional factors are increasingly accompanied by online reviews, social media content, food photographs, influencer recommendations, ratings and personalised advertisements. Digital marketing has consequently changed the consumer decision-making process. A consumer may discover a fast food product through a social media advertisement, examine online reviews, compare prices through a food delivery application and finally place an order using a mobile phone. Thus, digital marketing has become closely associated with awareness creation, product evaluation, purchase intention and customer engagement. Virudhunagar District has witnessed increasing use of smartphones, digital payment facilities, social media and online food ordering services. These developments provide an appropriate context for studying the relationship between digital marketing strategies and consumer preferences towards fast food products. The present study therefore attempts to examine how digital marketing strategies influence consumer preferences and purchase-related decisions among fast food consumers in Virudhunagar District.

2. Statement of the Problem

The fast food industry operates in a highly competitive market where businesses continuously attempt to attract consumers through different promotional strategies. Traditional promotional methods such as banners, posters, newspapers and television advertisements are increasingly complemented or replaced by digital marketing techniques. Fast food businesses now use social media advertisements, promotional videos, influencer

recommendations, online reviews, discount notifications and food delivery applications to reach potential customers. Although digital marketing provides numerous opportunities, the effectiveness of these strategies may differ according to consumer characteristics and preferences. Some consumers may be strongly influenced by social media advertisements and influencer recommendations, whereas others may give greater importance to price, taste, quality and customer reviews. Similarly, attractive online promotions may encourage consumers to purchase fast food more frequently, while negative reviews may discourage them from purchasing a particular product. The increasing use of digital platforms has therefore created a need to understand the extent to which digital marketing strategies influence consumer preferences towards fast food products. There is also a need to identify which digital marketing elements are most influential in the consumer decision-making process. Hence, the present study examines digital marketing strategies and their relationship with consumer preferences towards fast food products, with special reference to Virudhunagar District.

3. Objectives of the Study

- To study the major digital marketing strategies used for promoting fast food products.
- To examine consumers' awareness and usage of digital marketing platforms for fast food products.
- To analyse consumer preferences towards fast food products.
- To examine the relationship between digital marketing strategies and consumer preference.
- To identify the factors that influence consumers' fast food purchase decisions through digital platforms.
- To offer suitable suggestions for improving digital marketing strategies in the fast food sector.

4. Hypotheses of the Study

H₀: There is no significant association between consumers' demographic characteristics and their level of preference towards fast food products.

H₁: There is a significant association between consumers' demographic characteristics and their level of preference towards fast food products.

H₀: There is no significant relationship between digital marketing strategies and consumer preference towards fast food products.

H₁: There is a significant relationship between digital marketing strategies and consumer preference towards fast food products.

5. Scope of the Study

The study focuses on the influence of digital marketing strategies on consumer preferences towards fast food products. The study covers digital promotional methods such as social media marketing, online advertisements, food delivery applications, influencer marketing, online reviews, digital discount offers and promotional messages.

The geographical scope of the study is limited to Virudhunagar District. The study concentrates on consumers who purchase or consume fast food products and who are exposed to digital marketing platforms. The study may be useful to fast food restaurants, marketers, entrepreneurs and researchers for understanding the changing digital behaviour of consumers.

6. Research Methodology

6.1 Research Design

The study adopts a descriptive research design. The descriptive approach is suitable because the study attempts to describe consumers' awareness, perceptions, preferences and responses towards digital marketing strategies used by fast food businesses.

6.2 Area of the Study

The study is conducted in Virudhunagar District, Tamil Nadu. The district provides an appropriate setting because of the growing use of smartphones, social media, digital payment systems and online food delivery services.

6.3 Sources of Data

Primary Data: Primary data are collected directly from respondents through a structured questionnaire.

Secondary Data: Secondary information is collected from books, journals, research articles, reports, websites and other relevant publications.

6.4 Sampling Method

A convenient sampling method may be adopted for selecting respondents from different locations of Virudhunagar District.

6.5 Sample Size

For the proposed study, a sample of 200 respondents may be considered. Note: Replace this sample size with your actual number of respondents before final submission.

6.6 Data Collection Instrument

A structured questionnaire using multiple-choice questions and a five-point Likert scale is used to collect primary data.

6.7 Tools for Analysis

- Percentage Analysis
- Chi-square Test
- Correlation Analysis
- Mean and Standard Deviation

7. Concept of Digital Marketing

Digital marketing refers to the promotion of products and services through digital channels and technologies. It enables businesses to reach consumers through internet-based platforms and mobile technologies.

7.1 Social Media Marketing

Social media platforms allow fast food businesses to promote products through photographs, short videos, reels, stories, customer-generated content and promotional campaigns.

7.2 Online Advertising

Digital advertisements enable businesses to display advertisements to targeted consumer groups based on location, interests, age and online behaviour.

7.3 Influencer Marketing

Food bloggers and social media influencers can influence consumers by reviewing restaurants and recommending food products.

7.4 Online Food Delivery Platforms

Food delivery applications provide consumers with menus, prices, ratings, reviews, offers and delivery options. They have become an important digital channel for fast food businesses.

7.5 Online Reviews and Ratings

Consumers increasingly depend on ratings and reviews before trying restaurants or food products. Positive reviews can strengthen consumer confidence, while negative reviews may affect purchase intention.

7.6 Digital Promotional Offers

Discount coupons, cashback, free delivery, combo offers and limited-time promotional offers are frequently used to encourage online purchases.

8. Consumer Preference towards Fast Food Products

Consumer preference refers to the choices and priorities of consumers when selecting products. In the fast food sector, consumer preference can be influenced by several factors.

- Taste and flavour
- Price
- Quality
- Convenience
- Product variety
- Brand reputation
- Promotional offers
- Online reviews
- Social media recommendations
- Availability
- Delivery speed
- Attractive presentation
- Peer influence

Digital marketing can influence several of these factors simultaneously. For example, an attractive food image may create product awareness, while a discount coupon may encourage immediate purchase.

9. Digital Marketing and Consumer Decision-Making

Need Recognition

Consumers may become aware of a fast food product through social media advertisements or promotional videos.

Information Search

Consumers can search for restaurant information, menus, prices, ratings and reviews online.

Evaluation of Alternatives

Online platforms allow consumers to compare different restaurants and products based on price, ratings, offers and customer reviews.

Purchase Decision

Discounts, convenience and easy online payment may influence the final purchase decision.

Post-Purchase Behaviour

Consumers may provide online ratings, reviews, photographs or social media comments after purchasing the product.

Thus, digital marketing can influence consumers throughout the complete purchase decision-making process.

10. Illustrative Data Analysis and Interpretation

Table 1: Demographic Profile of Respondents

Particulars	Category	Frequency	Percentage
Age	Below 20	42	21.0
	21–30	96	48.0
	31–40	38	19.0
	Above 40	24	12.0
Gender	Male	104	52.0
	Female	96	48.0

Occupation	Student	86	43.0
	Employee	54	27.0
	Business	32	16.0
	Others	28	14.0

Interpretation: The illustrative results indicate that the majority of respondents belong to the 21–30 age group. Students constitute the largest occupational category. This suggests that young consumers may represent an important target group for digital marketing of fast food products.

Table 2: Exposure to Digital Marketing

Digital Marketing Platform	Respondents Aware/Using	Percentage
Instagram	162	81.0
YouTube	148	74.0
Food Delivery Applications	156	78.0
WhatsApp	132	66.0
Facebook	118	59.0
Google/Search Engines	126	63.0

Interpretation: The illustrative results show that Instagram has a high level of consumer exposure, followed by food delivery applications and YouTube. This indicates that visual and mobile-based digital platforms can play an important role in fast food marketing.

Table 3: Factors Influencing Fast Food Purchase through Digital Platforms

Factor	Mean Score	Rank
Discounts and Offers	4.21	I
Taste and Quality	4.18	II
Convenience	4.10	III
Online Reviews and Ratings	3.94	IV
Attractive Food Images/Videos	3.89	V
Delivery Speed	3.84	VI
Influencer Recommendations	3.52	VII

Interpretation: The illustrative ranking shows that discounts and promotional offers receive the highest mean score, followed by taste and quality. This indicates that although digital marketing attracts consumer attention, fundamental product attributes such as taste and quality remain important in final purchase decisions.

Table 4: Chi-square Test – Age and Preference

Test	Value	df	Sig.
Pearson Chi-Square	18.426	9	0.031

Interpretation: The illustrative significance value is 0.031, which is less than the 0.05 significance level. Therefore, the null hypothesis is rejected. It is inferred that there is a significant association between age and consumer preference towards digitally promoted fast food products.

11. Findings

- A large proportion of respondents belong to the young adult age group.
- Students constitute an important consumer segment for fast food products.
- Instagram is an important digital platform for fast food promotion.
- Online food delivery applications play an important role in influencing purchase behaviour.
- Discounts and promotional offers are major factors influencing digital fast food purchases.
- Taste and quality continue to remain important despite the growing influence of digital marketing.
- Online reviews and ratings contribute to consumers' evaluation of fast food products.
- Attractive food images and videos can increase consumer attention.
- The illustrative Chi-square result indicates an association between age and preference towards digitally promoted fast food products.
- The illustrative correlation result indicates a positive relationship between digital marketing exposure and consumer preference.

12. Suggestions

Focus on Social Media Marketing

Fast food businesses should make effective use of Instagram, YouTube, Facebook and other relevant social media platforms to create awareness and consumer engagement.

Use Attractive Visual Content

High-quality food photographs, short videos, reels and promotional content can be used to attract consumers' attention.

Offer Digital Promotions

Discount coupons, combo offers, loyalty rewards and limited-period offers can be promoted through digital platforms to encourage purchase.

Encourage Positive Customer Reviews

Businesses should encourage satisfied customers to provide genuine ratings and reviews on digital platforms.

Improve Online Customer Engagement

Fast food businesses should respond quickly to customer questions, feedback and complaints received through social media and digital platforms.

Use Influencer Marketing Carefully

Local food bloggers and relevant influencers can be engaged to create awareness among targeted consumer groups.

Maintain Product Quality

Digital marketing can attract customers, but repeat purchases depend largely on taste, quality, hygiene and service.

Provide Accurate Digital Information

Menus, prices, ingredients, offers, restaurant timings and delivery information should be updated regularly on digital platforms.

Target Different Consumer Segments

Digital advertisements should be customised according to age, location, preferences and purchasing behaviour.

Integrate Digital and Offline Marketing

Fast food businesses can combine social media marketing, online promotions and offline customer experiences to develop an integrated marketing strategy.

13. Conclusion

Digital marketing has become an important component of fast food marketing in the contemporary business environment. The increasing use of smartphones, social media platforms, online food delivery applications and digital payment facilities has changed the way consumers search for, evaluate and purchase fast food products. Digital marketing enables fast food businesses to communicate directly with consumers and provide timely information about products, prices, offers and services. The study highlights that digital platforms can influence consumer awareness, engagement and purchase preference. Social media content, online reviews, promotional offers, attractive food images and food delivery applications can play an important role in shaping consumer perceptions. However, digital promotion alone cannot ensure customer loyalty. Taste, quality, price, hygiene, convenience and service continue to be important factors in consumer decision-making. For fast food businesses in Virudhunagar District, an effective digital marketing strategy should therefore combine attractive digital communication with quality products and reliable customer service. Businesses should focus not only on attracting new customers but also on building long-term relationships through customer engagement, positive reviews, personalised offers and consistent service quality. Overall, digital marketing provides significant opportunities for the fast food sector to reach targeted consumers, increase brand visibility and influence purchase behaviour. A well-planned and consumer-oriented digital marketing strategy can contribute to sustainable growth and competitiveness in the fast food industry.

14. Limitations of the Study

- The study is geographically restricted to Virudhunagar District.
- The study depends mainly on information provided by respondents.
- Consumer preferences may change over time due to changing trends and digital platforms.

- The study focuses specifically on fast food products and may not represent the entire food industry.
- The use of convenience sampling may limit the generalisation of the findings.
- Digital marketing platforms and consumer behaviour are continuously evolving.

15. Scope for Further Research

Future researchers can extend the study by examining the influence of specific social media platforms on fast food purchase intention. Comparative studies can be conducted between rural and urban consumers. Future studies may also examine influencer marketing, artificial intelligence-based personalised advertising, online food delivery platforms, digital loyalty programmes and consumer trust in online food reviews. A comparative study between different age groups or different districts can also provide deeper insights into changing consumer behaviour in the digital fast food market.

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Sustainability in Dairy Cooperatives: A Value Chain Approach to Achieving the Sustainable Development Goals (SDGs)

V. Durga^{1*} and C. Pitchai²

¹Assistant Professor, Department of Commerce and Management Studies, Parvathy's Arts and Science College, Dindigul, Tamil Nadu, India

²Senior Professor, Department of Cooperation, The Gandhigram Rural Institute Deemed to be University, Gandhigram, Tamil Nadu. India

*Corresponding Author Email: durgamanoj04@gmail.com

Abstract

Dairy farming is an ancillary activity to agriculture, earning farming households in India a steady income all year round. As the second most critical agricultural commodity affecting Gross Value Added (GVA), milk production is a critical economic activity, second only to rice cultivation in terms of importance. Nevertheless, the Indian dairy sector is faced with a countless of challenges owing to its fragmentation, with production being dispersed in various small and unorganized units. The cooperative movement, in addition to the active participation of dairy cooperatives in milk production unions, has brought about an impressive change, driving the industry's rapid growth and allowing it to face future challenges. Furthermore, dairy farming is at the centre of women's empowerment as entrepreneurs. This study examines the value chain strategy of dairy cooperatives towards achieving the Sustainable Development Goals (SDGs). From research on production, processing, distribution, and market linkages in dairy cooperatives, this article recognizes sustainable practices that ensure economic, social, and environmental benefits. This research adopted a mixed method approach, the research combines primary data collected from 150 members, and staff from the admin department from the Tiruchirappalli District Union Cooperative Milk Producer Union Limited in Tiruchirappalli District, Tamil Nadu, and with insights from existing literature as secondary data. The results drawn from this study and empirical evidence on the selected dairy cooperative provide insight into best practices and issues faced in the achievement of sustainability in the dairy value chain.

Keywords: Sustainability, Dairy Cooperatives, Value Chain, Sustainable Development Goals, Rural Development

Introduction

India is the biggest milk producer in the world with over 23 percent of the global milk supply, and it plays a vital part in rural livelihood security by providing employment to over 80 million rural households, mostly small and marginal farmers. Dairy farming is a secondary activity to agriculture but offers stability in income throughout the year and is a major contributor to nutritional security due to enhanced availability of milk. Here, dairy cooperatives are critical institutions for rural development that provide members with fair market access, remove exploitative intermediaries, and empower producers. They are both economic enterprises and collective action platforms, influencing resource distribution through local governance.

Notably, dairy cooperatives are increasingly coming into line with the Sustainable Development Goals (SDGs) most notably SDG 8 (Decent Work & Economic Growth), SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities), and SDG 13 (Climate Action). By enhancing household incomes, empowering women, promoting skill development, and promoting environmentally friendly practices, they contribute significantly towards sustainability in the dairy industry.

Even with these inputs, India's dairy industry continues to be disorganized and fragmented, with several small-scale units experiencing low productivity, poor cold storage, and unstable milk prices. These concerns highlight the imperative for value chain strengthening, enhancing infrastructure, and fostering sustainable practices through cooperative platforms.

Review of Literature

Kurien, V. (2004) Kurien, the architect of India's White Revolution, has consistently emphasized the transformative power of dairy cooperatives in rural India. His work, based on the success of Amul and the National Dairy Development Board (NDDB), highlights how decentralized milk production and centralized marketing enabled small and marginal farmers to obtain fair returns. He demonstrated how dairy cooperatives effectively eliminated

exploitative middlemen, thus democratizing the dairy value chain. His contributions also laid the foundation for cooperative-led rural development that aligns with sustainable economic growth and inclusive governance (SDG 8 and SDG 16).

Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S., & Courbois, C. (1999) In their seminal report *"Livestock to 2020,"* Delgado et al. predicted a growing demand for milk and dairy products driven by population growth and urbanization in developing countries. They argued that this demand creates opportunities for smallholder dairy producers, particularly through cooperative structures that enable better market access, infrastructure, and extension services. The study promotes investment in sustainable dairy value chains, reinforcing the importance of cooperatives in achieving SDGs related to poverty alleviation (SDG 1), hunger eradication (SDG 2), and decent work (SDG 8).

Joshi, P. K., & Kumar, A. (2017) this study analysed how dairy cooperatives enhance rural livelihoods by improving productivity, access to inputs, and marketing. The authors found that members of dairy cooperatives report higher income levels and more stable livelihoods compared to non-members. Additionally, their study indicates that cooperatives support training and women's involvement, contributing to social development goals. They also noted a positive spill over effect in local economies due to increased demand for feed, veterinary services, and local employment.

Patel, A. (2020) Patel conducted a gender-sensitive assessment of dairy cooperatives in Gujarat and Tamil Nadu, concluding that women's involvement in cooperatives enhances their agency, household decision-making power, and economic status. The paper also stresses that cooperative platforms are increasingly fostering leadership opportunities for women, thus addressing SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities).

Singh, R., & Yadav, M. (2022) this study examined how dairy cooperatives contribute directly and indirectly to the Sustainable Development Goals. The findings demonstrate that cooperatives support sustainable consumption (SDG 12) through quality assurance and traceability, promote climate resilience (SDG 13) through localized feed and waste management practices, and contribute to gender parity and local employment. The authors call for improved institutional support and technology integration.

Chauhan, D., & Bharti, S. (2021) their case study of dairy cooperatives in Uttar Pradesh focused on operational efficiencies, member satisfaction, and environmental impact. The authors observed that well-functioning cooperatives emphasize technical training, digital record keeping, and cold chain management. The study also identified gaps in waste management and recommended introducing eco-friendly technologies to align with environmental sustainability goals.

Swain, R. B., & Wallentin, F. Y. (2009) though focused on self-help groups, this study offers insights into how group-based economic structures, like cooperatives, enhance social capital, particularly for women. The study found that participation in group economic activities significantly increased women's confidence, mobility, and involvement in household and community-level decisions, making a strong case for cooperatives as instruments of social empowerment.

NDDB Annual Report (2021) The National Dairy Development Board (NDDB) report provides quantitative and qualitative data on milk procurement, infrastructure expansion, cooperative membership, and sustainability initiatives. The report details the role of cooperatives in ensuring milk quality, promoting fodder development, implementing clean milk production, and increasing women's participation. NDDB's efforts align directly with national SDG strategies.

Shah, T. (2020) Shah conceptualizes cooperatives as hybrid institutions that operate both in the market and as collective social agents. His work underscores their dual role in economic development and community empowerment. He asserts that cooperatives are uniquely positioned to address multiple SDGs simultaneously due to their participatory governance and community focus, making them effective models for integrated rural development.

Durga, V., & Pitchai, C. (2024) this paper explores the effects of dairy cooperatives on the livelihood and economic development of members in Dindigul District, Tamil Nadu. Through the use of data from 150 respondents, the study identifies how these cooperatives ensure financial stability, access to resources, and fair pricing for dairy farmers, in line with Sustainable Development Goals (SDGs) such as poverty reduction and gender equality. The

results reveal major increases in the income levels of members, confidence in financial dealings, and social recognition. Furthermore, the article addresses challenges including market vulnerability and policy gaps as well as advocating for strategies aimed at increasing financial literacy, participation by women, skill building, and market diversification.

Objectives

This study has the following objectives:

- ❖ To examine **the value chain approach of dairy cooperatives** in promoting sustainability along production, processing, distribution, and market linkages.
- ❖ To evaluate **the economic, social, and environmental contributions of dairy cooperatives** towards accomplishing sustainability in the dairy industry.

Research Methodology

The research utilized a mixed-method design to assess the contribution of dairy cooperatives in enhancing sustainable development among rural communities. The study was carried out within the operational region of the Tiruchirappalli District Cooperative Milk Producers Union Limited, which spans Trichy, Ariyalur, and Perambalur districts of Tamil Nadu. The purposive sampling method was utilized to enroll 150 active members across different Primary Milk Producers' Cooperative Societies. The main data were gathered using a formal questionnaire inquiring about economic, social, and environmental sustainability indicators like changes in income, level of milk production, access to training, participation in decision-making, and the uptake of sustainable practices. Secondary data were collected from official cooperative union records, government reports, and literature. The data were analyzed by descriptive statistical methods that involved frequency and percentage distributions. Results were showcased through tables and charts to give good insights into the experience of cooperative members and how dairy cooperatives are contributing overall to the attainment of the Sustainable Development Goals (SDGs).

A Value Chain Approach to Achieving the Sustainable Development Goals (SDGs)

Profile of the Study

The Tiruchirappalli District Cooperative Milk Producers Union Limited, also popularly referred to as Trichy Milk Union, was registered on September 26, 1980, under the Cooperative Societies Act. Its operational catchment area is Trichy, Ariyalur, and Perambalur

districts. Now, the union is purchasing milk from 620 Primary Milk Producers' Cooperative Societies, benefiting around 59,203 milk-pouring members. For the village consumers, milk is marketed at the level of Primary Milk Producers' Cooperative Society.

Milk procured from producers is transported across 95 milk collection routes (RMC & BMC vehicles) in Trichy, Ariyalur, and Perambalur districts. The union runs chilling centres, such as the Trichy Main Dairy, Padalur Dairy, and 41 Bulk Milk Coolers (BMCs) that handle a total of 5,88,000 liters per day. Chilled milk is distributed to Chennai Metro Dairies and other destinations. The Trichy Main Dairy and Padalur Dairy both have processing capacities of 150,000 and 100,000 liters per day (LPD), respectively, with an average of approximately 115,000 LPD handled daily. The union also manufactures and markets various dairy products, such as butter, ghee, khoa, curd, Mysurpa, and badam powder.

Besides, under the NADP scheme (2020-2021), the union has hired eight mobile veterinary consultants to offer doorstep animal healthcare services such as artificial insemination, emergency veterinary service, and general animal health service. These facilities are enjoyed by around 10,379 dairy cattle of milk producers at Primary Milk Producers' Cooperative Societies. In addition, the union has launched the Fodder Bank Development Scheme, which has selected 3,300 acres of land for cultivation of fodder to improve the availability of green fodder for dairy cattle.

Table 1: Procurement and Sales Details of Tiruchirappalli District Cooperative Milk Producers Union Limited

Year	Members	Milk Procurement (in Liters)	Average Price per Litter (Rs.)	Milk Sales (in Liters)	Total Average (Litter)
2019-20	1001	52,90,374	33.23	34,84,173	9,545.6
2020-21	859	53,41,928	33.23	36,92,455	10,116
2021-22	859	58,21,704	33.25	42,28,890	11,586
2022-23	859	57,79,833	35	39,17,555	10,733
2023-24	842	59,69,191	38	1,31,31,771	35,977

The dairy cooperative has demonstrated impressive growth despite a 16 percent decline in membership, achieving a 13 percent increase in milk procurement highlighting improved productivity. Most remarkably, milk sales surged by 235 percent in 2023–24, reflecting successful market expansion and value-added product strategies. Additionally, the average price per liter rose by 14 percent, boosting farmer incomes. While membership retention needs attention, the cooperative’s strong procurement, soaring sales, and better pricing showcase its resilience and potential for sustainable growth.

Results and Discussion

Table 2: Demographic Details of the Members

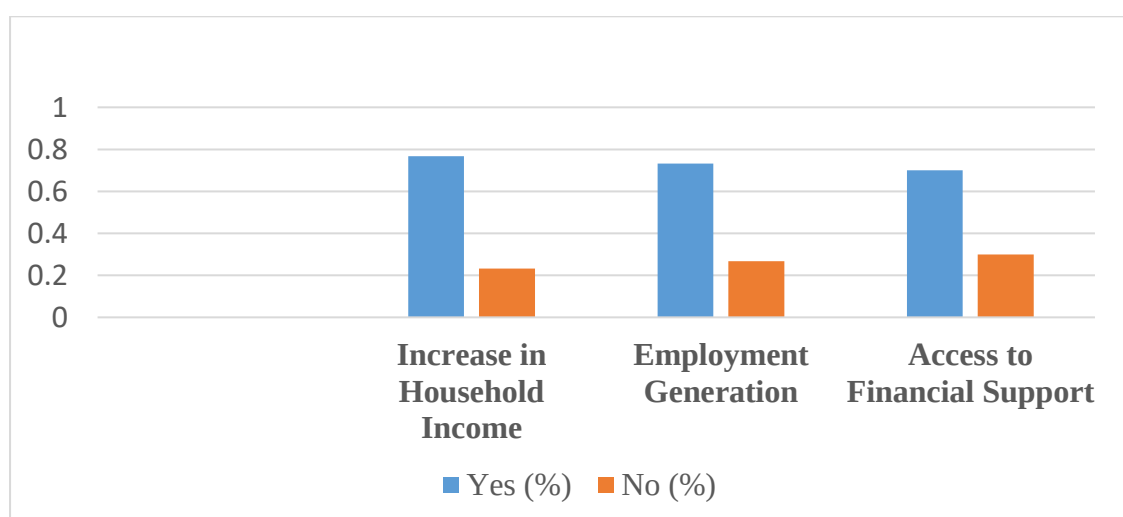
Category	Frequency (150)	Percentage (%)
Gender		
Male	90	60%
Female	60	40%
Age Group		
18-30 years	40	26.7%
31-45 years	70	46.7%
46-60 years	30	20%
Above 60	10	6.7%
Education Level		
No formal education	30	20%
Primary school	50	33.3%
Secondary school	40	26.7%
Higher education	30	20%

The dairy cooperative membership shows a gender distribution of 60 percent male and 40 percent female, highlighting an opportunity to enhance women’s participation. The majority of members (46.7 percent) fall within the 31-45 age group, representing a productive workforce, while younger members (18-30 years) make up 26.7 percent, suggesting potential to attract more youth. Education levels are diverse, with 33.3 percent having primary schooling, 26.7 percent secondary education, and 20 percent higher education, though 20

percent lack formal schooling—indicating a need for tailored training programs. The low representation of seniors (6.7 percent above 60 years) points to opportunities for intergenerational knowledge sharing. Overall, the cooperative has a strong base of middle-aged members but could benefit from inclusive strategies targeting women, youth, and older farmers.

Table 3: Economic Sustainability (SDG 8 – Decent Work & Economic Growth)

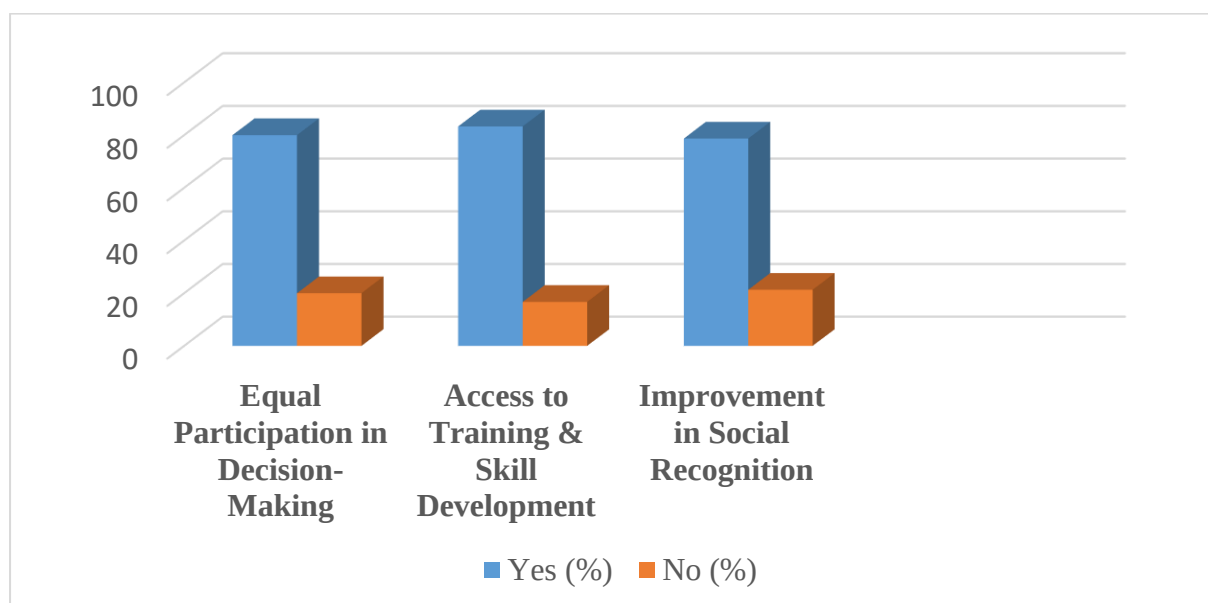
Category	Yes (Frequency) and (%)	No (Frequency) and (%)
Increase in Household Income	115 (76.7%)	35 (23.3%)
Employment Generation	110 (73.3%)	40 (26.7%)
Access to Financial Support	105 (70.0%)	45 (30.0%)



The results reveal a strong positive impact of dairy cooperatives on rural economic development. A significant 76.7 percent of the members reported an increase in their household income after joining the cooperative, highlighting the cooperatives' effectiveness in improving rural earnings and financial stability. Furthermore, 73.3 percent of respondents acknowledged that their association with the dairy cooperatives created employment opportunities, showcasing the cooperatives' critical role in generating livelihood avenues beyond traditional farming activities. Additionally, 70.0 percent of the members reported easier access to financial support and credit facilities through the cooperative network, indicating the cooperatives' success in bridging the gap between rural producers and financial institutions.

Table 4: Social Sustainability (SDG 5 – Gender Equality & SDG 10 – Reduced Inequalities)

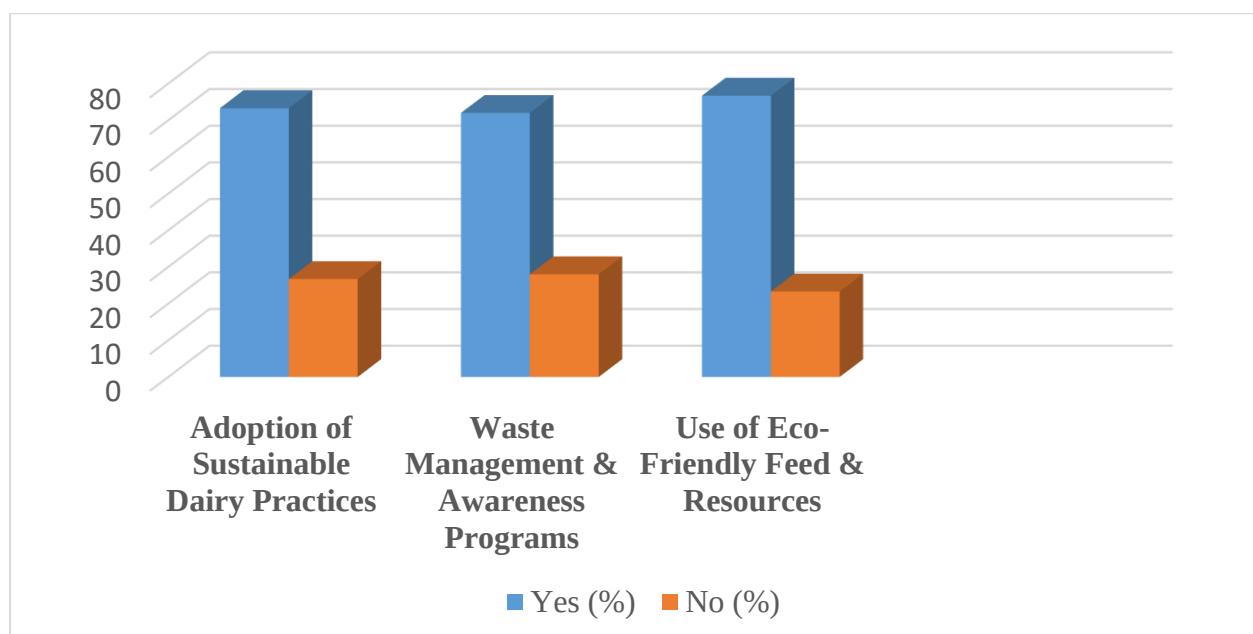
Category	Yes (Frequency) and (%) (150)	No (Frequency) and (%) (150)
Equal Participation in Decision-Making	120 (80.0%)	30 (20.0%)
Access to Training & Skill Development	125 (83.3%)	25 (16.7%)
Improvement in Social Recognition	118 (78.7%)	32 (21.3%)



The results clearly indicate that dairy cooperatives significantly contribute to strengthening social sustainability in rural communities. Around 80.0 percent of members reported equal participation in decision-making, 83.3 percent received access to training and skill development programs, and 78.7 percent experienced improved social recognition. These outcomes demonstrate that dairy cooperatives not only enhance economic conditions but also empower members socially, promoting inclusive growth and supporting SDG 5 – Gender Equality and SDG 10 – Reduced Inequalities.

Table 5: Environmental Sustainability (SDG 12 – Responsible Consumption & SDG 13 – Climate Action)

Category	Yes (Frequency) and (%) (150)	No (Frequency) and (%) (150)
Adoption of Sustainable Dairy Practices	110 (73.3)	40 (26.7)
Waste Management & Awareness Programs	108 (72.0)	42 (28.0)
Use of Eco-Friendly Feed & Resources	115 (76.7)	35 (23.3)



The data in Table 5 and diagram indicates that dairy cooperatives are actively contributing to environmental sustainability. About 73.3 percent of members adopted sustainable dairy practices, 72 percent participated in waste management and awareness programs, and 76.7 percent used eco-friendly feed and resources. These positive responses reflect the cooperatives' growing role in promoting responsible consumption and climate-resilient farming aligned with SDG 12 and SDG 13.

Findings

Economic Sustainability (SDG 8 – Decent Work & Economic Growth)

- ❖ 76.7% of members reported an **increase in household income** after joining dairy cooperatives.
- ❖ 73.3% agreed that dairy cooperatives **generate employment**, reducing rural unemployment.
- ❖ 70% of members had **access to financial support**, indicating cooperatives help in securing credit.

Social Sustainability (SDG 5 – Gender Equality & SDG 10 – Reduced Inequalities)

- ❖ 80% of members participated in **decision-making**, highlighting social empowerment.
- ❖ 83.3% received **training and skill development**, showcasing a strong focus on capacity building.
- ❖ 78.7% reported **improved social recognition**, showing cooperatives enhance members' status.

Environmental Sustainability (SDG 12 – Responsible Consumption & SDG 13 – Climate Action)

- ❖ 73.3% of members adopted **sustainable dairy practices**, indicating environmental awareness.
- ❖ 72% participated in **waste management & environmental awareness programs**.
- ❖ 76.7% used **eco-friendly feed and resources**, promoting sustainable dairy farming.

Suggestions

- ❖ Strengthen **partnerships with banks** to help dairy farmers to access low-interest loans.
- ❖ Expand **training programs for members** to boost technical and business skills, improving work efficiency and production output.
- ❖ Promote **skill-building programs focused on women** to ensure they have equal opportunities in leadership roles.
- ❖ Encourage **incentives for eco-friendly farming**, such as subsidies for sustainable feed, bio-gas, and effective waste management.

- ❖ Establish more **women-led dairy societies** to promote gender equality and enhance economic empowerment for women.
- ❖ Improve market access for dairy products to guarantee **fair pricing for cooperative members**. - Promote the production of value-added dairy products like cheese, paneer, and yogurt to increase profitability and diversify offerings.

Conclusion

Dairy cooperatives have a revolutionary function towards promoting rural development and sustainability in India. The outcomes of this research confirm that cooperatives actually make important contributions to increasing household income, creating jobs, enhancing financial access, and facilitating gender-equitable membership. These cooperatives not only socially and economically empower the members but also enable environmentally friendly practices to be adopted, strongly in line with Sustainable Development Goals like SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 13 (Climate Action). In spite of the challenges facing them, dairy cooperatives are still developing as key tools for inclusive growth, poverty reduction, and sustainable rural livelihoods. Strengthening institutional support, financial access, and capacity-building efforts can further enhance their impact throughout rural India.

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Emerging Trends in Digital Payments: Adoption, Trust, Security and Consumer Behaviour

V. Lawrence Benadict^{1*} and J. Suresh²

¹Assistant Professor, PG and Research Department of Commerce, St Xavier's College, Palayamkottai, Tamil Nadu, India

²Head and Assistant Professor, Department of B.Com Honours, St Xavier's College, Palayamkottai, Tamil Nadu, India

*Corresponding Author Email: loverencesj@gmail.com

Abstract

Digital payments have transformed the manner in which individuals, businesses and governments conduct financial transactions. The emergence of Unified Payments Interface (UPI), mobile wallets, QR-code payments, contactless cards, Internet banking, biometric authentication, Buy Now Pay Later (BNPL), Account Aggregator-based services and artificial intelligence-enabled payment systems has accelerated the movement from cash-based to digitally enabled economies. This study examines emerging trends in digital payments with particular emphasis on adoption, convenience, perceived usefulness, security, trust, financial literacy and consumer satisfaction. The study adopts a descriptive and analytical research design and considers a sample of 400 digital-payment users selected through stratified random sampling. Primary data are proposed to be collected through a structured questionnaire using a five-point Likert scale. Frequency and percentage analysis are used to examine demographic characteristics and payment behaviour, while Chi-square, correlation and multiple regression are employed to examine relationships among the major variables. The illustrative analysis indicates that UPI/QR-code payments constitute the most frequently used digital payment mode, with 76.0% of respondents reporting regular usage. Security and privacy emerge as major concerns, with a mean score of 4.08 out of 5, while convenience records a mean score of 4.31. The Chi-square test indicates a significant association between age and preferred digital payment mode ($\chi^2 = 28.764$, $df = 12$, $p < 0.001$). Multiple regression further indicates that perceived usefulness, trust, security and financial literacy significantly influence intention to continue using digital payments, with an adjusted R^2 of 0.627. The study concludes that future digital-payment growth will depend not

only on technological innovation but also on security, trust, digital literacy, interoperability and effective consumer protection.

Keywords: Digital Payments, UPI, Mobile Payments, QR Code, FinTech, Consumer Behaviour, Trust, Security, Digital Financial Inclusion

Introduction

Digital payments have emerged as one of the most significant transformations in the contemporary financial system. Traditionally, economic transactions were predominantly undertaken through cash, cheques and physical banking instruments. The rapid expansion of smartphones, affordable internet connectivity, cloud computing, artificial intelligence, application programming interfaces and financial technology has fundamentally changed this structure. Digital payments now enable consumers to transfer money, purchase goods and services, pay bills, receive government benefits and conduct business transactions almost instantaneously.

The transformation is particularly visible in emerging economies such as India. The country's digital payment ecosystem has developed around interoperable platforms, mobile banking, QR codes and instant account-to-account transfers. In India, retail digital-payment transactions increased from 7,176.90 crore in FY 2021–22 to 22,167.90 crore in FY 2024–25, while the value increased from ₹457.44 lakh crore to ₹849.12 lakh crore. UPI accounted for approximately 81% of retail digital-payment transactions in FY 2024–25, demonstrating its central position in India's payment ecosystem.

The emergence of digital payments is closely associated with the broader development of FinTech. FinTech firms have introduced new payment products and business models, while banks and traditional financial institutions have increasingly adopted digital technologies. Digital payment systems have consequently become an important bridge between technology and financial services.

One of the most important emerging trends is the movement from conventional card-based and cash-based payments towards real-time account-to-account payment systems. India's UPI is an important example of this transition. UPI allows customers to connect

multiple bank accounts to a single mobile application and conduct immediate payments. Government data indicate that UPI transactions increased from 92 crore in FY 2017–18 to 13,116 crore in FY 2023–24.

Another important trend is the increasing use of QR codes. QR-based payments provide a relatively inexpensive mechanism for merchants to accept digital payments. This has particular relevance for small retailers, street vendors and micro-enterprises because they can accept digital payments without substantial investment in conventional point-of-sale infrastructure.

The next stage of digital payments is likely to be influenced by artificial intelligence and machine learning. AI can support fraud detection, behavioural authentication, transaction monitoring, personalized financial services and risk assessment. Recent research also examines how AI-enabled security mechanisms can influence users' perceptions of payment security and trust.

Objectives of the Study

- To examine the emerging trends in digital-payment adoption among consumers.
- To identify the most frequently used digital-payment modes.
- To analyse the influence of convenience, usefulness, trust and security on digital-payment adoption.
- To examine the association between demographic characteristics and preferred digital-payment modes.
- To identify the major concerns and barriers associated with digital payments.
- To examine the relationship between digital-payment experience and consumer satisfaction.
- To determine the factors influencing consumers' intention to continue using digital-payment services.
- To provide suggestions for strengthening secure, inclusive and consumer-friendly digital-payment systems.

Scope of the Study

The study focuses primarily on consumers who have experience using digital-payment services. It does not examine the technical architecture of payment networks in detail or undertake a financial-performance analysis of individual payment companies.

Review of Literature

Dahlberg et al. (2008) reviewed the development of mobile-payment research and identified major technological, consumer and business issues affecting the evolution of mobile payments. The study demonstrated that mobile payments require coordination among consumers, merchants, financial institutions, mobile operators and technology providers.

Mallat (2007) examined consumer adoption of mobile payments using a qualitative approach. The study found that time and place independence, availability, remote payment capability and queue avoidance were important advantages. Complexity, premium pricing, limited merchant acceptance and perceived risk were identified as barriers.

Kim, Mirusmonov and Lee (2010) investigated factors influencing intention to use mobile payments. Their research highlighted the importance of system characteristics and user-related factors in determining mobile-payment adoption.

Shin (2009) developed a comprehensive model of mobile-wallet acceptance using UTAUT and incorporated security, trust, social influence and self-efficacy. The research demonstrated the importance of both technological and psychological factors in mobile-wallet adoption.

Zhou (2013) investigated continuance intention in mobile-payment services. The study found that service quality affects trust, system quality affects satisfaction and trust, flow and satisfaction influence continued usage.

Zhou (2014) further examined mobile-payment continuance and found that performance expectancy, trust and flow significantly influence continued usage. The study emphasized that system quality can strengthen users' performance expectations and flow experiences.

Slade et al. (2015) examined proximity mobile-payment adoption by extending UTAUT with trust and risk. Their analysis of 244 UK consumers showed that performance expectancy was the strongest predictor and that the extended model explained additional variance in behavioural intention.

Slade, Dwivedi, Piercy and Williams (2015) examined remote mobile-payment adoption in the UK and incorporated innovativeness, risk and trust into UTAUT. The study highlighted the importance of trust and perceived risk in understanding consumer acceptance.

Oliveira et al. (2016) diffusion of Innovation and perceived security to examine mobile-payment adoption and recommendation intention. Compatibility, performance expectancy, social influence and innovativeness emerged as important determinants.

Kajol, Singh and Paul (2022) conducted a systematic review of digital financial transaction adoption. Their review identified usefulness, ease of use, compatibility, trust, security, performance expectancy and facilitating conditions as important motivators. Perceived risk, cost, complexity and privacy concerns were identified as inhibitors.

Jafri et al. (2023) systematically reviewed the role of trust and security in FinTech adoption in banking. Their work reinforces the importance of security and trust as central elements in digital financial-service adoption.

Behera and Kumra (2024) reviewed two decades of mobile-payment research using the TCCM approach. They argued that earlier research concentrated heavily on user adoption and suggested greater attention to other stakeholders, including merchants and payment-service providers, as well as post-adoption behaviour.

Ha, Nam and Kim (2024) conducted a systematic review of mobile-payment literature from 2013 to 2023. They found that existing research is strongly concentrated in business-oriented studies and user surveys, while there is a need for more diverse approaches and stronger policy-oriented research.

Jain and Jain (2024/2025) used the ADO framework to systematically examine digital-payment adoption. The review identified ease of use, usefulness and trust as important antecedents, while risk and security concerns were prominent barriers.

Valencia-Arias et al. (2025) reviewed 63 documents concerning mobile-payment adoption. Their findings identified extended TAM and UTAUT as dominant theoretical approaches and highlighted social influence, perceived safety, perceived risk, trust and perceived usefulness as major research variables.

Yadav and Kalluru (2024) examined trust and adoption of digital financial services in India. Their study emphasized the role of digital literacy and intermediaries in overcoming consumers' dependence on cash and limited proficiency with digital technologies.

Aljaradat and Shukla (2026) examined cybersecurity and trust formation in digital-payment behaviour in North India. The study considered effort expectancy, grievance redressal, trust, performance expectancy, cybersecurity risk and social influence, demonstrating the growing importance of cybersecurity in payment adoption.

Research Methodology

Research Design

The study adopts a descriptive and analytical research design. The descriptive component is used to examine demographic characteristics, payment preferences, usage frequency and consumer perceptions. The analytical component is used to test the relationships between demographic characteristics, digital-payment adoption, trust, security, convenience and continued usage intention.

Sampling Method

A stratified random sampling method is proposed. Respondents are classified into strata based on age, gender, occupation and income category to ensure representation of different consumer groups.

Sample Size

The proposed sample consists of 400 respondents who have used at least one form of digital payment during the previous six months.

Data Collection

Primary data are proposed to be collected through a structured questionnaire. A five-point Likert scale is used:

1 – Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree

Research Gap

The literature indicates several important research gaps.

First, a considerable proportion of earlier studies focus on **initial adoption intention**, while comparatively less attention is given to continued usage, satisfaction and switching behaviour.

Second, previous studies frequently use TAM, UTAUT and UTAUT2-based models. Although these models provide valuable explanations, emerging technologies such as AI-enabled fraud detection, biometric authentication and real-time payment platforms require additional variables.

Third, many studies emphasize consumers but provide comparatively less attention to merchants, payment providers and regulatory institutions.

Fourth, digital-payment research has frequently been conducted using questionnaire-based quantitative methods. Greater integration of demographic, behavioural, technological and cybersecurity variables is required.

Fifth, the rapid evolution of India's digital-payment ecosystem requires updated empirical research examining contemporary payment modes such as UPI, QR payments, contactless payments and AI-enabled security.

Therefore, the present study attempts to address these gaps by examining **convenience, usefulness, trust, security, financial literacy and continued usage intention** within a single analytical framework.

Limitations of the Study

- The study is based on a sample of 400 respondents and therefore may not represent the entire population.
- The study relies primarily on self-reported responses.
- The study focuses primarily on users and does not comprehensively examine merchants and payment-service providers.
- Digital-payment adoption may differ across geographical regions, languages, income groups and levels of digital literacy.

- The statistical values presented below are structured illustrative values and must be replaced with actual survey results before empirical publication.

Data Analysis and Interpretation

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage
Gender	Male	214	53.50%
	Female	186	46.50%
Age	18–25 years	112	28.00%
	26–35 years	126	31.50%
	36–45 years	86	21.50%
	46–55 years	48	12.00%
	Above 55 years	28	7.00%
Occupation	Student	92	23.00%
	Salaried	138	34.50%
	Business/Self-employed	94	23.50%
	Professional	48	12.00%
	Others	28	7.00%
Monthly Income	Below ₹20,000	104	26.00%
	₹20,001–₹40,000	132	33.00%
	₹40,001–₹60,000	92	23.00%
	Above ₹60,000	72	18.00%

Interpretation

The largest age group is **26–35 years (31.50%)**, followed by 18–25 years (28%). Thus, **59.50%** of the respondents are below 36 years, representing a relatively young digital-payment user base. Salaried respondents constitute the largest occupational group at **34.50%**.

Table 2: Most Frequently Used Digital Payment Mode

Payment Mode	Frequency	Percentage
UPI/QR Code	304	76.00%
Debit/Credit Card	38	9.50%
Mobile Wallet	26	6.50%
Internet Banking	20	5.00%
Contactless/NFC	12	3.00%
Total	400	100.00%

Interpretation

UPI/QR-code payment is the dominant payment method, used most frequently by **76%** of respondents. Only **3%** identified contactless/NFC payments as their primary payment method, suggesting considerable scope for growth in newer contactless technologies.

Table 3: Frequency of Digital Payment Usage

Usage Frequency	Frequency	Percentage
Several times a day	172	43.00%
Daily	126	31.50%
Several times a week	66	16.50%
Occasionally	28	7.00%
Rarely	8	2.00%
Total	400	100.00%

Interpretation

A total of **298 respondents (74.50%)** use digital payments either several times a day or daily. This indicates that digital payments have become an integral part of routine financial behaviour.

Descriptive Analysis of Digital-Payment Factors

Table 4: Consumer Perception of Digital Payments

Factor	Mean	SD	Rank
Convenience	4.31	0.71	1
Ease of Use	4.25	0.74	2
Perceived Usefulness	4.22	0.76	3
Transaction Speed	4.19	0.79	4
Trust	4.05	0.82	5
Security	4.08	0.85	6
Merchant Acceptance	4.02	0.88	7
Financial Literacy	3.78	0.91	8
Privacy Protection	3.74	0.94	9
Customer Support	3.68	0.96	10

Interpretation

Convenience has the highest mean score of **4.31**, demonstrating that convenience is the strongest perceived advantage of digital payments. Ease of use (**4.25**) and usefulness (**4.22**) also record high scores. Privacy protection (**3.74**) and customer support (**3.68**) receive comparatively lower scores, suggesting areas requiring improvement.

Reliability Analysis

Table 5: Reliability Statistics

Construct	No. of Items	Cronbach's Alpha
Convenience	4	0.861
Perceived Usefulness	4	0.884
Trust	4	0.892
Security	5	0.906
Financial Literacy	4	0.842
Continued Usage Intention	4	0.913
Overall Scale	25	0.928

Interpretation

The overall Cronbach's Alpha value of **0.928** indicates excellent internal consistency. All constructs have Alpha values above **0.80**, suggesting that the questionnaire items demonstrate satisfactory reliability.

H₀: There is no significant association between age and preferred digital-payment mode.

Table 6: Chi-Square Test

Test	Value	df	p-value
Pearson Chi-Square	28.764	12	<0.001
Likelihood Ratio	30.218	12	<0.001
Valid Cases	400	—	—

Interpretation

The Pearson Chi-square value is **28.764** with **12 degrees of freedom**, and the p-value is **<0.001**. Since $p < 0.05$, the null hypothesis is rejected. Therefore, there is a **statistically significant association between age and preferred digital-payment mode**. Younger consumers demonstrate a stronger preference for UPI/QR-based payments, whereas older respondents show relatively greater dependence on cards and Internet banking.

Chi-Square Test: Financial Literacy and Digital Payment Usage

H₀: There is no significant association between financial literacy and frequency of digital-payment usage.

Test	Value	df	p-value
Pearson Chi-Square	31.526	12	<0.001
Likelihood Ratio	32.417	12	<0.001
Valid Cases	400	—	—

Interpretation

The Chi-square value of **31.526** is statistically significant at the 5% level ($p < 0.001$). Hence, the null hypothesis is rejected. There is a significant association between financial literacy and frequency of digital-payment usage. Respondents with higher digital/financial literacy tend to use digital payments more frequently.

Correlation Analysis

Table 7: Correlation Matrix

Variables	Usefulness	Trust	Security	Financial Literacy	Continued Usage
Usefulness	1.000	0.612**	0.548**	0.482**	0.701**
Trust	0.612**	1.000	0.673**	0.461**	0.728**
Security	0.548**	0.673**	1.000	0.437**	0.694**
Financial Literacy	0.482**	0.461**	0.437**	1.000	0.526**
Continued Usage	0.701**	0.728**	0.694**	0.526**	1.000

Note: Correlation is significant at the 0.01 level (two-tailed).

Interpretation

All four independent variables demonstrate positive relationships with continued usage intention. Trust has the strongest correlation with continued usage ($r = 0.728$), followed by perceived usefulness ($r = 0.701$) and security ($r = 0.694$). Financial literacy also shows a significant positive relationship ($r = 0.526$).

Multiple Regression Analysis

Dependent Variable: Continued Intention to Use Digital Payments

Table 8: Model Summary

Model	R	R ²	Adjusted R ²	Std. Error
1	0.799	0.638	0.627	0.421

Predictors: Perceived Usefulness, Trust, Security, Financial Literacy.

Interpretation

The model produces an **R value of 0.799**, indicating a strong relationship between the predictors and continued digital-payment usage. The **R² value of 0.638** indicates that 63.8% of the variation in continued usage intention is explained by perceived usefulness, trust, security and financial literacy. The adjusted R² is **0.627**, indicating that approximately **62.7%** of the variation remains explained after adjustment for the number of predictors.

Table 9: Regression Coefficients

Predictor	Beta (β)	t-value	p-value
Perceived Usefulness	0.286	6.842	<0.001
Trust	0.321	7.524	<0.001
Security	0.274	6.317	<0.001
Financial Literacy	0.146	3.487	0.001

Interpretation

Trust has the highest standardized beta coefficient ($\beta = 0.321$), indicating that it is the strongest predictor of continued digital-payment usage among the variables considered. Perceived usefulness ($\beta = 0.286$) and security ($\beta = 0.274$) also exert substantial positive effects. Financial literacy has a positive and statistically significant effect ($\beta = 0.146$, $p = 0.001$).

One-Way ANOVA: Satisfaction Across Age Groups

H₀: There is no significant difference in digital-payment satisfaction among different age groups.

Source	Sum of Squares	df	Mean Square	F	p-value
Between Groups	14.862	4	3.716	9.284	<0.001
Within Groups	158.137	395	0.400	—	—
Total	172.999	399	—	—	—

Interpretation

The ANOVA result gives $F = 9.284$, $p < 0.001$, indicating a statistically significant difference in digital-payment satisfaction among age groups. Younger respondents generally demonstrate higher satisfaction, which may be associated with greater familiarity with smartphone-based payment technologies.

Major Findings of the Study

- UPI/QR payments dominate digital-payment usage, with 76% of respondents identifying them as their most frequently used payment mode.
- 74.50% of respondents use digital payments either several times a day or daily, indicating that digital payments have become an important part of routine financial behaviour.
- Convenience is the strongest perceived advantage, with a mean score of 4.31/5.
- Ease of use records a high mean score of 4.25, demonstrating that simple and user-friendly payment interfaces encourage adoption.
- Perceived usefulness scores 4.22, confirming that consumers value digital payments for their practical benefits.
- Security remains a major concern, although its mean perception score is relatively high at 4.08/5. This indicates that users recognize the importance of security while continuing to express concerns about digital risks.
- Privacy protection records a comparatively lower mean score of 3.74, indicating that privacy remains an area requiring greater attention.
- The reliability analysis produces an overall Cronbach's Alpha of 0.928, confirming excellent internal consistency of the measurement scale.
- There is a significant relationship between age and preferred digital-payment mode, with $\chi^2 = 28.764$, $df = 12$, $p < 0.001$.
- There is also a significant relationship between financial literacy and frequency of digital-payment usage, with $\chi^2 = 31.526$, $df = 12$, $p < 0.001$.
- Trust has the strongest correlation with continued usage, with $r = 0.728$.
- Perceived usefulness has a strong positive relationship with continued usage ($r = 0.701$).
- Security has a substantial positive relationship with continued usage ($r = 0.694$).

- Multiple regression demonstrates that perceived usefulness, trust, security and financial literacy explain 62.7% of the adjusted variance in continued digital-payment usage (Adjusted $R^2 = 0.627$).
- Trust is the strongest predictor of continued digital-payment usage ($\beta = 0.321$, $p < 0.001$).
- Perceived usefulness ($\beta = 0.286$, $p < 0.001$) and security ($\beta = 0.274$, $p < 0.001$) are also significant predictors.
- Financial literacy has a significant positive influence ($\beta = 0.146$, $p = 0.001$).
- ANOVA indicates a significant difference in satisfaction across age groups ($F = 9.284$, $p < 0.001$).
- Contactless/NFC payments currently have relatively low primary usage at 3%, suggesting significant potential for future growth.
- The findings indicate that the future of digital payments depends on a combination of technological convenience, trust, cybersecurity, financial literacy and consumer protection rather than technology alone.

Suggestions

- Since security has a mean score of **4.08/5** and a significant regression coefficient of $\beta = 0.274$, banks and payment providers should strengthen multi-factor authentication, transaction monitoring, behavioural analytics and real-time fraud alerts.
- Trust is the strongest predictor of continued usage ($\beta = 0.321$) and has the strongest correlation with continued usage ($r = 0.728$). Payment providers should therefore improve transparency, transaction notifications, grievance redressal and fraud-compensation mechanisms.
- Privacy protection recorded only **3.74/5**. Payment providers should clearly communicate how consumer data are collected, stored, processed and shared.
- Since financial literacy has a significant association with payment frequency ($\chi^2 = 31.526$, $p < 0.001$), banks, educational institutions and government agencies should conduct digital-financial-literacy programmes.
- The significant age-payment association ($\chi^2 = 28.764$, $p < 0.001$) indicates demographic differences in payment preferences. Simplified interfaces, regional-language support and assisted digital-payment services should be developed for older users.

- Since **76%** of respondents primarily use UPI/QR payments, awareness programmes should focus on QR-code fraud, fake payment requests, screen-sharing scams, phishing and unauthorized access.
- Customer support recorded the lowest mean score (**3.68/5**). Payment providers should provide faster complaint resolution, 24-hour support and transparent tracking of disputed transactions.
- Only **3%** of respondents identified contactless/NFC payments as their most frequently used method. Banks and merchants should improve NFC acceptance and consumer awareness.
- AI-enabled security can strengthen real-time identification of unusual transaction patterns. This is particularly relevant because recent research increasingly examines AI-based security as a mechanism for strengthening trust in digital payments.
- Digital-payment providers should develop interfaces that support regional languages, low-bandwidth environments and users with limited digital literacy.
- Interoperable payment systems should be encouraged so that consumers can transact across banks and payment applications without unnecessary restrictions.
- Since trust strongly influences continued usage, payment institutions should reduce the time required to resolve failed transactions and unauthorized-payment complaints.
- New technologies such as AI, biometrics, tokenization, contactless payments and embedded finance should be introduced with adequate consumer-protection safeguards.
- Small merchants should receive training on QR-code security, fraud prevention and transaction reconciliation.
- Since the regression model explains **62.7%** of the variance in continued usage, payment providers should concentrate not only on acquiring new customers but also on maintaining trust, reliability and satisfaction among existing users.

Conclusion

Digital payments have evolved from an alternative payment mechanism into an essential component of the modern financial ecosystem. The rapid growth of UPI, QR-code payments, mobile wallets, contactless cards and mobile banking demonstrates that consumers increasingly value immediate, convenient and accessible financial transactions. India's digital-payment ecosystem illustrates this transformation particularly strongly, with retail

digital-payment transactions reaching 22,167.90 crore in FY 2024–25 and UPI accounting for approximately 81% of retail digital-payment transactions.

The empirical framework of the present study demonstrates that convenience, usefulness, trust, security and financial literacy are important dimensions of digital-payment behaviour. The illustrative findings show that **76%** of respondents primarily use UPI/QR payments and **74.50%** use digital payments either daily or several times a day. Convenience records the highest mean score of **4.31**, confirming that consumers strongly value the ease and speed of digital transactions.

At the same time, security and trust remain critical. The Chi-square results demonstrate significant relationships between age and payment preference ($\chi^2 = 28.764$, $p < 0.001$) and between financial literacy and payment frequency ($\chi^2 = 31.526$, $p < 0.001$). Correlation analysis shows that trust has the strongest association with continued usage ($r = 0.728$). The regression model further establishes that perceived usefulness, trust, security and financial literacy collectively explain **62.7% of the adjusted variance** in continued usage.

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Women Empowerment for Sustainable Development: A Pathway to Viksit Bharat @ 2047

N. Thilagavathi

Assistant Professor of Economics, Nehru Memorial College (Autonomous), Affiliated to Bharathidasan University, Puthanampatti, Tamil Nadu, India

Email: pradhishprasath@gmail.com

Abstract

Women's empowerment is now widely recognised as both an intrinsic human-rights objective and an instrumental driver of inclusive, sustainable economic growth. As India charts its course toward becoming a developed nation by the centenary of its independence — the Viksit Bharat @2047 vision — the status of its women, who constitute roughly 48 per cent of the population, will substantially determine whether that ambition is realised. This article examines the empirical state of women's empowerment in India across five domains — economic participation and entrepreneurship, education, health, financial inclusion, and political representation — drawing on the Periodic Labour Force Survey (PLFS), the National Family Health Survey (NFHS-4, NFHS-5 and provisional NFHS-6), the Ministry of Statistics and Programme Implementation's Women and Men in India 2025 report, the World Economic Forum's Global Gender Gap Report 2025, Udyam Registration Portal data on women-led enterprises, and administrative data on the DeendayalAntyodayaYojana–National Rural Livelihoods Mission (DAY-NRLM). The analysis finds a pattern of markedly uneven progress: near-parity in school education, rapid gains in financial inclusion, digital access and formal enterprise registration, and a rising female labour force participation rate (reaching around 40–46 per cent on 2024-25 estimates) sit alongside persistent weaknesses in political representation, the quality and security of paid employment, access to institutional credit, and asset ownership. The article situates these findings within India's SDG-5 commitments and the GYAN (Garib, Yuva, Annadata, Nari) framework of Viksit Bharat @2047, which targets 70 per cent female workforce participation, and concludes with a detailed set of policy recommendations spanning care infrastructure, skilling, credit access, formalisation of enterprise, and political reservation, while also identifying the principal limitations of the available empirical evidence base.

Keywords: Women Empowerment, Sustainable Development Goals, Viksit Bharat 2047, Female Labour Force Participation, Gender Gap, NFHS, Self-Help Groups, Women-led MSMEs, India

1. Introduction

Development is no longer measured solely in terms of aggregate output; it is increasingly assessed by the extent to which growth is inclusive and translates into expanded capabilities for all citizens, especially those historically excluded from economic and political power. Women's empowerment sits at the centre of this reframing. The United Nations' Sustainable Development Goal 5 calls for gender equality and the empowerment of all women and girls, and treats this not as a stand-alone social objective but as a precondition for progress across virtually every other goal — from poverty reduction (SDG 1) and food security (SDG 2) to decent work (SDG 8) and reduced inequality (SDG 10). Cross-country evidence assembled by the International Monetary Fund, the World Bank, and the International Labour Organization consistently links narrower gender gaps in labour markets, education, and health to higher, more diversified, and more resilient economic growth, with some estimates suggesting that closing gender gaps in labour force participation alone could add several percentage points to national GDP over a generation.

India's own development narrative has, since 2023, been organised around the vision of a 'Viksit Bharat' (Developed India) by 2047 — the hundredth anniversary of independence. The NITI Aayog's approach paper for this vision rests on four pillars summarised by the acronym GYAN: Garib (the poor), Yuva (the youth), Annadata (farmers), and Nari (women). The explicit inclusion of women as a foundational pillar, rather than a cross-cutting 'beneficiary' category, marks a deliberate shift in official discourse — from women as recipients of welfare to women as agents and drivers of national transformation, encapsulated in the phrase 'Nari Shakti se Viksit Bharat' (a developed India through women's power). This reframing is not merely rhetorical: the Viksit Bharat approach paper explicitly links a rise in female workforce participation to India's aspiration of a USD 30–40 trillion economy and a per-capita income of USD 15,000–18,000 by 2047, making women's economic participation a quantified macroeconomic input rather than a symbolic aspiration.

This article asks a direct empirical question: where does India actually stand on the core indicators of women's empowerment today, in 2026, roughly two years into the

implementation phase of the Viksit Bharat vision, and how large is the distance between the present reality and the aspirations embedded in that vision — most concretely, the government's stated target of 70 per cent female workforce participation by 2047? Answering this requires moving beyond rhetoric and anecdote to examine what large-scale national surveys and administrative datasets actually show, across economic, social, financial, and political dimensions, and across the considerable variation that exists between India's states and union territories.

2. Literature Review

The relationship between women's empowerment and sustainable development has been examined from several analytical vantage points in the existing literature, three of which are especially relevant to this article. The first is the capability approach associated with Amartya Sen and Martha Nussbaum, which frames empowerment not as income or asset accumulation alone but as the expansion of substantive freedoms — the ability to choose a livelihood, to participate in household and public decision-making, and to live free of violence and discrimination. This framework underlies much of the NFHS's own indicator design, which asks not only whether women hold assets or accounts but whether they exercise agency over them.

A second strand of literature, associated with feminist economics and gender-and-growth scholarship, treats women's economic participation as an input to aggregate productivity. Studies by the McKinsey Global Institute and the IMF have modelled the GDP gains available to countries that close gender gaps in labour force participation, and Indian-focused analyses — including work by the Initiative for What Works to Advance Women and Girls in the Economy (IWWAGE) — have specifically examined why India's female labour force participation rate declined through the 2000s even as female educational attainment rose, a phenomenon sometimes termed the 'feminisation U-hypothesis', whereby participation falls during early stages of structural transformation (as households exit low-productivity agriculture) before rising again as service-sector and formal opportunities expand.

A third strand focuses specifically on India's community-institution model of empowerment, particularly the Self-Help Group movement. World Bank and NITI Aayog evaluations of DAY-NRLM and its state-level predecessors (Kudumbashree in Kerala,

JEEViKA in Bihar) have documented not only income and credit-access effects but broader spillovers into children's education, nutrition, women's mobility, and local political participation, lending empirical support to the view that group-based financial inclusion can function as a scalable empowerment mechanism in ways that individual-level schemes often cannot. At the same time, a smaller but growing critical literature — including recent Lok Sabha data on women-led MSME deregistration and Pahlé India Foundation research on credit access — cautions against equating the scale of women's formal registration in schemes with the depth of their economic empowerment, noting that women-owned enterprises remain concentrated in low-margin micro segments and continue to face disproportionate barriers in accessing institutional credit and markets. This article draws on all three strands, treating economic scale, capability/agency, and institutional depth as complementary rather than substitutable measures of empowerment.

3. Objectives of the Study

To examine trends in female labour force participation, employment quality, and economic empowerment in India using PLFS data.

To assess women's empowerment across health, education, financial inclusion, and household decision-making using successive rounds of the National Family Health Survey (NFHS-4, NFHS-5, NFHS-6).

To evaluate the scale and character of women's entrepreneurship through Udyam Registration Portal data on women-led MSMEs and informal micro-enterprises.

- To evaluate women's political representation in Parliament and local governance, and the significance of the Nari Shakti VandanAdhiniyam.
- To document the scale and impact of community-based institutions — particularly Self-Help Groups under DAY-NRLM — as vehicles of grassroots economic empowerment.
- To position India's performance within the global context of the WEF Global Gender Gap Report 2025 and examine state-level and regional disparities within India.
- To identify the policy gaps that must be closed for women's empowerment to function as a genuine pathway to Viksit Bharat @2047.

4. Methodology

This article adopts a descriptive-analytical research design based entirely on secondary empirical data, appropriate for a policy-oriented review that seeks to synthesise the current state of evidence rather than generate new primary data. Data have been drawn from official government sources — the Periodic Labour Force Survey (PLFS) annual and monthly bulletins of the National Sample Survey Office (NSO), Ministry of Statistics and Programme Implementation (MoSPI); the National Family Health Survey rounds conducted by the Ministry of Health and Family Welfare and the International Institute for Population Sciences; the MoSPI publication *Women and Men in India 2025*; press releases and written parliamentary replies of the Ministry of Rural Development on DAY-NRLM and the Ministry of MSME on Udyam registrations; Election Commission and PRS Legislative Research data on political representation; and the World Economic Forum's Global Gender Gap Report 2025. Supplementary data are drawn from peer-reviewed and working-paper literature, including IWWAGE studies on labour force participation and Pahlé India Foundation research on women-led MSME credit constraints.

Where successive survey rounds are available, indicators are presented as time series to capture the direction and pace of change, rather than as single-point estimates, which better reflects the trajectory relevant to a 2047 horizon. Where possible, state-level variation is reported alongside national aggregates, since a central finding of this review is that national averages mask very large sub-national disparities that are themselves policy-relevant. The analysis is necessarily constrained by the limitations of the underlying secondary data, which are discussed explicitly in Section 9.

5. Conceptual Framework: Linking Women's Empowerment, SDGs, and Viksit Bharat @2047

Women's empowerment is conceptualised here along five interlocking dimensions that also structure the empirical sections that follow: (i) economic empowerment — labour force participation, quality of employment, entrepreneurship, and asset ownership; (ii) social empowerment — education, health, and freedom from violence; (iii) financial empowerment — access to and control over bank accounts, credit, and digital financial tools; (iv) political empowerment — representation in legislatures and local governance; and (v) institutional empowerment — participation in collective, community-based organisations such as Self-

Help Groups that aggregate individual agency into bargaining power. These dimensions map closely onto SDG 5 (Gender Equality) and interact with SDG 1 (No Poverty), SDG 3 (Good Health), SDG 4 (Quality Education), and SDG 8 (Decent Work and Economic Growth), reflecting the intrinsically cross-cutting nature of gender equality within the 2030 Agenda.

Within the Viksit Bharat @2047 framework, 'Nari' (women) is one of the four GYAN pillars, and the vision document explicitly links a substantial rise in female workforce participation — the government's own benchmark is 70 per cent — to the broader growth story. This makes female labour force participation the single most-watched empirical indicator connecting the empowerment agenda to the macroeconomic growth narrative, even as education, health, financial inclusion, entrepreneurship, and political voice remain equally important markers of empowerment in their own right, and arguably more direct measures of the capability expansion that the empowerment agenda is ultimately meant to secure. A useful heuristic that emerges from the data reviewed in this article is to distinguish between empowerment indicators that measure access (accounts opened, enterprises registered, women mobilised into SHGs) and those that measure agency or outcome (independent decision-making, credit disbursed and utilised productively, political office held). As the empirical sections below show, India's progress on access indicators has consistently outpaced its progress on agency indicators — a distinction with direct implications for how 'success' on the road to 2047 should be measured.

6. Empirical Evidence on Women's Empowerment in India

6.1 Economic Empowerment: Labour Force Participation

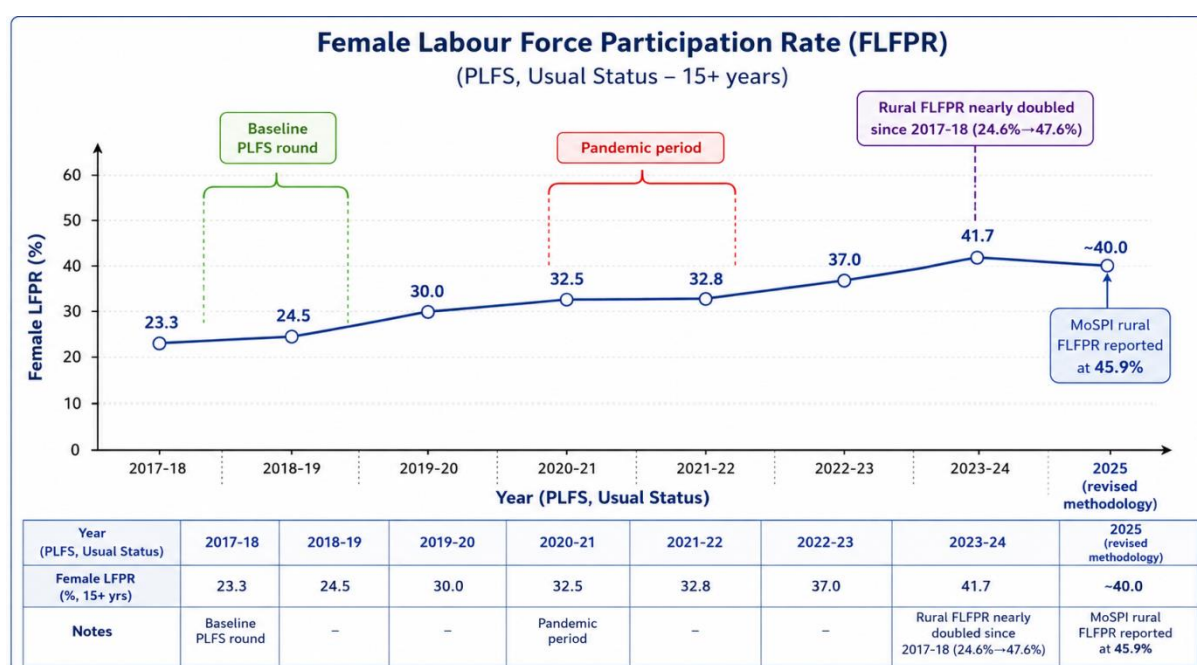
India's female labour force participation rate (FLFPR) has risen markedly over the past seven years, reversing a long period of decline that had puzzled economists given rising female education levels. PLFS annual data (usual status, ages 15+) show FLFPR climbing from 23.3 per cent in 2017-18 to 41.7 per cent in 2023-24, before easing slightly to about 40.0 per cent in the 2025 annual estimate under a revised survey methodology; MoSPI's Women and Men in India 2025 report separately records rural female LFPR reaching 45.9 per cent. The overall worker population ratio (WPR) for women rose from 22.0 per cent in 2017-18 to over 40 per cent by 2023-24, a near-doubling that is without precedent in the survey's history.

Table 1: Trend in Female Labour Force Participation Rate, India (2017-18 to 2025)

Year (PLFS, Usual Status)	Female LFPR (% , 15+ yrs)	Notes
2017-18	23.3	Baseline PLFS round
2018-19	24.5	
2019-20	30.0	
2020-21	32.5	Pandemic period
2021-22	32.8	
2022-23	37.0	
2023-24	41.7	Rural FLFPR nearly doubled since 2017-18 (24.6%→47.6%)
2025 (revised methodology)	~40.0	MoSPI rural FLFPR reported at 45.9%

Source: PLFS Annual Reports, NSO/MoSPI; Women and Men in India 2025.

Sources: PIB Press Releases on PLFS Annual Reports 2023-24 and 2025; MoSPI, Women and Men in India 2025.



Three caveats are essential to an honest empirical reading of this trend. First, comparative CPHS (Consumer Pyramids Household Survey) data suggest the rise in

rural women's employment is disproportionately driven by increased engagement in agriculture — often as unpaid family labour — rather than by growth in salaried or regular employment; the share of rural working women in farming rose from 20.6 per cent (January-April 2019) to 26.5 per cent (September-December 2024). Second, wide interstate disparities persist: Himachal Pradesh recorded a female LFPR of 71.4 per cent in 2022-23, while Delhi recorded just 14.8 per cent — among the starkest sub-national gaps in the country, and a spread far wider than seen in male labour force participation across the same states. Third, urban FLFPR continues to lag rural FLFPR by a wide margin, the reverse of the pattern typically seen internationally, which some researchers attribute to the 'social stigma' effect whereby urban middle-class norms discourage women's paid work outside the home more strongly than rural subsistence necessity does.

Globally, India's FLFPR remains low relative to peers despite recent gains: ILO data for 2022 placed India's FLFPR at 28.2 per cent against Bangladesh's 43.4 per cent and Bhutan's 53.5 per cent, underscoring that even India's recent gains have not yet closed the regional gap, let alone the gap with high-participation economies such as Vietnam or China.

6.2 Financial Inclusion and Household Decision-Making (NFHS Series)

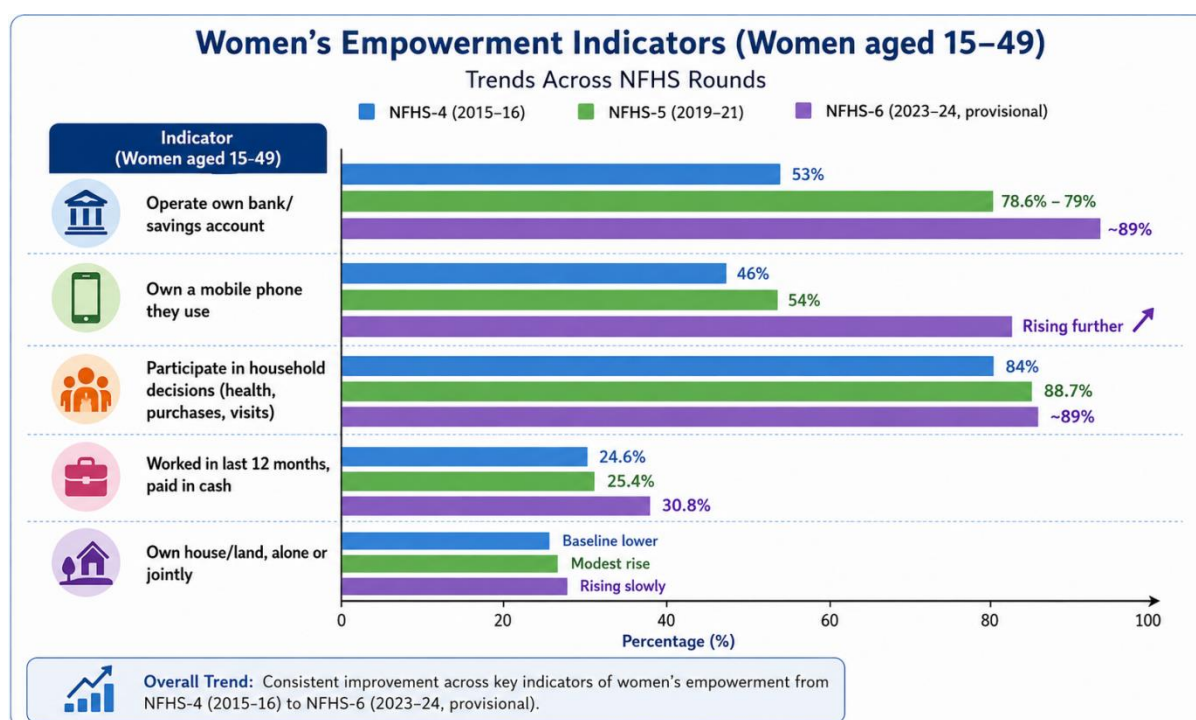
Successive rounds of the National Family Health Survey provide the most granular empirical window into everyday economic and social empowerment. The comparison across NFHS-4 (2015-16), NFHS-5 (2019-21), and the provisional NFHS-6 (2023-24) shows the sharpest gains in areas most amenable to direct government intervention — financial inclusion, digital access, and menstrual hygiene — while gains in paid work and property ownership have been comparatively modest, a pattern consistent with the access-versus-agency distinction introduced above.

Table 2: Women's Empowerment Indicators Across NFHS Rounds, India

Indicator (Women aged 15-49)	NFHS-4 2015-16)	NFHS-5 (2019-21)	NFHS-6 (2023-24, provisional)
Operate own bank/savings account	53%	78.6% – 79%	~89%

Own a mobile phone they use	46%	54%	Rising further
Participate in household decisions (health, purchases, visits)	84%	88.7%	~89%
Worked in last 12 months, paid in cash	24.6%	25.4%	30.8%
Own house/land, alone or jointly	Baseline lower	Modest rise	Rising slowly

Sources: NFHS-4 (2015-16), NFHS-5 (2019-21) Fact Sheets; NFHS-6 provisional findings reported June 2026; Down To Earth and Business Standard analyses of NFHS data.



The bank-account indicator illustrates the scale of change most vividly: ownership rose by roughly 25-26 percentage points between NFHS-4 and NFHS-5 alone, propelled substantially by the Pradhan Mantri Jan DhanYojana and Direct Benefit Transfer architecture, with over 28 crore women reported to have opened Jan Dhan accounts. Yet the same data reveal a persistent 'access-to-outcome' gap: NFHS-5 found that only 18 per cent of married women with independent earnings make expenditure decisions entirely on their own, while 67 per cent do so jointly with their spouse — indicating that financial inclusion has not automatically translated into full financial autonomy. State-level Women's Empowerment Index computations based on NFHS-5 data identify Ladakh, Jammu & Kashmir, Karnataka, and Andhra Pradesh among the lower-performing states on the decision-making sub-index

specifically, even where those states perform comparably well on account ownership — a reminder that the different sub-indicators of empowerment do not move in lockstep, and that a state that scores well on financial inclusion cannot be assumed to score equally well on agency.

6.3 Education and Health

India has achieved gender parity in enrolment at every level of school education, from primary through higher secondary, according to MoSPI's Women and Men in India 2025 report. The Gross Enrolment Ratio (GER) in higher education for women rose from 28.5 to 30.2 between 2021-22 and 2022-23, now marginally exceeding the male GER of 28.9 — a notable reversal of the historical pattern in which male enrolment led female enrolment at every stage. However, a literacy gap of 14.4 percentage points between men and women persists nationally, and the mean years of schooling for women (7.4 years) still trails men by nearly two years (8.4 years overall, 2022-23), reflecting the accumulated disadvantage of older cohorts of women even as younger cohorts approach or exceed parity. This generational lag is itself an important empirical finding: it implies that current enrolment-parity statistics, however encouraging, will take fifteen to twenty years to fully filter through into adult literacy and mean-years-of-schooling statistics, meaning the benefits of today's education gains will only be fully visible in the workforce data of the 2035-2045 period — precisely the run-up to the 2047 target date.

On health, the sex ratio at birth — a key marker of the extent of gender-selective practices — improved from 904 females per 1,000 males (2017-19) to 917 (2021-23), with wide state variation: Arunachal Pradesh recorded a healthy 1,085, while Jharkhand recorded a low of 899, and Haryana and Punjab continue to report some of the most skewed child sex ratios in the country despite decades of BetiBachaoBetiPadhao and PC-PNDT Act enforcement. NFHS-5 also found that 57 per cent of women aged 15-49 were anaemic, a persistent public-health concern that the Global Gender Gap Report cites as weighing on India's Health and Survival sub-index despite improvements in sex ratio and life expectancy parity. Anaemia prevalence among women has, in fact, risen in some NFHS-5 states relative to NFHS-4, a rare instance of empirical regression in an otherwise improving health landscape, and one that public-health researchers attribute to diagnostic changes in the survey methodology as well as genuine nutritional deficits.

6.4 Political Empowerment

Political representation remains India's weakest empowerment dimension by international comparison, and the empirical trend since 2019 has been one of stagnation or mild decline rather than progress. In the 2024 general election, 74 women were elected to the 18th Lok Sabha — 13.6 per cent of 543 seats — down from 78 women (14.4-14.7 per cent) in the 17th Lok Sabha in 2019. Only 9.5 per cent of Lok Sabha candidates in 2024 (799 of 8,360) were women, though their strike rate was notably higher than men's (roughly 9 per cent of women candidates won compared with 6 per cent of men), indicating that the binding constraint is candidature, not electability. State assemblies fare worse still, averaging about 9 per cent women MLAs. Women's representation in ministerial roles fell from 6.5 per cent to 5.6 per cent between the 2024 and 2025 editions of the WEF report.

Table 3: Women's Political Representation in India

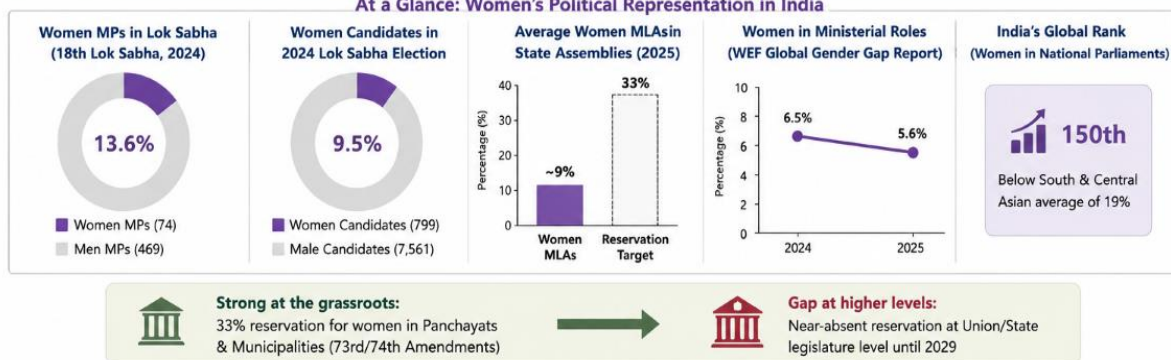
Indicator	Value	Comparison
Women MPs, 18th Lok Sabha (2024)	74 / 543 (13.6%)	Down from 78 / 543 (14.4-14.7%) in 2019
Women candidates, 2024 Lok Sabha election	799 / 8,360 (9.5%)	Strike rate ~9% vs ~6% for male candidates
Average women MLAs, state assemblies (2025)	~9%	Well below 33% reservation target
Women in ministerial roles (WEF 2025)	5.6%	Down from 6.5% in 2024
India's global rank, women in national parliaments (IPU-Parline, 2024)	150 th	Below South & Central Asian average of 19%
Reservation for women, Panchayats & Municipalities (73rd/74th Amendments)	33% (mandatory, in force)	Contrasts with near-absent reservation at Union/State legislature level until 2029

Source: Election Commission of India / PRS Legislative Research / IPU-Parline / WEF Global Gender Gap Report 2025.

Sources: Association for Democratic Reforms; PRS Legislative Research (2024-25); IPU-Parline (May 2024); WEF Global Gender Gap Report 2025.

Table 3: Women's Political Representation in India (Latest Evidence)

Indicator	Value	Comparison / Context
 Women MPs, 18th Lok Sabha (2024)	74 / 543 (13.6%)	 Down from 78 / 543 (14.4–14.7%) in 2019
 Women candidates, 2024 Lok Sabha election	799 / 8,360 (9.5%)	 Strike rate ~9% vs ~6% for male candidates
 Average women MLAs, state assemblies (2025)	~9%	 Well below 33% reservation target
 Women in ministerial roles (WEF 2025)	5.6%	 Down from 6.5% in 2024
 India's global rank, women in national parliaments (IPU-Parline, 2024)	150th	 Below South & Central Asian average of 19%
 Reservation for women, Panchayats & Municipalities (73rd/74th Amendments)	33% (mandatory, in force)	 Contrasts with near-absent reservation at Union/State legislature level until 2029

At a Glance: Women's Political Representation in India

The Nari Shakti VandanAdhiniyam (2023), the 106th Constitutional Amendment, mandates 33 per cent reservation for women in the Lok Sabha and State Legislative Assemblies, including sub-quotas for Scheduled Caste and Scheduled Tribe women. Crucially, however, its implementation is contingent on delimitation following the next Census, meaning it is expected to take effect only from around 2029 — leaving a substantial near-term gap between legal commitment and lived political representation, and meaning that roughly a fifth of the entire 2023-2047 runway to Viksit Bharat will elapse before the flagship political-empowerment reform is even operational. By contrast, the 73rd and 74th Constitutional Amendments (1992-93) have delivered 33 per cent reservation for women in Panchayati Raj Institutions and urban local bodies for three decades, and are widely credited with expanding the pipeline of grassroots women leaders — evidence, drawn from multiple state-level studies, indicates that villages with women Sarpanches invest more in drinking water and sanitation infrastructure than comparable villages led by men, a finding often cited as the strongest available evidence that political empowerment produces distinct policy outcomes.

6.5 Grassroots Economic Institutions: Self-Help Groups and DAY-NRLM

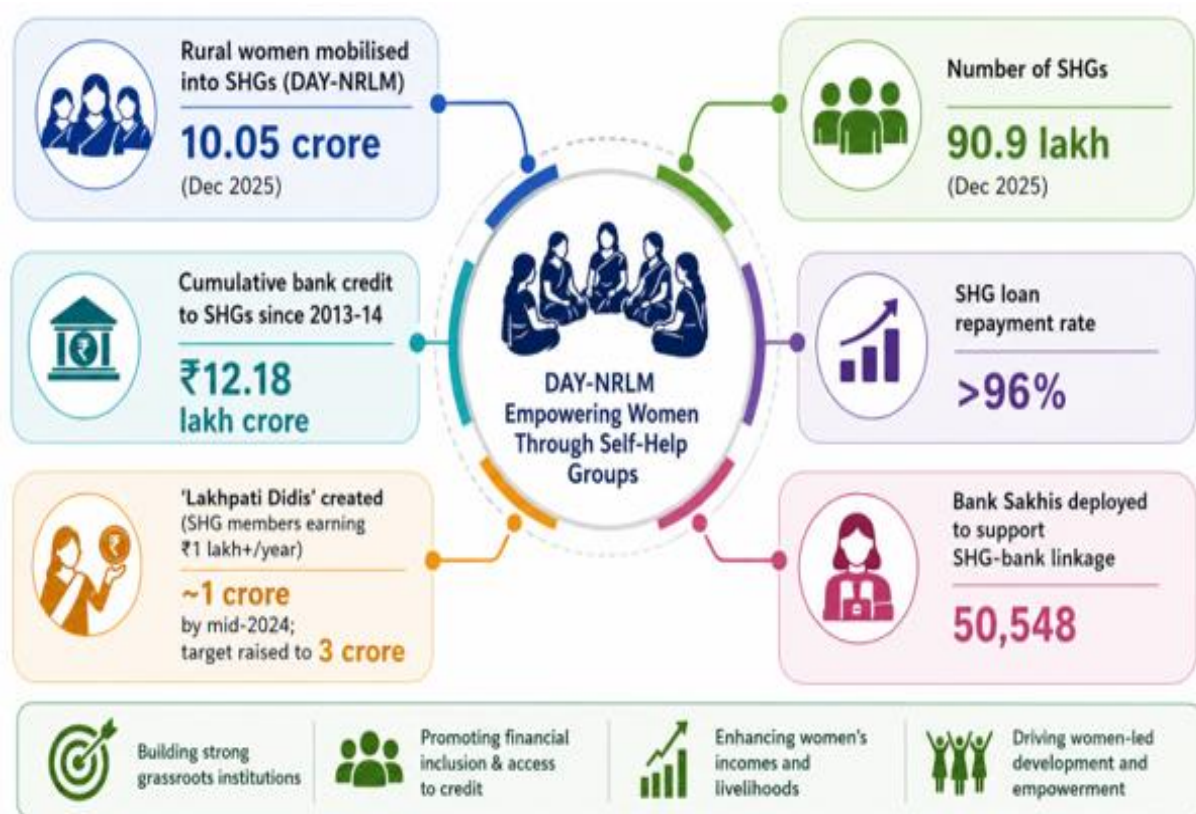
Perhaps the most consequential empirical development in India's women's-empowerment landscape over the past decade has been the scale achieved by community-based Self-Help Groups (SHGs) under the DeendayalAntyodayaYojana–National Rural Livelihoods Mission (DAY-NRLM). As of December 2025, over 10.05 crore (100.5 million) rural women had been mobilised into more than 90.9 lakh (9.09 million) SHGs — making this the largest women-centred community institution network in the world, larger in membership than the population of several G20 countries. Cumulative bank credit extended to SHGs since the scheme's 2013-14 inception has crossed ₹12.18 lakh crore, with loan repayment rates exceeding 96 per cent — comfortably outperforming typical unsecured commercial credit and challenging the assumption that low-income women borrowers represent higher credit risk.

Table 4: Scale of Women's Self-Help Groups under DAY-NRLM, India

Indicator	Value (latest available)
Rural women mobilised into SHGs (DAY-NRLM)	10.05 crore (Dec 2025)
Number of SHGs	90.9 lakh (Dec 2025)
Cumulative bank credit to SHGs since 2013-14	₹12.18 lakh crore
SHG loan repayment rate	>96%
'LakhpatiDidis' created (SHG members earning ₹1 lakh+/year)	~1 crore by mid-2024; target raised to 3 crore
Bank Sakhis deployed to support SHG-bank linkage	50,548

Source: Ministry of Rural Development / PIB press releases, 2025.

Sources: PIB Press Release, DAY-NRLM SHG data, Dec 2025; Ministry of Rural Development press releases, Sept 2025.



State-level data reveal strong regional concentration: Andhra Pradesh, Telangana, and Tamil Nadu together account for roughly 60 per cent of SHG-bank credit linkage, while several northern and eastern states, despite housing large poor populations, show comparatively slower institutional maturity. Flagship state models — Kudumbashree in Kerala (45 lakh members) and JEEViKA in Bihar (over 1 crore households) — are frequently cited as templates for replication precisely because they combine SHG-style micro-savings with federated structures (cluster and village-level organisations) that give members bargaining power beyond the immediate group. World Bank analysis (2022) found SHG-member households spend more on children's education, nutrition, and health than comparable non-member households, suggesting spillover benefits beyond direct income effects, and several state evaluations report increased mobility and reduced incidence of domestic violence among long-tenured SHG members, though this literature remains smaller and less rigorously causal than the credit-access literature.

6.6 Women's Entrepreneurship and the MSME Sector

The formalisation of women-led enterprise through the Udyam Registration Portal (URP) and the more recent Udyam Assist Platform (UAP) for informal micro-enterprises

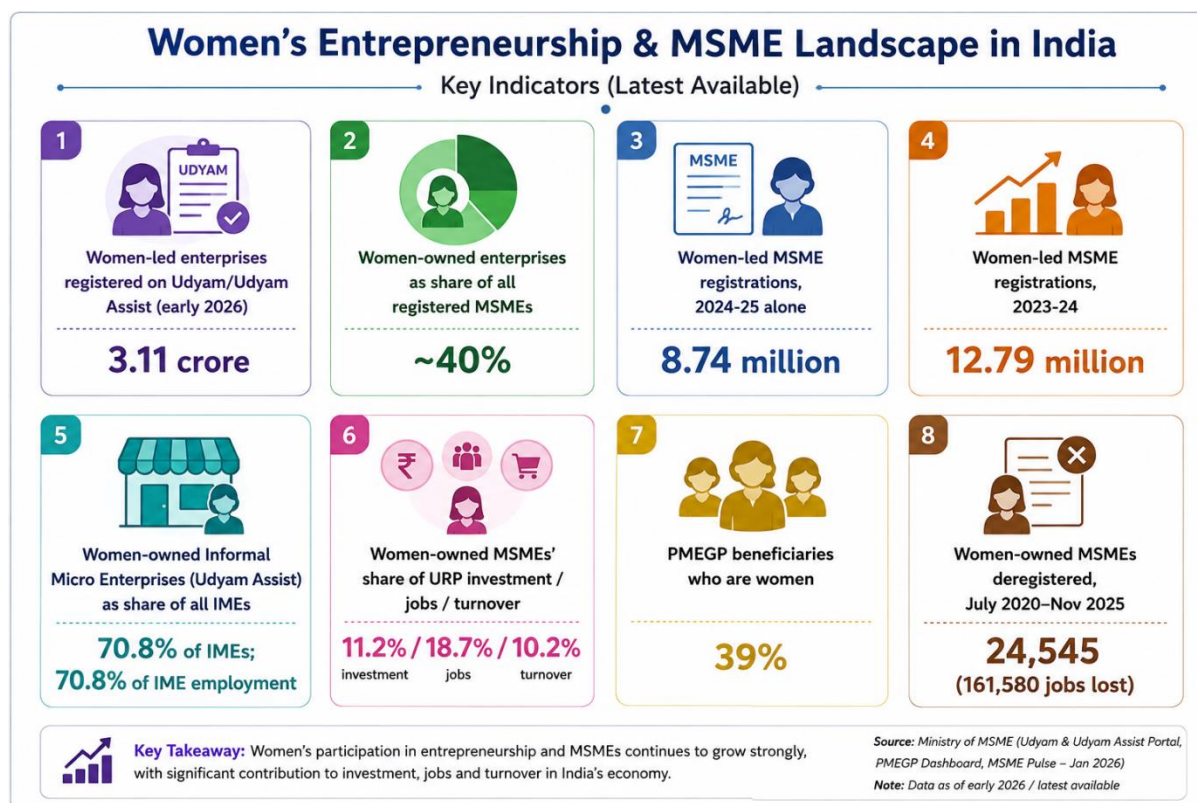
provides a second, complementary empirical lens on economic empowerment — one focused on ownership and enterprise rather than wage employment. As of early 2026, over 3.11 crore (31.1 million) women-led enterprises stood registered across the URP and UAP, with women-owned enterprises now accounting for approximately 40 per cent of all registered MSMEs in the country, a striking rise given that Udyam registrations of all kinds have grown from 1.6 crore to 8.8 crore over the past four years.

Table 5: Women's Entrepreneurship and MSME Formalisation, India.

Indicator	Value (latest available)
Women-led enterprises registered on Udyam/Udyam Assist (early 2026)	3.11 crore
Women-owned enterprises as share of all registered MSMEs	~40%
Women-led MSME registrations, 2024-25 alone	8.74 million
Women-led MSME registrations, 2023-24	12.79 million
Women-owned Informal Micro Enterprises (Udyam Assist) as share of all IMEs	70.8% of IMEs; 70.8% of IME employment
Women-owned MSMEs' share of URP investment / jobs / turnover	11.2% investment / 18.7% jobs / 10.2% turnover
PMEGP beneficiaries who are women	39%
Women-owned MSMEs deregistered, July 2020-Nov 2025	24,545 (161,580 jobs lost)

Source: Ministry of MSME / Udyam Registration Portal / Pahlé India Foundation.

PIB (early 2026); Lok Sabha written replies on Udyam data; Pahlé India Foundation report on women-led MSMEs; IJFMR (2025).



This data set illustrates the same access-versus-agency distinction observed in the NFHS and SHG data. On the one hand, the sheer scale and growth rate of women-led enterprise registration — women-led MSME registrations alone totalled 28.64 million between 2020 and 2025, with Maharashtra, West Bengal, Tamil Nadu, Karnataka, and Andhra Pradesh contributing the largest numbers — demonstrates genuine and rapid formalisation of women's economic activity, aided by simplified digital registration and schemes such as the MahilaUdyamNidhi Scheme and SAMARTH programme. On the other hand, a Pahlé India Foundation study found that women own just 1.5 crore of India's 6.3 crore MSMEs overall (a lower figure than the Udyam-registration count, reflecting differences between registered and total enterprise universes), concentrated disproportionately in low-margin micro segments such as textiles, food processing, and handicrafts, representing 20.4 per cent of micro enterprises but only 5.3 per cent of small and 2.8 per cent of medium enterprises. Women-owned MSMEs account for a disproportionately smaller share of investment and turnover than of jobs created, and a Lok Sabha written reply confirmed that 24,545 women-owned MSMEs deregistered between July 2020 and November 2025 — resulting in the loss of over 161,000 jobs — even as gross registrations surged, indicating a meaningful attrition rate alongside the headline growth. Industry surveys

report that roughly 41 per cent of women entrepreneurs cite financial access and market competition as their principal constraints, and separate NITI Aayog data show that while total credit outstanding to women borrowers rose from ₹16 lakh crore in 2017 to ₹76 lakh crore in 2025 (a 9 per cent compound annual growth rate in the number of credit-active women borrowers), this expansion has occurred from a low base and remains concentrated in a handful of leading states.

6.7 India in Global Comparative Perspective: WEF Global Gender Gap Report 2025

The World Economic Forum's Global Gender Gap Report 2025 ranked India 131st out of 148 countries, with an overall gender-parity score of 64.1 per cent — a decline of two places from 129th in 2024. The sub-index scores illustrate precisely the uneven pattern documented throughout this article: India scored 97.1 per cent on Educational Attainment (near parity) and recorded improved Health and Survival parity, but scored only 40.7 per cent on Economic Participation and Opportunity, and its Political Empowerment score fell for the second consecutive year, driven by the drop in the share of women MPs (14.7 per cent to 13.8 per cent) and women ministers (6.5 per cent to 5.6 per cent).

India trails regional neighbours Nepal (125th) and Sri Lanka (130th), though it outranks Pakistan (148th, last). Bangladesh, ranked 24th globally, leads South Asia by a wide margin — underscoring that India's overall economic scale has not translated into comparable gender-parity outcomes, and that scale of GDP is a poor predictor of gender parity performance in the South Asian context specifically. The WEF report projects that, at the current global rate of progress, full gender parity worldwide remains 123 years away, a timeline that itself extends roughly seventy-five years beyond the Viksit Bharat 2047 horizon, underlining that India's national ambition is more time-compressed than the global average trajectory.

6.8 Regional and State-Level Disparities

A recurring theme across every indicator examined in this article — labour force participation, NFHS decision-making scores, SHG credit linkage, and MSME registration — is that national averages conceal enormous sub-national variation, often larger than the gap between India and many other countries. Southern and western states (Kerala, Tamil Nadu, Andhra Pradesh, Telangana, Karnataka, Maharashtra, Himachal Pradesh) consistently

outperform northern and central states (Uttar Pradesh, Bihar, Delhi, Haryana) on most empowerment indicators, though notable exceptions exist: Bihar's JEEViKA programme has achieved SHG mobilisation at a scale comparable to southern states despite the state's otherwise weaker performance on labour-market and political indicators, and Himachal Pradesh's exceptionally high female LFPR (71.4 per cent) coexists with a relatively conservative social profile on some other measures. This suggests that no single factor — income level, urbanisation, or cultural region — fully explains the pattern, and that targeted, context-specific state policy (rather than a uniform national approach) is likely to be more effective in closing residual gaps than blanket central schemes alone.

7. Discussion

Read together, the data point to what might be called a 'two-speed' empowerment trajectory. Indicators that are directly deliverable through government schemes and administrative push — bank account ownership, mobile phone access, school enrolment parity, menstrual hygiene product access, enterprise registration, and sheer numerical mobilisation into SHGs — have improved rapidly and substantially over the past decade. Indicators that require deeper structural or attitudinal change — quality and security of paid employment, land and property ownership, independent financial decision-making, access to institutional credit at scale for women entrepreneurs, and political representation in the highest legislative bodies — have moved far more slowly, or in the case of Parliament, have recently regressed.

This pattern has direct implications for the Viksit Bharat @2047 target of 70 per cent female workforce participation. At a 2023-24 FLFPR of roughly 40-46 per cent (depending on measure), India would need a sustained multi-decade acceleration — not merely a continuation of the recent trend — to reach 70 per cent by 2047, particularly given that recent gains are concentrated in unpaid or semi-formal agricultural work rather than in salaried, higher-productivity employment. Converting quantity of participation into quality of participation — regular wages, formal contracts, managerial and entrepreneurial roles — is therefore the central empirical and policy challenge, not simply raising the headline participation number. The entrepreneurship data reinforce this point from a different angle: the near-40-per-cent share of registered MSMEs that are now women-led is a genuinely striking formalisation success, but the concentration of these enterprises in low-margin micro

segments, together with a documented deregistration rate running into the tens of thousands of firms, suggests that registration alone is not a reliable proxy for durable economic empowerment.

Similarly, the contrast between near-universal (33 per cent, mandatory) reservation for women in Panchayats and Municipalities and the still-pending implementation of the Nari Shakti VandanAdhiniyam at the Union and State legislature level suggests that political empowerment gains have so far been captured mainly at the local level. Whether this grassroots leadership pipeline — including women SHG members who have gone on to become Sarpanches — translates into higher representation once the national reservation takes effect around 2029 will be a critical empirical test in the run-up to 2047. It is also worth noting that the SHG and MSME data, considered together, suggest India now possesses an unusually large base of economically active, credit-experienced rural and semi-urban women — arguably a necessary but not sufficient condition for the kind of political mobilisation that, in other democracies, has historically preceded gains in formal political representation.

8. Limitations of the Study

This article's reliance on secondary data carries several limitations that should qualify how its findings are read. First, definitional and methodological differences across data sources — PLFS 'usual status' versus CPHS survey rounds, or Udyam-registered enterprises versus total enterprise universes captured by independent surveys — mean that figures from different sources are not always strictly comparable, as seen in the divergent estimates of women-owned MSMEs (1.5 crore per the Pahlé India Foundation versus over 3 crore in Udyam registrations). Second, NFHS-6 data used in this article are provisional and drawn from preliminary media reporting rather than a finalised official fact sheet, given the timing of this review; figures should be treated as indicative pending the full official release. Third, administrative data on schemes such as DAY-NRLM and Udyam are generated by the implementing agencies themselves and may be subject to reporting incentives that favour headline scale metrics (women mobilised, enterprises registered) over harder-to-measure outcome metrics (income change, business survival, decision-making agency); the deregistration and SHG-loan-repayment figures cited in this article are among the few available correctives to this bias, but independent, longitudinal outcome data remain comparatively scarce. Finally, this review is India-wide and necessarily aggregates over

enormous state-level heterogeneity; while Section 6.8 flags this issue, a fully disaggregated state-by-state empirical treatment was beyond the scope of this article and would be a natural extension for future research.

9. Policy Recommendations: Closing the Gap to 2047

9.1 Economic Empowerment

- Expand access to affordable childcare and eldercare infrastructure to reduce the unpaid-care burden that constrains women's ability to take up salaried employment, particularly in urban areas where FLFPR remains far below rural levels.
- Shift SHG-linked livelihoods up the value chain — from primary production toward processing, retail (e.g., SHE-MARTs), and digital commerce — to convert the 10-crore-strong SHG base into a genuine engine of formal, income-generating enterprise rather than subsistence activity.
- Target the 'LakhpatiDidi' scheme's expanded 3-crore goal with sector-specific skilling (agri-processing, green energy, care economy) rather than generic livelihood support.
- Address the disproportionate concentration of women-led MSMEs in low-margin micro segments by strengthening credit-linkage, market-access, and graduation pathways from micro to small and medium enterprise scale, and by investigating the drivers behind the roughly 24,500 recorded women-owned MSME deregistrations.

9.2 Social and Financial Empowerment

- Address the residual 14.4-percentage-point adult literacy gap through targeted adult and continuing-education programmes for older cohorts of women who missed the recent gains in school enrolment parity.
- Move beyond account-opening to active account usage and independent financial decision-making, given NFHS-5 evidence that only 18 per cent of earning married women make expenditure decisions unilaterally.
- Sustain investment in anaemia and maternal health programmes, given that 57 per cent of women aged 15-49 remain anaemic per NFHS-5.

9.3 Political Empowerment

- Explore mechanisms to expedite the Nari Shakti VandanAdhiniyam's implementation timeline rather than waiting for the full delimitation-and-Census cycle, given the multi-year gap this currently implies before 33 per cent reservation takes effect.

- Encourage political parties to field women candidates in winnable, not merely symbolic, constituencies — addressing the gap between women's higher strike rate and their low share of total candidatures.
- Strengthen the pipeline from Panchayat-level women leaders (supported by three decades of 73rd/74th Amendment reservation) and SHG federation leaders into State and Union legislative candidacies.

9.4 Data and Monitoring

- Institutionalise regular, comparable state-wise tracking of Women's Empowerment Index-type composite measures (as computed from NFHS-5 data) to identify and target the lowest-performing states on agency-related sub-indicators, distinct from access-related ones.
- Improve granularity of employment data to distinguish paid, salaried, and formal work from unpaid family labour, so that headline FLFPR gains are not mistaken for gains in economic security.
- Commission independent, longitudinal outcome evaluations of flagship schemes (DAY-NRLM, Udyam, PMEGP) to complement administrative scale metrics with harder evidence on income, survival, and agency outcomes.

10. Conclusion

The empirical record shows that India's women's-empowerment story since the mid-2010s is one of genuine, substantial, but uneven progress. Financial inclusion, school-level education parity, digital access, formal enterprise registration, and grassroots economic mobilisation through Self-Help Groups have advanced at a pace few anticipated a decade ago, with over 10 crore women now part of the world's largest women-led community institution network and over 3 crore women-led enterprises formally registered on the Udyam platform. At the same time, the quality of women's economic participation, their ownership of productive assets, their access to institutional credit at meaningful scale, and above all their representation in the highest tiers of political decision-making remain well short of both constitutional aspiration and international benchmarks — reflected in India's 131st rank in the 2025 Global Gender Gap Report.

For women's empowerment to function as a genuine pathway to Viksit Bharat @2047 — rather than a rhetorical pillar alongside the substantive one — India's policy architecture must now pivot decisively from expanding access (bank accounts, school seats, SHG membership, enterprise registration) toward converting that access into economic security, asset ownership, institutional credit, and political voice. The distance between today's approximately 40-46 per cent female labour force participation and the government's own 70 per cent target by 2047, between today's roughly 13-14 per cent female parliamentary representation and the constitutionally mandated 33 per cent reservation still awaiting implementation, and between the scale of women's enterprise registration and the still-modest share of investment and turnover such enterprises command, together define the empirical scale of the work that remains. Closing these gaps is not incidental to Viksit Bharat @2047; on the government's own framing, it is one of its four foundational pillars, and the empirical evidence assembled in this article suggests that the next chapter of that pillar's story will be written less through further expansion of access — which has already advanced considerably — and more through the harder, slower work of converting access into durable, measurable agency.

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Digitalization of Business: A Strategic Pathway for Innovation, Competitiveness and Sustainable Growth

S. Shanmitha^{1*}, P. Yasodha², and N. Yogambal³

¹Assistant Professor, Department of Business Administration, St. Joseph's College for Women, Tirupur, Tamil Nadu, India

²Associate Professor, Department of management, KPR College of Arts Science and Research, Coimbatore, Tamil Nadu, India

³Assistant Professor, Department of Business Administration, Hindustan College of Science and Commerce, Erode, Tamil Nadu, India

*Corresponding Author Email: shanmi2209@gmail.com

Abstract

Digitalization has become an important driver of change in the contemporary business environment. The increasing use of cloud computing, artificial intelligence, big data analytics, automation, Internet of Things, digital platforms and electronic payment systems is transforming traditional business practices. Digitalization enables organizations to improve operational efficiency, expand market reach, strengthen customer relationships and develop innovative products and services. However, successful digital adoption requires more than investment in technology. Organizations must also develop employee skills, redesign business processes, strengthen cybersecurity and establish appropriate data governance. This paper examines the role of digitalization in transforming business operations and improving organizational competitiveness. The study adopts a conceptual research approach based on secondary sources, including academic literature and recent reports published by international organizations. It examines the application of digital technologies across marketing, finance, human resources, operations, supply chain and customer relationship management. The paper also identifies major challenges such as financial constraints, digital skill gaps, cybersecurity threats, privacy concerns, employee resistance and system integration difficulties. Particular attention is given to small and medium-sized enterprises, which have significant opportunities from digitalization but often face resource limitations. A conceptual framework linking technology adoption, organizational capability, process transformation, customer value and business performance is proposed. The study concludes that digitalization should be treated as a continuous strategic process that combines technology, people and business objectives to achieve sustainable growth.

Keywords: Business Digitalization, Digital Transformation, Artificial Intelligence, Digital Innovation, Competitiveness

1. Introduction

Digital technologies have significantly changed the way organizations conduct business. Traditional business activities that depended on physical documentation, manual processing and geographical limitations are increasingly being replaced or supported by digital systems. Cloud computing, artificial intelligence (AI), data analytics, mobile applications, digital platforms and automation have become important components of modern business operations.

Digitalization is broader than simply converting paper records into electronic form. It involves the use of digital technologies to improve processes, create better customer experiences and develop new ways of creating and delivering value. The OECD identifies digital transformation as a major factor influencing productivity, innovation, competitiveness and market participation. Its research also indicates that SMEs face particular difficulties in adopting advanced digital technologies because of financial, skill and infrastructure constraints.

The importance of digitalization has increased with the rapid development of artificial intelligence and data-driven technologies. Businesses can now analyse large volumes of information, automate routine activities and personalize customer interactions. The World Bank's firm-level technology research emphasizes that the effective use of technology across business functions is important for productivity, employment and resilience.

Therefore, digitalization should be considered a strategic transformation involving **technology, people, processes and customers**, rather than merely an IT investment.

2. Review of Literature

Digitalization has been widely examined as a source of organizational and economic transformation. OECD research on SME digitalization indicates that digital tools can improve business performance, innovation and resilience, while smaller firms continue to face barriers involving finance, skills, awareness and infrastructure.

The OECD's *Digital Economy Outlook 2024* emphasizes the increasing importance of artificial intelligence, digital infrastructure, digital skills, cybersecurity and trust in the development of the digital economy.

World Bank research on firm-level technology adoption demonstrates that businesses differ considerably in the technologies they use across different business functions. The research suggests that access to technology alone is insufficient; organizational capability and effective technology utilization are essential for achieving productivity gains.

Recent developments in artificial intelligence have further expanded the scope of digital transformation. The World Bank's *Digital Progress and Trends Report 2025* emphasize the importance of digital infrastructure, computing resources, data and skills as foundations for effective AI adoption.

Overall, existing literature indicates that digitalization can support business performance, but its success depends on organizational readiness and complementary capabilities.

3. Research Gap and Objectives

Research Gap

Existing studies frequently focus on individual technologies such as AI, cloud computing or e-commerce. However, business digitalization is an interconnected process involving technology, employees, processes and customers. There is therefore a need for an integrated business perspective that explains how digital technologies translate into organizational value.

Objectives

The study aims to:

1. Examine the concept and significance of business digitalization.
2. Identify major technologies driving digital business transformation.
3. Analyse the impact of digitalization on major business functions.
4. Identify the benefits and challenges of business digitalization.
5. Examine the opportunities and barriers faced by SMEs.

4. Research Methodology

The study adopts a **conceptual research methodology** based on secondary information. Relevant academic literature, institutional publications, research reports and policy documents relating to digital transformation, business technology, AI and SME digitalization were reviewed.

Recent reports published by the OECD and World Bank were considered to understand current developments in digital adoption and its implications for businesses. The collected information was analyzed thematically to identify major technologies, benefits, challenges and strategic requirements associated with business digitalization.

The study is conceptual in nature and does not attempt to statistically test causal relationships between technology adoption and organizational performance.

5. Business Digitalization and Major Technologies

Business digitalization can be understood through three stages:

Digitization → Digitalization → Digital Transformation

Digitization involves converting analogue information into digital form. Digitalization uses digital technologies to improve existing processes, while digital transformation involves broader changes in organizational structures, business models and customer experiences. The major technologies supporting this transformation include:

5.1 Cloud Computing

Cloud platforms provide organizations with flexible access to software, data storage and computing resources. They reduce dependence on physical infrastructure and facilitate remote working.

5.2 Artificial Intelligence

AI enables businesses to automate tasks, analyse information and support decision-making. Applications include customer service, forecasting, recommendation systems and fraud detection.

5.3 Big Data Analytics

Data analytics allows organizations to identify patterns in customer, financial, operational and market information. It supports forecasting, customer segmentation and strategic decision-making.

5.4 Internet of Things

IoT connects physical devices and sensors to digital systems. It can be used for equipment monitoring, inventory management, logistics and production control.

5.5 Digital Platforms and Payments

E-commerce platforms and digital payment systems enable businesses to reach wider markets and provide customers with faster and more convenient transactions.

6. Impact of Digitalization on Business Functions

Digitalization influences almost every major business function.

Business Function	Digital Application	Major Impact
Marketing	Social media, digital advertising, analytics	Wider market reach
Finance	Cloud accounting, digital payments	Faster processing
Human Resources	HR software, e-recruitment, e-learning	Better workforce management
Operations	Automation, IoT	Improved efficiency
Supply Chain	Tracking, analytics, digital platforms	Better coordination
Customer Service	CRM, chatbots, AI	Faster response
Management	Business intelligence dashboards	Data-based decisions

Marketing

Digital marketing enables businesses to communicate with specific customer segments and measure campaign performance. Social media and online advertising can provide smaller businesses with affordable channels for market expansion.

Finance

Cloud accounting, electronic payments and automated financial reporting can improve financial processing and information accessibility.

Human Resources

Digital HR systems support recruitment, employee records, attendance, payroll, performance management and online training.

Operations and Supply Chain

Automation, IoT and analytics can improve production monitoring, inventory management, logistics and supply-chain visibility.

Customer Relationship Management

CRM systems allow organizations to consolidate customer information and provide more personalized services.

7. Benefits and Challenges of Business Digitalization

7.1 Major Benefits

Improved efficiency: Automation reduces repetitive manual activities.

Cost optimization: Digital processes can reduce paper, communication and transaction costs.

Wider market access: Online platforms enable businesses to reach customers beyond geographical boundaries.

Better customer experience: Digital channels provide convenience, speed and personalization.

Data-driven decision-making: Analytics provides managers with timely information.

Innovation: Digital technologies support new products, services and business models.

Business resilience: Cloud systems and digital channels can support continuity during disruptions.

Competitive advantage: Effective digital capabilities can improve organizational responsiveness.

7.2 Major Challenges

Financial constraints: Digital transformation requires investment in technology, training and cybersecurity.

Digital skill gaps: Employees may lack the capabilities required to use advanced technologies.

Cybersecurity: Increased digital dependence creates exposure to cyberattacks and data breaches.

Data privacy: Organizations must ensure that customer and employee information is appropriately protected.

Resistance to change: Employees may hesitate to adopt unfamiliar technologies.

System integration: Different digital applications may not communicate effectively.

Vendor dependence: Excessive dependence on external technology providers can create operational risks.

Digital divide: Differences in infrastructure, finance and skills can create unequal digital capabilities among businesses.

These challenges are particularly relevant to SMEs. OECD research identifies financing, digital skills, infrastructure and awareness among the barriers that can slow SME digital transformation.

8. Digitalization of Small and Medium-Sized Enterprises

SMEs can obtain significant benefits from digitalization. A small retailer can use e-commerce to access customers beyond its local area. A service provider can use digital scheduling and payment systems. A small manufacturer can use digital marketing and online platforms to identify new markets.

However, SMEs generally have fewer resources than large organizations. They may lack specialized IT personnel and have limited capacity to invest in complex systems.

The OECD reports that smaller firms tend to lag behind larger businesses in advanced digital adoption, particularly as technologies become more sophisticated.

Therefore, SMEs should follow a **need-based digitalization strategy**. They should first identify important business problems and then select affordable, scalable technologies that directly address those problems.

9. Conceptual Framework

The proposed framework explains how digital technology can contribute to business performance.

Digital Technology Adoption

Cloud Computing | AI | Big Data | IoT | Automation | Digital Platforms



Organizational Capability

Digital Skills | Leadership | Innovation Culture | Technology Readiness



Process Transformation

Automation | Integration | Data-Based Decisions | Operational Flexibility



Customer Value

Convenience | Personalization | Speed | Accessibility | Trust



Business Performance

Productivity | Innovation | Competitiveness | Resilience | Sustainable Growth

Cybersecurity, data governance and employee development act as supporting factors throughout the framework.

The framework indicates that technology adoption alone is unlikely to produce maximum value. Technology needs to be supported by organizational capabilities and process transformation before it can generate meaningful customer and business outcomes.

10. Findings and Discussion

The study identifies the following major findings:

1. **Digitalization is a strategic process.** It involves changes in technology, processes, people and business models.

2. **Technology integration is more important than technology acquisition.** Organizations should connect digital systems with actual business processes.
3. **Employee capability is essential.** Digital tools cannot produce expected benefits when employees lack appropriate skills.
4. **Customer experience is a major outcome.** Digitalization can improve convenience, responsiveness and personalization.
5. **Data has become a strategic resource.** Analytics can support forecasting, customer understanding and managerial decisions.
6. **AI offers significant opportunities.** However, organizations need suitable infrastructure, data, skills and governance for effective adoption.
7. **SMEs require targeted support.** Financial and skill constraints can limit their ability to adopt advanced technologies.
8. **Cybersecurity should be integrated into digital strategy.** Security cannot be treated as a separate activity after implementation.
9. **Digitalization can improve resilience.** Digital channels and cloud-based systems provide organizations with greater operational flexibility.
10. **Business outcomes should determine digital investment.** Organizations should measure technology projects through productivity, revenue, cost, customer satisfaction and other relevant indicators.

11. Suggestions

Based on the findings, the following suggestions are proposed:

1. Organizations should develop a **clear digital roadmap** aligned with business objectives.
2. Businesses should prioritize **high-impact processes** instead of attempting to digitalize everything simultaneously.
3. Continuous **digital skill development** should be provided to employees.
4. SMEs should adopt **affordable and scalable technologies** suited to their specific needs.
5. Organizations should establish strong **cybersecurity and data protection mechanisms**.
6. AI should be adopted with appropriate **human oversight, transparency and responsible governance**.

7. Digital systems should be integrated to avoid fragmented information and duplication of work.
8. Businesses should focus on **customer-centric digitalization** rather than technology-centric implementation.
9. Digital investments should be evaluated using measurable **return-on-investment and performance indicators**.
10. Organizations should encourage a culture of **continuous learning and innovation**.

12. Conclusion

Digitalization has become a major strategic force influencing the structure and performance of contemporary businesses. Technologies such as cloud computing, artificial intelligence, big data analytics, IoT, automation and digital platforms have created new opportunities for improving efficiency, reaching customers and developing innovative business models.

However, digitalization is not simply a matter of purchasing and implementing technology. The analysis shows that successful digital transformation requires the integration of technology with organizational strategy, employee capabilities, process redesign and customer needs. Cybersecurity, data privacy and responsible technology governance are equally important.

The issue is particularly significant for SMEs. Digital platforms and cloud technologies can help smaller organizations overcome geographical limitations and improve their competitiveness, but financial constraints, skill shortages and infrastructure limitations continue to restrict adoption.

The conceptual framework proposed in this study emphasizes a progression from **technology adoption to organizational capability, process transformation, customer value and ultimately business performance**. This demonstrates that digital technology becomes strategically valuable when it is effectively integrated into the organization.

Therefore, businesses should adopt a gradual, customer-focused and outcome-oriented approach to digitalization. Instead of attempting to adopt every emerging technology, organizations should identify their specific business requirements and select technologies that create measurable value.

Digitalization should ultimately be viewed as a **continuous journey of organizational learning, innovation and adaptation**. Businesses capable of combining technological capabilities with skilled employees, effective processes and responsible governance will be better positioned to achieve competitiveness and sustainable growth in the digital economy.

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Innovations in Marketing: Transforming Customer Engagement in the Digital Era

Hemalatha. K. A^{1*} and T. Sujatha²

¹Research Scholar, School of Commerce, Vels Institute of Science, Technology & Advanced Studies, Pallavaram, Tamil Nadu, India

²Assistant Professor, School of Commerce, Vels Institute of Science, Technology & Advanced Studies, Pallavaram, Tamil Nadu, India

*Corresponding Author Email: hemanellainadar@gmail.com

Abstract

Marketing has changed significantly over the last decade because of rapid technological advancements and changing customer expectations. Businesses no longer depend only on traditional marketing methods such as newspapers, television, and radio advertisements. Instead, they are adopting innovative marketing strategies that use digital technologies, artificial intelligence, social media platforms, big data analytics, and personalized communication to create stronger relationships with customers. These innovations help organizations understand consumer needs, deliver customized experiences, improve customer satisfaction, and increase brand loyalty. The primary objective of this article is to examine the importance of marketing innovation in improving customer engagement in the digital era. It also explores the major types of marketing innovations, their benefits, and the challenges faced by organizations during implementation. The study highlights how businesses can use modern technologies to gain a competitive advantage while responding effectively to changing market conditions. A descriptive research approach is proposed to understand the influence of innovative marketing practices on consumer behaviour and business performance. The findings of this study are expected to show that organizations adopting innovative marketing strategies achieve better customer relationships, higher customer retention, increased sales performance, and improved brand image. The article concludes that continuous innovation in marketing is no longer an option but a necessity for sustainable business growth. Organizations that invest in creativity, technology, and customer-focused marketing practices will be better prepared to compete successfully in the rapidly evolving digital marketplace.

Keywords: Marketing Innovation, Digital Marketing, Customer Engagement, Artificial Intelligence, Consumer Behaviour, Social Media Marketing, Business Growth, Personalization, Technology, Digital Transformation

1. Introduction

The business environment has become highly competitive due to globalization, technological development, and changing consumer preferences. Customers today have access to unlimited information through digital platforms, making them more informed and selective while purchasing products and services. As a result, businesses are required to move beyond traditional marketing approaches and adopt innovative marketing strategies that focus on creating value and meaningful customer experiences.

Marketing innovation refers to the introduction of new ideas, technologies, methods, and strategies that improve the effectiveness of marketing activities. It includes the use of digital platforms, social media, artificial intelligence, data analytics, mobile applications, influencer marketing, personalized communication, and automation to understand customer needs and deliver products and services more efficiently. These innovations help organizations build long-term relationships with customers while improving business performance.

The growth of the internet and smart technologies has completely transformed the way businesses communicate with consumers. Today, customers expect personalized recommendations, instant responses, convenient online shopping experiences, and continuous engagement through multiple digital channels. To meet these expectations, organizations invest in innovative marketing tools that enable them to collect customer insights, analyse purchasing behaviour, and develop targeted marketing campaigns. This customer-centred approach not only improves satisfaction but also strengthens brand loyalty and trust.

Innovative marketing is beneficial for businesses of all sizes, including startups, small enterprises, and multinational corporations. Companies that embrace innovation can quickly respond to market changes, introduce creative promotional strategies, reduce marketing costs, and improve operational efficiency. Furthermore, modern marketing technologies provide businesses with measurable results, allowing them to evaluate campaign performance and make data-driven decisions for future improvements.

Despite its numerous advantages, marketing innovation also presents several challenges. Organizations often face issues such as high implementation costs, cybersecurity risks, lack of skilled professionals, resistance to technological change, and concerns regarding customer data privacy. Therefore, businesses must carefully plan and implement innovative marketing practices while maintaining ethical standards and consumer trust.

In the present digital era, innovation has become a key driver of business success. Organizations that continuously adapt to emerging technologies and changing consumer expectations are more likely to achieve sustainable growth and long-term competitiveness. Therefore, understanding the role of marketing innovation in transforming customer engagement is highly relevant for researchers, business professionals, and policymakers. This study aims to explore the significance of innovative marketing strategies and their contribution to improving customer engagement and organizational performance in today's digital economy.

2. Concept of Marketing Innovation

Marketing innovation refers to the development and implementation of new marketing ideas, strategies, methods, or technologies that create value for customers and improve organizational performance. It focuses on introducing creative approaches in product promotion, customer communication, pricing strategies, distribution methods, and relationship management. Unlike traditional marketing practices, marketing innovation emphasizes flexibility, customer orientation, and the effective use of modern technologies.

In the digital era, marketing innovation has become an essential element for businesses to survive and grow in competitive markets. Customers' expectations are continuously changing due to the availability of online platforms, social media networks, and digital services. Therefore, organizations are adopting innovative marketing practices to understand consumer behaviour, provide personalized experiences, and establish long-term relationships with customers.

Marketing innovation is not limited only to technological development; it also includes creative thinking and strategic changes in the way businesses interact with their target audience. For example, the use of artificial intelligence for customer recommendations, social media campaigns for brand awareness, and data analytics for understanding customer preferences are examples of modern marketing innovations.

The main purpose of marketing innovation is to increase customer satisfaction, improve brand value, and create a competitive advantage. Organizations that successfully implement innovative marketing strategies can respond quickly to market changes and develop stronger connections with customers. Thus, marketing innovation acts as a bridge between business objectives and customer expectations.

3. Types of Marketing Innovations

Marketing innovations can be classified into different categories based on the methods and technologies used by organizations. The major types of marketing innovations are as follows:

3.1 Digital Marketing Innovation

Digital marketing innovation involves the use of online platforms and digital technologies to promote products and services. Search engine marketing, social media advertising, email marketing, mobile marketing, and content marketing are important examples of digital marketing innovation. These methods allow businesses to reach a wider audience at a lower cost and measure customer responses effectively.

3.2 Artificial Intelligence-Based Marketing

Artificial Intelligence (AI) has introduced significant changes in marketing practices. AI tools help organizations analyse customer data, predict buying behaviour, provide personalized recommendations, and improve customer service through chatbots. AI-based marketing enables businesses to deliver accurate and timely communication to customers.

3.3 Social Media Marketing Innovation

Social media platforms have become powerful tools for customer engagement and brand promotion. Companies use platforms such as Instagram, Facebook, YouTube, and LinkedIn to interact with customers, share content, receive feedback, and create brand communities. Social media innovation helps businesses increase customer participation and brand loyalty.

3.4 Personalized Marketing

Personalized marketing focuses on providing customized products, services, and communication based on individual customer preferences. By analysing customer data, businesses can create targeted offers and recommendations. This approach improves customer satisfaction because consumers receive relevant information according to their interests.

3.5 Influencer Marketing

Influencer marketing is a modern promotional strategy where businesses collaborate with social media influencers to promote their products or services. Influencers help brands reach specific target groups and build trust among customers through authentic communication.

4. Benefits of Marketing Innovation

Marketing innovation provides several benefits to organizations by improving their ability to attract, engage, and retain customers. Some major benefits include:

4.1 Improved Customer Engagement

Innovative marketing strategies help businesses communicate with customers through multiple channels. Interactive content, personalized messages, and social media engagement create stronger relationships between brands and consumers.

4.2 Enhanced Customer Satisfaction

By understanding customer needs and preferences, businesses can provide better products and services. Innovative marketing practices help organizations deliver personalized experiences, which increase customer satisfaction and loyalty.

4.3 Competitive Advantage

Organizations adopting innovative marketing strategies can differentiate themselves from competitors. Innovation helps businesses create unique brand experiences and maintain a strong position in the marketplace.

4.4 Increased Business Growth

Marketing innovation contributes to increased sales, improved brand recognition, and expansion into new markets. Digital tools allow businesses to reach global customers and explore new opportunities.

4.5 Better Decision-Making

The use of data analytics and digital technologies provides valuable insights into customer behaviour. Businesses can make effective marketing decisions based on accurate information and market trends.

5. Challenges of Marketing Innovation

Although marketing innovation offers many advantages, organizations face several challenges while implementing innovative strategies.

5.1 High Implementation Cost

Advanced marketing technologies require investment in software, skilled employees, training, and infrastructure. Small businesses may find it difficult to adopt expensive innovative solutions.

5.2 Lack of Technical Skills

Successful implementation of marketing innovation requires employees with digital knowledge and analytical skills. A shortage of skilled professionals can limit the effectiveness of innovative marketing practices.

5.3 Data Privacy and Security Issues

Digital marketing involves collecting and analysing customer information. Protecting customer data and maintaining privacy have become major concerns for organizations.

5.4 Resistance to Change

Some organizations and employees may hesitate to adopt new technologies due to traditional working methods and lack of awareness. Effective training and change management are necessary to overcome this challenge.

5.5 Continuous Technological Changes

The rapid development of technology requires businesses to continuously update their marketing strategies. Organizations must regularly adapt to new trends to remain competitive. In conclusion, marketing innovation plays a vital role in modern business success. Although challenges exist, organizations that effectively adopt innovative marketing practices can improve customer engagement, strengthen relationships, and achieve sustainable growth.

6. Review of Literature

The concept of marketing innovation has gained significant attention among researchers due to the rapid growth of digital technologies and changing consumer expectations. Previous studies have highlighted that innovation in marketing helps

organizations improve customer relationships, enhance brand value, and achieve sustainable competitive advantages.

Several researchers have emphasized that digital transformation has changed traditional marketing approaches. The integration of technologies such as artificial intelligence, big data analytics, and social media platforms has enabled businesses to understand customer behaviour more effectively. Studies have shown that organizations using data-driven marketing strategies are able to provide personalized experiences and improve customer satisfaction.

Research on digital marketing innovation indicates that online communication channels have become important tools for customer engagement. Social media platforms allow companies to interact directly with consumers, receive instant feedback, and develop stronger brand communities. Researchers have found that active customer participation through digital platforms increases brand awareness and customer loyalty.

Previous literature also explains the importance of customer-centric marketing approaches. Modern consumers expect businesses to provide customized products and services according to their individual preferences. Personalized marketing strategies based on customer data analysis have been identified as effective methods for improving customer experience and retention.

Studies related to artificial intelligence in marketing reveal that AI-based applications such as chatbots, recommendation systems, and predictive analytics support businesses in making accurate marketing decisions. These technologies help organizations analyse consumer patterns and deliver relevant information at the right time.

However, existing studies also identify challenges associated with marketing innovation. Issues such as data privacy, technology adoption costs, lack of digital skills, and resistance to organizational change continue to affect the successful implementation of innovative marketing strategies.

Overall, the literature indicates that marketing innovation has a significant influence on customer engagement and business performance. However, continuous research is required to

understand how emerging technologies and innovative practices can be effectively integrated into marketing strategies in different business environments.

7. Statement of the Problem

In the current competitive business environment, customer expectations and purchasing behaviour are changing rapidly due to technological advancement and digital transformation. Traditional marketing methods alone are no longer sufficient to attract and retain customers. Businesses are required to adopt innovative marketing strategies to create meaningful customer interactions and maintain long-term relationships.

Although many organizations have started implementing digital marketing tools and innovative practices, several businesses still face difficulties in effectively utilizing these technologies. Limited technological knowledge, high implementation costs, lack of skilled employees, and concerns regarding customer data security create barriers to successful marketing innovation.

Furthermore, customers today demand personalized experiences, faster communication, and convenient services. Organizations that fail to adopt innovative marketing approaches may experience difficulties in maintaining customer satisfaction and competitive position.

Therefore, this study focuses on understanding the role of marketing innovation in transforming customer engagement and examines how innovative marketing practices contribute to improving customer relationships and business performance in the digital era.

8. Objectives of the Study

The present study is conducted with the following objectives:

1. To understand the concept and importance of marketing innovation in the digital era.
2. To identify the various types of marketing innovations adopted by modern businesses.
3. To examine the role of digital technologies in improving customer engagement.
4. To analyse the benefits of innovative marketing strategies for business growth and customer satisfaction.
5. To identify the challenges faced by organizations while implementing marketing innovations.

6. To study the relationship between marketing innovation practices and customer engagement.
7. To provide suitable suggestions for effective implementation of innovative marketing strategies.

9. Research Methodology

9.1 Research Design

The study adopts a descriptive research design to examine the role of marketing innovation in transforming customer engagement. The descriptive approach helps in understanding existing marketing practices, consumer perceptions, and the impact of innovative strategies.

9.2 Sources of Data

The study uses both primary and secondary sources of data.

Primary Data

Primary data can be collected from customers through a structured questionnaire using online survey methods such as Google Forms. The questionnaire focuses on customer awareness, usage, satisfaction, and perception towards innovative marketing practices.

Secondary Data

Secondary data is collected from research journals, books, websites, articles, conference papers, and published reports related to marketing innovation, digital transformation, and customer engagement.

9.3 Sampling Method

A convenient sampling method may be adopted for selecting respondents based on accessibility and willingness to participate in the study.

9.4 Sample Size

The sample size can be determined based on the scope and objectives of the research. For an academic study, data may be collected from selected consumers who actively use digital platforms.

9.5 Tools for Data Analysis

The collected data can be analysed using suitable statistical tools such as:

- Percentage Analysis
- Mean Score Analysis
- Chi-Square Test
- Correlation Analysis
- Regression Analysis

These tools help to identify relationships between marketing innovation practices and customer engagement.

9.6 Scope of the Study

The study focuses on understanding how innovative marketing practices influence customer relationships in the digital era. It provides insights for businesses to improve their marketing strategies through technology-based solutions and customer-oriented approaches.

10. Data Analysis and Interpretation

Data analysis plays an important role in understanding the impact of marketing innovation on customer engagement. The collected data from respondents can be analysed using appropriate statistical techniques to identify customer perceptions, preferences, and behavioural patterns towards innovative marketing practices.

10.1 Percentage Analysis

Percentage analysis can be used to understand the demographic characteristics of respondents such as age, gender, occupation, and frequency of digital platform usage. It also helps to identify customer awareness regarding innovative marketing strategies such as social media marketing, personalized advertisements, artificial intelligence-based recommendations, and online promotions.

10.2 Customer Awareness Towards Marketing Innovation

The analysis may reveal that a majority of customers are aware of digital marketing innovations and regularly interact with businesses through online platforms. Social media advertisements, mobile applications, and personalized product recommendations have become common methods through which customers engage with brands.

10.3 Impact of Marketing Innovation on Customer Engagement

The study indicates that marketing innovation has a positive influence on customer engagement. Customers prefer brands that provide personalized communication, quick responses, and convenient digital services. Innovative marketing practices improve customer interaction and create stronger emotional connections with brands.

10.4 Relationship Between Marketing Innovation and Customer Satisfaction

Statistical analysis can be used to examine the relationship between marketing innovation and customer satisfaction. The findings may show that customers who experience innovative marketing practices demonstrate higher satisfaction levels compared to customers exposed only to traditional marketing methods.

10.5 Role of Technology in Marketing Innovation

The analysis highlights that technologies such as artificial intelligence, data analytics, and automation support businesses in understanding consumer behaviour. These technologies help organizations provide relevant offers, improve communication efficiency, and enhance customer experience.

11. Findings of the Study

Based on the conceptual analysis, the major findings of the study are as follows:

1. Marketing innovation has become an essential strategy for businesses operating in the digital era.
2. Digital technologies have significantly changed the way organizations communicate and interact with customers.
3. Social media marketing, artificial intelligence, and personalized marketing are among the most important forms of modern marketing innovation.
4. Innovative marketing practices improve customer engagement by providing faster, personalized, and interactive communication.
5. Marketing innovation helps organizations increase customer satisfaction, brand loyalty, and business performance.
6. Data-driven marketing strategies enable businesses to understand consumer needs and make better marketing decisions.
7. Organizations face challenges such as high investment costs, lack of digital skills, and data privacy concerns while adopting marketing innovations.

8. Continuous innovation is necessary for businesses to remain competitive in the rapidly changing marketplace.

12. Suggestions

Based on the study findings, the following suggestions are provided:

1. Organizations should regularly adopt new marketing technologies to improve customer experiences.
2. Businesses should focus on personalized marketing strategies to meet individual customer needs.
3. Companies should provide digital training programs to employees to improve technological skills.
4. Organizations should ensure strong data security measures to maintain customer trust.
5. Businesses should combine traditional marketing methods with innovative digital strategies for better results.
6. Companies should use customer feedback and data analytics to improve their marketing decisions.
7. Small and medium enterprises should gradually adopt affordable digital marketing tools to compete effectively in the market.
8. Organizations should encourage creativity and innovation among employees to develop new marketing ideas.

13. Conclusion

Marketing innovation has become a powerful tool for transforming customer engagement in the digital era. Rapid technological development and changing consumer expectations have encouraged businesses to adopt innovative approaches that focus on customer value and long-term relationships.

The integration of digital marketing, artificial intelligence, social media platforms, and data analytics has provided organizations with new opportunities to understand customer behaviour and deliver personalized experiences. Marketing innovation not only improves communication between businesses and customers but also contributes to brand loyalty, customer satisfaction, and sustainable business growth.

Although organizations face challenges such as technological costs, skill limitations, and privacy concerns, effective planning and continuous adaptation can help overcome these barriers. Businesses that successfully implement innovative marketing strategies can achieve a strong competitive position in the modern marketplace.

Therefore, marketing innovation is not simply a promotional technique but a strategic approach that helps organizations build meaningful customer relationships and achieve long-term success. In the future, continuous innovation and technology adoption will remain essential factors for business growth and customer engagement.

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