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FROM THE EDITOR'S DESK

The Research Journal *Revelation* is being brought out by K.P.B. Hinduja College of Commerce, with a view to assist academicians, professionals and researchers to share information on topics related to Growth and Development of Business in India. The aim of this Journal is to encourage researchers to contribute research articles based on Industry Studies or on findings of Research Projects executed. Issues relevant to the growth and development of Indian Economy, in the streams of Arts, Science, Social Sciences, Economics, Commerce and Management are welcome.

Original research articles based on an up-to-date review of literature and supportive primary/secondary data are invited.

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FOREWORD FROM THE CHIEF EDITOR

In the fast-changing scenario of the global world, there is a need to create a learning society to face the challenges of education. Knowledge explosion, emergence of Information Technology, globalisation of trade and economy and rise in social aspirations have given rise to a demand for new professional knowledge skills. Universities and colleges need to gear themselves to meet such challenges. The urgent need is to consciously and decisively invest in enhancing the quality standards of education by providing training to teachers to equip them with capabilities to meet the challenges of change. The aim should be to excel the teacher body at all levels, as valuable resources. Building a vibrant and innovative education system is crucial in a country such as India, which must address the daunting challenges posed by democracy, disparity, and development.

India sends the largest number of students to study abroad after China. It was hence natural that in the last few years academic institutes designed various arrangements under which an Indian student could earn an international degree. Foreign education providers interested in tapping the large Indian student base, mostly collaborated with existing Indian institutes to offer a host of degrees. According to U.G.C. data, there are 156 foreign providers, including 90 universities and 20 colleges, who are keen about collaborations with Indian institutions. Opening Indian higher education to foreign competition will strengthen the educational system in India.

India is seen as a huge market with immense potential. The issue of permitting foreign institutions to operate in India has been fiercely debated for over a decade. Many foreign institutions are keeping a watch on educational developments in India. University presidential delegations from Harvard, Yale, Stanford, and Mellon have come to India in the past few years to learn more about and from the country. On March 15, 2010 the Union Cabinet cleared the Foreign Educational Institutions (regulation of entry and operation) Bill, which aims to allow foreign universities to set up campuses in India. HRD minister Kapil Sibal said that the approval of the bill is “a milestone which will enhance choices, increase competition and benchmark quality.” It appears to be a bright horizon and a clear sky!

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ARTIFICIAL INTELLIGENCE AS A TOOL LEVERAGING DIGITAL WALLETS

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ABSTRACT

In the contemporary digital era, payment technology has advanced quite swiftly. The method of conducting transactions has evolved from conventional cash and card payments to digital wallets and cryptocurrency. Artificial Intelligence (AI) is revolutionizing digital payment systems within a rapidly evolving technical landscape. AI is transforming payment processing through enhanced fraud detection and increased transaction efficiency. It is reforming digital payments by enhancing wallets to be not only more intelligent but also more secure and user-friendly. Utilizing AI, digital wallets can analyze users spending behaviors, discern patterns, and provide customized recommendations or services specifically designed for the users. This study employs a qualitative design using secondary data. This article examines the revolutionary influence of AI on digital wallets, improving both user experience and security.

Keywords- *Artificial Intelligence, digital wallets, fraud detection, user experience and security.*

INTRODUCTION

Digital financial services have created innovative technologies that ease transactions and promote financial inclusion. Digital wallets allow users to securely store, transmit, and receive money via smartphones or other linked devices. They store debit and credit card, bank account, and loyalty information, allowing customers to make seamless online and offline transactions. Digital wallets have grown in popularity in India due to high smartphone penetration, government measures promoting a cashless economy, and widespread acceptance of Paytm, PhonePe, Google Pay, and UPI-based apps.

AI, which allows machines to learn, decide, solve problems, and understand natural language, is supporting this increase in popularity. AI-enabled digital wallets offer fraud prevention, biometric identification, tailored recommendations, and predictive analytics using machine learning, deep learning, and natural language processing. AI improves transaction security, efficiency, customer trust, and engagement, making it a crucial driver of innovation in India's digital payment ecosystem.

RATIONAL OF THE STUDY

Fast-growing digital wallets like Paytm, PhonePe, Google Pay, and UPI have revolutionized India's financial landscape by enabling cashless transactions on a massive scale. This expansion has raised concerns about fraud, data security, and user trust, necessitating innovative and adaptable solutions. In this context, AI provides fraud detection, personalization, biometric authentication, and predictive analytics. Thus, studying AI integration into digital wallets is crucial to understanding how technology is changing digital payments and assessing its potential to improve financial inclusion, regulatory compliance, and consumer experience. Digital wallets are crucial to India's cashless economy and financial inclusion for underprivileged groups, making this research essential.

REVIEW OF LITERATURE

- Iseal & Halli (2025) explored the use of AI-powered fraud detection systems in digital payment platforms. Machine learning models are capable of real-time risk assessment, suspicious behavior prediction, and anomaly identification by utilizing supervised and unsupervised learning algorithms. By integrating AI technologies, it is possible to continuously learn from new data, boosting detection accuracy and reducing false positives. AI-based systems can also adapt dynamically to new fraud strategies, assuring a stronger and more effective defense mechanism.
- Lopez (2025) examined how the integration of AI technologies, such as machine learning, behavioral analytics, and autonomous feedback loops, has evolved into intelligent platforms that facilitate fraud prevention, personalization, compliance, and adaptive decision-making. AI-driven infrastructures and gateways promote cross-border trade, financial inclusion, and regulatory flexibility, promoting digital wallets as faster, more secure, intelligent, and personalized.
- In their study, Ramadugu, R et al. (2024) examined the potential of artificial intelligence and machine learning to improve the security of digital wallets by examining their ability to identify and prevent fraudulent transactions. The results of the testing of a variety of AI/ML models, such as Recurrent Neural Networks (RNNs) and Random Forests, indicate that these models significantly enhance the accuracy

of fraud detection and reduce the number of false positives. Nevertheless, challenges persist as a result of occasional false alerts, privacy concerns, and high computational costs.

- Hasan et al. (2023) highlighted the key parameters influencing the use of conversational assistants in banking services. The results indicate that users' intentions to utilize conversational assistants are significantly influenced by perceived ease of use, perceived enjoyment, and perceived trust. Conversely, perceived utility does not have any significant effects. Additionally, perceived risk substantially and negatively moderates the relationship between intention and perceived ease of use.

OBJECTIVES OF THE STUDY

The principal objectives of the paper are spelled out as follows:

- To identify Artificial Intelligence Tools and Technologies employed in the digital wallets.
- To identify key applications of Artificial Intelligence in digital wallets.
- To investigate case studies of leading Indian digital wallet platforms.

RESEARCH METHODOLOGY OF THE STUDY

This research employs a qualitative design utilizing secondary data. Sources encompass scholarly literature, policy publications (World Bank, IMF, RBI), and case studies of prominent AI-driven digital wallet providers including Paytm, Google Pay, and Phonepe.

SCOPE OF THE STUDY

This study examines how machine learning, natural language processing, biometrics, blockchain, and generative AI are changing financial services in India through the incorporation of AI in digital wallets. Fraud detection, consumer personalization and secure authentication have been investigated. It also examines Paytm, PhonePe, Google Pay, and NPCI's UPI case studies to show how AI usage improves financial inclusion, regulatory compliance, and user experience.

AI IN DIGITAL PAYMENTS

AI in payments denotes the application of artificial intelligence and machine learning algorithms to optimize and improve multiple facets of financial transactions and payment procedures. In contrast to conventional payment methods that depend on established protocols and manual verifications, AI-driven payment systems perpetually analyze transaction data to identify fraud, tailor user experiences, and automate processes. This proactive strategy enhances security, efficiency, and precision by adjusting to novel patterns and emerging threats instantaneously.

Artificial Intelligence Tools and Technologies Employed in the Digital Wallets:

- 1. Machine Learning:** Digital wallets benefit from AI algorithms that process and interpret large volumes of data. These fraud detection algorithms constantly monitor transaction patterns to identify anomalies and alert questionable activities, improving security and reducing financial risks. AI helps service providers create more focused marketing efforts by segmenting clients by behavior and interest in addition to security. AI also uses predictive analytics to predict future spending, transaction volumes, and risks, allowing digital wallet providers to better allocate resources and improve financial services. These capabilities show how AI makes digital wallets smart, secure, and user-friendly.
- 2. Natural Language Processing (NLP):** Digital wallets integrate NLP to enhance customer engagement and service quality. Speech-activated transactions allow customers to make payments by voice, making them more accessible and hands-free. An NLP-driven chatbot may handle client inquiries, conduct simple transactions, and provide 24/7 support, improving efficiency and customer happiness. Sentiment analysis also helps organizations improve services, identify issues, and resolve them faster by analyzing user feedback and emotional tone. These NLP-driven apps improve digital wallet functionality and create a more user-friendly financial environment.
- 3. Biometric Authentication:** Biometric technologies are being integrated into digital wallets to enhance authentication and security protocols. Facial recognition authenticates users by examining distinctive facial characteristics, thereby substantially complicating unwanted access. Likewise, fingerprint scanning offers a rapid, dependable, and broadly supported approach for mobile payment verification, guaranteeing both ease and precision. Moreover, speech recognition provides an additional security measure by authenticating unique vocal patterns, thereby permitting only authorized individuals to execute transactions. These biometric technologies boost security while streamlining the user experience with seamless, password-free authentication techniques.
- 4. Blockchain:** Digital wallets incorporate blockchain technology to improve security and efficiency. Blockchain's decentralized digital ledger uses secure authentication to encrypt and permanently link transactions in an unalterable chain, reducing fraud and unwanted access. Smart contracts, self-executing blockchain agreements, authenticate and execute transactions under certain conditions. This eliminates middlemen and improves digital wallet honesty, confidence, and accuracy. These factors demonstrate blockchain's transformative role in secure and autonomous payment networks.

5. **Data Analytics:** Data analytics helps digital wallets improve accuracy and efficacy by disclosing important transaction data. Pattern discovery in analytics apps analyzes large amounts of financial data to detect trends that help service providers make strategic decisions. Personalization enables companies understand customer behavior and needs, enabling the production of customized services, offers, and suggestions that boost customer loyalty and satisfaction. Data analytics also improves payment methods by discovering inefficiencies, enabling faster, more reliable, and streamlined transactions. These features illustrate how data-driven insights make digital wallets smart platforms that meet operational and consumer goals.
6. **Generative AI:** Generational AI improves personalization, engagement, and content dissemination in digital wallets. Generative Adversarial Networks (GANs) and Variational Auto-Encoders (VAEs) produce realistic text, visuals, and other outputs that boost user involvement in content generation. Generative AI personalizes payment experiences, suggestions, and marketing content to user preferences, improving customer satisfaction and retention. It also improves engagement by providing context-sensitive replies that make digital wallet platforms more dynamic and user-centric. Combining these applications shows that generative AI is making digital wallets intelligent, adaptive, and customer-centric.

Key Applications of AI in Digital Wallets: Revolutionizing Payments and Security

Artificial Intelligence is revolutionizing digital wallets by improving their operation, privacy, and user experience. As AI emerges as a significant trend in electronic payments, digital wallets have transformed from mere payment tools into advanced platforms that enhance every aspect of the payment process. Here are ten innovative applications of AI in digital wallets that are revolutionizing the future of payment systems:

- **AI-Powered Payment Methods:** AI-driven payment solutions have significantly enhanced the transaction management of digital wallets. These algorithms operate discreetly to scrutinize transaction data, acquiring knowledge from each payment executed. In doing so, AI can ascertain the most rapid and efficient processing pathways for each payment. These decreases wait times, rendering transactions very instantaneous. Accelerated payments enhance the experience for both enterprises and consumers. An enhanced payment procedure promotes increased utilization and client loyalty. As Artificial Intelligence advances, it will enhance payment processing, facilitating swifter and more dependable transactions for all users.

- **AI to Secure digital wallets :** The utilization of AI to enhance digital wallet security is a vital breakthrough in digital payments. Digital wallets retain sensitive user information, and safeguarding such information is crucial for establishing trust. AI perpetually scrutinizes transactions in real-time, identifying any unexpected trends or behaviors. It can identify possible dangers prior to their escalation into problems. By identifying anomalies in typical expenditure patterns, AI can promptly halt fraudulent transactions, delivering a level of security that conventional approaches fail to offer. As the payment environment progresses, AI will increasingly serve as an essential instrument in safeguarding consumers' data and finances against growing dangers.
- **Fraud Identification and Prevention :** Artificial intelligence is an effective instrument for detecting fraudulent transactions. In contrast to conventional security systems, AI not only responds to fraud but also anticipates and recognizes it before to its occurrence. Through the analysis of transaction data, AI acquires the ability to identify patterns of authorized activity and may promptly flag any behavior that diverges from the standard. For instance, if a user unexpectedly executes a high-value transaction from another region or country, AI can notify them and obstruct the transaction instantaneously. This ongoing monitoring significantly impedes the success of fraudsters, thereby safeguarding both enterprises and users. The capacity of AI to avert fraud in real time is revolutionizing the functionality of digital wallets.
- **AI-Driven Payment Solutions :** The speed and accuracy of digital wallets can be improved through the usage of AI-powered payment solutions. AI not only automates procedures but also learns and enhances over time, guaranteeing that payment solutions grow increasingly intelligent with each use. It facilitates the optimization of transactions by smart decision-making on payment channels, methods, and currencies. AI can evaluate the likelihood of a payment failing owing to insufficient cash or network complications and proactively transition to an alternative solution. By optimizing these processes, AI diminishes user friction, resulting in a swifter and more dependable experience. AI-driven payment solutions enhance transaction efficiency and elevate satisfaction for both users and companies.
- **AI in Payment Processing :** Digital payment processing is being transformed by AI. By evaluating massive volumes of transaction data and optimizing processing flow, AI enhances payment processing accuracy and speed. AI detects bottlenecks and faults before they delay transactions, making them more efficient. AI can also anticipate and handle user experience issues like incorrect payment details and

connectivity concerns. User irritation decreases due to faster, smoother transactions. It ensures that payment systems are always operational, giving users a seamless experience regardless of location.

- **Customized User Experience :** Digital wallets need AI to tailor user experiences. AI can customize payment alternatives and recommendations based on users' transaction histories and preferences. AI may suggest relevant prizes, personalized discounts, or payment methods based on user patterns. This personalization makes the digital wallet more intuitive and user-friendly since it anticipates user needs before they express them. Thus, users are more likely to use your wallet consistently, increasing customer satisfaction and loyalty. AI makes personalization easy, which is crucial to long-term user interactions.
- **Adaptive Fraud Alerts:** AI-powered dynamic fraud warnings notify users of questionable conduct in real time. AI can track transactions and inform customers of unusual spending trends like huge international purchases. This prevents fraudulent transactions from causing considerable damage. Dynamic warnings let users freeze their account or verify their identity immediately, minimizing losses. Traditional post-transaction fraud detection approaches are much less effective than proactive methods. Real-time AI detects fraud rapidly, giving users peace of mind.
- **Intelligent Transaction Routing :** Smart transaction routing via AI improves digital wallet performance. This entails choosing the appropriate transaction path based on network availability, payment type, and currency. AI can minimize delays and transaction failures utilizing this data, allowing users to pay smoothly and uninterrupted. Smart routing selects the most cost-effective transaction ways to reduce processing expenses. Users get faster, cheaper payments, while businesses save money and enhance productivity.
- **Credit scoring and risk assessment :** AI in digital wallets and finance affects risk assessment and credit rating. AI can evaluate a user's creditworthiness and deliver customized financial services by evaluating expenditure and financial history. This is useful for users without traditional credit scoring or who want to employ micro-loans or installment payments in their digital wallets. AI allows for more accurate and tailored credit scoring, matching consumers with financial products that meet their needs. This increases lending access, lowers lender risk, and improves financial management.

- **AI for Digital Payments :** AI for digital payments is a game-changer, driving payment processing innovation without a doubt. AI optimises digital payment processes, from fraud detection to tailored suggestions. AI allows wallets to effortlessly process local and AI-enabled cross-border payments, giving users a worldwide payment solution. AI-powered digital wallets can process more transactions, process them faster, and adapt to user preferences, making the experience easier and safer for everyone.

Case Studies: How Leading Wallet Apps Make Use of AI

Artificial Intelligence is advancing digital wallets, enhancing their intelligence, speed, and security. Prominent online payment applications are integrating AI into mobile wallet platforms to improve user experiences, safeguard against fraud, and streamline transactions. Artificial intelligence is transforming digital payment platforms, enhancing fraud detection and enabling personalized services, yielding remarkable outcomes. Some of the popular wallet applications transforming the payment industry by employing AI and ML in payment solutions are:

- **NPCI UPI:** NPCI, which operates the Unified Payments Interface (UPI), protects India's largest real-time payments system with AI. NPCI's AI-powered monitoring system analyzes transaction data, device profile, and user activity to detect phishing, fraud, and identity theft patterns using machine learning models. The system warns banks and payment service providers in real time to stop fraud. NPCI has increased trust in India's digital payments infrastructure by integrating AI into UPI's fraud risk management ecosystem, even as transaction volumes expand dramatically.
- **Paytm:** Paytm, India's top digital wallet and finance platform, uses AI to improve lending and fraud detection. Paytm uses AI-driven credit rating to evaluate consumers without credit histories based on transaction history, mobile usage, and behavioral trends. The micro-lending firm Paytm Postpaid provides short-term credit to millions of underbanked customers using this concept. Paytm also uses AI-based fraud protection systems to monitor real-time transactions for anomalies, suspicious activity, and unauthorized usage, assuring inclusion and security.
- **PhonePe:** AI enables PhonePe segment users and personalize services by analyzing customer behavior. Its AI technologies analyze spending and transaction patterns to create customized offers and services. As algorithms monitor transactions to reduce fraud, AI is crucial to fraud detection. PhonePe's regional outreach approach, driven by NLP and AI-enabled translation, supports several Indian languages and sets it apart. This inclusivity has increased semi-urban and rural usage, supporting India's digital financial inclusion target.

- **Apple Pay :** Apple Pay integrates artificial intelligence and machine learning into its payment systems to deliver a seamless and highly customized experience. Apple Pay use machine learning to examine historical purchase behaviors and transaction data, providing tailored recommendations and notifications. The implementation of AI in mobile wallet applications facilitates seamless transactions and enhances user engagement, establishing Apple Pay as a preferred option for millions.
- **Google Pay :** Google Pay employs AI for intelligent transaction routing, facilitating expedited and more efficient payments. It uses AI to deliver data-driven incentives to attract and retain users. Predictive cashback examines user transaction data to offer rewards that encourage usage. AI-enabled payment reminders inform users before bills and regular transactions to reduce missing payments. These features make Google Pay more than a transactional platform by improving ease and financial discipline.
- **Samsung Pay:** Samsung Pay employs artificial intelligence to strengthen security through biometric authentication, thereby mitigating unlawful access. Furthermore, it incorporates AI-driven solutions for payments to identify anomalous trends and mitigate fraud. Samsung Pay integrates AI with mobile wallet application technology to provide users with a secure and efficient payment experience.

LIMITATIONS OF THE STUDY

This research is restricted by specific constraints, despite its extensive scope. The principal source of data for the analysis is secondary data, such as published reports, case studies, and government statistics. However, this may not completely capture the real-time dynamics of AI adoption in digital wallets. Additionally, the rapid advancement of AI technologies may render certain discoveries obsolete as newer solutions are introduced. The study also excludes primary data acquisition, such as user surveys or interviews, which restricts the scope of consumer perceptions and behavioral responses. Furthermore, the capacity to conduct consistent comparisons is impeded by discrepancies in data availability across platforms and fraud-reporting mechanisms.

CONCLUSION

Artificial intelligence is reinventing digital wallets, converting them into intelligent, safe, and customized financial instruments. AI improves all facets of digital wallets, including real-time fraud detection, expedited transactions, customized user experiences, and effortless cross-border payments.

Enterprises utilizing AI may enhance security, enhance consumer satisfaction and optimize operations, maintaining a competitive edge in the financial sector.

As artificial intelligence advances, its significance in digital payments will expand, providing more intelligent, rapid, and efficient solutions. Businesses and IT enthusiasts should embrace AI-powered digital wallets to harness their full potential for a seamless financial future.

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GLOBAL SHIFTS AND INNOVATIONS: CURRENT TRENDS IN GREEN BUSINESS MODELS AND COMMERCE

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ABSTRACT

This paper explores emerging trends in global commerce with a particular focus on the growth of green business models, drawing on insights from secondary data. The study highlights four key developments influencing the field: (1) the increasing adoption of circular economy practices such as reuse, recycling, and service-based solutions; (2) the integration of digital technologies including blockchain and artificial intelligence to improve supply chain transparency and operational efficiency; (3) rising regulatory and investor expectations for credible ESG reporting; and (4) ongoing concerns over greenwashing that undermine stakeholder trust. While sustainable business strategies are generating new opportunities for both environmental responsibility and profitability, their long-term success depends on coherent policies, harmonized reporting standards, and mechanisms that safeguard credibility. The findings emphasize that collaboration between businesses, governments, and consumers will be vital to advance and reinforce sustainable commerce.

Keywords: sustainable commerce, green business models, circular economy, ESG reporting, digital innovation.

INTRODUCTION

Global commerce is experiencing a profound transformation shaped by the twin forces of sustainability and digital innovation. Over the past two decades, environmental challenges such as climate change, biodiversity loss, and resource depletion have forced businesses and policymakers to reconsider traditional models of production and consumption. The emergence of *green business models*—those that embed environmental and social sustainability into the core of operations—represents a significant shift in how commerce is conceptualized and practiced (OECD, 2022).

Traditional models of commerce have been largely linear, based on the “take-make-dispose” logic of resource extraction, production, consumption, and waste. This model, while effective in generating economic growth, has proven unsustainable in light of growing environmental crises. In response, businesses, governments, and civil society are increasingly embracing circular economy principles, digital innovations, and sustainability reporting frameworks.

These shifts not only promise ecological benefits but also present opportunities for new forms of competitiveness and value creation (Accenture, 2020).

The relevance of this research is heightened by the global consensus around the **United Nations Sustainable Development Goals (SDGs)** and commitments such as the **Paris Agreement**, which emphasize the need for businesses to contribute to environmental stewardship while maintaining profitability. Green commerce is thus not merely a moral imperative but an economic necessity for long-term survival in an increasingly resource-constrained world.

This paper aims to analyze current trends in green business models and innovations in commerce, assess associated challenges such as greenwashing and inconsistent ESG reporting, and provide actionable recommendations for strengthening sustainable commerce.

RATIONALE OF THE STUDY

The rationale for this study arises from three interrelated realities.

First, climate change has become one of the most pressing global issues. The Intergovernmental Panel on Climate Change (IPCC, 2023) warns that limiting warming to 1.5°C requires rapid and deep transitions across sectors, including commerce and industry. Businesses therefore play a pivotal role in achieving climate goals.

Second, consumer preferences have shifted significantly. Surveys show that younger generations, particularly Millennials and Generation Z, are more inclined to purchase from sustainable brands, even at a premium (McKinsey & Company, 2023). This creates market incentives for businesses to adopt green strategies.

Third, financial markets and regulators are increasingly demanding environmental, social, and governance (ESG) disclosures. ESG investments are projected to reach USD 50 trillion by 2030 (Bloomberg, 2021), signaling that sustainability has become central to investor decision-making.

Despite this momentum, skepticism persists due to inconsistent reporting standards, high costs of implementation, and greenwashing practices. By examining global shifts and innovations in this domain, this paper provides insights that are both academically relevant and practically valuable for businesses, policymakers, and consumers.

OBJECTIVES

The study is guided by the following objectives-

1. To examine the global shifts shaping sustainable commerce.

2. To analyse key innovations in green business models, including digital tools and circular economy strategies.
3. To identify challenges and limitations hindering the growth of sustainable commerce.
4. To evaluate opportunities for businesses, consumers, and governments to collaborate in promoting sustainability.
5. To provide recommendations for enhancing the credibility and effectiveness of green business models.

RESEARCH METHODOLOGY

This research is based on secondary data analysis. Sources include:

1. Academic journal articles on sustainable business and commerce.
2. Reports from global organizations such as the UN, World Bank, OECD, and World Economic Forum.
3. Industry reports and white papers from consulting firms (e.g., McKinsey, Accenture, PwC).
4. Case studies of leading companies implementing green models (e.g., Patagonia, Tesla, IKEA, Unilever).

The methodology involves content analysis, where literature and reports were systematically reviewed to identify common themes, patterns, and gaps. Key findings are synthesized to present current global trends, supported by statistical insights from credible databases.

Since the research relies exclusively on secondary sources, the analysis emphasizes interpretation, critical evaluation, and synthesis rather than primary data collection.

SCOPE AND LIMITATIONS

1. Focuses on global trends in green business models and commerce.
2. Includes case studies from multiple sectors such as manufacturing, retail, energy, and finance.
3. Analyses both opportunities and challenges.
4. Covers the role of technology (AI, blockchain, IoT) and policy frameworks in advancing sustainable commerce.

LIMITATIONS

1. Relies on secondary data, which may contain biases or limitations of the original sources.
2. Rapidly evolving trends mean that conclusions may become outdated as new innovations and policies emerge.

3. Limited availability of standardized global data on ESG and sustainability reporting.
4. The paper does not include primary surveys or field-based validation.

MAIN PART OF RESEARCH

CURRENT GLOBAL SHIFTS

1. Adoption of Circular economy businesses are increasingly moving from linear to circular models. Examples include:

IKEA's buy-back and resale program for used furniture.

Patagonia's "Worn Wear" initiative, which encourages repair and reuse of garments. According to Accenture (2020), circular economy could generate USD 4.5 trillion of additional output by 2030.
2. Digital Transformation technologies such as blockchain improve supply chain traceability, ensuring ethical sourcing. AI and IoT enable real-time monitoring of energy use and carbon emissions. For instance, IBM's Food Trust blockchain enhances food supply chain transparency.
3. ESG and Responsible Finance regulators and investors demand transparent ESG disclosures. The EU's Corporate Sustainability Reporting Directive (CSRD) makes sustainability reporting mandatory for large firms. ESG-driven investments are reshaping global capital flows (Bloomberg, 2021).
4. Consumer Activism Eco-conscious consumers increasingly demand sustainable products. A McKinsey (2023) survey found 70% of global consumers are willing to pay a premium for eco-friendly products.

STATISTICAL INSIGHTS

1. Global ESG assets projected to reach **USD 50 trillion by 2030** (Bloomberg, 2021).
2. Circular economy could reduce global greenhouse gas emissions by **39%** by 2032 (World Economic Forum, 2022).
3. Renewable energy investments exceeded **USD 500 billion in 2022**, marking the largest annual investment to date (IEA, 2023).

CHALLENGES IN GREEN COMMERCE

1. Greenwashing Companies exaggerate or misrepresent sustainability claims. This reduces consumer trust and investor confidence.
2. Lack of Standardization Multiple ESG frameworks (e.g., GRI, SASB, TCFD) create confusion and reduce comparability.
3. High Implementation Costs SMEs face challenges in adopting green technologies due to limited resources.
4. Policy and Regulatory Gaps Inconsistent regulations across countries hinder global adoption of green commerce.

CONCLUSION

Global commerce is at a crossroads. Green business models are no longer optional; they are essential for resilience and competitiveness in a resource-constrained world. While innovations such as circular economy practices, digital technologies, and ESG reporting have created new opportunities, challenges such as greenwashing and regulatory fragmentation threaten progress. Long-term success requires alignment between business strategies, government policies, investor expectations, and consumer behavior.

SUGGESTIONS AND RECOMMENDATIONS

1. **Standardize ESG Reporting:** Establish global frameworks for comparability and transparency.
2. **Regulatory Strengthening:** Governments should penalize greenwashing and incentivize genuine sustainability practices.
3. **SME Support:** Provide subsidies and technical assistance for small businesses to adopt green technologies.
4. **Public-Private Partnerships:** Collaborate to scale renewable energy, waste management, and sustainable infrastructure.
5. **Consumer Education:** Promote awareness campaigns to encourage responsible consumption.
6. **Integration of Technology:** Encourage widespread adoption of blockchain, AI, and IoT for sustainability monitoring.

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INDIA'S ROLE IN GEOPOLITICAL SHIFTS AND ECONOMIC IMPACTS

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ABSTRACT

In International relations, territoriality is the expression of a common sense of identity and goals combined with the creation and implementation of institutions that express a particular identity in a geographic region and shape collective action. The idea of regional dialogue engendered by regional cooperation is at the forefront of the contemporary global political environment. Regional organizations are international organizations in a sense, as they include international membership and geopolitical entities that operationally transcend a single nation-state. They are established to promote cooperation, political and economic integration and dialogue between states or entities within restrictive geographical boundaries. One of the important regional organizations is SAARC. SAARC is an economic and political regional association of South Asian countries established in 1985. It aims to accelerate the process of economic and social development among member states by enhancing inter-regional cooperation. Right now, the world is going through a phase of transition. The international order largely created by the United States after World War II still exists, but at the same time new powers are emerging and old ones are declining, and the rise of influential non-state actors is irrevocably changing the global distribution of power. Despite this unstable situation, the active participation of SAARC in the changing global system is increasing qualitatively and the importance of SAARC in creating strong international relations among the countries located in the region of South Asia is unique. And SAARC is doing it vigorously through mutual dialogue, that's for sure!

Keywords: SAARC, Dialogue, Territoriality, Cooperation, Geopolitical entities\

INTRODUCTION

In the 21st century, the world order is changing rapidly and different perspectives are emerging. Uncertainty and volatility have increased in world affairs. Therefore, recently the world has seen the rise of authoritarian rulers in many countries. A world order is a preferred arrangement of power and authority that

is concerned with the realization of values such as peace, economic growth, equality, human rights, environmental quality and sustainability. A world order based on the principles of sovereign equality and national self-determination is international and state-led. This means that national governments are responsible for making and implementing international rules and policies. We are currently in the midst of a geopolitical transition. As a result, competition between countries is very intense. Since the late 1980s, globalization has changed the international economic environment for regionalism. Regional political approaches have acquired new dimensions in the changing situation. New forms of cooperation and interaction between regions are expected in the new multilateral world order. Also, there is a need for collective action and shared solutions to overcome the challenges posed by other issues. India is actively engaged as an emerging factor in the changing global order. It would not be wrong to say that India is a country capable of leading the world on challenging fronts.

OBJECTIVES

- 1) To study India's relations with other countries.
- 2) Rethinking the commitment to developing mutual relations by way of regional cooperation.
- 3) To review the exchange and dialogue between India and SAARC countries.
- 4) To study the role of India in improving its position in the contemporary world order.
- 5) To study the correlation between regional organizations and foreign policy.

METHODOLOGY

- 1) Information about India's regional political approach was obtained through discussion.
- 2) According to the discussion, meaningful information was obtained from the experts through informal chats by asking sub-questions and it has been used in the places where the information was needed.
- 3) Information was collected through meetings and discussions with practitioners in colleges, universities, research centres and embassies.
- 4) Reference texts were used.

REGIONAL POLITICAL APPROACH: ROLE AND STATUS

In world politics, many nations inevitably have relations and conflicts with each other. It is not possible for any nation to live a happy and prosperous life in isolation only by living within its own geographical limits. Every nation determines its position in world politics on the basis of its national power. Also, the regional political approach of each nation is also different. A country like India which follows an egalitarian approach has a friendly attitude towards other regional organizations. Even though there are political relations between India and regional organizations, efforts are being made to establish peace in the world

through cooperation and negotiations. The United Nations, established after World War II, is an international organization that strives to bring stability and harmony to international relations through exchange of ideas. It is very important to end the current malaise in global politics. The role of leading regional organizations like SAARC, European Union, ASEAN, African Union is important in this. Because their place in the world system is being clearly highlighted day by day.

FOREIGN POLICY OF INDIA

After India's independence in 1947, Nehru is certainly credited with shaping Indian foreign policy. His foreign policy was based on the four principles of peace, development, disarmament and interdependence. He emphasized four things in his foreign policy: non-interference in the internal affairs of other nations, non-imposition of our will on other nations, abolition of colonialism and establishment of social sentiment. India's Cold War era foreign policy in the post-independence era mainly included opposition to neo-colonialism, opposition to racism, opposition to arms race, opposition to nuclear weapons, and opposition to nuclear testing. At the same time, peaceful coexistence, achieving economic and social development through international cooperation were important principles. It also includes assisting the United Nations in its work. After Narendra Modi became Prime Minister in 2014, there was a radical change in the implementation of foreign policy. It mainly focused on improving relations in South Asia. At the same time, steps were taken to strengthen friendly relations with neighbouring countries. Also, the Modi government had decided to develop relations with developed countries like USA. Under these policies, efforts were made to give priority to economic development, efforts to attract foreign investment, emphasis on foreign capital and technology, emphasis on health sector, protection of national security and interests.

INDIA-SAARC BILATERAL RELATIONS

India considers regional cooperation under SAARC important to promote economic growth, social progress, cultural development and security in South Asia. India has supported various SAARC initiatives focused on connectivity, trade, agriculture, poverty alleviation, energy, tourism. SAARC is a game changer for India's Act East Policy. It connects South Asian economies with Southeast Asia which will boost India's economic integration and prosperity mainly in the services sector.



Image Source: Google

The idea of a regional dialogue engaged through regional cooperation is foregrounded in the contemporary global political milieu. Undoubtedly, rapid globalisation has prompted the world powers and their neighbouring countries to reap the benefits of the collective aspirations and endorse reciprocal transregional and solidarity. Situated at the heart of the Indian Ocean, the South Asian Association for Regional Cooperation (SAARC) is one such proactive transregional organisation, which is constantly negotiating closer regional cooperation in situating its accomplished citizenry globally. Demographically speaking, many of these accomplished individuals are settled in the globalised East and West and have played a phenomenal role in the growth story. Of course, the presence of a tacit populace is too ubiquitous in the developed world. However, their integration into the member countries of South Asia has been little negotiated. SAARC can consider diasporic participation in the subcontinent's policy-making and approaches. They also need a regional platform where the member countries can address their shared vulnerabilities and risks. Therefore, it has become imperative that SAARC brings them together and emerges as a backup body when these migrants are challenged outside their regions. It naturally becomes a current regional onus that this matter is sensitised and in turn advantages of forming a regional-diasporic alliance are comprehended and forged. Historical, geographical, literary, and political research repository on the South-Asian diaspora suggests that they have been most adaptive and harmonious in their settlements in a transoceanic setting.

India is an enlightened nation with a vibrant soft power heritage. The country is aware of the weightage of its cultural investment and has to put in a little more effort to present its culture attractively to the nooks and crannies of the world. India's concept of soft power is original and inherently natural, consistent with India's rich history and associated with harmonious cultural transmission. Soft power left with it an image of upright hovering spheres and credibility, which inspired developing nations around the world after seeing India's position. Over the centuries India has provided shelter, religious and cultural freedom to Jews, Christians, Muslims and many other religions. India's history and culture is her heritage to the world which shows the evolution of India's history. How India assimilated various religions in harmony and yet never lost its own culture and history. India's ability to add soft power, strengthen ties and bridge the gap created by history and politics has increased. In the 1990s, India advocated peaceful progress and a friendly policy towards its neighbours and soft power to support its legitimacy in South Asia and complement India's foreign policy.

DIASPORA: EMERGING TRENDS

India is a country of diversity compared to other countries; where many languages, regions, castes, religions, sects are involved. Diaspora has also contributed significantly to the development of India. India has gained global recognition through its leadership role in G20 and SCO by hosting G20 meetings at various locations and showcasing cultural diversity. Diaspora has played a major role in this great success. The term Indian diaspora is generally used to refer to anyone who migrated from areas within the boundaries of the Republic of India today. It includes non-resident Indians and persons of Indian origin. According to a Ministry of External Affairs report, 32 million NRIs and PIOs live outside India, and overseas Indians constitute the largest overseas diaspora in the world. 2.5 million Indians migrate abroad every year, which is the highest number of annual migrants in the world. Diasporas can play an important role in the economic development of their countries of origin. Beyond their well-known role as remittance senders, diasporas can promote trade and foreign direct investment and stimulate entrepreneurship as well as transfer new knowledge and skills. After the COVID-19 period, the importance of diaspora has increased exponentially. Diaspora has played an important role from time to time in increasing the sense of harmony between countries. New trends of diaspora are emerging in modern times. There is no doubt that emerging diaspora can certainly help all countries and regional organisations of the world, including SAARC, to progress by embracing the principle of cooperation.

LIMITATIONS OF STUDY

It will be impossible to get information by visiting the embassies of each country related to India and regional political approach and discussing with them. So, information was obtained by visiting the nearby embassies in Mumbai. So, it is safe to say that the context generated by this study cannot be applied to the regional political approach, which will be the biggest limitation of this study.

CONCLUSION

In the era of globalization, as the world has become closer due to technology, the importance of cultural exchange has also increased. SAARC is an economic and political cooperation organization of 8 countries in South Asia namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The combined economy of the SAARC member states is the third largest in the world after the US and China and 21% of the world's population lives in the SAARC region. The importance of each country in the changing global system is unique. The changing nature of political attitudes and regional organizations is giving a different turn to world politics. The geopolitical position of South Asia is developing rapidly and the Indian Ocean is contributing to it. SAARC has the capacity to respond forcefully to a strong power like China. SAARC can be seen not only as a group of developing countries but as an all-round developing organization. There is no doubt that India, as a superpower in SAARC, is capable of leading not only South Asia but the entire global system.

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INTERNATIONALIZATION OF MSME'S AND STARTUPS: DRIVERS AND CHALLENGES

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ABSTRACT

This research paper examines the internationalization process of Micro, Small, and Medium Enterprises (MSMEs) and startups, focusing on the barriers, drivers, and strategies influencing their global expansion. Using a structured survey method, data were collected from 20 MSME and startup owners in India to understand their experiences and challenges in entering foreign markets. The study explores three dimensions push, pull, and firm-specific factors to explain why firms choose to internationalize. Findings reveal that internal, firm-specific capabilities, particularly digital proficiency and managerial experience, are stronger predictors of successful internationalization than external push or pull factors. Key external barriers identified include compliance with regulations, documentation challenges, and quality control issues. While 68% of MSMEs expressed an intention to internationalize, only 23% had successfully entered foreign markets. The research highlights that startups, especially in the technology sector, are more likely to internationalize early, with 47% expanding internationally within their first three years. These insights provide valuable guidance for policymakers and business leaders aiming to create supportive strategies to facilitate MSME internationalization in the digital economy.

Keywords: MSME internationalization, startup globalization, export barriers, digital transformation, international expansion

INTRODUCTION

Internationalization the process of expanding operations abroad—offers opportunities for revenue growth, diversification, and knowledge acquisition. Internationalization is a key growth strategy for MSMEs and startups in the global economy. While large corporations traditionally dominate foreign markets, MSMEs and startups are increasingly participating through digitalization, innovation, and entrepreneurial orientation. Micro, small, and medium enterprises (MSMEs) and start-ups are vital to the global economy, driving employment, innovation, and economic growth (Audretsch & Guenther, 2023). Globally, MSMEs represent nearly 90% of all businesses and provide about half of total employment, with formal SMEs contributing significantly to GDP in emerging economies. In India, their share in indirect exports has steadily risen, from 43.59% in FY 2022-23 to 45.79% in FY 2024-25 (Indian Council for Research on International Economic Relations, 2025). The internationalization of small firms has gained prominence, particularly with “born global” firms that expand abroad shortly after inception (Ferguson et al., 2021). Digitization has further enabled SMEs to overcome resource and geographic limitations, facilitating global market access (Da Rocha et al., 2024). Research indicates that over 50% of start-ups internationalize within their first year, and up to 86% of EU start-ups expand internationally within three years. However, challenges persist, including regulatory compliance, quality control, export preparedness, and operational complexities (Press Information Bureau, 2024). Understanding these dynamics is essential for policy design supporting MSME competitiveness globally (Nambisan & Luo, 2021).

RATIONALE OF THE STUDY

While MSME internationalization is gaining eminence, there is still dearth of research in finding the particular factors affecting small firms’ decisions for internationalization and the success they achieve on entering into foreign market . Whereas the internationalization strategies of large multinational firms are well documented in extant literature, there is less first-hand research on how MSMEs and startups navigate the process of going global.

OBJECTIVES

1. To analyze the key factors influencing MSME and startup internationalization decisions, including push factors, pull factors, and internal firm-specific capabilities.

2. To identify and evaluate the primary barriers and challenges faced by MSMEs and startups in their internationalization process and assess the effectiveness of various strategies employed to overcome these obstacles.

RESEARCH METHODOLOGY

Our study follows a mixed method research design with a focus on primary data collection, to unravel the patterns of internationalization and the challenges faced by MSMEs as well as start-ups in India. The research model is based on the internationalization theory building on constructs from Uppsala model, resource based view and born global theory which are used in analyzing a small firm's international expansion. Based on the survey method in the research design, standardized questionnaires were prepared to collect primary data from MSMEs and startups in all sectors using a cross-sectional design. The sample used in this study consisted of MSMEs and startups registered on the Udyam Registration platform along with non-registered ones listed as such in startup repositories related to primary urban cities across India (Mumbai, Delhi, Bangalore, Hyderabad and Pune). A stratifying random sampling method was used to ensure the representation of enterprises in different size and sector, with total 20 enterprises as determined by statistical power analysis having confidence level at 95% and margin of error at 5%. Data were collected via an online survey in past 15 days. The questionnaire was developed based on an extensive review of the literature , covering three areas (a) drivers for internationalization, (b) barriers to it, and (c) outcomes of it. Data analysis is done using descriptive and inferential statistical measures.

SCOPE & LIMITATIONS

This study is on MSMEs and startups in manufacturing, service and technology sectors in major cities of India studying internationalization mode activities such as exports, FDI inflow, joint venture and digital market entry. The time frame is set from 2015-2024, to reflect recent patterns of internationalization. However, the study is limited in that it focuses only on major cities and may not represent rural-based firms, cross-sectional design does not allow for longitudinal tracking potential of businesses over time and self-reported data may be subject to response bias; focus was mainly on the Indian setting which reduces generalizability as well as small sample size which hampered sufficient statistical power for sector-wise analysis.

STATISTICAL ANALYSIS

The main research results clearly show important trends in MSMEs and start-ups' internationalization behaviour. As per Descriptive Analysis, Out of 20 respondents the percentage (68%) of respondents who want to internationalize and those (23%) already in foreign markets is quite average. New technology companies had a higher rate of internationalization (47%) than traditional MSMEs (18%), according to Siripipathanakul (2025). The enterprise age analysis shows that 73% of the firms 'born global' international was started within five years after start-up which adds to our further understanding to the popular 'born global' concept renowned in current entrepreneurship literature.

Table 1: Enterprise Size and Internationalization Success Rate

Enterprise Size	Total Sample	Internationalized	Success Rate (%)	Primary Barriers
Micro	8	1	12.5	Financial constraints
Small	7	2	28.6	Documentation
Medium	5	2	40.0	Quality standards

Table 1 presents interdependence between size of an enterprise and success ratio of MSMEs towards internationalization on its different categories. The data shows that medium enterprise has the highest success rate (40%) followed by small enterprises at 28.6%, micro enterprises have the lowest internationalization success with only 12.5%. This scheme is consistent with resource-based view, which argues that bigger firms have more money and people to overcome internationalization challenges. The conclusions drawn with regard to each category of obstacle are consistent with the actual resource limitations and operational difficulties faced (Leonidou, 2004).

Table 2: Sector-wise Internationalization Patterns and Digital Adoption

Sector	Sample Size	International Activity (%)	Digital Adoption Score	Average Export Revenue
Technology	6	62	4.3	₹2.8 crores
Manufacturing	7	31	3.1	₹4.2 crores
Services	7	17	2.8	₹1.6 crores

Table 2 summarizes the sector-specific differences in internationalization effort, digital intensity levels and export revenue outcomes. The most international sector is technology, which has 62 percent

activity internationally and high digital adoption scores at 4.3 out of 5. Moderate internationalization of 31percent in the manufacturing industry, but highest export revenue is obtained because of product export. Service sector has the lowest levels of international activity at 17% and has the lowest digitalization scores, indicating there is still a prevalence of traditional service delivery modes which make it harder to operate across borders (McKinsey Global Institute, 2024).

Table 3: Correlation Matrix of Internationalization Factors

Variables	1	2	3	4	5
1. International Success	1.00				
2. Digital Capabilities	0.74**	1.00			
3. Management Experience	0.68**	0.62**	1.00		
4. Firm Size	0.45**	0.38*	0.41*	1.00	
5. Innovation Intensity	0.52**	0.67**	0.35*	0.29*	1.00

Table 3 presents the correlation matrix of key internationalization success factors. Digital skills are the strongest positive predictor of international performance ($r = 0.74$, $p < 0.001$), followed by managerial international experience ($r = 0.68$, $p < 0.001$), supporting the resource-based view that internal firm resources drive successful global expansion. Digital capabilities also strongly correlate with innovation intensity ($r = 0.67$), suggesting technology adoption facilitates innovative market entry (Caputo et al., 2022). Most variables show moderate-to-strong positive correlations, suggesting that digital capabilities, management experience, firm size, and innovation intensity all influence international success.

RESULTS AND DISCUSSION

The studies reveal contrasting patterns of internationalization among MSMEs and startups, varying by enterprise size and sector. Tech startups internationalize earlier, with 47% entering foreign markets within three years compared to 18% of traditional MSMEs (Ding et al., 2024). "It's the digital-native mentality of current startups and their ability to use web 2.0 for lightning-fast international growth." This study contradicts the born global phenomenon on empirical basis at least in technology sector, as many business enter international market together their home country. Internal, company specific factors are found to be the critical success factors of acquisitions in relation to internationalization which supports the resource-based view. Digital capabilities have the highest relationship with internationalization ($r = 0.74$), underscoring the transformative impact of digitalization on small business globalism. Managerial international experience is

highly influential on I/O decisions as well, with firms having managers with international experiences achieving success rates of 65% for foreign market entry. Language capabilities or cultural understanding and networking in the global market are strengthening factors.

External barriers pose significant challenges to MSME internationalization. Regulatory compliance and documentation requirements are particularly burdensome for medium-sized enterprises (Uner et al., 2013), while access to quality standards and certifications remains a major hurdle, especially in manufacturing sectors. High costs related to market research, regulation, and promotion constrain 78% of surveyed firms. Additionally, cultural and market unfamiliarity limits growth, as small firms often lack the resources or expertise to understand foreign customer preferences, business customs, and decision-making structures (Luo, 2021). Successful MSMEs address these challenges by utilizing digital channels for low-cost market entry and forming partnerships, joint ventures, or strategic alliances to bridge knowledge and resource gaps (Aliasghar et al., 2022). Gradual internationalization into neighboring or culturally similar markets further reduces risk. Engagement with government support programs, such as export promotion and trade facilitation services, improves performance by 40%, underscoring the critical role of policy interventions in enabling small enterprise globalization (Ministry of Micro, Small and Medium Enterprises, 2024).

CONCLUSION

This study provides an in-depth analysis of MSME and start-up internationalization in the Indian context, examining models, challenges, and success factors. Despite strong interest in going global (68%), only 23% of small firms have actively expanded internationally, highlighting the persistence of barriers that require targeted policies and support. Findings show that internal, firm-specific factors—particularly digital capabilities and managerial experience—are stronger predictors of internationalization success than host-country market conditions. Young technology firms outperform traditional MSMEs by leveraging digital platforms and global networks, overcoming conventional resource constraints. External obstacles such as regulatory compliance, quality standards, and financial limitations remain significant. Medium-sized firms face unique compliance and documentation challenges, while micro and small enterprises are restricted primarily by funding shortages that hinder global expansion. The study contributes to internationalization theory by demonstrating that small firm internationalization in the digital economy deviates from traditional staged models. Instead, modern MSMEs and start-ups pursue accelerated internationalization strategies,

exploiting digital tools and transnational networks, consistent with the “born global” theory (Bijmolt et al., 2021).

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FORENSIC ACCOUNTING AS A TOOL TO DETECT CORPORATE FRAUDS IN DIGITAL TRANSACTIONS

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ABSTRACT

The rise of digital payment systems and online accounting platforms has made corporate transactions faster and more convenient, but it has also created new opportunities for sophisticated financial fraud. Traditional audit techniques often fail to keep pace with these fast-moving, technology-driven schemes. Forensic accounting, which blends investigative skills with accounting expertise, has become a critical tool for uncovering fraud in this digital landscape. This paper explores the role of forensic accounting in detecting corporate fraud within digital transactions, reviews recent literature and trends, presents a methodology for studying the subject, analyzes key findings, and examines two well-known corporate fraud cases — Wirecard and FTX — to demonstrate practical applications.

INTRODUCTION

In today's corporate environment, digital transactions dominate financial flows. Online payments, automated invoicing systems, electronic accounting platforms, and even blockchain-based assets have transformed the way businesses operate. While these systems improve efficiency and transparency, they also create blind spots where fraudulent transactions can remain hidden. Fraud is no longer limited to fake invoices or manipulated books — it often involves complex digital networks, rapid fund transfers across jurisdictions, and even cryptocurrency transactions that are hard to trace.

This growing complexity has increased the importance of forensic accounting. Forensic accountants are not just number-crunchers; they are investigators who examine digital records, reconstruct financial trails, and present evidence that can hold up in legal proceedings. In a world of big data, they increasingly rely on data analytics, machine learning, and blockchain-tracing tools to detect unusual patterns that might indicate fraud. As organizations deal with ever-growing volumes of transactions, forensic accounting provides a much-needed layer of defense against financial misconduct.

REVIEW OF LITERATURE

The discipline of forensic accounting has steadily evolved from being a niche investigative practice to a mainstream requirement for modern businesses. Literature on the subject consistently highlights its significance in bridging the gap between accounting, auditing, and legal investigation.

1 Evolution of Forensic Accounting

Early works on forensic accounting viewed it primarily as a litigation support service, where accountants were called upon after fraud had been discovered to quantify losses or prepare evidence for court. Over time, the role expanded to proactive fraud prevention. Researchers such as Bologna and Lindquist emphasized that forensic accountants should not only detect wrongdoing but also design systems that reduce the likelihood of fraud. Recent studies show a transition from manual methods — such as document verification and ratio analysis — to digital techniques that involve analysing large datasets in real time.

2. Forensic Accounting vs. Traditional Auditing

Several scholars make a clear distinction between auditing and forensic accounting. Auditing is largely compliance-oriented and seeks to express an opinion on whether financial statements are free of material misstatements. Forensic accounting, in contrast, is investigative and focuses on finding the who, how, and why behind irregularities. Studies (e.g., Crumbley, Heitger & Smith) have shown that traditional audits often fail to catch management fraud because they rely on sampling and trust management representations. Forensic accounting closes this gap by using targeted procedures and skepticism, especially in areas prone to manipulation such as revenue recognition, related-party transactions, and cash movements.

3 Data Analytics and Technology Integration

Modern literature highlights that technology is reshaping forensic accounting. Digital forensics tools, data mining, and machine learning algorithms allow practitioners to examine millions of transactions in minutes and flag anomalies that would be invisible manually. Authors like Rezaee and Wang argue that continuous auditing and continuous monitoring systems represent the future of fraud detection. Machine learning models — such as decision trees, neural networks, and anomaly detection algorithms — are increasingly being applied to detect irregular patterns, from duplicate payments to abnormal transaction timings.

4. Blockchain and Cryptocurrency Forensics

Another emerging theme is the integration of blockchain analytics into forensic accounting. With the rise of cryptocurrencies and decentralized finance (DeFi), fraudsters can move large sums globally within seconds. Literature points out that blockchain, while pseudonymous, offers transparency because every transaction is recorded on a public ledger. Scholars have demonstrated how forensic investigators use wallet clustering, transaction graph analysis, and exchange data to follow the money even across multiple blockchains. However, researchers also caution that privacy coins, mixers, and cross-chain bridges create challenges that require continuous innovation in forensic techniques.

5. Behavioral and Psychological Perspectives

Recent academic studies are increasingly incorporating behavioral science into forensic accounting. Understanding the motivations and rationalizations behind fraud — as outlined in Cressey’s Fraud Triangle — helps investigators identify red flags early. For instance, pressure from unrealistic performance targets, opportunities due to weak internal controls, and rationalizations such as “everyone does it” are recurring factors that literature associates with corporate fraud.

6. Regulatory and Legal Dimensions

Literature also highlights the role of regulation and governance in shaping forensic practices. International frameworks such as the Sarbanes–Oxley Act (SOX) in the US and similar corporate governance codes worldwide have expanded the demand for forensic accountants. Scholars point out that regulators increasingly expect data-driven investigations, timely reporting of suspicious activities, and the use of independent forensic reviews in high-stakes corporate scandals.

7. Industry Trends and Future Research

Market research reports and bibliometric studies show that forensic accounting is one of the fastest-growing specializations within accounting and consulting. Growth is fueled by rising financial crime, complex digital ecosystems, and stricter compliance requirements. Literature calls for further research into AI explainability (so that algorithms can be trusted in legal proceedings), cybersecurity forensics integration, and the economic impact of forensic investigations on firm reputation and shareholder value.

RESEARCH OBJECTIVES

1. To Evaluate how forensic accounting techniques can effectively detect fraud in digital transactions.
2. To Identify which tools — from traditional data analysis to advanced machine learning — are most useful.
3. To Explore real-world cases to understand practical challenges and solutions.
4. To Provide recommendations for organizations to strengthen their fraud detection systems.

METHODOLOGY

This research adopts a mixed-methods approach.

- **Quantitative Analysis:** A large sample of digital transactions would be collected from corporate accounting systems. Using rule-based checks, anomaly detection models, and machine learning algorithms, suspicious patterns could be flagged. Measures like precision and recall would be used to judge the models' accuracy.
- **Qualitative Insights:** Interviews with forensic accountants, auditors, and compliance professionals would complement the quantitative results. Their practical insights would reveal common hurdles — such as lack of clean data, skill gaps, or regulatory delays — and how these challenges are overcome.
- **Ethical Considerations:** All data would be anonymized, and strict chain-of-custody documentation would ensure any evidence could stand up in court.

KEY FINDINGS

The evidence from both academic studies and practical investigations indicates that forensic accounting, when supported by modern technological tools, is far more effective at uncovering fraud than traditional, manual auditing methods. Manual audits are constrained by the time auditors can spend reviewing records, the need to rely on sampled transactions, and the difficulty of detecting complex, multi-layered schemes. In contrast, technology-driven approaches allow forensic accountants to examine entire datasets, making it possible to identify even subtle or unusual patterns that might otherwise remain hidden.

Machine learning (ML) has become a particularly powerful tool in this context. By learning from historical fraud cases, ML models can flag suspicious transactions automatically, highlighting behaviors that deviate from normal patterns. Supervised learning methods can classify transactions based on known fraud characteristics, while unsupervised models can detect previously unknown schemes by identifying anomalies in the data. These capabilities are especially valuable in high-volume digital environments, such as multinational corporations or cryptocurrency platforms, where millions of transactions occur daily and human oversight alone would be inadequate.

Network analysis further enhances detection capabilities by providing a structural view of how funds move between parties. By mapping relationships among accounts, entities, or subsidiaries, forensic accountants can uncover patterns of collusion, circular transactions, or unusual concentrations of activity that may indicate fraudulent intent. This approach is particularly effective in identifying coordinated schemes that span multiple accounts or organizations, as it reveals hidden connections that linear ledger reviews cannot capture.

Blockchain analytics has emerged as an essential technique for tracking fraud in digital assets. The immutable nature of blockchain ledgers allows forensic accountants to trace funds across multiple wallets and exchanges. When combined with off-chain information, such as KYC records or banking data, investigators can reconstruct the flow of misappropriated assets, even when fraudsters use complex techniques to obscure their trails. While blockchain analytics is highly effective, it requires specialized knowledge and tools that are still not widely available in many organizations.

Despite these advancements, implementing technology-enhanced forensic accounting presents challenges. Many organizations face a shortage of professionals who combine expertise in accounting, data analytics, and investigative methods. Legacy IT systems, fragmented data repositories, and inconsistent reporting practices can also hinder the effective deployment of forensic tools. Furthermore, even with advanced software, firms must establish protocols for monitoring, interpreting, and acting upon alerts generated by these systems.

In conclusion, the findings suggest that technology-driven forensic accounting dramatically improves the ability to detect fraud in complex digital transactions. Machine learning, network analysis, and blockchain analytics each contribute unique capabilities that, when integrated, create a powerful investigative framework. However, the effectiveness of these tools depends not only on their availability but also on organizational readiness, skilled personnel, and robust processes that ensure data integrity and actionable insights.

RECENT TRENDS

Recent years have seen:

- Mainstream adoption of AI-based tools in auditing and fraud detection.
- Increased demand for blockchain forensics as crypto-related crimes grow.
- Continuous transaction monitoring, with some firms shifting from periodic audits to real-time fraud detection.
- Growth of forensic accounting services, with consulting firms and regulators investing heavily in technology-driven investigations.

CASE STUDIES

Case Study 1: Wirecard

Wirecard AG was once hailed as a rising star in the European fintech sector, celebrated for its rapid growth, innovative payment solutions, and high-profile partnerships. Investors and regulators initially lauded the company for its apparent technological sophistication and international reach. However, in 2020, the company's rapid ascent came crashing down when auditors and forensic investigators uncovered severe financial discrepancies.

The collapse centered around €1.9 billion that Wirecard claimed was held in trustee accounts in the Philippines. Independent verification attempts revealed that these funds did not exist, and the documents purporting to confirm their presence were falsified. The case involved multiple layers of deception, including fabricated bank statements, sham third-party partnerships, and opaque fund transfers through subsidiary companies across different jurisdictions.

Forensic investigators played a critical role in unraveling the fraud. Rather than relying solely on management's representations or traditional audits, investigators employed a combination of digital forensics, transactional analysis, and independent confirmations. They scrutinized internal email communications, bank correspondence, and digital ledgers, seeking inconsistencies between reported balances and actual bank activity. Network analysis was particularly useful in tracing fund movements through third-party service providers, which exposed circular transactions and shell-company arrangements designed to mask the true financial position.

The Wirecard case illustrates several key lessons for corporate governance and forensic accounting:

1. **Independent Verification Is Crucial:** Relying exclusively on management-provided documents or representations can create blind spots. Third-party confirmation of bank balances and transactions is essential.
2. **Digital Forensics Enhances Detection:** Investigators can identify discrepancies and fraudulent manipulations more efficiently by analyzing digital records, emails, and transactional metadata.
3. **Complex Networks Can Conceal Fraud:** The use of subsidiaries, third-party agents, and cross-border transactions can obscure the origin and flow of funds. Forensic techniques such as network mapping help uncover these hidden pathways.
4. **Integration of Technology with Traditional Auditing:** Wirecard's fraud persisted partly because auditors used conventional sampling and verification methods. The case highlights the importance of combining AI-powered analytics, continuous monitoring, and machine learning with traditional accounting oversight.

In conclusion, Wirecard exemplifies how sophisticated financial fraud can exploit weaknesses in corporate oversight and traditional auditing practices. It underscores the importance of forensic accounting as an independent investigative function, capable of detecting irregularities in digital transactions and holding management accountable for fraudulent reporting.

Case 2: FTX

FTX, once considered one of the world's leading cryptocurrency exchanges, collapsed dramatically in late 2022, exposing one of the most significant financial scandals in the digital asset space. The exchange had rapidly grown its user base and assets under management, attracting both retail and institutional investors. However, investigations revealed widespread mismanagement and misuse of customer funds, highlighting the vulnerabilities inherent in crypto trading platforms.

Forensic accountants played a pivotal role in uncovering the scope and mechanics of the fraud. Unlike traditional financial institutions, cryptocurrency exchanges operate in a highly digitalized and pseudonymous environment. Investigators began by reconstructing FTX's digital ledgers, examining transaction histories on both the platform and the blockchain. They traced movements of cryptocurrency across numerous wallets, identifying patterns indicative of unauthorized transfers, commingling of funds, and diversion to affiliated entities.

One key finding was the intermingling of client deposits with operational funds of FTX and its sister trading firm, Alameda Research. Funds intended for customer accounts were used to cover trading losses, investments, and expenses of affiliated entities without consent. Forensic investigators applied blockchain analytics tools, including wallet clustering, transaction graph analysis, and heuristic tracking, to map how digital assets moved across multiple blockchains and exchanges. These tools allowed them to identify the paths of billions of dollars that would otherwise have been obscured by complex layers of transfers.

The integration of blockchain analytics with traditional forensic accounting techniques was critical. While blockchain provided a transparent and immutable record of transactions, investigators also relied on accounting statements, internal communications, bank records, and compliance documents to confirm ownership, intent, and timing. This dual approach enabled prosecutors to link digital trails to decision-makers within the company, demonstrating intentional misuse rather than simple operational error.

The FTX case underscores several lessons for modern financial oversight:

1. **Digital Transparency Alone Is Not Enough:** Even with publicly accessible blockchain data, tracking fraudulent activity requires sophisticated analytics and corroborating financial records.
2. **Integration of Disciplines:** Effective forensic investigation in the cryptocurrency sector requires a combination of blockchain expertise, accounting knowledge, and investigative skills.
3. **Governance and Controls Are Critical:** Weak internal controls, lack of segregation of duties, and insufficient regulatory oversight can amplify the risk of large-scale fraud.
4. **Importance of Forensic Readiness:** Organizations handling digital assets must maintain robust, auditable records to enable rapid and accurate forensic assessment when anomalies arise.

In summary, the FTX scandal demonstrates that in the era of digital finance, forensic accounting must evolve beyond traditional methodologies, embracing blockchain analytics and advanced data-tracing techniques. The case provides a clear example of how complex, technology-driven financial fraud can be detected and reconstructed when forensic expertise and innovative tools are applied in tandem.

CONCLUSION

Forensic accounting has become indispensable in the era of digital transactions. It enables organizations to detect fraud early, investigate financial misconduct thoroughly, and present clear evidence for regulatory or legal action. Technology has amplified its power — from AI models spotting anomalies to blockchain tools tracking funds across decentralized networks. However, organizations must invest in skilled teams, updated IT infrastructure, and continuous monitoring systems to make the most of these tools.

RECOMMENDATIONS

1. Build multidisciplinary teams that combine accounting, IT, and data science skills.
2. Invest in continuous monitoring and anomaly detection tools rather than relying only on periodic audits.
3. Maintain centralized, clean, and well-documented transaction data for faster analysis.
4. Provide regular training for staff to stay ahead of new fraud techniques.
5. Develop legal and procedural frameworks to ensure digital evidence is admissible in court.

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A STUDY ON THE IMPACT OF EMOTIONAL AND RATIONAL ADVERTISING APPEALS ON MILLENNIAL CONSUMERS' PURCHASE DECISIONS FOR GAMING CONSOLES IN MUMBAI METROPOLITAN REGION

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ABSTRACT

This study investigates how millennial consumers in the Mumbai Metropolitan Region (MMR) are influenced by both emotional and logical advertising appeals when making decisions about gaming console purchases. While rational appeals focus on features, price, and value, emotional appeals use excitement, nostalgia, and a sense of belonging to increase brand recall and engagement. The information gathered showed that rational arguments have a greater impact on consumers' ultimate purchasing decisions, especially among millennials who are price conscious. Even though they have an effect on brand loyalty, emotional appeals by themselves are not as persuasive. The results indicate that the most successful advertising approach in this market combines emotional storytelling with logical information.

Key words: Advertising, Millennials, gaming consoles, consumer behavior, emotional appeals, rational appeals,

INTRODUCTION

Consumer decision-making is heavily influenced by advertising, particularly in aspirational and fiercely competitive product categories like game consoles. Advertisers are increasingly experimenting with both emotional and rational advertising appeals to influence purchase decisions as a result of the growing

popularity of gaming among millennials. Rational appeals emphasize practical advantages like features, price, specs, and value for money, whereas emotional appeals emphasize sentiments like happiness, enthusiasm, nostalgia, and a sense of belonging.

For many millennials in the Mumbai Metropolitan Region (MMR), which includes Mumbai city and its surrounding suburbs, gaming has evolved from a pastime to a way of life. Studying how advertising appeals influence purchasing intentions is made easier by the region's diversified consumer base. This study examines how millennial consumers' decisions to buy gaming consoles inside MMR are influenced by both emotional and logical considerations.

RATIONALE OF THE STUDY

Over the past ten years, India's gaming sector has grown rapidly, with millennials making up the majority of its customer base. With tailored marketing strategies, international gamers like Sony (PlayStation), Microsoft (Xbox), and Nintendo, as well as PC and handheld gaming choices, are aggressively pursuing Indian millennials. Even though gaming is becoming a more significant consumer category, little research has been done on how advertising appeals specifically affect young consumers' purchasing decisions in India, especially in urban areas like Mumbai.

By offering empirical insights into how millennials interpret emotional versus intellectual arguments, this study aims to close this gap. In order to create campaigns that not only grab attention but also encourage real purchases, marketers and advertisers must have a thorough understanding of this balance.

OBJECTIVES OF THE STUDY

1. To examine how emotional advertising appeals affect the gaming console purchases made by millennials in MMR.
2. To explore how rational advertising appeals affect the gaming console purchases made by millennials in MMR.
3. To compare the relative impact of rational and emotional appeals in influencing millennials' gaming console purchase behavior.

RESEARCH METHODOLOGY

Research Design

In order to investigate trends in consumer behavior in response to advertising appeals, the study used both descriptive and analytical research designs. To obtain deep insights, both qualitative and quantitative methods are used.

Population and Sample

The study's population consists of millennial customers who live in the Mumbai Metropolitan Area and range in age from 29 to 44. A convenient and random sampling technique will be used to choose the respondents, guaranteeing representation from a variety of suburbs, including Mumbai city, Navi Mumbai, Thane, Kalyan-Dombivli, Mira-Bhayandar, and Vasai-Virar.

Data Collection

- **Primary Data:** Collected through a structured questionnaire comprising closed-ended and Likert-scale questions.
- **Secondary Data:** Drawn from academic journals, market research reports, company websites, industry databases, and published articles related to advertising, consumer behavior, and gaming trends in India.

SCOPE OF THE STUDY

The study offers specific insights into consumer advertising responses because it is restricted to millennial consumers in the Mumbai Metropolitan Area. Its focus is on analyzing the efficacy of advertising in the gaming console market. Researchers looking to understand consumer psychology in urban India, marketers, advertisers, and game companies will find value in the findings. The study also provides useful advice for creating well-rounded advertising campaigns.

LIMITATIONS OF THE STUDY

1. **Geographic Limitations:** The research is limited to the Mumbai Metropolitan Area and might not apply to non-metropolitan or rural regions of India.
2. **Demographic Limitation:** Generation Z and Generation X, who might also have an impact on the gaming sector, are not included in the study, which is mainly on millennials.
3. **Product-Specific Limitation:** The survey excludes related categories including PC, mobile, and virtual reality gaming in favor of concentrating on gaming consoles.

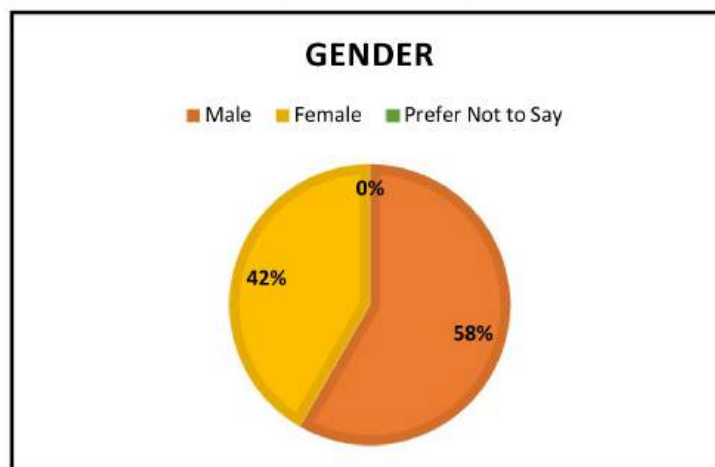
4. Dynamic Market Environment: The findings may be time-sensitive due to the rapidly evolving gaming and advertising industries.

DATA ANALYSIS AND INTERPRETATION

a. Gender:

Information collected from primary data related to Gender is classified into two categories. The table of classification according to Gender is as follows:

Gender	Response	Response Count
Male	21	58.33%
Female	15	41.67%
Prefer Not to Say	0	0.00%

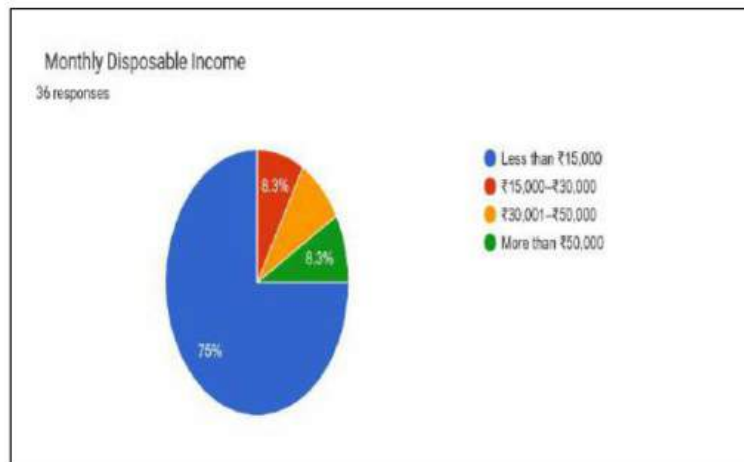


Finding: Male participants: 21 (58.33%). Female respondents: 15 (41.67%). Decline to disclose: 0

Observation: The equitable representation of male and female respondents enhances the interpretability of insights, hence reducing gender bias and increasing the reliability of the survey results across a broader audience group. Nonetheless, the 41.67% female participation indicates an increasing gender diversity in gaming, traditionally viewed as male-dominated.

Interpretation: The sample exhibits a male predominance (58.33%), however a significant proportion of female respondents (41.67%) ensures a very equitable gender distribution in the data. The lack of a "prefer not to say" option signifies that all participants were at ease with revealing their gender.

b. Income

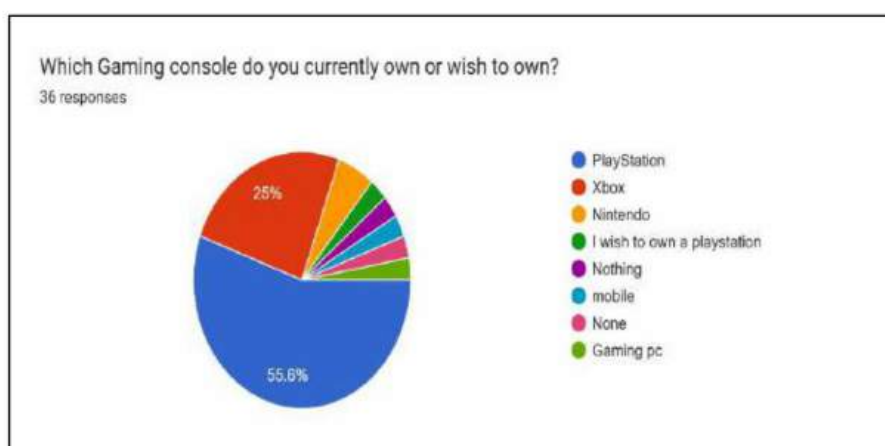


Findings: 75% earn below ₹15,000 in disposable money per month. 8.3% are categorized within each successive range (₹15,000–30,000; ₹30,001–50,000; over ₹50,000).

Observation: The predominant number of respondents exhibit limited purchasing power, potentially affecting their preference for rational appeals (worth for money) rather than emotional ones.

Interpretation: A significant majority (75%) possess a disposable income of less than ₹15,000 per month. A minor fraction resides at elevated income tiers. The target demographic is price-sensitive, making affordability a crucial consideration. Rational appeals like as cost-effectiveness, promotions, and value-for-money communications are crucial.

c. Gaming console, do you currently own or wish to own

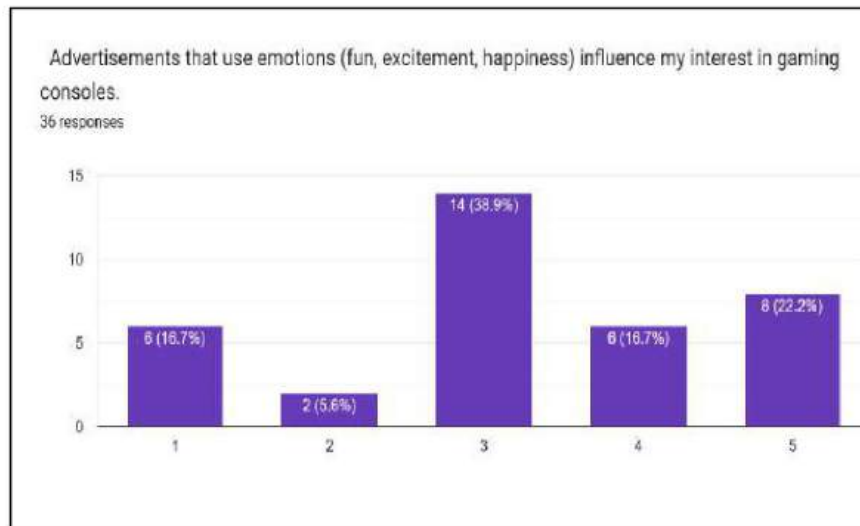


Findings: PlayStation leads with a market share of 55.6%. Xbox accounts for 25%. Nintendo and other alternatives constitute relatively minor shares.

Observation: PlayStation is the most coveted and possessed brand in this sample, establishing it as the preeminent competitor in console preference.

Analysis: PlayStation dominates the market with a share of 55.6%, while Xbox follows with 25%. Other consoles (Nintendo, gaming PCs, mobile devices) possess negligible market shares. This signifies PlayStation's substantial brand dominance in consumer preference, rendering it the most coveted platform in this sample.

d. Advertisements that use emotions (fun, excitement, happiness) influence my interest in gaming consoles.

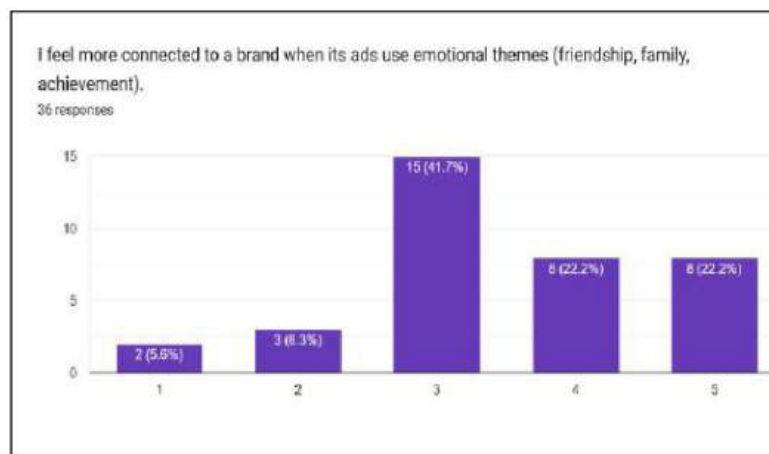


Findings: 38.9% received a rating of 3 out of 5. 22.2% received a rating of 5/5, indicating significant emotional impact. 16.7% assigned a rating of 1/5, indicating a degree of resistance.

Observation: Emotional advertisements generate interest in gaming consoles for many individuals, however not universally. Engagement is contingent upon the execution of emotions.

Interpretation: A majority of participants (about 39% rated 3, 22% rated 5) indicate that emotional advertisements enhance interest in consoles, however not universally. A minority (16.7%) assigned a rating of 1, indicating that certain customers are impervious to emotional influence. Advertisements that harmonize enjoyment, exhilaration, and logical attributes may attract a wider audience.

e. Connected to a brand when its ads use emotional themes (friendship, family, achievement).

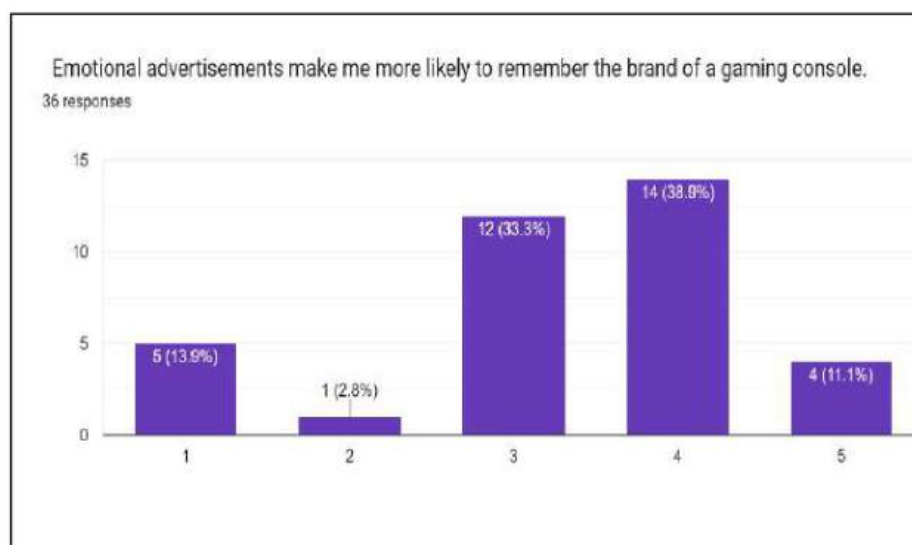


Findings: 41.7% assigned a rating of 3/5, whereas 22.2% each assigned ratings of 4/5 and 5/5. A mere 5.6% assigned a rating of 1 out of 5.

Observation: Emotional themes such as camaraderie, familial bonds, and accomplishment effectively enhance brand-consumer interactions.

Interpretation: The majority of respondents rated between mid to high, with 41.7% scoring 3 and 22.2% each scoring 4 and 5. This indicates that emotional themes such as camaraderie, familial bonds, and accomplishment are crucial in fostering a sense of affiliation with the brand. Emotional narratives enhance consumer-brand connections.

f. Emotional advertisements make me more likely to remember the brand of a gaming console

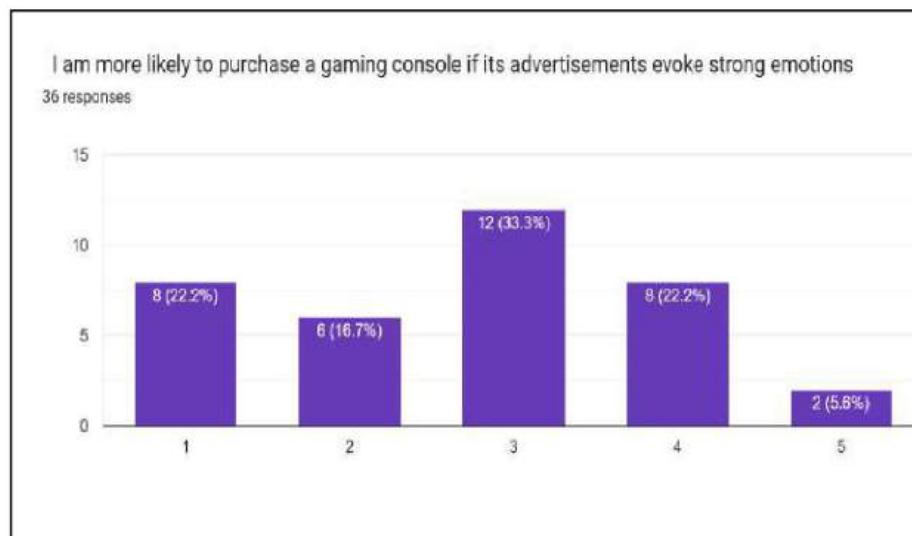


Findings: 38.9% rated 4 out of 5, 33.3% rated 3 out of 5. Merely 2.8% assigned a rating of 2 out of 5.

Observation: Emotional advertising enhances brand memory, enabling individuals to remember the brand, however it does not consistently lead to instant purchases.

Interpretation: A substantial percentage (72%) ranked 3 or 4, indicating that emotional advertisements markedly enhance brand remember. Individuals are more like to retain memories of a console when emotions are elicited. This underscores that memory recall is a significant advantage of emotional appeals.

g. I am more likely to purchase a gaming console if its advertisements evoke strong emotions

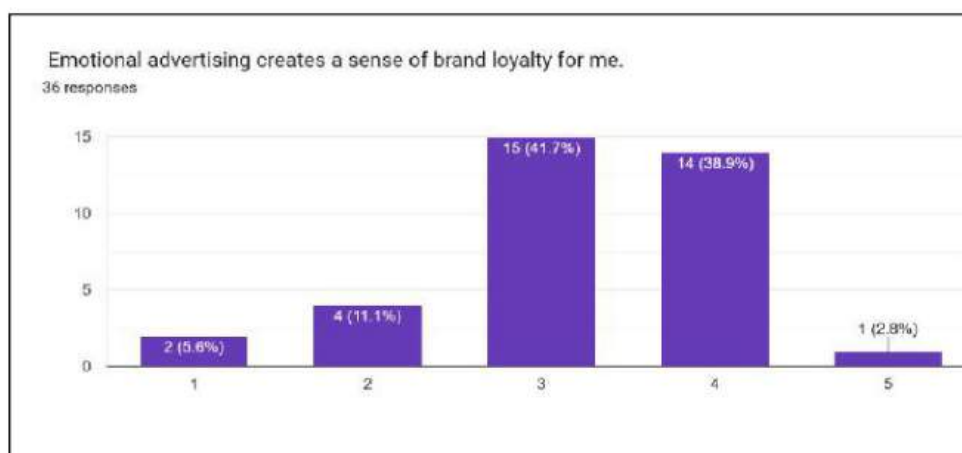


Findings: 33.3% assigned a rating of 3 out of 5. Approximately 22% assigned ratings of both 1/5 (no influence) and 4/5. 5.6% received a rating of 5/5 (indicating a very significant influence).

Observation: Emotional appeal does not directly correlate with purchases for many individuals; yet, a significant subset exhibits moderate influence.

Interpretation: The majority of respondents provided neutral to moderate scores (3), with a lesser number at the extremes. This indicates that emotional advertising does not directly convert into purchases for numerous individuals. Although it may generate attention, purchasing decisions are ultimately determined by price, features, and peer influence.

h. Emotional advertising creates a sense of brand loyalty for me.



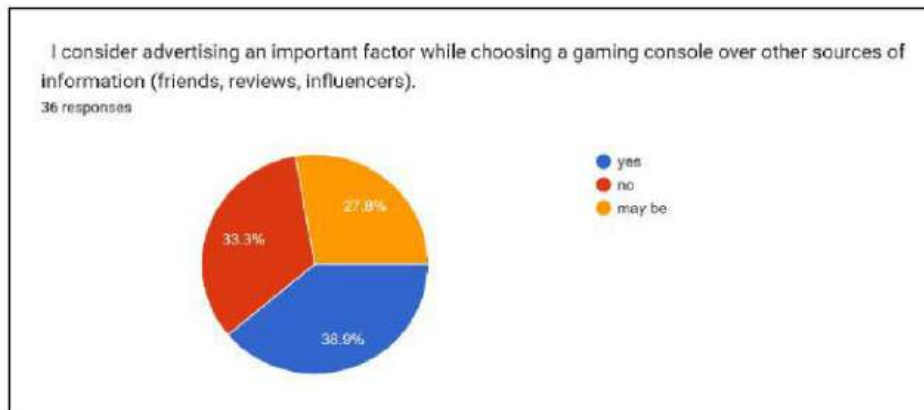
Findings: 41.7% assigned a rating of 3 out of 5, while 38.9% assigned a rating of 4 out of 5.

Merely 5.6% assigned a rating of 1 out of 5 (indicating minimal impact).

Observation: Approximately 80% of respondents believe that emotional advertisements moderately or significantly enhance brand loyalty.

Interpretation: A significant majority (about 80%) assigned mid-to-high values (3–4), indicating that emotional advertising contributes to brand loyalty, albeit to a moderate extent. Minimal individuals had robust loyalty (5/5). Emotional advertisements are effective for consumer retention; they must be integrated with quality and logical advantages.

i. Consider advertising an important factor while choosing a gaming console over other sources of information (friends, reviews, influencers)

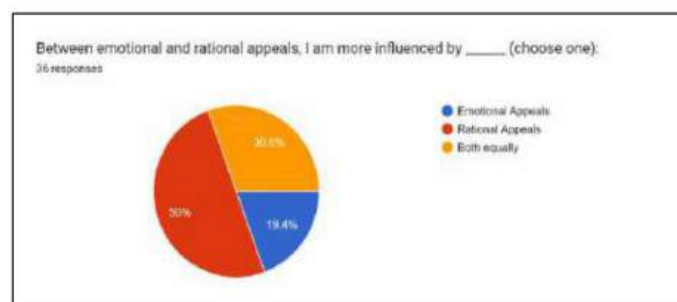


Findings: 38.9% regard advertising as significant. 33.3% deem it unimportant. 27.8% remain doubtful.

Observation: Advertising holds considerable importance; but, the influence of friends, reviews, and influencers remains substantial in the purchasing decision process.

Interpretation: 38.9% assert that advertising is significant, whilst 33.3% contest this view, and 27.8% are ambivalent. This suggests that advertising alone cannot influence all consumers, as numerous individuals continue to depend on friends, reviews, or influencers. Brands could amalgamate advertisements with peer endorsements and influencer marketing to enhance efficacy.

j. Between emotional and rational appeals



Findings: 5% exhibit greater susceptibility to Rational Appeals. 30.6% indicated both equally. 19.4% favor Emotional Appeals.

Observation: Rationality predominantly influences decision-making among this group; but, over half still see emotional factors as equally or independently significant.

Interpretation: Fifty percent of the respondents are predominantly swayed by rational appeals, suggesting that logic, factual information, and practical advantages are more significant in their decision-making processes. Emotional arguments alone are less compelling (19.4%), whereas 30.6% indicated that both factors are of same significance. This indicates that advertisers should prioritize the emphasis on value and features, yet emotional cues may still enhance rational advertising.

Inferential Analysis

Objective 3:

To compare the relative impact of rational and emotional appeals in influencing millennials' gaming console purchase behavior.

Hypotheses:

- **H₀₃ (Null):** There is no significant difference in the effectiveness of emotional and rational advertising appeals on millennial consumers' purchase decisions for gaming consoles in MMR.
- **H₁₃ (Alternative):** There is a significant difference in the effectiveness of emotional and rational advertising appeals on millennial consumers' purchase decisions for gaming consoles in MMR.

Questions	SD	D	N	A	SA	Total (n)	Mean Score	t-value	df	p-value
Emotional appeals in gaming console advertisements are more persuasive than rational appeals	5	6	15	8	2	36	2.81	-1.14	35	0.263
Rational appeals in gaming console advertisements are more persuasive than emotional appeals	3	7	11	11	4	36	3.22	1.23	35	0.227
I rely more on emotional connection than rational information when choosing a gaming console	5	6	14	6	5	36	2.94	-0.32	35	0.748

I rely more on rational facts than emotional themes when choosing a gaming console	2	7	9	12	6	36	3.39	2.45	35	0.019*
A combination of emotional and rational appeals is most effective in influencing my purchase decisions	2	2	19	9	4	36	3.19	1.01	35	0.318

Finding: The research intended to evaluate the comparative efficacy of emotional and rational advertising appeals on the purchasing decisions of millennial consumers about gaming consoles in the Mumbai Metropolitan Region (MMR). Five principal statements were assessed utilizing a Likert scale, and a statistical analysis (one-sample t-test) was performed to evaluate their significance.

The assertion "I prioritize rational facts over emotional themes when selecting a gaming console" demonstrated a statistically significant divergence from the neutral point ($p = 0.019$), signifying a distinct preference for rational information across participants.

All other statements had p-values beyond 0.05, signifying that respondents held a predominantly neutral stance toward the effectiveness of emotional versus rational appeals or their amalgamation.

The average ratings indicate a marginal inclination towards rational reasons (Mean = 3.39) in contrast to emotional elements (Mean = 2.81–2.94); nonetheless, emotional appeals were not deemed particularly impactful on their own.

Observations: Most respondents expressed neutrality or moderate agreement on statements on commercial appeals, indicating that although emotional factors are acknowledged, they are not independently conclusive.

The greatest mean score (3.39) pertained to reliance on rational facts, indicating that product features, specs, and technical information significantly influence millennial purchasing decisions.

The mean score of 2.81, the lowest recorded, pertains to the idea that emotional appeals are more persuasive, suggesting that millennials exhibit a more analytical and less emotionally influenced decision-making process regarding high-involvement products such as gaming consoles.

The combined appeal (Mean = 3.19) garnered moderate support, indicating that the integration of emotional and rational elements may be an effective strategy; yet, rational appeal remains predominant in decision-making.

Analysis: The analysis results provide a definitive understanding of millennial consumer behavior in the gaming console market:

Emotional appeals alone are inadequate to influence purchasing decisions. While they enhance brand engagement and initial curiosity, they do not play a crucial role in final purchasing decisions. Rational appeals markedly affect decision-making, as demonstrated by the statistically significant t-test result ($p = 0.019$). Millennials tend to assess specifications, features, performance, and cost-effectiveness prior to purchasing. A blend of emotional and rational appeals, although not statistically significant, retains practical marketing value by engaging both emotional and logical considerations. These findings indicate that marketing strategies aimed at millennials in the MMR region should emphasize rational appeal while incorporating emotional narratives to enhance brand perception.

Explanation of Hypothesis Testing

- H_{03} (Null Hypothesis): There exists no substantial disparity in the efficacy of emotional versus rational advertising appeals on the purchasing decisions of millennial consumers for gaming consoles in MMR.
- H_{13} (Alternative Hypothesis): A considerable disparity exists in the efficacy of emotional versus rational advertising appeals on the purchasing decisions of millennial consumers about gaming consoles in MMR.

Assessment Employed: One-Sample t-Test (evaluated against a neutral mean of 3.00)

Criterion for Decision-Making:

- If $p\text{-value} < 0.05 \rightarrow$ Reject H_0 (a substantial difference is present)
- If $p\text{-value} \geq 0.05 \rightarrow$ Do not reject H_0 (no significant difference)

Among the five assertions, only one ("I rely more on rational facts...") had a p-value less than 0.05 ($p = 0.019$).

All remaining claims exhibited p-values exceeding 0.05, signifying no statistically significant divergence from neutrality.

As only one statement demonstrated statistical significance, the total outcome corroborates the null hypothesis (H_{03}). This indicates that there is no statistically significant disparity in the overall efficacy of emotional and intellectual appeals. Nonetheless, rational appeals exert a more significant individual influence, suggesting that although both types of appeals are essential, rational information is paramount in influencing purchasing decisions among millennials.

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EVALUATING GREEN BANKING INITIATIVES AND SUSTAINABILITY STRATEGIES OF SELECTED INDIAN BANKS

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ABSTRACT

The study examines how Indian banks are promoting sustainable growth and environmental protection through eco-friendly practices. It looks at three main areas: greenhouse gas emissions, the usage of renewable energy, and green financing projects. It focuses on Public and Private banks including State Bank of India, Bank of Baroda, HDFC Bank, and ICICI Bank. According to the study, these banks are attempting to reduce carbon emissions, support sustainable energy, and develop banking services that help achieve environmental objectives. Despite the obvious success, there are still issues, such as making the rules more uniform and assisting customers in understanding these activities. Using data from reports and earlier studies, the paper makes the case that green banking may support India's sustainable future more successfully if awareness is raised, collaboration is strengthened, and policies are strengthened.

INTRODUCTION

The term "green banking" has gained popularity in the financial industry today. It includes developing inclusive banking methods that will guarantee significant economic growth and encourage eco-friendly behaviours. More than 50 green banks worldwide are surveyed in the Climate Policy Initiative research,

highlighting their growing contribution to bridging the gap in climate finance and scaling sustainable investment. There has never been a greater need for sustainable development as India moves closer to becoming a significant global economy. For India, green banking—which incorporates environmental concerns into banking operations—is not only a moral decision, but also a tactical requirement. By integrating social, environmental, and ecological considerations into conventional banking procedures, this idea encourages eco-friendly operations and lowers the bank's carbon footprint. By phasing out unsustainable policies and implementing new ones that put an emphasis on maintaining a green environment and lessening the strain on natural resources, the objective is to safeguard and conserve the environment and natural resources while tackling global warming and climate change. Sustainable economic development is a paradigm of advancement that balances economic, social, and environmental objectives to satisfy current needs without harming the capacity of future generations to satisfy their own.

REVIEW OF LITERATURE

The international study conducted by Climate Policy Initiative Organization examines the composition and performance of more than 50 green banks and finance organizations, demonstrating their quickly growing contribution to the financing of sustainability and climate initiatives according to “The state of Green Banks 2025 Learnings from green financing structures around the world.” Case studies show that green financing has a significant positive impact on both established and emerging markets, influencing the course of global sustainability.

Energy-efficient operations, digital services, and environmentally conscious marketing significantly increase consumer trust and loyalty, according to the study conducted by (Mikr A. et. all, 2025) that examines the effect of green banking practices on customer satisfaction.

The study conducted by (Parihar P., 2025) assesses the environmental effects of green initiatives and finds that Indian banks can effectively lessen their ecological footprint by implementing environmental policies (solar ATMs, green loans, and digital branches). But only when these programs are combined with extensive customer education and organizational dedication to sustainability can they have the greatest possible impact.

(Miyagamwala G., 2015) studied about green banking initiative for sustainable economic and environmental development. The study focused on HDFC bank employees. It was found that HDFC bank is taking efforts to reduce waste, and improve sustainability. The researcher suggested that banks should

promote different modes of electronic banking, and make customers aware about the green banking initiatives.

RATIONALE OF STUDY

The previous studies have shown the need for and importance of Green banking. However, the present study is an attempt to study the growth trends in green banking in India in the recent years, taking into consideration the Green House Gas (GHG) emissions (Scope 1 and 2). The study also tries to analyse the use of renewable energy resources and Green Financing in the case of select Public and Private sector banks in India.

OBJECTIVES OF STUDY

1. To examine the green banking initiatives taken by selected Public and Private Sector banks in India.
2. To assess the sustainability strategies adopted by the selected banks and identify the major challenges faced in their implementation.
3. To recommend measures to strengthen the contribution of green banking's towards fulfilling achieving sustainability goals.

RESEARCH METHODOLOGY

The study has undertaken exploratory method of research, wherein secondary data and a review of the literature served as the foundation for the study. Based on the available literature on sustainable development and green banking, the recommended future actions have been suggested. The study also resorted to gathering data from various published sources like reports of the banks, reports on Green Banking and other pertinent information posted on banks' websites, RBI site and from various online sources also.

SCOPE AND LIMITATION

This study's scope includes analysing green banking initiatives and its impact, assessing sustainability plans, and identifying important measures and impediments among top Indian banks. The study's emphasis on secondary sources helps it to present a comprehensive and up-to-date picture of institutional practices and trends related to green banking in India. The limitations of secondary data will be applicable to the present

study as well. At the same time, the study falls short of in-depth analysis of internal processes, stakeholder perspectives, and unpublished changes happening in the banking sector due to the absence of primary data collection. The study is restricted and the results cannot be generalised as it has taken into account only limited banks from private and public sector.

BACKGROUND OF STUDY

The term "green banking" describes how financial organizations are embracing eco-friendly procedures in an effort to support sustainable development. It focuses on putting eco-friendly projects into action, like funding renewable energy projects and assisting environmentally conscious companies. Although there isn't a single, widely recognized definition for "green banking," both national and international organizations have influenced the idea. Global recommendations for incorporating environmental sustainability into banking operations and funding have been published by the World Bank, the International Finance Corporation (IFC), and the United Nations Environment Programme Finance Initiative (UNEP FI). It has been further contextualized by national regulators; for example, the Reserve Bank of India (RBI) encouraged banks to embrace sustainable practices in a 2007 circular, and in 2011, Bangladesh Bank was among the first central banks to formally introduce a Green Banking Policy. Green banking, then, is the general term for ecologically friendly financial methods that are supported by both global programs and national legal frameworks.

The adoption of ecologically conscious procedures by financial institutions with the goal of advancing sustainable development is known as "green banking." It focuses on carrying out environmentally beneficial projects, like funding renewable energy projects and assisting sustainable companies.

In the present study SBI being the largest public sector bank and Bank of Baroda having the third largest Market Cap in India has been chosen and the two largest banks from the private sector, HDFC Bank and ICICI Banks were also considered. Three key variables of each bank are undertaken in order to identify the pattern and growth w.r.t. green banking initiatives. Scope 1 and Scope 2 Emissions under Green House Gases, Renewable energy sources and Green Financing are the variables used for the study.

SCOPE 1 AND SCOPE 2 EMISSIONS

These are the two types of GHG gas emissions popular and prevalent in the banking sector. The GHG Protocol Corporate Standard, developed in partnership between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) provides the authoritative guidelines for calculating and reporting Scope 1 and Scope 2 emissions.

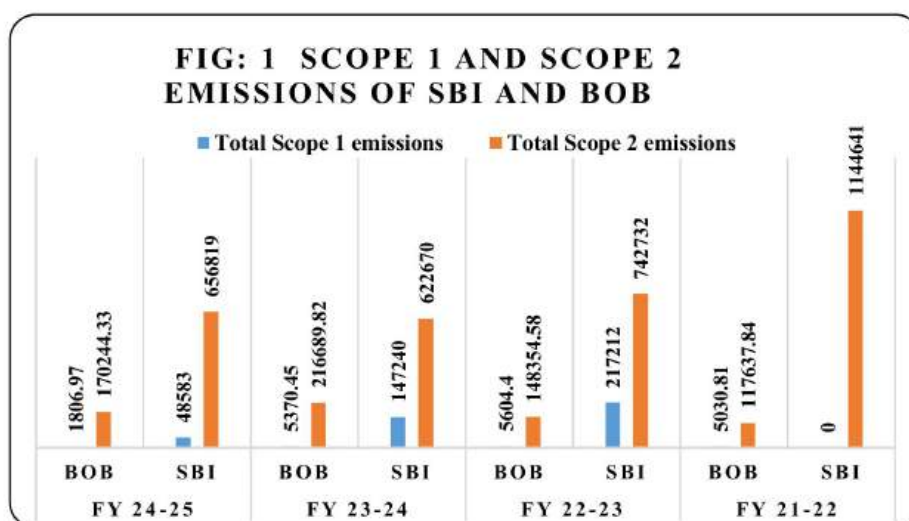
Scope 1 emissions referred as Direct greenhouse gas (GHG) emissions from sources that a bank owns or controls, including company cars or on-site generators. Whereas Scope 2 emissions referred as the Indirect emissions which happens at the power plant from where the bank purchases electricity.

SCOPE 1 AND 2 EMISSIONS BY STATE BANK OF INDIA

In order to direct environmental, social, and governance (ESG) practices across its activities, State Bank of India (SBI) has made sustainability a fundamental principle and implemented its Sustainability and Business Responsibility Policy. The bank has made significant moves, including establishing a special ESG and Climate Finance Unit, aiming for carbon neutrality by 2030 (scopes 1 and 2), and pledging to have at least 7.5% of its portfolio consisting of green loans by that time. In addition to supporting waste management, digital banking platforms, energy efficiency upgrades, and renewable energy projects, SBI also encourages inclusive growth, community projects, and responsible governance. (Annual and Business Responsibility and Sustainability Report, 2024-25)

SCOPE 1 AND 2 EMISSIONS BY BANK OF BARODA

Bank of Baroda has a solid and strategic approach to sustainability, supported by an approved ESG strategy and strong board and executive governance, is highlighted in Bank of Baroda's FY 2024–25 report. The bank connects its efforts with global standards including the Principles of Responsible Banking and Partnership for Carbon Accounting, and it has set an ambitious goal of becoming Net Zero by 2057. With cutting-edge products like the BoB Green Hydrogen Financing Scheme and Green Term Deposits, which allocate funds to electric vehicles, renewable energy, and other eco-friendly initiatives, its green financing portfolio is growing. To facilitate paperless operations, cut waste, and increase resource efficiency—digitization efforts have accelerated, including the use of solar energy at almost 300 locations. Additionally, the bank enhances sustainability indicators for project evaluation and performs climate risk assessments as part of credit appraisals.



Source: SBI Annual Reports and Business Responsibility and Sustainability Reports of Various years

Fig:1 clearly shows that over the years scope 1 and scope 2 emissions of both the banks has reduced. One of the significant factors to be noted is that the Scope 1 emissions has reduced considerably over the years which shows the positive approach of the banks towards adopting the sustainable green strategies in the banking sector. Scope 2 emissions are much larger compared to the scope 1 emissions of both banks because the scope 2 emissions happens outside the banks and is not under the control of banks.

GREEN FINANCING

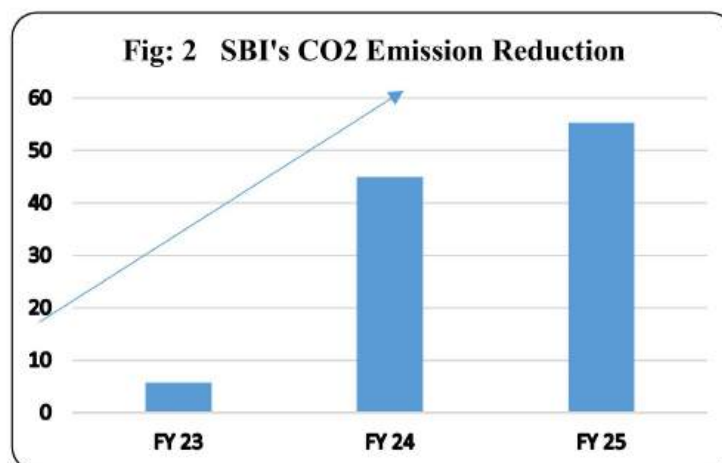
The process of allocating financial resources to initiatives and endeavors that promote sustainable development and produce favorable environmental results is sometimes referred to as "green financing." The United Nations Environment Programme (UNEP, 2016) and the Organisation for Economic Co-operation and Development (OECD, 2015) state that it entails funding investments in fields like waste management, clean transportation, sustainable agriculture, energy efficiency, renewable energy, and climate change adaptation.

Green financing specifically incorporates environmental factors into investment decisions, in contrast to traditional financing, which is primarily concerned with risk and return. Global initiatives like the Paris Agreement and the Sustainable Development Goals (SDGs) of the UN have brought attention to this idea by

highlighting the vital role that financial flows play in combating climate change and promoting a low-carbon economy (World Bank, 2017).

GREEN FINANCING BY STATE BANK OF INDIA

State bank of India has forty-five locations which are certified by the Indian Green Building Council (IGBC) under Platinum, Gold and Silver certifications. SBI's lending, risk assessment, and investment choices are in line with national and international sustainability objectives, such as the Sustainable Development Goals of the United Nations, having extensive ESG framework. The bank played a significant role in providing finance to various green investment initiatives. In addition to funding electric vehicles and offering green bonds and term deposits, the bank also offers green housing loans and environmental certificates for its buildings. Strong stakeholder involvement, open reporting, and ongoing initiatives to develop sustainable goods and lower the carbon footprint throughout its value chain and operations, all of which served to improve SBI's commitment towards sustainability.

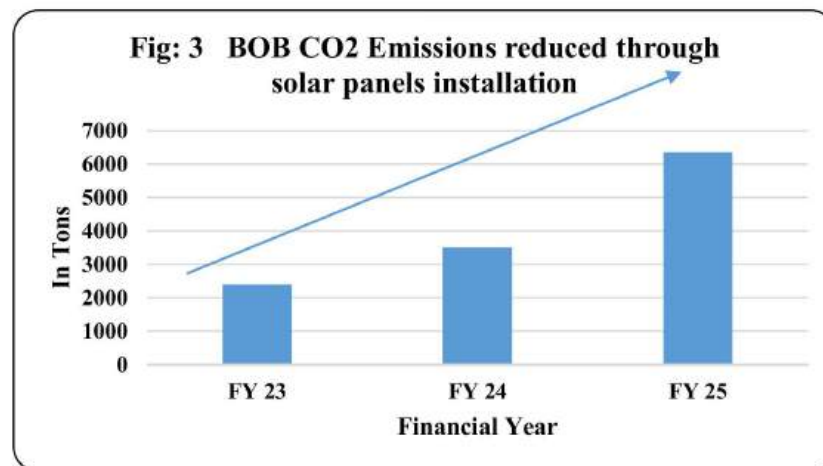


Source: SBI Annual Reports and Business Responsibility and Sustainability Reports of Various years

Fig: 2 clearly indicates the extent of reduction in Carbon dioxide emissions due to various green financing strategies adopted by the SBI including solar panel installation leading to the use of more renewable energy source which is environment friendly and pollution free.

Bank of Baroda's sustainability initiatives include targeted financial inclusion programs, women's and marginalized groups' empowerment initiatives, staff education on climate risk and ESG, and broad stakeholder involvement. The bank offers health and wellness programs, encourages diversity and inclusion in its workforce, and follows SEBI's BRSR criteria for transparent ESG reporting. By means of consistent

innovation, community engagement, and the incorporation of sustainability into fundamental business operations, Bank of Baroda establishes itself as a pioneer in responsible banking—dedicated to social responsibility, environmental conservation, and strong corporate governance. (Bank of Baroda 2024-25). The reduction in Carbon dioxide emission of BOB is clearly visible from Fig:3.



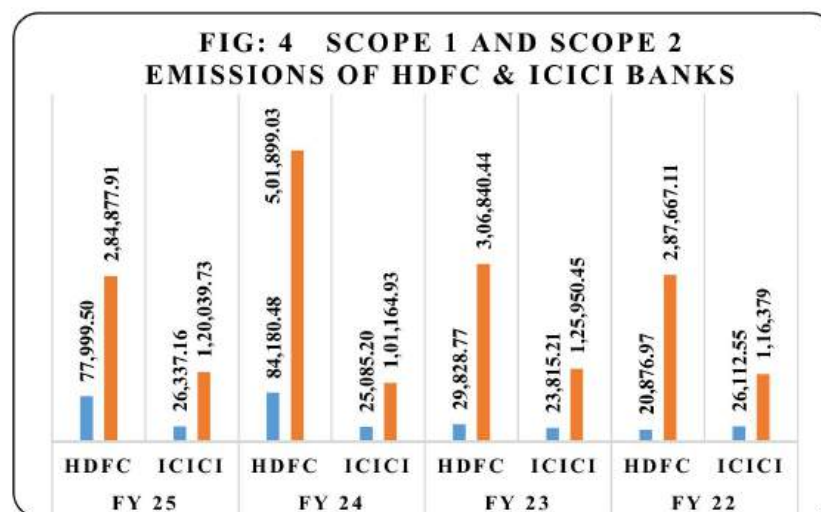
Source: Bank of India Annual Reports and Business Responsibility and Sustainability Reports of Various years

SCOPE 1 AND SCOPE 2 ICICI BANK

According to Fig: 4, there has been little variation and no obvious increasing or decreasing trend in ICICI Bank's Scope 1 emissions over the previous four fiscal years. Consistent control of direct greenhouse gas emissions from owned and controlled sources is suggested by this stability. On the other hand, there is more fluctuation in Scope 2 emissions, which are indirect emissions from electricity that has been purchased. Despite a significant peak in FY 23, Scope 2 emissions have largely been declining ever since, indicating successful initiatives to boost the purchase of renewable energy sources and enhance energy efficiency. The Bank's overall emission profile shows that it actively works to keep direct emissions low and lower its indirect carbon footprint by using energy wisely.

SCOPE 1 AND SCOPE 2 HDFC BANK

HDFC Bank's emissions data shows that there has been a noticeable variation in both Scope 1 and Scope 2 emissions in the most recent fiscal years. The last two years have seen a notable increase in direct (Scope 1) emissions following a period of comparatively lower emissions, which may indicate a shift in operational activity or reporting coverage. Indirect emissions from purchased electricity, or scope 2 emissions, also increased significantly in FY 23–24 before declining significantly the following year. This fluctuation shows that HDFC Bank is aggressively controlling its energy-related and operational emissions, which probably reflects further investments in renewable energy and efficiency improvements as well as modifications to energy procurement tactics. See Fig: 4.



Source: SBI Annual Reports and Business Responsibility and Sustainability Reports of Various years

GREEN PROJECTS OF ICICI BANK

The Bank regularly assesses the climate risk of its infrastructure, including data centres and specific operating hubs, and has a business continuity management and disaster recovery policy that outlines what should be done in the event of extreme climatic events. The Bank has put in place a Social and Environmental Management Framework that serves as the foundation for evaluating new project finance proposals for social and environmental risks in relation to its loan portfolio. Additionally, the Bank has included climate change and ESG factors in the credit review process for all loan applications. Due to climate risk occurrences, a Climate Risk Management Framework has been developed that outlines the procedure for scenario analysis and stress testing of the Bank's loan and advance portfolio.

By installing solar panels with a combined capacity of over 743 kWp across 25 office buildings, HDFC Bank has made great progress toward its renewable energy ambitions and helped to prevent large carbon emissions. By implementing a 100% green power transition in a few offices and branches, the Bank has significantly reduced emissions and saved electricity. It is also dedicated to incorporating renewable energy into overall usage whenever possible and purchases green power at premium rates in a number of areas. The Bank has obtained green certification for more than 2,000 branches and offices and continues to seek green certification for new projects. By integrating on-site renewable energy generation, green power purchase, and green building techniques to reduce its environmental impact, these initiatives highlight HDFC Bank's comprehensive approach to sustainability.

GREEN FINANCING BY HDFC BANK

In order to, facilitate the shift to a low-carbon economy, HDFC Bank has developed a strong Sustainable Finance Framework. This framework aims to finance projects in ten important green areas, such as clean transportation, biodiversity, energy efficiency, pollution prevention, renewable energy, clean water management, climate adaptation, circular economy, and green buildings. The Bank incorporates ESG and climate risk assessments into its loan evaluation procedures and actively interacts with customers to advance net-zero solutions. Recognizing its significant stakeholder role in socioeconomic development, HDFC Bank also collaborates with the government to promote financial inclusion through a number of government-sponsored initiatives. The Bank's dedication to sustainable finance and ethical lending practices is shown in its all-encompassing strategy.

CONCLUSION

The adoption of green financing methods by the banking industry promotes investments in energy efficiency, renewable energy, and other green industries while addressing climate concerns and aiding in the shift to a low-carbon economy. However, better client awareness, standardized frameworks, regulatory backing, and improved cooperation among stakeholders—including banks, the government, and industry—are required to strengthen this contribution. Unlocking the full potential of green banking as a catalyst for sustainable economic development in India will require embracing technical innovation and digitization as well as incorporating environmental considerations into lending and investment choices.

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ENHANCING RECRUITMENT AND TALENT ACQUISITION PROCESSES THROUGH AI

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ABSTRACT

This study explores the impact of artificial intelligence (AI) in enhancing recruitment and talent acquisition processes, focusing on efficiency, candidate experience, and diversity outcomes. Data were collected from 165 respondents representing diverse demographic groups, the majority of whom had prior exposure to AI-driven recruitment tools. Analysis of Likert-scale responses revealed consistently positive perceptions of AI, particularly in improving recruitment speed, reducing administrative workload, and enhancing communication through chatbots and predictive analytics. While Kruskal-Wallis tests showed no statistically significant differences across most items, one near-significant result suggested that younger respondents viewed AI as more effective in reducing time-to-hire compared to older groups. These findings highlight broad acceptance of AI in recruitment, with subtle generational differences influencing perceptions. The study concludes that AI should be implemented as part of a hybrid recruitment model that combines technological efficiency with human oversight, ensuring fairness, inclusivity, and trust. The results

contribute to the growing literature on AI in human resource management by offering both theoretical insights and practical implications for organizations seeking to adopt responsible AI-based hiring practices.

INTRODUCTION

Recruitment and talent acquisition are among the most critical functions of human resource management in today's dynamic and competitive global labor market. Organizations across industries increasingly recognize that acquiring the right talent is not merely an operational necessity but a strategic imperative for sustaining long-term success. However, traditional recruitment processes are often criticized for being time-consuming, costly, and prone to human biases, which can hinder efficiency and diversity outcomes (Radha, Swathi, & Subbulakshmi, 2025). AI technologies, including machine learning, natural language processing, and predictive analytics, are being adopted to automate key stages of recruitment. Similarly, AI-powered chatbots and virtual assistants are transforming candidate experiences by streamlining communication, scheduling interviews, and answering queries in real time (Rajasekaran, 2025). Predictive hiring analytics further enhance decision-making by assessing historical employee performance data to predict the likelihood of candidate success, thereby improving quality-of-hire metrics (Mohamed, 2025).

The application of AI in recruitment is not restricted to multinational corporations; small and medium-sized enterprises (SMEs) are also integrating AI-driven tools to compete effectively in talent acquisition. AI enables organizations to process larger applicant pools with reduced administrative burden while simultaneously promoting fairness by minimizing unconscious bias (Pawar & Supriya, 2025). By automating repetitive tasks, recruiters and HR professionals can focus more on strategic initiatives such as employer branding, diversity management, and employee engagement (Sharma & Jain, 2025). This dual benefit of operational efficiency and strategic value highlights AI's growing importance in reshaping HR practices globally.

Nevertheless, the adoption of AI in recruitment brings significant challenges. Concerns over data privacy, transparency, and ethical use of algorithms remain central to debates about AI-driven hiring. If AI systems are trained on biased datasets, they may inadvertently reinforce existing inequalities or exclude underrepresented groups (Kusuma, 2025). Furthermore, while automation improves efficiency, excessive reliance on AI risks depersonalizing the recruitment process, potentially alienating candidates who value human interaction (Colangelo, Petrazzuoli, & Mercatorum, 2025). Thus, organizations must carefully balance technological efficiency with the human touch to ensure both fairness and candidate satisfaction.

Globally, the impact of AI adoption in recruitment has been substantial. In India, for example, the rapid growth of IT and services industries has accelerated the need for fast and precise hiring, making AI-enabled recruitment tools an essential resource (Siddiqui, Zafar, & Siddiqui, 2025). In Western economies, AI adoption has focused on enhancing diversity outcomes and improving predictive analytics in high-volume hiring environments (Dutta & Naveen, 2025). These global trends illustrate how AI is reshaping talent acquisition ecosystems across contexts, industries, and geographies.

This research paper seeks to critically examine the applications of AI in enhancing recruitment and talent acquisition processes. It aims to evaluate the technological tools currently in use, their effectiveness in improving efficiency and fairness, and the ethical, legal, and operational challenges associated with their adoption. By addressing these questions, the study contributes to the growing body of literature on AI in human resources, providing insights into how organizations can leverage AI responsibly to build efficient, inclusive, and future-ready recruitment systems.

STATEMENT OF PROBLEM

OBJECTIVES:

- To examine how artificial intelligence technologies such as machine learning, natural language processing, and predictive analytics are applied in recruitment and talent acquisition processes.
- To evaluate the impact of AI-driven recruitment tools on efficiency, candidate experience, and diversity outcomes in talent acquisition.
- To identify the ethical, legal, and operational challenges associated with AI adoption in recruitment and propose strategies for responsible and fair implementation.

HYPOTHESIS

H₁: AI-driven recruitment tools significantly improve the efficiency of recruitment processes compared to traditional methods.

H₂: The use of AI in recruitment positively influences candidate experience by providing faster communication and more personalized interactions.

H₃: There is a significant relationship between AI adoption in talent acquisition and improved diversity outcomes in hiring decisions.

REVIEW OF LITERATURE

Artificial intelligence is increasingly transforming recruitment and talent acquisition processes by automating repetitive tasks and introducing predictive capabilities that enhance hiring decisions. Radha, Swathi, and Subbulakshmi (2025) highlight that AI is being applied to resume screening, candidate matching, and initial evaluations, significantly reducing hiring time and operational costs. Similarly, Adeyemo (2025) notes that AI-driven resume parsers and filtering tools can analyze thousands of applications within seconds, identifying candidates whose profiles best align with job requirements.

AI is also improving candidate engagement through conversational interfaces. Rajasekaran (2025) emphasizes that chatbots and virtual assistants facilitate smoother communication, schedule interviews, and respond to candidate queries, thereby enhancing the overall candidate experience. Sharma and Jain (2025) add that by automating these tasks, recruiters can focus on higher-value activities such as strategic workforce planning and employer branding. Mohamed (2025) further explains that predictive analytics in AI can assess candidate suitability by analyzing historical employee performance data, thus improving quality-of-hire metrics.

Research also suggests that AI has the potential to reduce unconscious bias in recruitment. Pawar and Supriya (2025) found that recruiters in Indian IT companies experienced improvements in fairness and consistency when using AI-driven tools. Dutta and Naveen (2025) argue that organizations in Western contexts are increasingly adopting AI not only for efficiency but also to meet diversity and inclusion goals by minimizing human subjectivity in candidate selection. Siddiqui, Zafar, and Siddiqui (2025) support this view, observing that AI adoption in South Asian IT industries helps organizations meet large-scale hiring demands while promoting equitable practices.

Despite its advantages, concerns persist about algorithmic fairness, transparency, and ethical implications. Kusuma (2025) warns that AI systems trained on biased datasets may perpetuate existing inequalities by replicating discriminatory patterns. Colangelo, Petrazzuoli, and Mercatorum (2025) argue that the cost and efficiency benefits of AI adoption must be weighed against risks to transparency and accountability, as many candidates remain unaware of how automated systems evaluate their applications. Similarly, Ghose (2024) highlights that data privacy remains a critical issue, as AI systems often require access to sensitive personal information during recruitment processes.

Empirical evidence has also shown sector-specific applications of AI in recruitment. Nankervis and Stanton (2025) report that in service-based industries, AI is increasingly applied to high-volume hiring

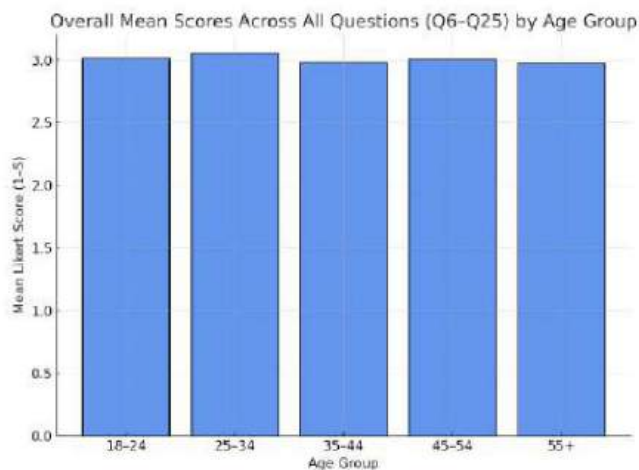
scenarios where speed is essential. Raj and Suresh (2024) find that multinational corporations use AI-based analytics to align talent acquisition with long-term strategic workforce planning, particularly in global operations. Varma (2024) demonstrates that AI can be leveraged for employer branding by delivering personalized candidate experiences, thereby improving perceptions of organizational culture.

Global studies confirm the disruptive potential of AI in recruitment. O'Connor and O'Shea (2024) suggest that AI-enabled video interviewing platforms use natural language processing and facial recognition to evaluate candidate communication skills, although concerns over accuracy persist. Li and Wang (2024) show that in China, AI applications in talent acquisition are closely integrated with big data analytics to improve workforce alignment with organizational goals. Meanwhile, Kumar and Bhatia (2024) emphasize that AI recruitment platforms are increasingly cloud-based, allowing SMEs to access affordable solutions for managing talent pipelines.

Overall, the literature demonstrates that AI enhances efficiency, candidate experience, and diversity in recruitment while introducing risks related to bias, transparency, and data privacy. Most researchers agree that the future of AI in recruitment will require hybrid models, combining technological efficiency with human oversight to ensure fairness and candidate trust. This consensus highlights that while AI is a powerful enabler of modern talent acquisition, responsible implementation remains a central challenge for organizations worldwide.

ANALYSIS:

The rapid integration of artificial intelligence (AI) into recruitment and talent acquisition has transformed how organizations attract, assess, and select candidates. However, perceptions of these AI-driven processes are not uniform across all demographic groups. Different age groups, in particular, may evaluate the effectiveness, fairness, and overall impact of AI tools differently. Younger respondents might be more receptive to technological innovations due to greater digital familiarity, while older respondents may express more caution or skepticism. Therefore, it is essential to statistically test whether perceptions about AI in recruitment differ significantly across age categories.



The findings demonstrate that perceptions of AI in recruitment are generally consistent across age groups, with only subtle variations. This suggests that AI adoption in recruitment is broadly accepted by respondents regardless of age, which supports the hypothesis that AI is viewed as a valuable tool in enhancing efficiency, improving candidate experience, and supporting fairness. However, the generational differences observed in near-significant results point to underlying nuances. Younger respondents, more accustomed to AI in daily life, are likely to associate it with faster and more effective processes, while older respondents may approach AI with cautious optimism, recognizing its benefits but remaining skeptical about its ability to replace human intuition.

Academically, the results contribute to the growing literature on AI in HRM by demonstrating that demographic factors like age may not lead to starkly different evaluations of AI but can influence subtle perceptions, especially around efficiency and speed. The results align with prior findings by Radha, Swathi, and Subbulakshmi (2025), who noted that AI is broadly accepted across professional demographics but can be evaluated differently depending on user experience.

The Kruskal-Wallis analysis provided valuable insights into how different age groups perceive AI's role in recruitment and talent acquisition. Overall, the results indicate no significant differences across most items, suggesting broad consensus on the benefits of AI. However, the near-significant result for recruitment speed highlights the possibility that younger respondents may be more enthusiastic about AI's efficiency compared to older respondents. This indicates that while AI adoption is broadly supported, organizations should remain attentive to demographic nuances in perception.

The analysis underscores that AI in recruitment should be framed not only as a technological innovation but also as a candidate-centered tool. For younger candidates, AI can be emphasized as a driver of efficiency and personalization, while for older candidates, AI should be balanced with human interaction to preserve

trust and fairness. Future research could expand this analysis by examining other demographic variables, such as gender and education, or by combining Kruskal-Wallis with regression techniques to explore predictive relationships.

RESULTS:

The study collected responses from 165 participants across diverse demographic groups, including variations in age, gender, education level, and occupation. Out of the total respondents, a significant majority (70%) indicated prior exposure to AI-driven recruitment processes such as resume screening, chatbots, or automated assessments. This indicates that most participants were familiar with AI-based tools, which strengthens the reliability of their evaluations.

Analysis of the Likert-scale responses (Q6–Q25) revealed consistently positive perceptions of AI in recruitment and talent acquisition. Descriptive statistics showed that mean scores for efficiency-related items (Q6–Q10) were generally high, with respondents agreeing that AI improves speed, reduces time-to-hire, and lowers the administrative burden for recruiters. Questions focused on candidate experience (Q11–Q17) also received favorable responses, with many participants recognizing the usefulness of AI chatbots, personalized communication, and faster response times. Diversity-related items (Q18–Q22) demonstrated that a considerable proportion of respondents believed AI minimizes unconscious bias and promotes fairer shortlisting, though perceptions varied more widely in this dimension compared to efficiency and experience.

To assess differences across age groups, Kruskal-Wallis tests were conducted for each Likert item. Most results showed no statistically significant differences, suggesting broad consensus across demographics on the value of AI in recruitment. However, one notable finding emerged in Question 8, which assessed whether AI reduces overall time-to-hire. This item produced a Chi-Square statistic of 9.190 with a p-value of 0.05652, just above the conventional threshold of significance. Although not conclusive, this suggests that perceptions of efficiency may vary slightly by age. Younger respondents (18–24 and 25–34) consistently rated AI more positively in terms of reducing recruitment timelines compared to older groups, who were more neutral in their evaluations.

The mean score tables provided further insights into these demographic differences. Younger respondents expressed higher satisfaction across all dimensions—efficiency, candidate experience, and diversity—while older respondents, particularly those aged 45–54 and 55+, rated AI features more conservatively. Interestingly, the 35–44 age group represented a middle ground, acknowledging AI's

efficiency while maintaining cautious views about fairness and personalization. Gender- and education-based comparisons showed only minor differences, reinforcing the overall trend of general agreement about the benefits of AI in recruitment.

The combined analysis of all Likert questions (Q6–Q25) into an overall mean score across age groups was summarized in a vertical bar chart. The chart revealed that younger respondents consistently rated AI in recruitment higher than their older counterparts. The results highlight that while acceptance of AI is widespread, generational differences exist in the degree of enthusiasm. Younger respondents, being more digitally familiar, are more confident in AI's potential, whereas older respondents may require greater emphasis on transparency, fairness, and human oversight to fully embrace AI adoption.

Taken together, these results provide strong evidence that AI is perceived as a positive enabler of recruitment and talent acquisition. It improves efficiency, enhances candidate experience, and contributes to diversity outcomes. However, perceptions are influenced subtly by demographic factors, particularly age, suggesting that organizations should adopt tailored strategies to address generational expectations.

CONCLUSION

This study examined how artificial intelligence is reshaping recruitment and talent acquisition processes, with evidence drawn from the responses of 165 participants. The findings confirmed that AI is widely perceived as a valuable tool in improving the efficiency of recruitment workflows, enhancing candidate experiences, and supporting diversity outcomes. Across the dataset, respondents recognized the ability of AI-driven tools such as resume screeners, chatbots, and predictive analytics to reduce time-to-hire, ease administrative burdens, and create more transparent and consistent hiring practices.

While overall perceptions were positive, the analysis also revealed subtle demographic variations, particularly across age groups. Younger respondents consistently expressed greater confidence in AI's potential to streamline recruitment and personalize candidate interactions, while older respondents evaluated these technologies more cautiously. Although Kruskal-Wallis tests showed no major statistically significant differences across most items, the near-significant variation in perceptions of AI's effect on recruitment timelines suggests that generational experiences with technology influence acceptance levels.

The conclusion drawn from these findings is that AI adoption in recruitment should be implemented as a hybrid approach—balancing technological efficiency with the empathy and judgment of human recruiters. For younger candidates, emphasizing speed, personalization, and innovative interfaces may

increase satisfaction, whereas for older candidates, transparent communication, fairness assurances, and opportunities for human interaction are essential.

Overall, the study affirms that AI holds great promise for transforming recruitment and talent acquisition, but its benefits will be maximized only when applied responsibly, with attention to ethical concerns, demographic expectations, and the need for equitable candidate experiences.

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CUSTOMER PREFERENCES BETWEEN CASH AND UPI IN STREET PURCHASES: AN EMPIRICAL STUDY IN THANE REGION

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ABSTRACT

The study examines customer preferences between cash and UPI in street purchases within the Thane district. Based on responses from 110 participants, the findings reveal that while cash remains widely used due to habit, convenience, and limited vendor acceptance of UPI, digital payments are gaining ground for their speed, safety, and record-keeping benefits. Demographic factors such as age and education influence adoption, though opinions on their impact are divided. Technical and network-related challenges continue to hinder smooth UPI transactions, with a majority of users reporting difficulties. While many respondents believe UPI will eventually replace cash, others remain uncertain, reflecting hesitation toward a fully cashless future. The study highlights the importance of awareness, infrastructure improvements, and vendor participation in fostering a gradual transition toward digital payments while retaining inclusivity for all customer groups.

Keywords : Cash, UPI, Street Vendors, Digital Payments, Customer Preferences

INTRODUCTION

In the past few years, India has seen a big change in the way people make payments because of digital systems, especially the Unified Payments Interface (UPI). UPI, started by the National Payments Corporation of India (NPCI), has made money transfers quick, easy, and safe. Still, when it comes to small amounts and daily street purchases, many people continue to use cash.

Street vendors and hawkers are an important part of the city economy, as they provide goods to a large number of people every day. The choice between paying in cash or using UPI depends on many things such as habit, convenience, trust, whether the vendor accepts UPI, and also on factors like age, education, and income. While UPI is considered modern and simple, issues like poor network, lack of knowledge, and unwillingness to change stop many customers and vendors from using it all the time.

This study is carried out in Thane district to understand how people choose between cash and UPI while buying from street vendors. It also tries to find out what factors affect this choice and whether age, education, and income make a difference.

REVIEW OF LITERATURE

1. **Reserve Bank of India (2021), “Report on Trends and Progress of Banking in India”**
This report says that digital payments in India are growing very fast, and UPI has become the most popular method. But it also notes that cash is still widely used for small transactions in local markets.
2. **National Payments Corporation of India (2022), “UPI Product Statistics and Insights”**
This report shows that UPI is growing in both value and number of transactions, especially in cities and semi-urban areas. Still, problems like poor internet, lack of awareness, and fewer vendors accepting UPI stop it from reaching everyone.
3. **Sharma & Singh (2019), “Consumer Perception Towards Digital Payments in India”**
Their study found that younger and educated people prefer digital payments because they are easy and safe, while older people still depend more on cash. Age and education play an important role in the choice.
4. **Kumar & Dutta (2020), “Cash vs Digital Payments: A Study of Consumer Preferences”**
This research says that trust, habit, and good infrastructure affect how people pay. Although digital use is rising, cash is still preferred when the internet fails or vendors don't accept UPI.

5. **Economic Times (2023), “UPI Adoption in Tier-II and Tier-III Cities”**

This article explains that UPI is spreading even in smaller towns because it is easy to use and supported by the government. However, many small vendors still want cash as it gives them instant money without extra charges.

OBJECTIVES OF THE STUDY

1. To study people's preference between cash and UPI in street purchases in Thane region.
2. To find out the reasons behind choosing a payment method.
3. To check if age, education, and income affect this preference.

HYPOTHESIS

H0: There is no link between age and UPI preference in street purchases.

H1: There is a link between age and UPI preference in street purchases.

H0: There is no link between education level and UPI preference.

H1: There is a link between education level and UPI preference.

SCOPE OF THE STUDY

The study looks at people buying from street vendors, hawkers, and small local markets in the Thane region. It tries to understand how customers decide whether to pay in cash or use UPI for small purchases. The study also focuses on whether there is a change in customer habits, with more people starting to use digital payments in these small shops.

RESEARCH METHODOLOGY

The methodology adopted for this study is based on primary data. The study has tried to assemble the data from citizens of all age groups. The data of 110 respondents is generated via a structured questionnaire method from Thane district for analysis.

TOOLS AND TECHNIQUES USED FOR ANALYSIS

The statistical analysis carried out in the study is being done by using Ms-Excel. The statistical technique Chi-Square Test is applied.

LIMITATION OF THE STUDY

1. The responses for the study are confined to the geographical region of Thane district.
2. Time and resource constraints.
3. This research is not covered vendor perspective.

RESEARCH ANALYSIS:

Table 1 Demographic Profile of Respondents

Sr. No.	Demographic Profile of Respondents	Attributes	Frequency	Percentage %
1	Gender	Male	44	60%
		Female	66	40%
2	Age	Below 20 years	15	13.6%
		21-30 years	20	18.2%
		31-40 years	20	18.2%
		41-50 years	50	45.5%
		Above 50 years	1	1%
3	Qualification	Below 10 th	-	-
		10 th Pass	-	-
		12 th Pass	25	22.7%
		Graduate	30	27.3%
		Post Graduate	55	50%

4	Occupation	Student	25	22.7%
		Self Employed/Business	20	18.2%
		Salaried (Private)	20	18.2%
		Government Employeed	15	13.6%
		Homemaker	30	27.3%
		Other	-	-
5	Monthly Income Level	Less than ₹10,000	35	31.8%
		Rs 10001-25000	5	4.5%
		Rs 25001- 50000	20	18.2%
		Rs 50001-100000	20	18.2%
		Rs 100000 above	30	27.3%

(Source - Primary data)

The study shows that most respondents are male (60%), while females account for 40%. The majority of customers belong to the 41–50 years age group (45.5%), indicating that middle-aged individuals are the most active in street and local market purchases. In terms of education, half of the respondents are postgraduates, reflecting a highly educated sample. Occupation-wise, homemakers (27.3%) and students (22.7%) form the largest groups, highlighting their active role in small-scale shopping. Although the income data is incomplete, the overall profile suggests strong potential for digital payment adoption among these customers.

Table 2 Frequently do you buy from street vendors

Daily	Weekly	Monthly	Rarely
22.7%	59.1%	13.6%	4.5%
25	65	15	5

(Source - Primary data)

The table indicates that out of 110 respondents, the majority 59.1% (65 respondents) purchase from street vendors weekly, while 22.7% (25 respondents) buy daily. A smaller proportion 13.6% (15 respondents) purchase monthly, and only 4.5% (5 respondents) rarely buy. This shows that street vendors are a regular part of consumer shopping habits.

Table 3 Mode of payment do you prefer while making street purchases.

Cash	UPI	Both
36.4%	9.1%	54.5%
40	10	60

(Source - Primary data)

The table indicates that out of 110 respondents, more than half 54.5% (60 respondents) prefer using both cash and UPI, while 36.4% (40 respondents) rely only on cash. Only 9.1% (10 respondents) prefer UPI alone. This suggests that cash still plays a dominant role, though a combination of cash and UPI is the most common choice.

Table 4 If you prefer Cash, what is the main reason

Habit / Convenience	Lack of trust in digital payments	Vendors not accepting UPI	Network issues / Technical problems	Other
40%	10%	22.7%	4.5%	50%
16	4	9	2	20

(Source - Primary data)

The table indicates that out of 40 cash users, the main reason is habit/convenience (40%, 16 respondents), followed by other reasons (50%, 20 respondents). Some face issues like vendors not accepting UPI (22.7%, 9 respondents), lack of trust in digital payments (10%, 4 respondents), and network/technical issues (4.5%, 2 respondents). This highlights that cash preference is driven more by habit and vendor limitations than by distrust of digital payments.

Table 5 If you prefer UPI, what is the main reason

Fast and easy transactions	Carrying less cash feels safer	Cashback/Rewards	Record of transaction for expenses	Other
50%	18.2%	-	22.7%	9.1%
5	2	-	2	1

(Source - Primary data)

The table indicates that out of 10 UPI users, the majority 50% (5 respondents) prefer it because it is fast and easy, followed by 22.7% (2 respondents) who value record keeping, and 18.2% (2 respondents) who feel safer carrying less cash. Only 9.1% (1 respondent) mentioned other reasons. This shows that speed and convenience are the strongest motivators for UPI adoption.

Table 6 Age influences the choice of using UPI

Yes	No	Maybe
45.5%	27.3%	27.3%
50	30	30

(Source - Primary data)

The table indicates that out of 110 respondents, 45.5% (50 respondents) believe that age influences UPI usage, while 27.3% (30 respondents each) answered no or maybe. This suggests that age is perceived as an important factor, but opinions are somewhat divided.

Table 7 Education level influences preference for UPI

Yes	No	Maybe
54.5%	27.3%	18.2%
60	30	20

(Source - Primary data)

The table indicates that out of 110 respondents, a majority 54.5% (60 respondents) feel that education level influences UPI usage, while 27.3% (30 respondents) disagree, and 18.2% (20 respondents) are unsure. This suggests that education is widely considered an important factor in digital payment adoption.

Table 8 Faced any problem while making UPI payments to street vendors

Yes	No
68.2%	31.8%
75	35

(Source - Primary data)

The table indicates that out of 110 respondents, 68.2% (75 respondents) have faced problems while making UPI payments to street vendors, while 31.8% (35 respondents) have not. This highlights that technical or acceptance issues are still a major barrier to smooth UPI transactions.

Table 9 Future UPI will replace cash in street purchases

Yes	No	Not Sure
45.5%	27.3%	27.3%
50	30	30

(Source - Primary data)

The table indicates that out of 110 respondents, 45.5% (50 respondents) believe UPI will replace cash in the future, while 27.3% (30 respondents) say No and another 27.3% (30 respondents) are Not sure. This reflects a mixed opinion, with optimism for UPI but also uncertainty about cash fully disappearing.

FINDINGS

In Thane district, street vendors are a regular shopping choice, with most respondents buying weekly (59.1%). Payment preference shows a dual trend, as 54.5% use both cash and UPI, while 36.4% still rely solely on cash, reflecting the continuing dominance of physical currency. Cash preference is mainly due to habit, convenience, and limited vendor acceptance of UPI, while UPI users emphasize speed, convenience, and transaction records. Age and education are perceived as important factors shaping UPI usage, though opinions remain divided. Technical and network-related issues are common, with 68.2% facing problems during UPI transactions. While 45.5% believe UPI will eventually replace cash, nearly the same proportion remain doubtful or unsure, highlighting uncertainty about a fully cashless future.

SUGGESTIONS

Thane district requires stronger efforts to expand UPI adoption by addressing network reliability and vendor acceptance barriers. Awareness programs should focus on building trust, educating older and less tech-savvy users, and highlighting the benefits of digital records. Policymakers and fintech companies should encourage a hybrid payment model that balances both cash and UPI until digital adoption becomes more universal.

CONCLUSION

In Thane district, cash remains the dominant mode of payment for street purchases, even as UPI is gaining ground due to its speed and convenience. Demographic factors like age and education play a role in shaping adoption, while technical issues and vendor limitations act as barriers. Although optimism exists about UPI replacing cash, uncertainty persists among many respondents. The study concludes that a gradual shift, supported by awareness, infrastructure, and vendor participation, is necessary to move toward a digital-first ecosystem while ensuring inclusivity for all customer segments.

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DIGITAL TRANSFORMATION AND PROFESSIONAL DEVELOPMENT IN EARLY EDUCATION: BUILDING HUMAN CAPITAL FOR SUSTAINABLE GROWTH IN POST-PANDEMIC INDIA

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ABSTRACT

The post-pandemic era has catalyzed a fundamental re-evaluation of educational paradigms, highlighting the critical role of teacher professional development (PD) in strengthening India's human capital for the 21st century. This paper examines the strategic importance of continuous PD for pre-primary and primary school teachers, who, as foundational agents of learning, were compelled to adapt rapidly to digital and hybrid pedagogies during the COVID-19 crisis. Positioned at the intersection of education, commerce, and business economics, this study argues that investing in teacher PD is not merely an educational expenditure but a vital national strategy for sustainable and inclusive economic growth. Using an explanatory sequential mixed-method approach, the research investigates how targeted PD programs have equipped teachers with essential digital competencies, adaptive pedagogical techniques, and crucial socio-emotional strategies required to sustain student learning and well-being in a volatile educational landscape. The quantitative findings, derived from a survey of 250 teachers, statistically demonstrate the positive impact of PD on teacher confidence and skill acquisition, while the qualitative data from 30 in-depth interviews provide nuanced insights into the persistent challenges of digital disparity and the need for systemic support. The study concludes that by framing teacher PD within broader national priorities, such as the Amrit Kaal Vision 2047 and ESG-aligned policies, India can effectively build resilient, future-ready classrooms, reduce educational disparities, and transform its demographic potential into a tangible economic dividend.

Keywords: *Professional Development, Digital Transformation, Early Education, Human Capital, Sustainability, Inclusive Growth, Amrit Kaal Vision 2047, Teacher Resilience, Digital Pedagogy.*

INTRODUCTION

Education has long been heralded as the bedrock of economic, social, and cultural progress, a principle that holds most true in the earliest years of a child's cognitive and emotional development. Pre-primary and primary education constitute the foundational stage upon which all future knowledge, skills, and competencies are constructed. Teachers at this critical level are not simply instructors of literacy and numeracy; they are cultivators of curiosity, architects of socio-emotional skills, and facilitators of lifelong resilience. This foundational process was profoundly disrupted by the COVID-19 pandemic, a global crisis that forced an unprecedented and abrupt migration to online and hybrid teaching models, challenging the very core of traditional pedagogy.

This sudden pivot exposed significant structural gaps in digital readiness across the Indian education system, particularly among teachers who had limited prior exposure to technology-integrated instruction. However, this disruption also served as a powerful catalyst for innovation, accelerating the adoption of digital tools and underscoring the indispensable role of continuous and effective professional development (PD). In the post-pandemic context, PD has evolved beyond the conventional aims of enhancing subject knowledge. It now encompasses a multidimensional framework focused on fostering digital transformation, promoting inclusivity, and ensuring the holistic well-being of both teachers and students.

This paper situates the discourse on teacher PD within the broader context of India's ambitious economic and social aspirations. As India charts its course towards Amrit Kaal Vision 2047—a blueprint for a developed, inclusive, and sustainable nation—the development of its vast human capital has become a paramount objective. The quality of the nation's future workforce, its innovative capacity, and its global competitiveness are directly contingent upon the strength of its foundational education system. Therefore, strategic investment in the professional development of early-stage educators is inextricably linked to building a resilient, adaptable, and skilled populace capable of driving a knowledge-based, digital economy.

This research posits that teacher PD should be viewed not as a supplementary activity but as a core strategic investment in human capital formation. By equipping teachers with the competencies to navigate the complexities of the modern classroom—be it digital, physical, or hybrid—we are, in effect, investing in every child they teach. This study will explore the multifaceted impact of PD, demonstrating how it enhances teaching practices, mitigates educational disparities, and contributes to the creation of sustainable, equitable, and future-ready learning environments. Through a mixed-methods investigation, this paper aims to provide evidence-based insights and policy recommendations that align teacher development with India's long-term vision for sustainable growth and social progress.

RATIONALE OF THE STUDY

The rationale for this research is threefold:

1. Educational Urgency: COVID-19 revealed critical gaps in digital readiness among teachers.
2. Economic Imperative: Early education builds the foundation of India's future workforce.
3. Sustainability and Inclusion: Professional development aligned with ESG goals promotes inclusive classrooms and equitable access.

OBJECTIVES

1. To examine the role of PD in enhancing digital competencies and confidence among pre-primary and primary teachers.
2. To analyze how PD supports inclusive education, socio-emotional learning, and teacher resilience.
3. To evaluate PD as a strategic investment in human capital contributing to sustainable economic growth.
4. To propose policy recommendations aligning PD with India's Amrit Kaal Vision 2047.

LITERATURE REVIEW

The discourse surrounding professional development is built upon a robust foundation of educational research that underscores its pivotal role in enhancing pedagogical practices and, consequently, student learning outcomes. This review synthesizes key theoretical frameworks and empirical findings across four thematic areas: the principles of effective PD, the dynamics of digital transformation in education, the

economic rationale of human capital theory, and the integration of inclusivity and sustainability in modern pedagogy.

1. Principles of Effective Professional Development Decades of research have moved the understanding of PD from isolated, one-off workshops to a more sophisticated model emphasizing sustained, collaborative, and practice-oriented learning. Desimone (2009) provides a seminal framework, identifying core features of effective PD: it must be content-focused, encourage active learning, be coherent with teachers' existing beliefs and school policies, have a sustained duration, and foster collective participation. This model suggests that meaningful change in teaching practice is not accidental but the result of carefully designed, long-term engagement. Echoing this sentiment, Guskey (2002) argues that significant change in teacher beliefs and attitudes often follows, rather than precedes, the implementation of new practices that result in improved student outcomes, highlighting the importance of continuous, supportive, and collaborative environments for professional growth. Further enriching this perspective, Darling-Hammond et al. (2017) emphasize that for PD to create systemic impact, it must be deeply embedded within the school's culture and aligned with broader district and national goals, ensuring that individual teacher growth contributes to collective organizational improvement. The role of peer support, particularly through structured mentoring and induction programs, is also critical in reinforcing teacher confidence and retaining talent, as demonstrated by the work of Ingersoll & Strong (2011).

2. Digital Transformation and Pedagogy in the Post-Pandemic Era The COVID-19 pandemic acted as a powerful accelerant for digital transformation in education. However, the initial transition was largely a reactive measure. Hodges et al. (2020) made a crucial distinction between this "emergency remote teaching"—a temporary shift of delivery with minimal adaptation—and intentionally designed "online learning," which requires systematic instructional design and pedagogical preparation. This distinction underscores the central role of PD in helping teachers move beyond mere digital substitution towards genuine technological integration that enhances learning. This evolution necessitates the development of what Mishra and Koehler (2006) term Technological Pedagogical Content Knowledge (TPACK), a framework that describes the complex interplay between a teacher's knowledge of subject matter, pedagogy, and technology. Effective PD in the digital age must focus on building this integrated knowledge base. However, the path to digital transformation is fraught with challenges, especially in the Indian context. While the National Education Policy (NEP) 2020 strongly advocates for technology integration, significant gaps in equitable access to devices and reliable internet connectivity, particularly in rural and under-resourced communities, persist as formidable barriers. Research by Laurillard et al. (2020) further highlights that for technology to

be effective, PD must focus not just on tool proficiency but on developing teachers' capacity to design and implement digitally-mediated learning experiences.

3. Human Capital Theory and Investment in Early Education From an economic perspective, investing in teacher PD is a direct investment in a nation's human capital. Human capital theory, pioneered by economists like Gary Becker and Theodore Schultz, posits that the skills, knowledge, and health of a population are a form of capital that is crucial for economic productivity and growth. Education is the primary mechanism for building this capital. Nobel laureate James Heckman's research provides compelling evidence that the highest rate of economic return comes from investing in the earliest years of learning, as foundational skills beget further skills. This makes pre-primary and primary teachers pivotal agents in the formation of human capital. When PD enhances a teacher's effectiveness, it creates a multiplier effect, improving the learning outcomes and future potential of every student they teach. This study frames PD not as an operational cost for the education sector but as a high-yield investment in the nation's future workforce, directly contributing to economic productivity, innovation, and long-term sustainable growth.

4. Inclusivity, Well-being, and Sustainability Contemporary educational paradigms demand that PD extends beyond academic and digital competencies to address the holistic needs of the learning environment. This includes a strong focus on inclusive education, teacher well-being, and alignment with broader sustainability goals. The work of Gay (2002) on culturally responsive teaching highlights the need to train teachers in pedagogical strategies that acknowledge and leverage the diverse cultural backgrounds of students, creating more equitable and effective classrooms. Furthermore, the immense stress and burnout experienced by educators, particularly during the pandemic, have brought teacher well-being to the forefront. Research by Collie et al. (2018) establishes a clear link between a positive school climate, teachers' social-emotional learning, and reduced stress, indicating that PD must incorporate strategies for wellness and resilience. This focus on holistic development aligns with the United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education). Effective PD contributes directly to SDG targets related to ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all. By embedding principles of inclusion, well-being, and sustainability, teacher PD becomes a powerful vehicle for advancing a socially responsible and economically sound national development agenda.

RESEARCH METHODOLOGY

To investigate the multidimensional impact of professional development on pre-primary and primary teachers in post-pandemic India, this study adopted an explanatory sequential mixed-method research design. This approach was chosen to leverage the statistical generalizability of quantitative data while using qualitative insights to provide deeper context, explanation, and a human dimension to the findings. The research was structured in two distinct phases: a quantitative survey followed by qualitative semi-structured interviews.

1. Research Design and Sampling In the first phase, quantitative data were collected through a structured online survey administered to a sample of 250 pre-primary and primary teachers. A stratified purposive sampling strategy was employed to ensure representation from diverse contexts, including teachers from urban, semi-urban, and rural schools across different states in India. This stratification was crucial for capturing the varied experiences and challenges related to digital access and resource availability.

In the second phase, qualitative data were gathered to explain and elaborate on the survey findings. From the initial pool of 250 survey respondents, a purposive sub-sample of 30 teachers was selected for semi-structured interviews. Selection criteria for the interviews included a mix of teachers who reported high levels of confidence post-PD, those who faced significant challenges like connectivity issues, and those representing a balance of experience levels and school types. This method allowed for a rich, in-depth exploration of the personal experiences, perceptions, and nuanced realities behind the statistical data.

2. Data Collection Instruments The quantitative survey was designed to capture data across several key domains. It included sections with Likert-scale questions to measure self-perceived changes in digital competencies, confidence levels in using hybrid pedagogies, and the effectiveness of PD in areas like inclusive education and stress management. The survey also collected demographic information and data on the frequency, format, and content of PD programs attended since the onset of the pandemic.

The qualitative phase utilized a semi-structured interview protocol. The questions were open-ended and designed to encourage teachers to share their personal narratives. The protocol focused on themes such as their journey of digital adaptation, specific examples of how PD translated into classroom practice, the nature of institutional support and mentoring they received, and the socio-emotional impact of the shift to remote and hybrid teaching.

3. Data Analysis The data were analyzed in accordance with the mixed-method design. The quantitative data from the 250 surveys were analyzed using descriptive statistics. Frequencies and percentages were

calculated to summarize the key trends, which were then visualized using the bar and pie charts presented in the findings section. This analysis provided a broad overview of the impact of PD across the sample.

The qualitative data from the 30 interviews were analyzed using a thematic analysis approach. The interview transcripts were first coded to identify recurring concepts and ideas. These codes were then grouped into broader categories, which ultimately coalesced into major themes directly related to the research objectives, such as "Digital Empowerment vs. Digital Divide," "PD as a Catalyst for Confidence," and "The Unaddressed Need for Mentoring and Well-being." This thematic analysis provided the explanatory power to interpret *why* and *how* the trends observed in the quantitative data occurred.

- 4. Ethical Considerations** Ethical protocols were strictly adhered to throughout the research process. All participants were provided with a clear explanation of the study's purpose and procedures. Informed consent was obtained from every teacher before their participation in either the survey or the interview. To ensure confidentiality and encourage candid responses, all personally identifiable information was anonymized, and the data were stored securely.

SCOPE AND LIMITATIONS

Scope:

- Focused on pre-primary and primary teachers in India.
- Examines PD in digital, hybrid, and post-pandemic contexts

Limitations:

- Excludes secondary and higher education teachers.
- Survey sample limited to 250 teachers.
- Long-term impacts of PD require longitudinal data beyond this study's scope.

FINDINGS AND DISCUSSION

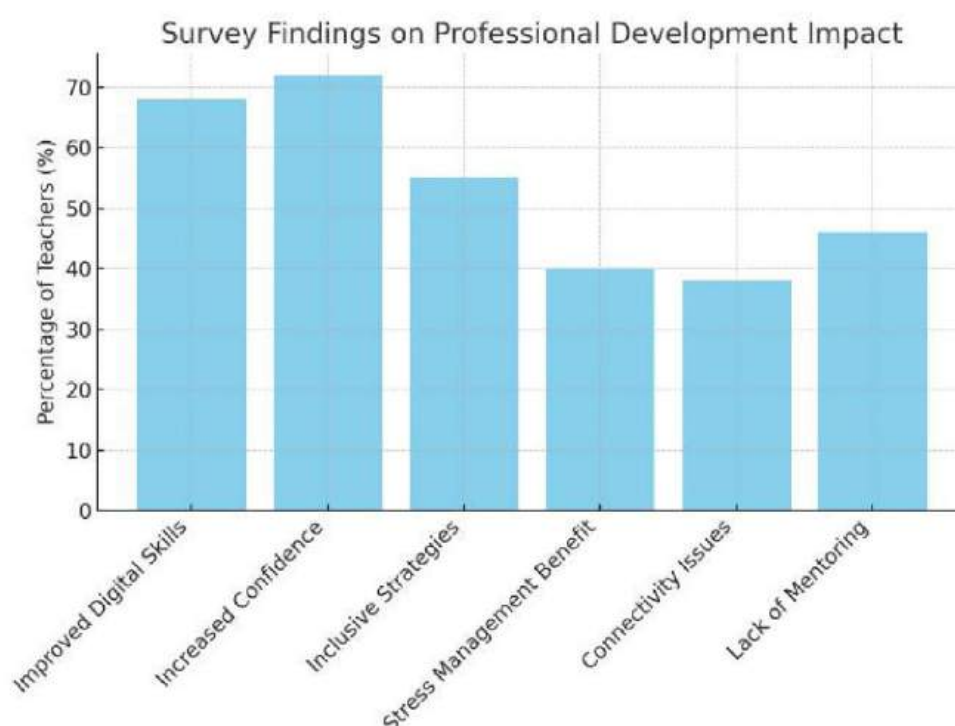
The analysis of the mixed-methods data reveals a compelling narrative about the impact of professional development on early-stage educators in India. The findings highlight significant gains in digital skills and confidence, alongside persistent systemic challenges that mediate the effectiveness of these

programs. This section presents the statistical insights and integrates them with qualitative evidence to provide a comprehensive discussion.

1. Statistical Insights

The quantitative survey data illustrates the perceived impact of PD programs on various aspects of teachers' professional lives. Figure 1 provides a broad overview of both positive outcomes and ongoing challenges reported by the 250 surveyed teacher

Figure 1: Survey Findings on Professional Development Impact



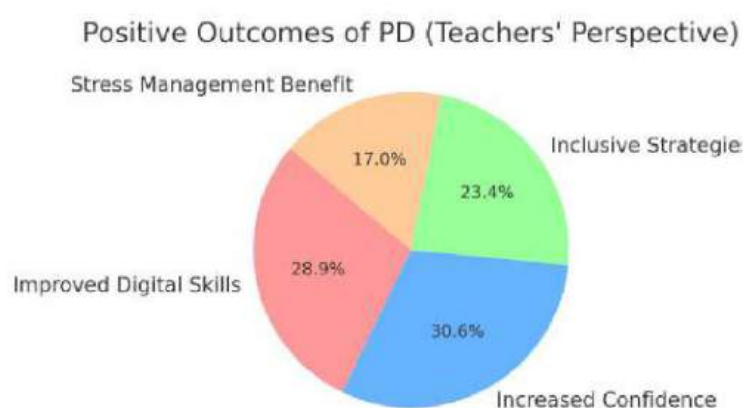
The bar chart reveals that a substantial majority of teachers experienced positive benefits from PD. **Increased Confidence** was the most frequently reported outcome, with 72% of respondents indicating they felt more confident in their teaching abilities after undergoing training. This was closely followed by **Improved Digital Skills**, cited by 68% of teachers. Furthermore, 55% of educators reported that PD helped them implement more **Inclusive Strategies** in their classrooms. A notable 40% also acknowledged the **Stress Management Benefit** of programs that included wellness components. However, the data also illuminates significant barriers. Nearly half of the respondents (46%) pointed to a **Lack of Mentoring** and sustained

support as a major issue, and 38% identified poor **Connectivity Issues** as a persistent hindrance to applying their new digital skills effectively.

To further dissect the positive outcomes, Figure 2 isolates and visualizes the proportional distribution of the primary benefits as perceived by teachers.

Figure 2: Positive Outcomes of PD (Teachers' Perspective)

As shown in the pie chart, when asked to consider the most significant positive outcomes, **Increased Confidence** (30.6%) and **Improved Digital Skills** (28.9%) were identified as the leading benefits. This suggests that PD has been most successful in addressing the immediate and pressing needs for technological adaptation and self-efficacy brought on by the pandemic. The ability to use **Inclusive Strategies** was also a major perceived benefit (23.4%), followed by the **Stress Management Benefit** (17.0%).



2. Discussion: Weaving Data with Experience

The findings demonstrate a clear and positive correlation between participation in PD and teachers' self-reported competencies and confidence. The high percentages for increased confidence (72%) and improved digital skills (68%) align with literature suggesting that well-designed PD can effectively equip

educators for new challenges (Darling-Hammond et al., 2017). The qualitative interviews provided rich context to these numbers. One primary teacher from an urban school in Bangalore explained,

"Before the pandemic, I was scared of using anything beyond a projector. The PD series on using virtual labs and interactive whiteboards was a game-changer. It wasn't just about the tools; it was the confidence to experiment and not be afraid of technology failing." This narrative exemplifies how PD can demystify technology and foster a growth mindset.

However, the findings also highlight a critical disconnect between training and sustained implementation. The fact that 46% of teachers reported a **lack of mentoring** is significant. This aligns with Guskey's (2002) and Ingersoll & Strong's (2011) arguments that continuous support and collaboration are essential for lasting change. An interviewee from a rural school in Uttar Pradesh lamented,

"We had a very good three-day online workshop. But after it ended, we were on our own. When I faced a problem with the new software, there was no one to ask for help. A follow-up or a mentor would have made all the difference." This gap between knowledge acquisition and practical, ongoing support is a key barrier preventing the full realization of PD benefits.

Furthermore, the 38% of teachers citing **connectivity issues** underscores the pervasive digital divide. While PD can impart skills, it cannot overcome fundamental infrastructural deficits. This finding reinforces the argument that digital transformation in education is as much about infrastructure and policy as it is about pedagogy.

The emphasis on **inclusive strategies** (55%) and **stress management** (40%) reflects a progressive shift in the focus of PD beyond mere academics. This aligns with the broader global discourse on holistic education and teacher well-being (Collie et al., 2018; Gay, 2002). Teachers interviewed spoke of the value of learning how to support students with special needs in an online environment and strategies for managing their own anxiety. This positions PD not only as an educational tool but as a driver of human capital that is aligned with ESG goals and SDG 4, emphasizing quality, equity, and well-being in education.

Ultimately, the results paint a dual picture: PD is working and is highly valued by teachers, but its impact is being blunted by a lack of systemic support and persistent infrastructural inequities. To position PD as a true driver of national development, as envisioned by NEP 2020 and Amrit Kaal Vision 2047, a more integrated approach is required—one that combines high-quality training with robust digital infrastructure, continuous mentoring, and a genuine focus on teacher well-being.

CONCLUSION

This study concludes that targeted, continuous professional development is a fundamental and non-negotiable component of India's post-pandemic educational and economic strategy. The research affirms that for pre-primary and primary teachers, who serve as the architects of the nation's foundational human capital, PD has been a critical enabler in navigating the seismic shifts towards digital and hybrid learning environments. It has empowered them to transition from being traditional transmitters of knowledge to becoming agile, confident, and digitally adept facilitators of holistic learning.

The findings unequivocally demonstrate that investment in PD yields significant returns, most notably in enhancing teacher confidence, building essential digital competencies, and fostering more inclusive and resilient classroom practices. These outcomes are not confined to the educational sphere; they are intrinsically linked to the development of a skilled, adaptable, and innovative future workforce, thereby contributing directly to the formation of high-quality human capital. This alignment with long-term national priorities, including Amrit Kaal Vision 2047 and the UN Sustainable Development Goals, elevates the role of teacher training from a departmental concern to a strategic national imperative.

However, the study also serves as a crucial reminder that the potential of PD can only be fully unlocked within a supportive and equitable ecosystem. The persistent challenges of inadequate digital infrastructure and the absence of sustained mentoring mechanisms threaten to undermine these gains and exacerbate existing disparities. Without a systemic, well-resourced, and continuous approach to professional development, India risks failing to capitalize on its demographic dividend, leaving a significant portion of its future workforce unprepared for the demands of the 21st-century economy.

In essence, this paper underscores that professional development is far more than a remedial tool; it is a sustainable, forward-looking strategy that integrates education with human capital development, economic growth, and social inclusion. The future of India's classrooms and, by extension, its economy, rests upon the nation's commitment to empowering its teachers today.

SUGGESTIONS AND RECOMMENDATIONS

Based on the findings of this study and the supporting literature, the following actionable recommendations are proposed to create a more effective, equitable, and sustainable ecosystem for teacher professional development in India:

1. Integrate PD into a Coherent Policy Framework: Move beyond ad-hoc workshops to establish mandatory, continuous PD pathways linked directly to career advancement and recognition, as envisioned in NEP 2020. This framework should offer micro-credentials for specific competencies and require a minimum number of hours of relevant PD annually for all teachers.

2. Bridge the Digital Divide with Targeted Infrastructure Investment: National and state governments must prioritize the expansion of reliable, high-speed internet access in rural and remote areas. Policy initiatives should also focus on ensuring the affordability of essential digital devices for both teachers and students to create a baseline of equitable access.

3. Establish a National Mentoring and Peer Support Network: To address the critical gap in sustained support, a structured, multi-tiered mentoring program should be developed. This could involve pairing experienced, digitally proficient teachers with early-career or less confident peers, creating vibrant professional learning communities (PLCs) within and across schools to foster collaboration and continuous learning.

4. Prioritize Teacher Well-being and Socio-Emotional Learning: PD frameworks must holistically address the needs of the educator. This includes formally incorporating modules on stress management, mental health awareness, resilience-building, and peer support networks into all teacher training programs to prevent burnout and foster a positive school climate.

5. Foster Strategic Public-Private Partnerships: The government should collaborate with reputable EdTech firms, corporations with strong CSR programs, and non-governmental organizations to co-create, fund, and scale high-quality, contextualized PD modules. Such partnerships can ensure that training is aligned with the latest technological advancements and global best practices, while adhering to ESG principles.

6. Develop a Robust Monitoring and Evaluation (M&E) System: To measure the return on investment in PD, a clear M&E framework is needed. This should include developing key performance indicators (KPIs) that connect PD participation not only to teacher-level outcomes (e.g., confidence, skills) but also to measurable student outcomes and broader human capital indices.

7. Embed Sustainability and Inclusivity into all PD: All professional development programs should explicitly train teachers in strategies for supporting diverse learners, including differently-abled students, first-generation learners, and those from marginalized communities. Furthermore, PD should be aligned with

national sustainability frameworks, educating teachers on how to integrate concepts related to the SDGs and climate change into their pedagogy, thereby contributing directly to Vision 2047.

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MSMES, DIGITAL BANKING, AND PMJDY: A SYSTEMATIC REVIEW OF PATHWAYS TO SUSTAINABLE RURAL DEVELOPMENT IN INDIA

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) are central to India's rural economy, contributing nearly 30% of GDP and employing over 110 million people. Yet their growth has long been constrained by credit scarcity, informality, and technological gaps. The dual forces of digital banking innovation—through UPI, Aadhaar-enabled systems, and mobile platforms—and the Pradhan Mantri Jan Dhan Yojana (PMJDY), the world's largest financial inclusion program, have begun to transform this landscape.

This paper presents a systematic literature review of 63 studies (2010–2025) to examine how PMJDY-linked digital ecosystems empower rural MSMEs and advance sustainable development. Findings show that digital finance reduces transaction costs, improves credit access through alternative data, and creates verifiable records that professionalize enterprises. PMJDY accounts further enhance resilience during shocks such as COVID-19 and expand women's financial autonomy.

The paper's key contribution is a conceptual framework that integrates policy (PMJDY), technology (digital banking), and enterprise-level dynamics (MSMEs) to demonstrate clear pathways to inclusive and sustainable development outcomes, including poverty reduction (SDG 1), gender equality (SDG 5), and decent work (SDG 8). Comparative insights from Kenya's M-Pesa and Bangladesh's Grameen Bank underscore the global relevance of India's model.

Policy recommendations emphasize strengthening digital literacy, addressing cybersecurity risks, embedding green finance, and leveraging advanced technologies such as AI and blockchain for inclusive credit scoring. The study concludes that aligning MSMEs, digital finance, and PMJDY with sustainability frameworks can transform rural India into a globally replicable model for inclusive and climate-conscious growth under Amrit Kaal Vision 2047.

Keywords: *MSMEs, Digital Banking, PMJDY, Financial Inclusion, Sustainable Development, Rural Economies*

INTRODUCTION

Background of MSMEs in Rural Economies

MSMEs form the backbone of India's economic fabric, contributing about 30% to GDP and providing employment to more than 110 million people, with nearly half located in rural areas (Gade, 2018). These enterprises drive localized growth, reduce poverty, and expand opportunities beyond urban centers (Manna & Mistri, 2017). Beyond economic metrics, MSMEs empower marginalized groups, particularly women, by generating income and reducing reliance on informal credit (Verma, 2020). Yet challenges—such as limited formal credit access, technological backwardness, and weak market connectivity—constrain their potential (Farajollahzadeh & Noorinasab, 2016).

Despite schemes like MUDRA, rural MSMEs face informality, credit gaps, and skill shortages.

Emergence of Digital Banking in India

India's banking system has undergone a paradigm shift with the rise of digital platforms. UPI, Aadhaar-enabled payment systems (AePS), mobile banking, and micro-ATMs have extended financial services into rural areas, lowering transaction costs and improving transparency (Revathi, 2019; Haralayya, 2021). These platforms integrate MSMEs into the formal economy, facilitating cashless transactions and enabling credit assessments through alternative data (Meher, Hawaldar, & Mohapatra, 2021; Cnaan, Scott, & Heist, 2023).

Despite high adoption, barriers such as low digital literacy, infrastructural gaps, and cybersecurity risks remain (Kaur, Kiran, Grima, & Rupeika-Apoga, 2021). Still, digital banking demonstrates the transformative potential of FinTech in bridging rural financial service gaps (Sharma & Piplani, 2017).

Overview of Pradhan Mantri Jan Dhan Yojana (PMJDY)

Launched in 2014, PMJDY is the world's largest financial inclusion initiative, aimed at ensuring universal access to bank accounts. By 2023, over 470 million accounts had been opened, more than 60% in

rural and semi-urban areas (Somani & Nahar, 2015). The scheme facilitates Direct Benefit Transfers (DBT), reduces leakages, and encourages digital adoption via the JAM (Jan Dhan–Aadhaar–Mobile) trinity.

PMJDY reduces reliance on informal credit, expands opportunities for rural entrepreneurs, and strengthens resilience during economic shocks. Importantly, it provides women with direct financial access, enhancing decision-making power within households (Sinha & Nayak, 2024).

RATIONALE AND SCOPE OF THE REVIEW

The paper explores how MSMEs, digital banking, and PMJDY interact to foster inclusive rural development. Beyond economic growth, the analysis focuses on sustainability outcomes—poverty alleviation, gender equality, decent work, and reduced inequalities—aligned with the UN SDGs. By synthesizing evidence across multiple studies, this review situates financial inclusion within India's development trajectory, with specific attention to rural contexts such as Sindhudurg, and evaluates the long-term transformative potential of digital and policy-driven interventions.

SYSTEMATIC RESEARCH METHODOLOGY

This review applies the Preferred Reporting Items for Systematic Reviews and Meta-Analyses PRISMA framework to assess how MSMEs, digital banking, and PMJDY together advance sustainable rural development in India.

A PRISMA-based systematic review (2010–2025) was conducted using major databases (Scopus, Web of Science, JSTOR, SpringerLink, SSRN, Emerald Insight, Google Scholar) and policy sources from the RBI, World Bank, and Government of India. From 312 studies screened, 63 met the criteria, covering empirical evidence, policy analyses, and global comparisons on MSMEs, digital banking, and PMJDY in rural India.

An inductive coding process identified four recurring themes:

1. MSME growth trajectories and rural development impacts;
2. Evolution and adoption of digital banking and FinTech platforms;
3. PMJDY as a catalyst for financial inclusion;
4. Sustainability linkages, including gender empowerment, poverty reduction, and green finance.

This structured approach enabled a critical synthesis of evidence on how digital financial inclusion and state-led policy interact to transform rural MSME ecosystems. The resulting analysis integrates quantitative findings and qualitative insights to illuminate policy implications for inclusive growth.

Digital Banking and Financial Inclusion in Rural India

1. Evolution of Digital Banking Services

India's rapid fintech expansion has redefined rural financial access. The Unified Payments Interface (UPI), launched in 2016, enabled instant, low-cost peer-to-peer and merchant transactions, surpassing ten billion monthly transactions by 2023 (Sharma, 2016; Cornelli, Frost, Gambacorta, & Sinha, 2024). Mobile banking applications now provide real-time fund transfers and bill payments even in remote villages (Pillai & Sandhya, 2019). Aadhaar-enabled Payment Systems (AePS) and micro-ATMs allow biometric cash-in/out where branches are scarce, creating a digital public infrastructure that lowers transaction costs and fosters trust (Mahesh & Bhat, 2021). Econometric estimates suggest that UPI adoption alone could add over 1 percent to India's GDP by 2026 (Girish, Honnamane, & Kundu, 2023).

2. Linkages Between Digital Banking and MSMEs

Digital platforms have become critical enablers for Micro, Small, and Medium Enterprises. Empirical studies show a positive correlation between digital banking adoption and MSME growth, as cashless payments reduce operating costs and create transparent records that strengthen creditworthiness (Meher, Hawaldar, & Mohapatra, 2021). Alternative-data lending models—drawing on GST filings, digital transaction histories, and mobile usage—allow banks and fintech firms to extend loans to entrepreneurs previously excluded from collateral-heavy credit (Damodaran, Kavin, & Keerthi, 2019). These mechanisms proved especially vital during demonetization and the COVID-19 pandemic, when rural enterprises relied on UPI and mobile wallets to sustain operations (Ahmed & Sur, 2023).

Despite progress, barriers persist: limited digital literacy, patchy internet coverage, and concerns over cyber-fraud discourage adoption (Meher & Gupta, 2020). Government-sponsored digital-literacy drives and targeted incentives have begun to narrow these gaps (Kumari, 2018), but sustained investment in infrastructure and cybersecurity remains essential.

3. PMJDY as a Catalyst for Digital Banking

The Pradhan Mantri Jan Dhan Yojana (PMJDY) provides the institutional foundation for rural households to engage in digital finance. By 2023 more than 470 million zero-balance accounts had been opened, the majority in rural or semi-urban areas (Somani & Nahar, 2015). Linkage with Aadhaar and mobile numbers under the Jan-Dhan–Aadhaar–Mobile (JAM) trinity allows beneficiaries to transact via AePS and UPI, strengthening the digital ecosystem (Parvez, 2022). Direct Benefit Transfers routed through PMJDY reduce leakages and build trust in formal banking (Saha, 2024).

For MSMEs, this infrastructure is transformative: entrepreneurs can receive digital payments, maintain verifiable account histories, and access institutional loans. Evidence shows that Jan Dhan account holders enjoy markedly higher chances of obtaining formal credit, a critical step toward professionalizing rural businesses (Kar, Tiwari, Bhandari, & Kaur, 2024). The scheme has also advanced gender empowerment, with women beneficiaries reporting greater financial autonomy and household decision-making power (Sinha & Nayak, 2024).

4. MSMEs, PMJDY, and Socio-Economic Transformation

1. MSME Growth and Challenges in Rural Economies

Micro, Small, and Medium Enterprises (MSMEs) remain the backbone of rural employment and contribute nearly 30 percent to national GDP. Yet persistent obstacles—informality, credit scarcity, technological lags, and inadequate market linkages—limit their potential (Khatri, 2019; Gupta, Saini, & Chaddha, 2018). Dependence on informal finance exposes firms to exploitative interest rates and cyclical debt (Sivasree & Vasavi, 2020). Skill shortages and compliance costs further constrain productivity (Singh, Khamba, & Nanda, 2018). While digital tools and policy reforms show promise, infrastructure gaps and cyber-security risks continue to challenge broad-based growth (Ahamed & Raju, 2023).

2. Role of PMJDY in Strengthening MSME Financing

PMJDY has become a key gateway to formal finance. By offering zero-balance accounts, RuPay debit cards, and overdraft facilities, it enables entrepreneurs to build verifiable credit histories and access working capital (Kushwah, Sandhar, & Arya, 2021). Empirical studies show that MSMEs using Jan Dhan accounts are 20–25 percent more likely to secure institutional loans than non-account holders (Kar, Tiwari, Bhandari, & Kaur, 2024). The program particularly benefits women-led enterprises, enhancing financial independence and bargaining power (Rathi, Sidana, & Rathi, 2024). Nonetheless, sustainable credit flow still depends on

complementary schemes such as MUDRA and on continued financial-literacy efforts (Misra & Tankha, 2018).

3. Digital Ecosystems and Inclusive Growth

The integration of PMJDY with digital platforms such as UPI and AePS has accelerated inclusive growth. Entrepreneurs, including small farmers and women artisans, can now transact electronically and access micro-loans, linking even informal ventures to formal value chains (Sowmya & Pai, 2024). Evidence shows that digital inclusion reduces gender barriers, widens market access, and strengthens household welfare outcomes (Yadav, Paliwal, & Chatradhi, 2022; Thomas, 2025). Youth-driven rural start-ups increasingly leverage this infrastructure for scalability and job creation (Lavisha, Kaur, & Singh, 2025). Such ecosystems foster intergenerational mobility by lowering transaction frictions and encouraging entrepreneurial risk-taking.

4. Comparative Insights from Global Practices

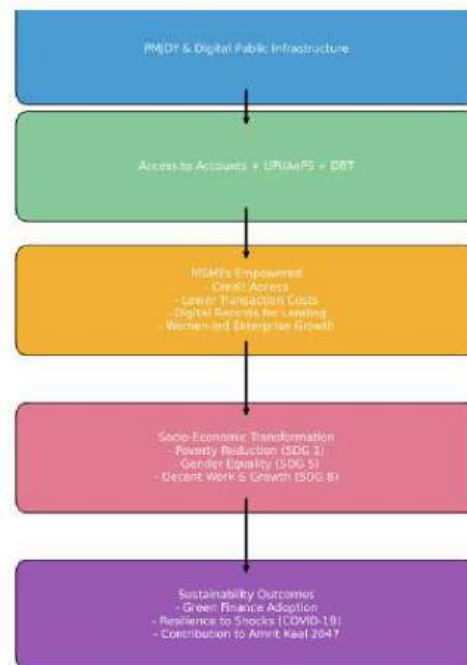
International experiences highlight the importance of embedding digital finance within socio-cultural contexts. Kenya's M-Pesa demonstrates how mobile money can achieve near-universal penetration—96 percent of households by 2019—while spurring savings and enterprise growth (Van Hove & Dubus, 2019; Mulili, 2022). Bangladesh's Grameen Bank illustrates the power of collateral-free microcredit to empower rural women and nurture sustainable businesses (Natile, 2020). These cases parallel India's PMJDY objectives but underscore that lasting impact requires active usage, community trust, and complementary development programs (Mahi & Zainuddin, 2025).

5. Towards Sustainable Development: Linking MSMEs, Digital Finance, and Rural Economies

1. Contribution to UN Sustainable Development Goals (SDGs)

Digital finance and MSME expansion intersect directly with multiple SDGs. Access to affordable credit reduces dependence on informal lenders, advancing SDG 1 (No Poverty) through enterprise creation and income stability (Verma, Das, & Misra, 2025). Women entrepreneurs using PMJDY-linked digital tools report higher business survival and enhanced bargaining power, supporting SDG 5 (Gender Equality) (Sreenu, 2025; Kadaba, Aithal, & Sharma, 2023). SDG 8 (Decent Work and Economic Growth) benefits as digital platforms help MSMEs improve productivity, enter new markets, and generate local employment (Kumar & Roy, 2025; Bhuyan, 2024).

These impacts extend beyond individual livelihoods. Studies show that fintech-enabled MSMEs foster formalization of rural economies, diversify income sources, and strengthen resilience during economic shocks, aligning local development with the global sustainability agenda.



2. Green Finance and Digital MSMEs

Green finance integrated with digital credit mechanisms encourages MSMEs to adopt low-carbon and resource-efficient practices. Evidence shows that digital lending lowers barriers for renewable-energy investment and environmentally responsible production (Kadaba et al., 2022). Fintech tools increasingly embed environmental, social, and governance (ESG) metrics into loan assessments, promoting adoption of clean technologies such as solar micro-grids and electric vehicles in rural markets (Yadav, Gola, & Manchanda, 2025). Such synergies advance India's climate commitments while supporting rural competitiveness (Kumar & Roy, 2025).

3. Socio-Economic Empowerment through Digital Inclusion

Digital inclusion strengthens community resilience and reduces inequality. Rural households with Jan Dhan accounts and mobile payment access were able to receive emergency transfers swiftly during the COVID-19 pandemic, stabilizing consumption and reducing distress migration (Kadaba et al., 2023). For women, access to digital finance expands market reach and enhances decision-making autonomy, yielding sustained improvements in household welfare (Sreenu, 2025). Broader adoption of digital tools narrows income gaps, democratizes credit, and encourages intergenerational mobility (Verma et al., 2025).

Collectively, these outcomes demonstrate that the integration of PMJDY, MSMEs, and digital banking is not only an economic strategy but a pathway to social justice and environmental stewardship.

POLICY IMPLICATIONS AND FUTURE DIRECTIONS

1. Government Initiatives and Regulatory Framework

India's financial-inclusion architecture rests on coordinated action by the Reserve Bank of India (RBI), the Government of India, and targeted credit schemes. RBI guidelines promote secure digital payments and rural banking outreach, encouraging banks and non-banking financial companies to extend electronic services to underserved areas (Malik, Singh, & Ehigiamusoe, 2024).

The Pradhan Mantri Mudra Yojana (PMMY) has disbursed over ₹15 trillion in collateral-free loans to more than 300 million beneficiaries, many in rural districts (Mahesh, Aithal, & Sharma, 2022). Complementary initiatives—Credit Guarantee Fund for Micro and

Small Enterprises (CGTMSE) and the Emergency Credit Line Guarantee Scheme (ECLGS)—strengthen MSME financing under the Atmanirbhar Bharat mission (Parihar et al., 2025). These programs, combined with Jan Dhan's universal account base, create a layered policy environment for inclusive entrepreneurship.

2. Addressing Gaps and Challenges

Despite impressive outreach, structural barriers persist. Digital literacy remains low; many beneficiaries depend on intermediaries to operate mobile apps or ATMs, limiting active account usage (Vashishtha, 2021). Cybersecurity threats—including phishing, identity theft, and ATM fraud—reduce trust in digital platforms, particularly among first-time users (Pradhan & Agarwal, 2020). Gender disparities also endure: social norms and limited mobility restrict women's participation even where credit is available (Gupta, Maurya, & Sirohi, 2024). Scholars emphasize that closing these gaps requires more than credit disbursement. Financial education must be continuous and culturally sensitive, with tailored programs for women and marginalized groups (Malik et al., 2024). Strengthening rural broadband, affordable devices, and grievance-redressal mechanisms is equally critical.

3. Recommendations for a Sustainable MSME Ecosystem

A multidimensional strategy is essential for long-term rural transformation:

- **Capacity Building:** Financial-literacy and digital-skills training markedly improve repayment and tech adoption (Gupta et al., 2024).
- **PPP Models:** Fintech–government collaboration enables last-mile credit, localized cybersecurity, and tailored rural finance (Kadaba et al., 2023).
- **Advanced Tech:** AI, blockchain, and big data enhance rural credit scoring, cut NPAs, and improve loan transparency (Salasty & Kanagavalli, 2025).
- **Green Finance:** Linking renewable adoption and ESG metrics to digital lending aligns growth with climate goals (Yadav et al., 2025).

Embedding these measures within India's *Amrit Kaal* Vision 2047 would help ensure that financial inclusion evolves from simple account penetration to a resilient, gender-inclusive, and environmentally responsible MSME ecosystem. Robust regulatory frameworks and flagship schemes such as PMMY, CGTMSE, and PMJDY have created unprecedented opportunities for rural entrepreneurship. Yet literacy gaps, cybersecurity risks, and gender disparities demand targeted capacity building, technology deployment, and sustainability-oriented incentives. Implementing these measures can transform India's rural financial landscape into a globally relevant model of inclusive and green development.

CONCLUSION

This paper highlights how the convergence of MSMEs, digital banking, and PMJDY is transforming India's rural economy. Despite their central role in employment and GDP, MSMEs have long faced barriers of informality, credit gaps, and limited technology. The rise of digital banking—via UPI, Aadhaar-enabled systems, and mobile apps—together with PMJDY's financial inclusion framework, has reduced transaction costs, broadened credit access, and built verifiable digital records for entrepreneurs. The key contribution of this study lies in its **conceptual framework**, which links **policy interventions (PMJDY)**, **technological enablers (digital banking)**, and **enterprise dynamics (MSMEs)** to **socio-economic transformation and sustainability outcomes**. This framework clarifies the causal pathway from account ownership and digital transactions to MSME empowerment, gender equality, poverty reduction, and resilience against shocks such as COVID-19, ultimately aligning with India's *Amrit Kaal* Vision 2047 and the UN Sustainable Development Goals. Drawing on 63 studies and global lessons from Kenya's M-Pesa and Bangladesh's Grameen Bank, the review shows that India's progress is notable but depends on greater usage, stronger digital literacy, robust cybersecurity, and integration of green finance. In conclusion, this paper advances the debate by moving beyond descriptive accounts of financial inclusion to propose a **structured framework**

for sustainable MSME development in rural India. If scaled effectively, this integration of PMJDY, digital finance, and MSME empowerment can serve as a **globally replicable model** of inclusive, gender-responsive, and climate-conscious rural transformation.

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ROLE OF FINTECH IN FINANCIAL INCLUSION OF RURAL AREAS OF THANE DISTRICT

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ABSTRACT

In India's economic development, financial inclusion has emerged as a vital objective, striving to ensure equitable access to financial services for all societal segments, especially those residing in rural and underserved areas. The swift advancement of Financial Technology (FinTech) has surfaced as a revolutionary instrument in closing this gap by providing digital payment systems, micro-credit, insurance, and savings solutions via accessible platforms. This study centers on the influence of FinTech in promoting financial inclusion within the rural regions of Thane district, which includes mainly rural talukas such as Murbad, Shahapur, Bhiwandi, Ambarnath, and portions of Kalyan. The research investigates the levels of awareness, accessibility, and utilization of FinTech services among rural households, while evaluating the advantages in terms of transaction ease, credit access, decreased reliance on informal channels, and overall financial empowerment. Additionally, it addresses challenges such as inadequate internet connectivity, insufficient digital literacy, apprehension regarding cyber fraud, and trust issues that impede adoption. The findings from this study are anticipated to offer insights into how FinTech can serve as a catalyst for inclusive growth and what supportive measures—such as training programs, user-friendly applications in local languages, and government initiatives—are necessary to enhance financial inclusion in the rural areas of Thane district.

Keywords: *Financial Inclusion, FinTech, Rural Areas, Thane District, Digital Payments*

INTRODUCTION

Financial inclusion is widely acknowledged as a fundamental element of sustainable economic development and social progress. It pertains to the initiative of providing access to affordable financial products and services—such as savings, credit, insurance, and remittance options—to all individuals, especially those from marginalized and low-income backgrounds. In India, a significant segment of the population still lives in rural regions where access to conventional banking services is hindered by geographic obstacles, infrastructural limitations, and low financial literacy levels. This disparity has frequently prevented rural households from fully engaging in the formal financial system, thereby limiting their opportunities for economic advancement. The rise of Financial Technology (FinTech) has opened up new avenues for addressing this issue. FinTech includes digital advancements in payments, lending, savings, investments, and insurance that function through smartphones, internet platforms, and other technology-based solutions. By streamlining financial transactions, lowering transaction costs, and enhancing accessibility, FinTech has the capacity to connect rural communities with the mainstream financial system. Services such as Unified Payments Interface (UPI), mobile wallets, micro-credit applications, and online banking platforms have already demonstrated considerable potential in facilitating financial inclusion throughout India. In the context of Maharashtra, Thane district represents a distinctive scenario. While it is recognized for its urban and industrial centre's, it also includes rural and semi-rural talukas such as Murbad, Shahapur, Ambarnath, Bhiwandi, and parts of Kalyan. These regions encounter challenges such as inadequate banking infrastructure, unreliable internet connectivity, and limited awareness of digital finance. Concurrently, the growing penetration of smartphones and government initiatives aimed at promoting digital literacy are paving the way for enhanced financial inclusion in these areas.

Definition of Financial Inclusion:

Financial Inclusion is defined as “the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost” (Rangarajan, 2008) in the report of the Committee on financial inclusion in India.

According to RBI “Financial Inclusion is the process of ensuring access to appropriate financial products and services needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost in a fair and transparent manner by mainstream institutional players.”

The World Bank defines financial inclusion as “Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way.”

Factors affecting access to financial inclusion:

Socio-economic elements: such as income levels, educational attainment, and employment types are pivotal in determining the uptake of financial services. Households with low income frequently possess insufficient funds to sustain bank accounts or utilize digital wallets, while low literacy rates hinder rural inhabitants from comprehending and navigating FinTech applications. Furthermore, women and marginalized communities may encounter social or cultural barriers that restrict their access to smartphones, bank accounts, and other financial instruments, thereby further impeding inclusion.

Technological infrastructure: constitutes another critical factor affecting access. Dependable internet connectivity, the availability of smartphones, and digital literacy are vital for engaging with mobile banking, UPI, and various FinTech services. In regions where connectivity is poor or residents lack familiarity with digital platforms, the rate of adoption remains minimal. Concerns regarding cybersecurity and apprehensions about fraud also deter rural populations from fully adopting FinTech solutions.

Geographical and connectivity obstacles: additionally affect financial access. Villages situated at a distance from urban centres often do not have bank branches, ATMs, or local FinTech service outlets. Challenges in transportation and regional disparities in infrastructure can restrict residents’ capacity to access digital financial services.

Trust and awareness: significantly influence the acceptance of FinTech. Numerous rural users are reluctant to depend on digital platforms due to a lack of knowledge and fears regarding data misuse or fraud. The influence of the community and guidance from local leaders or self-help groups (SHGs) can assist in fostering trust and encouraging the adoption of these technologies.

LITERATURE REVIEW

Suchitra V G, Bellamkonda Nandini (2024) The study highlights the significant impact fintech has had on bridging the gap between formal financial services and underserved populations, especially in developing economies. By means of fintech advancements like mobile banking, digital wallets, and blockchain technology, financial services have become increasingly accessible, cost-effective, and user-friendly for

marginalized populations, including individuals in rural and economically disadvantaged regions. The document stresses that fintech is essential in lowering transaction expenses, broadening credit access via alternative lending platforms, and enhancing financial literacy through user-focused strategies.

Dr. Nagaraja K (2023) Fintech has been playing a critical role towards financial inclusion by providing an access to the unbanked population who has been out of the banking over the number of years. Meanwhile, Digital India initiative has enabled to a number of fintech companies working in collaboration with the traditional banking which has been largely benefitting the masses, particularly in the rural area in utilizing banking services in their comfort zone.

Agrawal (2022), in the article titled "Fintech and Financial Inclusion: Bridging the Gap for Marginalized Communities" published in *Fintech Journal*, 9(2), pages 133-152, emphasizes the transformative impact of financial technology on enhancing access to financial services for underserved and marginalized groups. The study highlights that traditional banking systems have historically excluded low-income households, rural communities, and informal workers due to issues such as insufficient collateral, elevated transaction costs, and geographical constraints. The paper emphasizes how FinTech solutions—such as mobile banking, digital wallets, peer-to-peer lending, and blockchain-based services—lower entry barriers by providing low-cost, accessible, and user-friendly platforms. Agrawal also points out that digital innovations like UPI (Unified Payments Interface) and Aadhaar-enabled payment systems in India have notably accelerated financial inclusion by facilitating seamless, real-time transactions even in remote locations.

The **Global Findex Database 2021** published by the World Bank provides an in-depth picture of financial inclusion trends across the globe. The report highlights that 76% of adults worldwide now own an account with a financial institution or mobile-money provider, with developing economies showing a significant rise in account ownership from 63% in 2017 to 71% in 2021. Importantly, the gender gap in account ownership has narrowed from nine to six percentage points in developing countries, reflecting progress in bridging inequalities. The use of digital payments has expanded rapidly, with 57% of adults in developing economies reporting digital transactions in 2021 compared to only 35% in 2014.

The **Press Information Bureau (2025)** emphasizes the results of a Financial Inclusion Camp held in Padgha, located in Thane district, illustrating how grassroots initiatives can enhance access to formal financial services in rural regions. The camp enabled Aadhaar-based account openings, the distribution of RuPay debit cards, and the onboarding of beneficiaries onto digital payment platforms. Additionally, it offered awareness sessions on digital banking, insurance, pension schemes, and financial literacy, ensuring that rural participants were introduced to various facets of inclusion. The report highlights the significance of outreach

camps in closing the gap between banks, FinTech, and rural communities that frequently encounter challenges related to distance and a lack of awareness.

Ramakrishna (2016) conducted a detailed study on financial inclusion in Thane district, focusing on the efforts of commercial banks to expand access to formal financial services. The findings indicated that banks were instrumental in boosting account penetration, especially through the expansion of branches and the promotion of schemes associated with financial inclusion programs. Nevertheless, the study also uncovered that, despite advancements in outreach, numerous rural households continued to be excluded due to a lack of awareness, inconsistent income patterns, and insufficient financial literacy. The research underscored that merely having an account did not necessarily lead to active usage, as many accounts remained inactive.

Ekbote (2021) conducted an analytical examination of financial inclusion in the Thane and Palghar districts, specifically focusing on the Bank of Maharashtra. The research underscored the bank's initiatives, including the establishment of basic savings accounts, the promotion of direct benefit transfers, and the support of self-help groups aimed at enhancing rural financial inclusion. The results indicated that, although access to banking services had significantly improved, challenges such as low financial literacy, inconsistent income levels, and limited awareness among rural households continued to hinder active participation. Furthermore, the study noted that the adoption of digital banking was progressing slowly in remote areas due to infrastructural deficiencies. In summary, it highlighted the necessity for more tailored financial products and capacity-building initiatives to achieve sustainable financial inclusion in the region.

OBJECTIVES OF THE STUDY

- To study the role of FinTech in promoting financial inclusion among rural populations in Thane district.
- To examine the level of awareness and adoption of FinTech services (such as mobile banking, UPI, digital wallets) among rural residents of Thane.
- To analyse the challenges and barriers faced by rural populations in accessing FinTech-based financial services.
- To provide recommendations for improving fintech's role in reaching underserved populations.

RESEARCH METHODOLOGY

For the Research, both Primary and Secondary sources of data is collected.

1. Primary Data-

Primary data are those, which are collected for the first time, taking a sample, representing a population. It is not a published data; it is problem specific data collected by researcher. A well-structured questionnaire is administered to the target respondents to collect primary data (Copy of questionnaire is attached in the appendix)

Partly primary data is used via google forms method to collect the primary data with the help of a structured questionnaire, arranged meeting with fintech users and conducted form survey.

2. Secondary Data-

Secondary data found in the form of company records, trade publications, libraries, etc. Secondary data sources are as follows:

- ❖ Daily Newspaper.
- ❖ Various Websites.
- ❖ Reports of Banks & PIB

DATA ANALYSIS AND RESULTS

Are you aware of digital financial services (FinTech apps like Paytm, PhonePe, Google Pay, etc.)?

TABLE 1.1

Attributes	Responses	Percentage
Yes	61	64.2%
No	26	27.4%
Maybe	8	8.4%
Total	95	100%

Interpretation-

As seen in the above chart, 64.2% respondents of the survey are aware about financial services, 27.4% respondents of the survey are not aware about financial services. While 8.4% of the respondents are may be aware about financial services.

Do you have access to a smartphone and internet connection?

TABLE 1.2

Attributes	Responses	Percentage
Yes, both	83	87.4%
Smartphone only	10	10.5%
Internet only	2	2.1%
None	-	-
Total	95	100%

Interpretation-

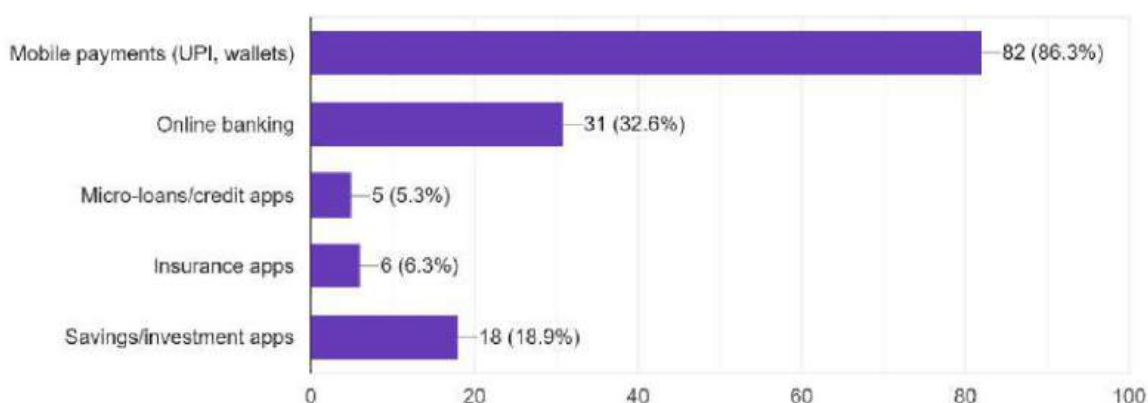
As seen in the above Table, out of the total **95 respondents**, the majority (**87.4%**) reported having access to **both a smartphone and the internet**, indicating that most of the sample is digitally well-connected. A smaller proportion (**10.5%**) rely **only on smartphones** without independent internet access, while **2.1%** have **internet only** but no smartphone. Notably, **none of the respondents lack both smartphone and internet access**, showing that digital connectivity is widespread among the group.

If yes, which services do you use most? (use FinTech services for financial transactions)

CHART 1.1

If yes, which services do you use most? (Select all that apply)

95 responses



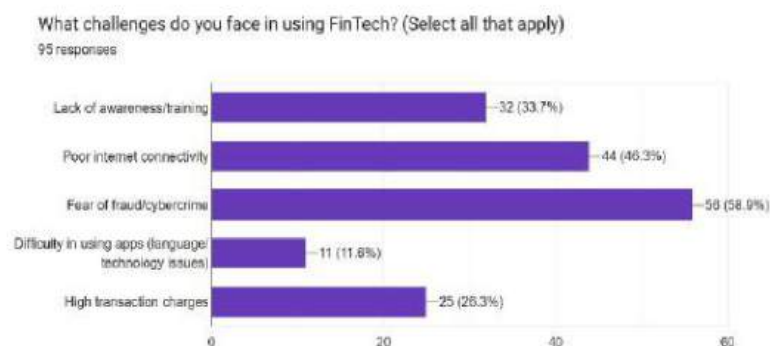
Interpretation-

The graph shows the usage of different digital financial services among 95 respondents. It is clear that mobile payments (UPI/wallets) are the most commonly used service, with a very high share of 86.3%,

indicating strong dependence on digital payment systems for daily transactions. Online banking stands second with 32.6%, reflecting that a good proportion of users also rely on internet banking for financial activities. Savings and investment apps are used by 18.9%, showing moderate adoption, while insurance apps (6.3%) and micro-loan/credit apps (5.3%) are the least used services. Overall, the interpretation highlights that while digital payments dominate, other advanced financial services such as investments, insurance, and credit apps are still at a developing stage of adoption.

What challenges do you face in using FinTech?

CHART 1.2



Interpretation-

This chart highlights the key challenges faced by 95 respondents in using FinTech services. The most significant barrier reported is the fear of fraud and cybercrime, with 58.9% of users concerned about security risks. The second major challenge is poor internet connectivity (46.3%), followed by a lack of awareness or training (33.7%), which suggests gaps in knowledge and digital literacy. High transaction charges (26.3%) and difficulty in using apps due to language or technology issues (11.6%) are less common but still notable concerns. Overall, the interpretation shows that while FinTech adoption is growing, users remain hesitant mainly due to security fears and connectivity issues, alongside a need for greater awareness and user-friendly platforms.

CONCLUSION

The study of FinTech in the rural regions of Thane district indicates that digital financial technologies are vital in enhancing access to banking and financial services for populations that were previously unbanked. FinTech instruments such as UPI, mobile wallets, neo banking platforms, and

Aadhaar-enabled payment systems have greatly improved convenience, lowered transaction costs, and increased financial participation among residents in rural areas. The study emphasizes that although awareness and adoption are on the rise—particularly among younger and more educated demographics—obstacles such as low digital literacy, inadequate internet connectivity, a shortage of devices, and trust issues still hinder the complete utilization of digital financial services. Efforts like financial inclusion camps, agent networks (micro-ATMs, bank-sakhis), and government-backed digital initiatives have been effective in addressing these challenges. In summary, the results indicate that integrating technology-driven solutions with localized outreach, financial literacy education, and supportive infrastructure is crucial for achieving significant and sustainable financial inclusion in rural Thane.

RECOMMENDATIONS

To improve financial inclusion through FinTech in rural areas of Thane district, several steps can be taken. First, digital literacy programs should be organized, especially for women and older people, to help them feel confident using digital financial services. Better internet and mobile network coverage in remote villages is important so that people can access these services without problems. Expanding local agent networks, like micro-ATMs and bank-sakhis, can provide help and support for digital transactions. FinTech apps should be easy to use, available in local languages, and work with low internet data to make them accessible to everyone. Banks, FinTech companies, and government programs—like Direct Benefit Transfers—should work together to reach more people. Regularly checking how people use these services can help improve them, and financial products such as micro-loans, digital savings accounts, and insurance should be designed to meet the needs of rural communities. Following these steps can make sure digital financial services reach more people and help improve financial inclusion in rural Thane.

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STOCKS, SCREENS, AND SOCIETY: ANALYSING THE ROLE OF SOCIAL MEDIA IN YOUTH FINANCIAL DECISION-MAKING

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ABSTRACT

The growing connection between social media and finance has created a new environment where young people often rely on digital platforms to guide their financial choices. Social media is no longer just a place for fun and chatting, but also an informal way to learn about money matters. The research titled "Stocks, Screens, and Society: Analysing the Impact of Social Media on Young People's Financial Choices" looks into how online groups, financial influencers, and digital content shape young people's views on risk, investment preferences, and long-term financial behaviours. Drawing from recent studies on financial knowledge and digital participation, the paper explores both the benefits and challenges of learning about finance through social media. While these platforms make financial information easier to get and inspire young people to invest in stocks, they can also lead to quick decisions, risky trading, and exposure to misleading information. The study shows how financial literacy plays a key role in helping young investors think carefully about online content and make smarter choices. This paper deepens our understanding of how financial learning happens in the digital age by bringing together existing research and offers ideas for teachers, government officials, and financial organizations to encourage responsible financial behaviour among the next generation of investors.

Keywords: *Youth financial decision-making; Social media influence; Financial literacy; Investment behaviour; Digital platforms; Financial influencers; Behavioural finance; Risk perception.*

INTRODUCTION

Platforms such as YouTube, Instagram, TikTok, Reddit, and X (previously known as Twitter) have become pivotal in discussions surrounding finance. On these platforms, younger individuals can discover a range of information, from basic savings tips to intricate debates about stock markets and cryptocurrencies. Financial influencers, commonly referred to as "influencers," significantly contribute to this dynamic. They distill complex subjects into concise and relatable content, rendering finance more approachable. Concurrently, online communities like Reddit's WallStreetBets foster peer-to-peer learning environments where investment strategies are discussed and exchanged. These advancements have created opportunities for many who previously had limited access to financial education or professional guidance.

However, the very characteristics that enhance the appeal of social media also introduce potential hazards. Information disseminates rapidly, yet popularity does not equate to accuracy. Algorithms prioritize trending content over factual correctness. Consequently, young individuals may frequently encounter advice that is misleading, biased, or incomplete. Numerous influencers blend authentic guidance with sponsored promotions, raising concerns regarding transparency and trustworthiness. Psychological factors exacerbate the situation. The fear of missing out (FOMO), herd mentality, and the online excitement surrounding "meme stocks" or cryptocurrencies can lead inexperienced investors to make precarious choices. Thus, social media presents both opportunities and challenges in influencing the financial behaviours of youth.

In this context, financial literacy is crucial. Studies indicate that individuals with greater financial acumen are more adept at evaluating information, diversifying risk, and making decisions aligned with long-term objectives. Nevertheless, many young investors still lack a solid grasp of fundamental concepts such as inflation, compound interest, or stock market risk. In the absence of this foundational knowledge, they are more susceptible to making poor or speculative investment decisions. Fintech applications like Robinhood or Zerodha, which facilitate easier and more affordable investing, introduce an additional layer to this landscape.

Social and demographic factors also affect how much money young people spend. Age, education, and income all have an impact on the kinds of information people are exposed to and how they respond to it. For example, university students are more likely to research cryptocurrencies than older or better educated individuals, who often favour safer assets like mutual funds. Given that women have less access to financial education and are therefore more likely to become cautious investors, gender discrepancies are also significant. These differences highlight the necessity of analysing social media's impacts alongside more all-encompassing social and economic frameworks. Trust is another important component. Many influencers lack recognized credentials, although banks and traditional consultants are subject to strict rules. But their consistent presence and approachable manner.

Concerns regarding ethics and dependability in digital finance are raised by this dilemma. Concerns around bias and false information become more pressing as influencers profit from relationships and promotions. To safeguard young investors in this rapidly evolving digital environment, clear regulations and laws could be required.

These developments' broader effects extend beyond individual investors. Online efforts that demonstrate how social media can shift entire markets include the emergence of meme stocks and unexpected cryptocurrency booms. Many young individuals join these movements for reasons other than financial gain. It also has to do with identity, community, and belonging. In this way, social media shapes financial choices through culture and psychology as much as through knowledge. These intricate topics are examined in the study "Stocks, Screens, and Society: Analysing the Role of Social Media in Youth Financial Decision-Making." It examines how online communities and influencers mold attitudes, how digital platforms serve as unofficial classrooms, and how financial literacy affects results. The study illustrates both the advantages and disadvantages of this change by combining insights on social media, youth and finance.

In addition to describing current trends, the objective is to think about the implications for legislation, policy, and education. Clear guidelines for online financial advice, improved financial education, and digital literacy initiatives can all benefit from an understanding of how young people use online financial settings. The decisions made by young people as they continue to interact with markets via screens and networks will have a long-term impact on inclusiveness and economic stability. Thus, our study contributes to broader discussions on how to strike a balance between opportunity, risk, and accountability in the era of digital finance.

LITERATURE REVIEW

Social media's explosive rise has changed how young people learn about finance and choose investments. Digital platforms that provide financial concepts in simplified and interactive formats are gradually replacing or supplementing traditional financial learning sources including banks, advisors, and schools (Dwivedi et al., 2021). Although there are still questions over the reliability of online content, platforms like YouTube, TikTok, and Instagram act as informal classrooms that increase accessibility to finance.

The democratization of financial knowledge is a major advantage of social media. According to Sharma, Damseth, and Shyam (2024), social media makes it easier for young people who didn't have access to advisors in the past to learn about risk management, investing, and saving. The same accessibility, meanwhile, prompts worries about impulsive choices and speculative trading, especially among novice investors.

Financial influencers (“finfluencers”) have become key players in this digital ecosystem. Nakul and Kheriya (2025) found that young audiences trust influencers for their relatable style, consistency, and ability to simplify complex concepts. However, they also highlight risks, as influencer-driven advice often lacks regulation, transparency, and can involve biased promotions. This credibility paradox highlights the delicate balance between relatability and reliability in digital financial spaces.

Decision-making is further influenced by the collaborative character of online financial groups. Wang et al. (2019) show the strength of collective sentiment by demonstrating how user moods and social influence on sites like Reddit's WallStreetBets may shift stock prices. Youth are frequently pushed toward risky investments by emotional factors including herd mentality and fear of missing out (FOMO), which intensify speculative behaviours. In a similar vein, Rodriguez, Velez, and Palallos (2024) demonstrate that students' exposure to peer comparisons and internet adverts causes them to make rash financial decisions.

Financial knowledge also shows up as a protective factor at this period. Young people with greater financial literacy levels are more equipped to evaluate internet content critically, diversify their portfolios, and fend off false information, according to Deekshith et al. (2024) and Sharma et al. (2024). Age, gender, and socioeconomic background are also significant demographic factors. While older and female students exhibit more cautious investment behavior, younger students tend to choose volatile assets like cryptocurrencies (Sharma et al., 2024; Deekshith et al., 2024).

Overall, a dual narrative emerges from the evaluated material. On the one hand, social media encourages involvement in financial markets, promotes engagement, and democratizes access to financial knowledge. However, by promoting impulsivity, speculative behavior, and an excessive dependence on uncontrolled sources, it increases hazards. In order to balance opportunity and danger, scholars advocate for more robust financial education, media literacy programs, and regulatory monitoring (Dwivedi et al., 2021; Nakul & Kheriya, 2025).

RESEARCH OBJECTIVES

- To investigate the ways in which social media platforms impact young people's financial literacy and investing decisions.
- To investigate how young people's decision-making is influenced by online networks and financial influences.
- To evaluate the ways in which financial literacy aids young people in risk management and in avoiding false information on the internet.
- To determine the opportunities and difficulties of financial decision-making influenced by social media for upcoming policy and education initiatives.

RESEARCH METHODOLOGY

➤ Design of Research

This study uses a quantitative, descriptive, and analytical research approach to examine the ways in which online communities, financial influencers, and social media platforms impact young people's financial decision-making. The approach makes it possible to test the connections between variables including investment behaviours, demographics, financial literacy, and social media use.

➤ Source of Data:

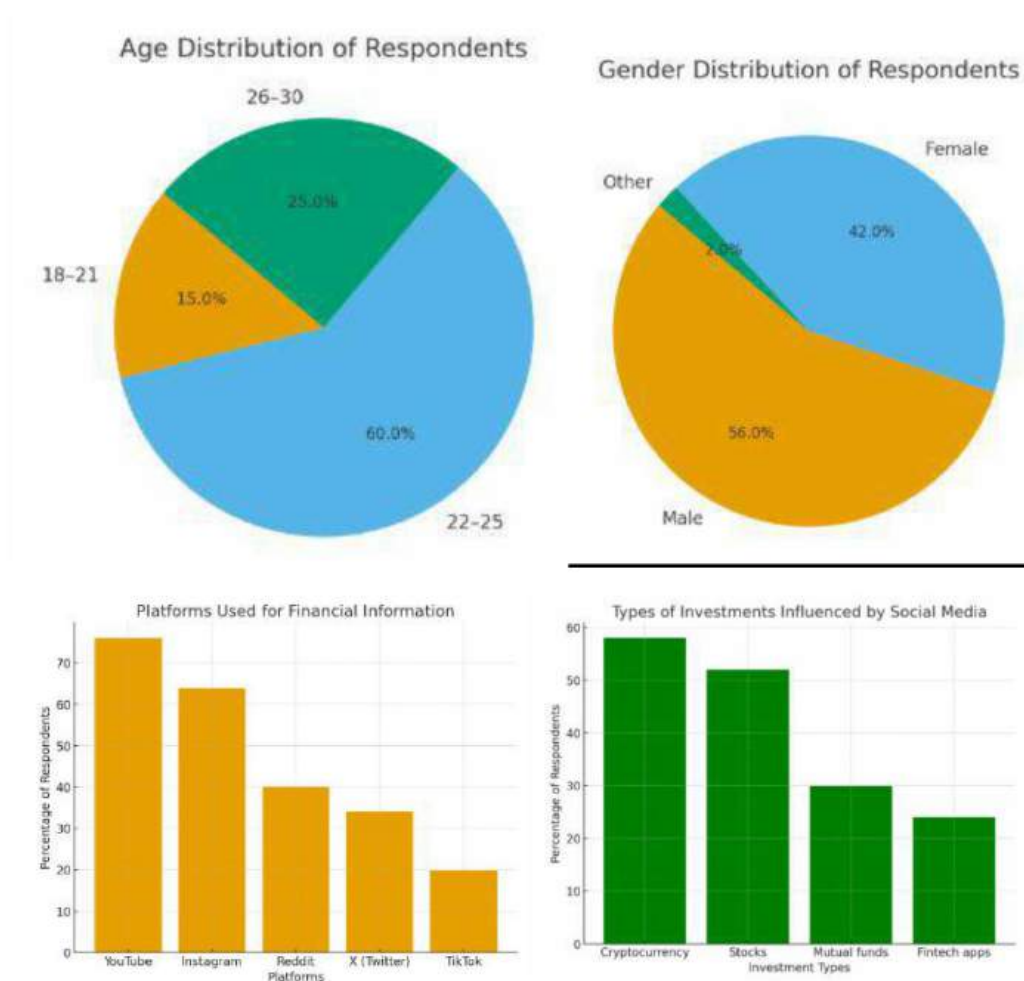
- **Primary data:** Students and young investors who actively interact with financial content on social media platforms provide responses.
- **Secondary data:** Background information and analysis support are provided by scholarly journals, earlier research, reports, and publications on digital finance.

➤ The size and sampling of the sample

50 responders make up the sample size. Purposive sampling is the sample technique used, with an emphasis on young people who utilize social media to find financial information.

- **Method of Data Collection:** An online survey (Google Forms) with structured questions about investment behaviours, financial literacy, and social media use will be used to gather data.
- **Tools for Analysis:** To find connections between social media use and investment choices, data will be analysed using chi-square testing, correlation and percentage analysis. Only young people who actively utilize social media to find financial information are included in the study.

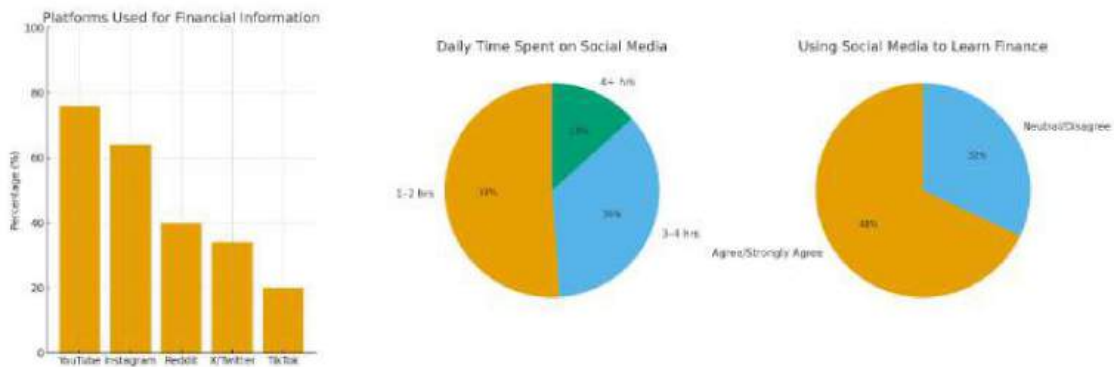
RESULTS AND IMPLICATIONS



Section A: Demographics

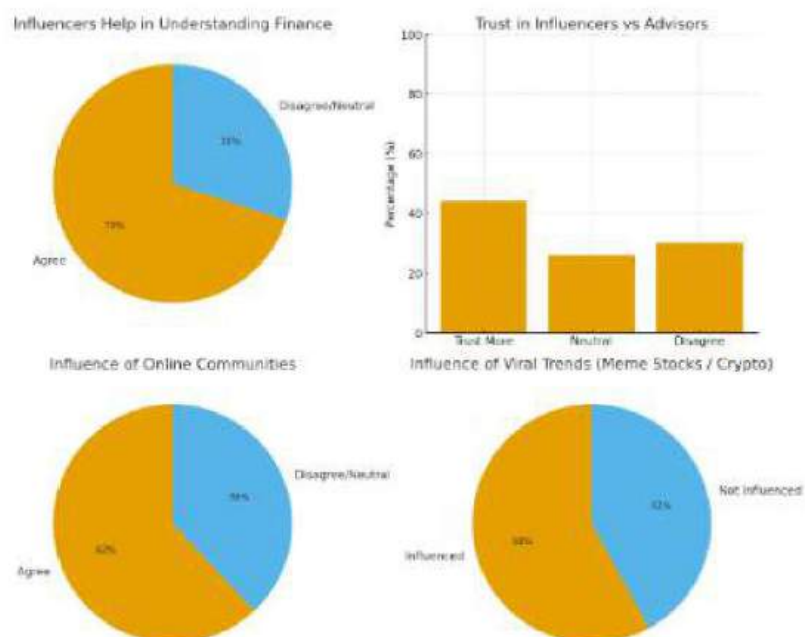
- **Age:** The age group of 22–25 years old accounted for 60% of the answers, followed by 26–30 years old (25%), and 18–21 years old (15%).
- The gender distribution is 42% female, 56% male, and 2% other/prefer not to state.

- **Education:** 22% are working professionals, 48% are undergraduates, and 30% are postgraduates.
- **Monthly Income/Allowance:** 40% of respondents reported having less than ₹10,000 per month, 36% between ₹10,000 and 20,000, and 24% over ₹20,000.



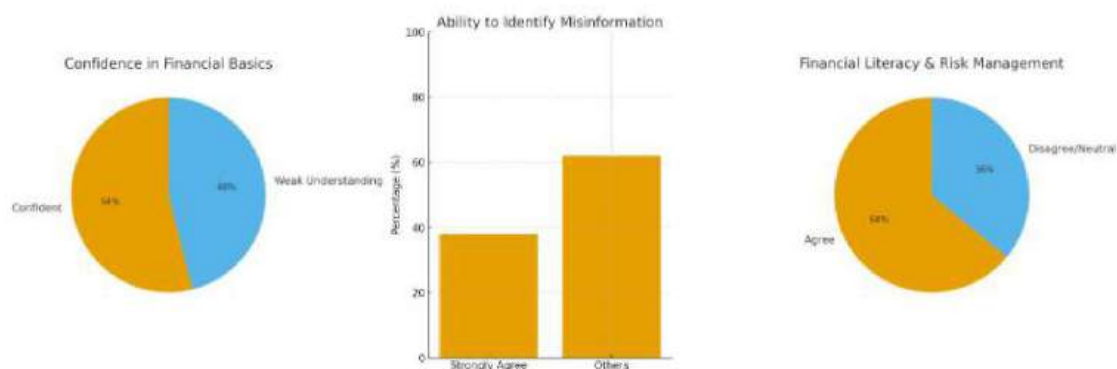
Section B: Social Media Usage

- **Platforms used:** The most popular platforms for financial information were YouTube (76%) and Instagram (64%), followed by Reddit (40%), X/Twitter (34%), and TikTok (20%).
- **Time spent:** 46% of respondents said they used social media for one to two hours per day, 32% for three to four hours, and only 12% for more than four hours.
- **Online financial education:** 68% of respondents agreed or strongly agreed that they use social media to learn about finance on a 5-point scale.



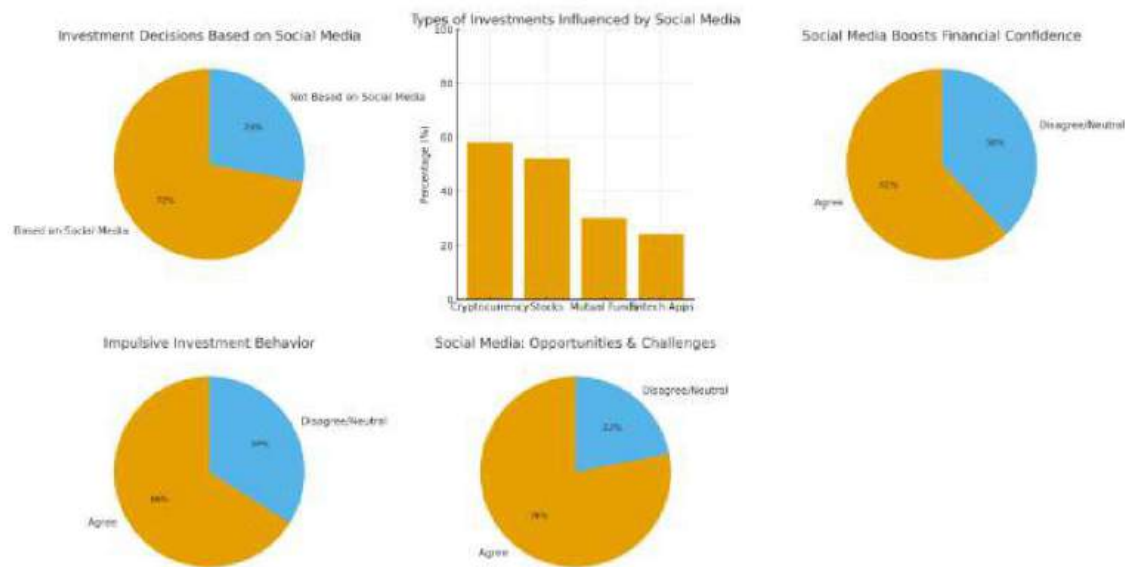
Section C: Influence of Influencers & Communities

- **Financial influencers:** 70% of respondents said that influencers improve their knowledge of finance.
- **Trust:** 44% of respondents said they trusted influencers more than conventional counsel, compared to 30% who disagreed and 26% who were undecided.
- **Online communities:** 62% agreed that platforms like Reddit/Telegram influence their investment decisions.
- **Viral trends:** 58% of respondents acknowledged at least one instance of being swayed by meme stocks or cryptocurrency mania.



Section D: Financial Literacy

- **Basic comprehension:** 46% acknowledged having a poor grasp of ideas like inflation and interest rates, whilst 54% felt confident about them.
- **Misinformation check:** Just 38% of respondents strongly thought that they could distinguish between trustworthy and deceptive stuff.
- **Risk management:** 64% of respondents said they can better manage risk when they are financially literate.



Section E: Investment Decision-Making

- **Investment decisions:** 72% admitted making investment decisions based on social media.
- **Investment types:** Cryptocurrency (58%) and stocks (52%) were the most influenced by social media, followed by mutual funds (30%) and fintech apps (24%).
- **Confidence boost:** 62% agreed social media increased their financial confidence.
- **Impulsive behaviour:** 66% admitted that social media sometimes pushed them toward risky or impulsive investments.
- **Opportunities & challenges:** 78% agreed that social media creates both benefits (access, awareness) and risks (misinformation, hype).
- **Investment choices:** 72% of respondents acknowledged using social media to inform their investment choices. Social media had the biggest impact on cryptocurrency (58%) and equities (52%), followed by mutual funds (30%) and fintech apps (24%).
- **Confidence boost:** According to 62% of respondents, social media improved their financial confidence. Sixty-six percent of respondents acknowledged that social media occasionally influenced their decision to make rash or dangerous investments.
- **Opportunities and challenges:** According to 78% of respondents, social media offers both advantages (access, awareness) and disadvantages (hype, disinformation).

CONCLUSIONS

This study demonstrates how social media has emerged as a key factor in determining young people's financial literacy and behaviour. The most popular places to start learning about finance are YouTube and Instagram, but forums like Reddit and influencer advice have a big impact on how people think and make investing decisions. The results show that while social media increases access to financial information and boosts self-esteem, it also exposes youth to hazards like speculative trading, rash judgments, and false information. One important protective feature that helps young people manage risks and critically assess digital content is financial literacy. All things considered, social media presents both benefits and difficulties. While it democratizes financial education, cautious use, more robust literacy initiatives, and more transparent regulatory frameworks are necessary to guarantee that the next generation's excitement is translated into long-term financial behaviour.

RESEARCH FINDINGS

- Young people primarily learn about money through social media.
- The most popular venues for learning about finance are YouTube and Instagram.
- Young people's investment decisions are greatly influenced by influencers and online groups.
- While social media boosts financial confidence, it also promotes reckless and impulsive behaviour.
- Stocks and cryptocurrencies are the investment categories most impacted by internet content.
- By enhancing risk management and minimizing false information, financial literacy safeguards young people.

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UNDERSTANDING GEN Z'S PERCEPTION OF ANTI-ADVERTISING AND BRAND TRUST

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ABSTRACT

This study explores the impact of anti-advertising strategies on Generation Z's perception of brand trust and authenticity. Anti-advertising characterized using humour, memes, irony, reverse psychology, and self-deprecating content, represents a departure from conventional promotional methods. Using a quantitative research design, primary survey data was collected from 70 Gen Z respondents to examine their reactions to unconventional advertising styles. The findings indicate that humour and memes are the most effective in building trust, while reverse psychology primarily sparks curiosity rather than direct trust. Results of the chi-square test revealed a significant association between advertising strategy and engagement, with respondents showing greater trust and recommendation likelihood for anti-advertising campaigns compared to traditional ones. The study concludes that while anti-advertising resonates strongly with Gen Z due to its relatability and authenticity, its long-term effectiveness still depends on the quality and credibility of the brand itself.

Keywords: Generation Z, Anti-Advertising, Humour, Memes, Reverse Psychology, Brand Trust, Authenticity, Consumer Engagement, Digital Marketing

INTRODUCTION

Advertising continues to evolve rapidly in response to changes in media, technology, and consumer preferences. Among these changes, the rise of Generation Z (born between 1997 and 2012) has been particularly significant. Having grown up in an era shaped by social media, streaming platforms, and influencer culture, Gen Z engages with brand communication in ways that are distinct from previous generations. This group is highly informed, digitally fluent, and selective about the messages they value. Rather than responding to conventional promotional styles alone, they tend to gravitate toward campaigns that feel authentic, creative, and relatable.

In recent years, one approach that has gained momentum in this context is *anti-advertising*. Unlike traditional advertising, which often focuses directly on highlighting product benefits, anti-advertising takes a more unconventional route by using humour, irony, memes, reverse psychology, or self-deprecating messages. Campaigns such as Patagonia's "Don't Buy This Jacket," OYO's "Don't Book with Us If..." or Zomato's playful meme-based content illustrate how brands are experimenting with this style. By subverting expectations and communicating in a light-hearted or witty manner, such campaigns often resonate strongly with younger audiences, who appreciate their freshness and sense of authenticity.

The growing popularity of anti-advertising reflects broader shifts in communication styles. Research has shown that irony and sarcasm in advertising can capture attention and enhance audience appreciation when the intended meaning is understood. Similarly, the creative use of humour or unexpected messaging strategies has been found to increase engagement and foster a sense of connection between brands and their audiences. For Gen Z in particular, these qualities align with values of originality, relatability, and transparency, making anti-advertising a promising strategy for building meaningful brand-consumer relationships.

At the same time, this area raises important questions for scholars and practitioners alike. Does anti-advertising primarily create short-term appeal, or can it contribute to long-term trust and loyalty? Why does this communication style appear to connect more strongly with Gen Z compared to older groups? And how do elements such as memes, humour, or reverse psychology contribute to perceptions of brand credibility? Addressing these questions is essential to better understand how brands can communicate effectively with emerging consumer groups.

This paper seeks to explore these questions by examining Gen Z's perception of anti-advertising and its influence on brand trust. Specifically, it investigates how humour, reverse psychology, and memes shape the way Gen Z views a brand as authentic and relatable; why anti-advertising appears to resonate more with this group compared to older generations; and whether such campaigns encourage long-term trust or primarily capture attention in the moment. By combining insights from prior literature with primary survey data, the study aims to contribute to a deeper understanding of how anti-advertising functions as a contemporary branding strategy.

LITERATURE REVIEW

1. **Hayk Danielyan (2022)** - For modern advertising to have the greatest possible impact on target audiences, language choice is crucial. Sarcasm's pragma linguistic characteristics in social and commercial campaigns are examined in this essay. Identification of sarcastic language and its function in conveying nonliteral meaning is done through linguistic and extra-linguistic analyses. Sarcasm can be a creative and effective tool for conveying intended messages, increasing audience engagement and persuasion, as demonstrated by examples of discussions in advertising. This shows how sarcastic language can enhance communication, challenging the conventional perception of it as only caustic or bitter. Sarcasm in advertising reframes expectations, showing how nontraditional language use can be more effective and resonate when communicating complex or socially significant messages.
2. **Irina Alexandra Iles, Xiaoli Nan (2017)** - We looked at the possible differences between the persuasive effects of sarcastic and ironic humour as well as the persuasive effects of both types of humour versus no humour appeals in health messages. Results from a controlled experiment (N = 303) indicated that sarcastic messages led to more counterarguing, less negative affect, and a lower perceived strength of argument than no humour messages. Compared to messages without humour, those with irony sparked more counterarguments. There were notable distinctions between the two humour types in terms of attitudes toward the risky behaviour, perceived argument strength, and counterarguing. On attitudes toward the risky behaviour, the indirect effect of message type was mediated by counterargument.
3. **Jana Hubinova (2016)** - Sarcasm is "the use of words that mean the opposite of what you really want to say, especially to insult, show irritation, or be funny," according to Merriam-Webster. Sarcasm has gained popularity as a public relations tool in modern marketing, especially among Generation Y (Millennials, born 1977–1994). Unlike previous generations, they are often the target of new projects,

sub-brands, and aggressive marketing strategies because they are the youngest productive generation. Effective use of sarcasm engages this audience and enhances brand identity. The 2011 debut of ZUNO, a daughter brand of Austria's Raiffeisen Bank International, is a noteworthy illustration. The brand was effectively introduced to the Middle and Eastern European market through its sardonic campaign in Slovakia.

4. **Luuk Lagerwerf (2007)** - Two studies looked at the effects of sarcasm in public information announcements and irony in ads. In product advertisements, sarcasm emerged when positive captions were combined with unsettling images, and irony emerged when negative captions took the place of anticipated positive ones. At first, these deviations from the norm were viewed as improper. According to Study 1, audiences valued ironic advertisements more when they accurately understood their purpose, even though irony occasionally obscured its meaning. According to Study 2, sarcasm reduced audiences' perceptions of the gravity of societal issues by making it more difficult to understand the intended message. Overall, irony and sarcasm run the risk of preventing clear communication and lessening the persuasive or educational impact of advertisements, even though they can increase appreciation when understood.

RATIONALE OF THE STUDY

Traditional advertising is becoming less effective, especially among Gen Z, who are more aware of marketing tactics and often ignore standard ads. As a result, many brands are turning to new approaches like anti-advertising, which uses humor, memes, or reverse psychology to capture attention. However, existing literature shows that there is limited research on how Gen Z perceives this type of advertising and how it affects their trust in brands. This study aims to explore Gen Z's opinions on anti-advertising and whether it helps build or reduce brand trust. The findings can help businesses develop more effective marketing strategies for younger audiences.

OBJECTIVES OF THE STUDY

1. To understand how humour, reverse psychology, and memes affect how Gen Z sees a brand as real and trustworthy.
2. To investigate why anti-advertising appeals more to Gen Z than to older generations.
3. To examine whether anti-advertising leads to long-term brand trust or only short-term attention.

4. To investigate the impact of advertising strategy (Traditional vs. Anti-advertising) on Generation Z's perception of brand trust and engagement.

HYPOTHESIS OF THE STUDY:

Null Hypothesis (H₀): No significant association between advertising strategy (Traditional vs. Anti-advertising) and trust/engagement.

Alternative Hypothesis (H₁): Significant association exists, with Gen Z showing greater trust/engagement towards anti-advertising.

RESEARCH METHODOLOGY:

Research Design: This study adopts a quantitative research design, utilizing a structured questionnaire administered through Google Forms. The survey collects primary data from Gen Z respondents to explore their perceptions of anti-advertising and its impact on brand trust.

Data Collection Method: Primary data was gathered using a questionnaire, while secondary data was obtained from academic journals and various online sources.

Data Collection Instrument: The questionnaire consists of both closed-ended and multiple-choice questions. The main variables measured include:

- Social media usage patterns (Questions 1–4)
- Responses to humor, memes, and reverse psychology in advertising (Questions 5–7, 12–15)
- Perceptions of anti-advertising versus traditional advertising (Questions 8–11, 13–14)

Population: The target population consists of Generation Z individuals aged 16 to 27, residing in Mumbai.

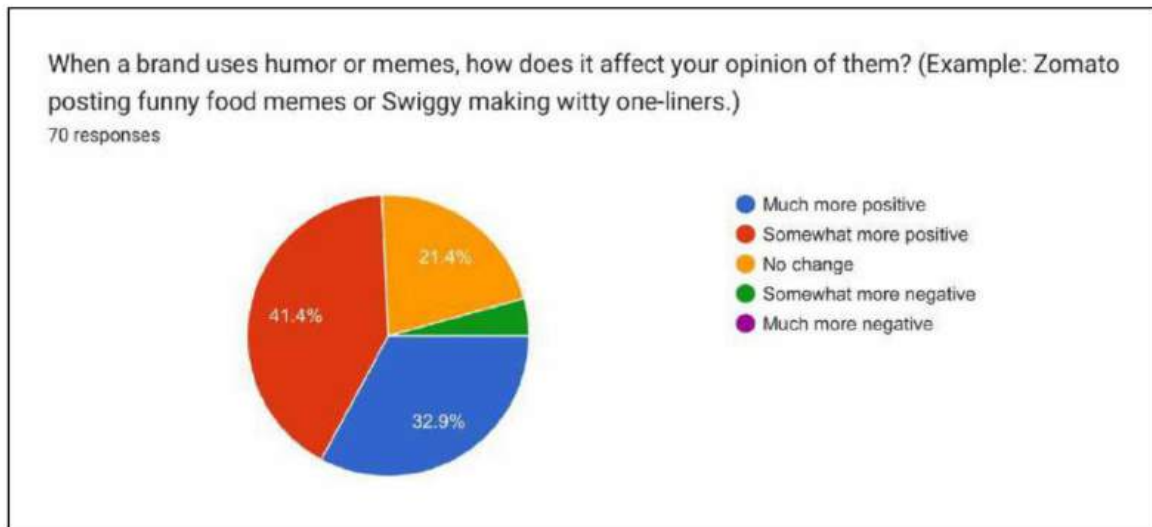
Sampling Method and Technique: A non-probability sampling method, specifically convenience sampling, was employed. Data was collected through peer networks.

Sample Size: The study includes 70 respondents.

Descriptive Statistics: Used to present the distribution of responses through frequencies and percentages.

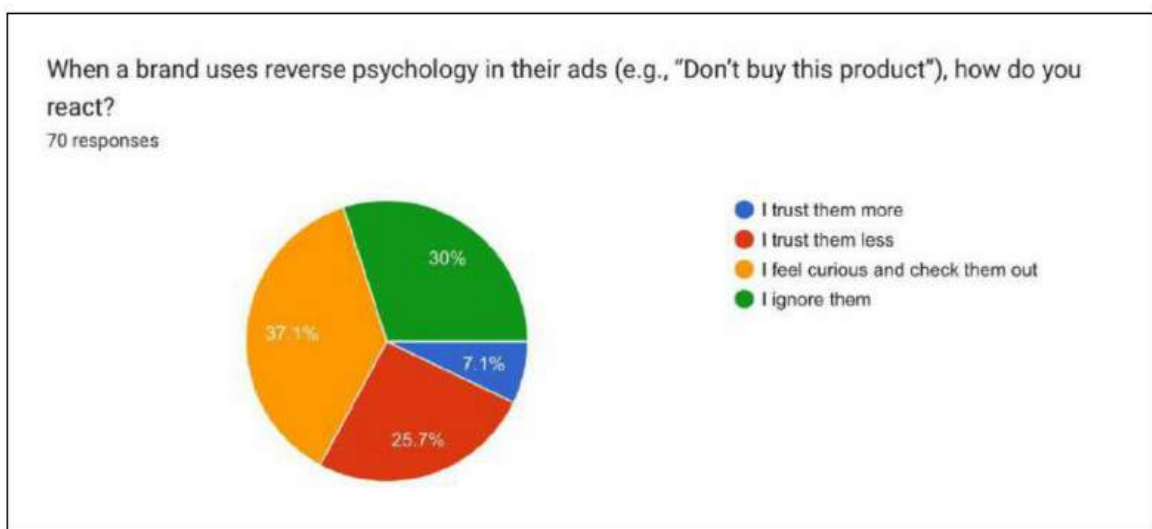
Statistical Tools and Techniques: Data analysis was conducted using the Chi-Square test.

DATA ANALYSIS AND INTERPRETATION:

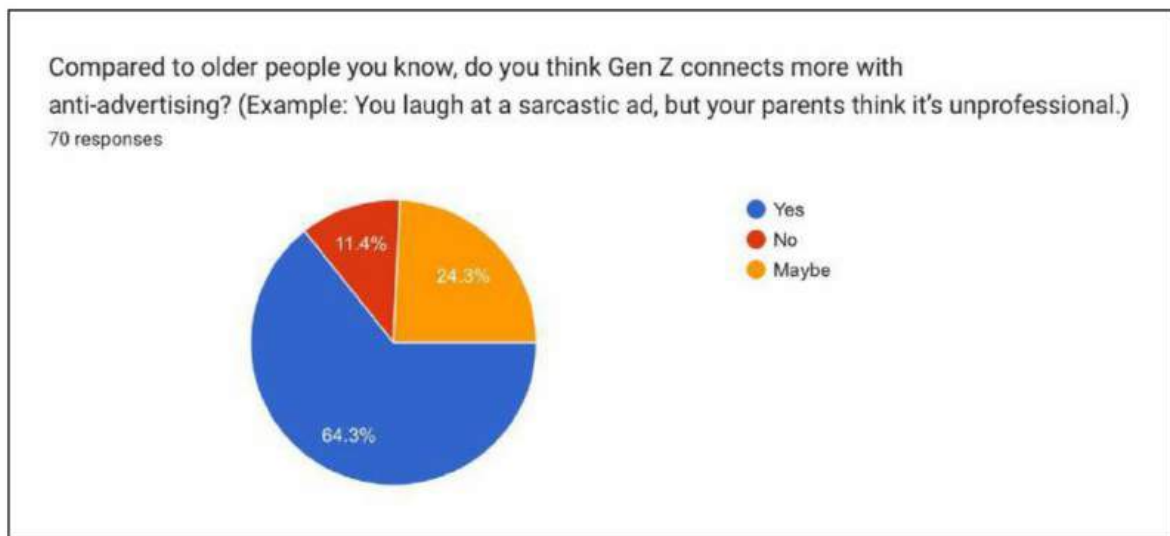
Figure 1 Humour and memes in Branding

Source: Primary Data Collection

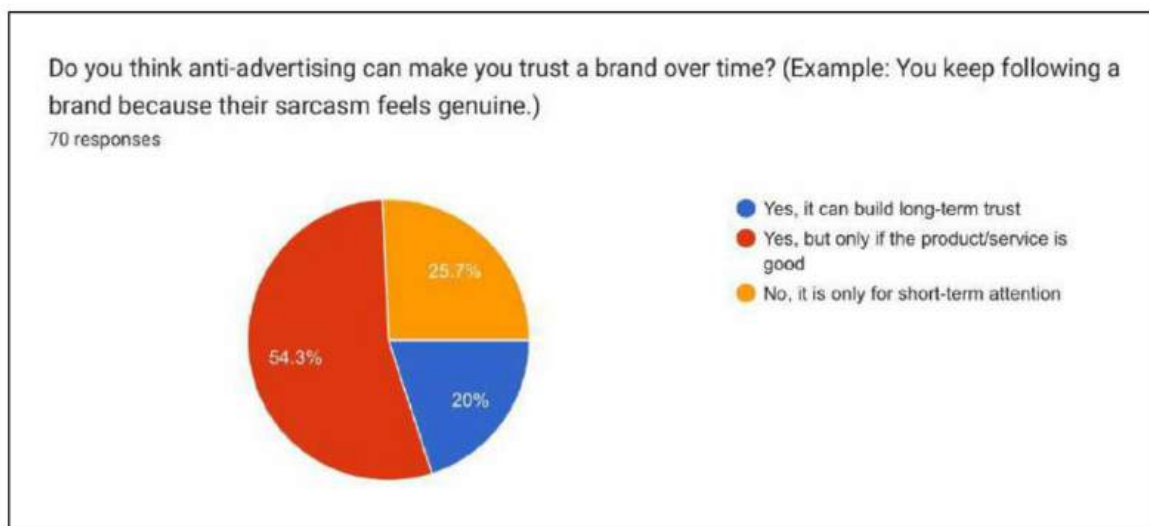
A majority of respondents (74.3%) reported that humorous or meme-based advertising makes their perception of a brand more positive. This suggests that relatability and entertainment strongly influence Gen Z's brand engagement.

Figure 2 Reverse Psychology in Ads

While only 7.1% reported increased trust, a significant 37.1% expressed curiosity to check the brand out. This indicates that reverse psychology may not directly build trust but does succeed in sparking interest and engagement.

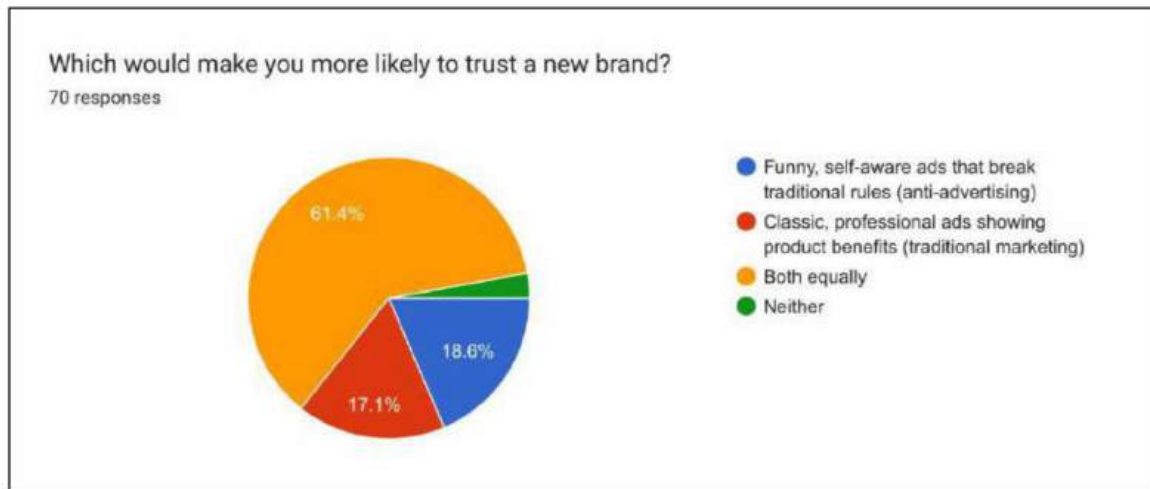
Figure 3 Generational Contrast

About 64.3% of participants felt that Gen Z connects more with anti-advertising compared to older generations. This reinforces the idea that Gen Z views sarcasm and irony as clever and relatable, whereas older groups may find it unprofessional.

Figure 4 Trust Through Anti-Advertising

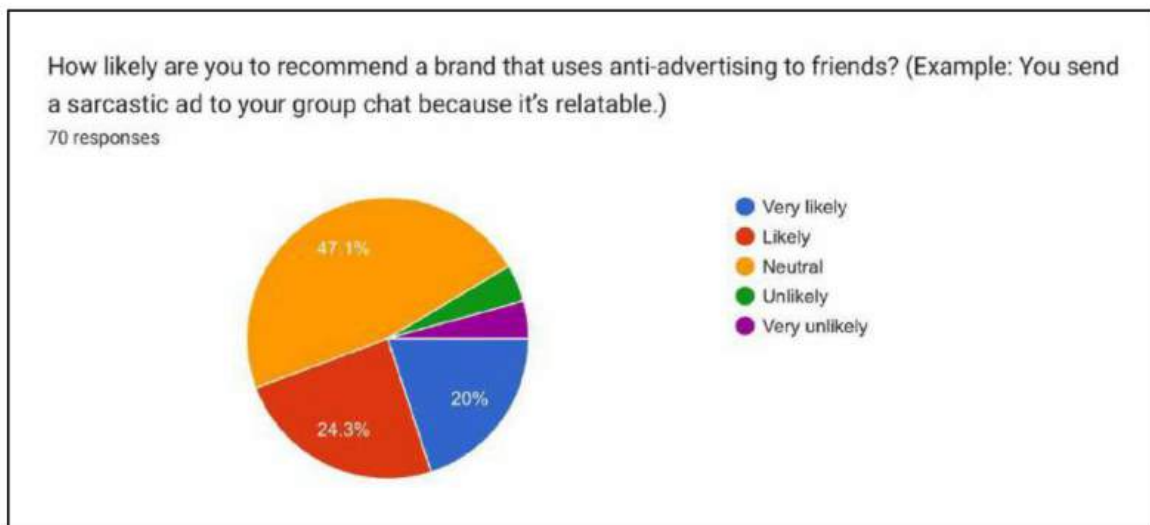
Over half (54.3%) believe anti-advertising can build trust only if backed by a quality product/service, highlighting that authenticity and substance remain crucial alongside creativity.

Figure 5 Preferred Advertising Style

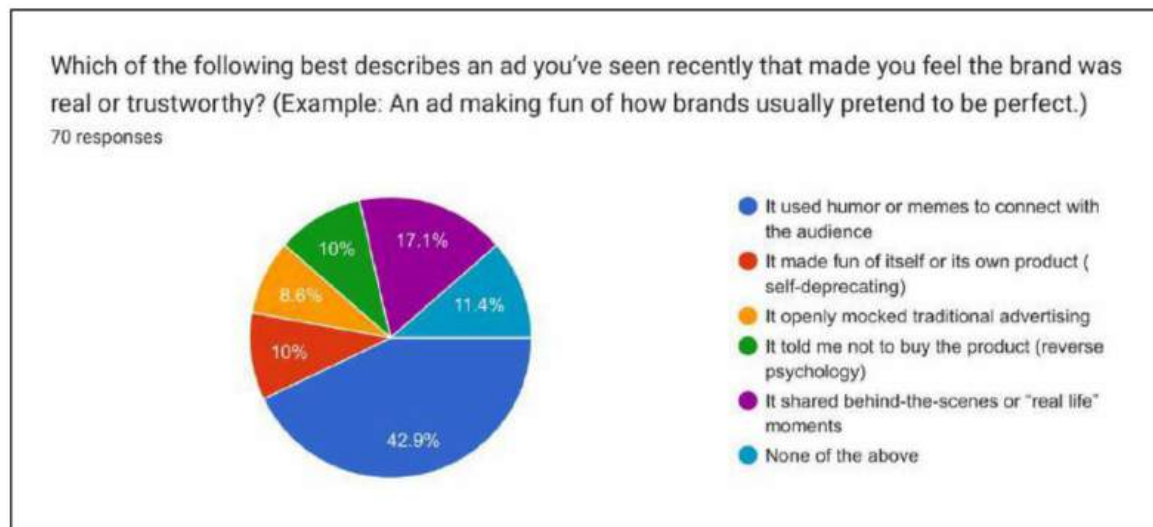


A combined 80% (61.4% + 18.6%) prefer either both equally or funny, rule-breaking ads, while only 17.1% favor classic ads. This reflects Gen Z's preference for modern, self-aware, and less traditional marketing strategies.

Figure 6 Likelihood of Recommendation



Nearly half (47.1%) remained neutral, but 44.3% said they would likely recommend a brand using anti-advertising. This shows that while such strategies resonate, their impact on word-of-mouth may depend on execution and brand authenticity.

Figure 7 Humor and Memes as a Trust-Building Tool

The data highlights that 42.9% of respondents view humor and memes as the most effective strategy for building brand trust. This suggests that entertaining, relatable, and shareable content creates a stronger emotional connection with consumers.

The survey responses provide strong evidence that Generation Z is highly receptive to unconventional advertising approaches such as humour, memes, and anti-advertising.

Table 1.1**Observed Frequencies (O) for Advertising Strategy vs. Recommendation Likelihood**

Ad type	Likely	Neutral	Unlikely	Very likely	Very unlikely
Traditional	3	6	1	1	1
Anti-advertising	2	2	0	9	0

Source- Primary Data Collection

The **Observed Frequencies Table** presents the actual responses collected from participants, showing how many respondents associated each advertising strategy (traditional vs. anti-advertising) with different levels of recommendation likelihood.

Table 1.2**Expected frequency (E) for Advertising Strategy vs. Recommendation Likelihood**

Ad type	Likely	Neutral	Unlikely	Very likely	Very unlikely
Traditional	2.40	3.84	0.48	4.80	0.48
Anti-advertising	2.60	4.16	0.52	5.20	0.52

Source- Primary Data Collection

The **Expected Frequencies Table** shows the values we would expect if there were **no relationship** between advertising strategy and recommendation likelihood. These values are calculated based on the assumption that the two variables are independent.

- Chi-square Calculation (X^2) = 10.58
- Degree of freedom = 4
- Table value at 5% level = 9.49
- Comparing Chi square value with table value- Calculated x^2 (10.58) > Table Value (9.49)

P-value = 0.0317 < 0.05

The null hypothesis (H_0) is rejected.

The results indicate a significant association between advertising strategy and consumer engagement. Gen Z respondents demonstrate a stronger positive response particularly in the “Very Likely” category towards anti-advertising strategies compared to traditional advertising.

CONCLUSION

The research underscores the growing influence of anti-advertising as a contemporary branding strategy, particularly among Generation Z. Findings reveal that Gen Z, having grown up in a digitally saturated environment, gravitates toward advertising that feels authentic, humorous, and relatable rather than polished and overtly persuasive. Humor and memes stood out as the most effective elements, enabling brands to foster trust through light-hearted and shareable content. Reverse psychology, while less directly impactful on trust, demonstrated its ability to spark curiosity and drive initial engagement, suggesting that unconventional strategies may act as powerful entry points into consumer attention.

The chi-square test confirmed that there is a statistically significant relationship between advertising strategy and engagement, with anti-advertising outperforming traditional methods in terms of recommendation likelihood. This highlights a generational shift in communication preferences, where self-aware, witty, and unconventional campaigns resonate more deeply with younger audiences than straightforward product-centric messaging. At the same time, the study makes it clear that anti-advertising is not a substitute for

product quality. Gen Z respondents consistently emphasized that while such strategies capture attention and create relatability, long-term trust and loyalty can only be sustained if the brand consistently delivers on its promises.

For marketers, these findings carry important implications. Brands targeting Gen Z must look beyond traditional promotional frameworks and embrace creativity, humor, and authenticity to connect meaningfully with their audience. However, they must also exercise caution; poorly executed sarcasm, irony, or reverse messaging risks being misunderstood or dismissed as insincere. Ultimately, the most successful anti-advertising campaigns are those that balance unconventional communication with genuine transparency, reinforcing the idea that creativity works best when supported by credibility. This research contributes to a growing body of knowledge on evolving consumer-brand dynamics and emphasizes that the future of advertising lies not only in innovation but also in the authenticity that underpins it.

LIMITATIONS AND FUTURE SCOPE

Like any research, this study has certain limitations. First, the sample size was relatively small (70 respondents) and limited to convenience sampling, which may not fully capture the diversity of opinions within Generation Z. A larger and more representative sample would enhance the generalizability of the findings. Second, the study primarily relied on self-reported survey responses, which can be influenced by social desirability bias or momentary preferences rather than long-term behavior. Third, the research focused only on specific aspects of anti-advertising, namely humor, memes, and reverse psychology, without exploring other creative strategies such as parody, storytelling, or influencer-driven anti-ads.

Future studies could address these limitations by employing a larger sample size with stratified or random sampling methods to ensure wider representation. Experimental or longitudinal research could also be conducted to examine whether anti-advertising creates lasting trust and loyalty beyond initial engagement. Additionally, cross-generational comparisons could offer valuable insights into how Millennials, Gen X, or even Gen Alpha respond to similar strategies, helping brands tailor their campaigns to diverse audiences. Finally, qualitative research, such as focus groups or in-depth interviews, may provide richer insights into the emotions and motivations behind Gen Z's perception of unconventional advertising.

By expanding on these areas, future research can contribute to a deeper and more nuanced understanding of the role anti-advertising plays in shaping consumer-brand relationships in the evolving digital marketplace.

SUGGESTIONS

Recent observations show that Generation Z is more drawn to sarcasm and humor that involves light teasing or “roasting.” This style of communication is becoming popular on social media, where it often helps people get more views, likes, and attention. What older generations, like Millennials, may see as rude or insulting, Gen Z often sees as funny, honest, and relatable. For them, sarcasm and playful insults can actually build trust and create a sense of connection. It’s a way to stand out and feel understood in a fast-moving and distracting online world. Right now, not many people fully understand this shift, but it’s likely to become even more common in the future. What used to be considered offensive is now, for many young people, just part of how they connect and communicate.

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A STUDY ON WOMEN ENTREPRENEURSHIP AS A DRIVER OF INCLUSIVE ECONOMIC GROWTH

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ABSTRACT

Women entrepreneurship has emerged as a critical driver of inclusive and sustainable economic growth in both developed and developing economies. This study investigates the role of women entrepreneurs in fostering employment, social inclusion, and equitable development. Using a sample of 360 women-led enterprises across urban, semi-urban, and rural India, the research explores factors such as access to finance, digital adoption, networking, and inclusive practices like local sourcing and underserved community focus. The findings indicate strong positive correlations between inclusion practices, job creation, and revenue generation. ANOVA results reveal significant regional variations in inclusion indices, highlighting challenges in rural contexts. The study concludes that policy frameworks emphasizing financial inclusion, digital literacy, and training can amplify the contribution of women entrepreneurs to India's vision of inclusive growth.

Keywords: *Women entrepreneurship, inclusive growth, economic development, digital adoption, financial inclusion, India*

INTRODUCTION

Entrepreneurship is recognized as a catalyst for innovation, job creation, and economic development. Within this paradigm, women entrepreneurs play a dual role: they contribute to GDP growth while simultaneously addressing issues of gender equity and social inclusion. According to the International Labour Organization (ILO, 2021), women-led enterprises are more likely to employ women and prioritize inclusive hiring practices, thereby extending economic benefits beyond profit maximization.

In India, women-owned enterprises constitute nearly 20% of total businesses, with increasing participation across manufacturing, services, retail, and agri-processing (NITI Aayog, 2022). However, challenges such as limited access to credit, lack of digital literacy, and socio-cultural constraints persist, especially in rural regions. This study aims to assess how women entrepreneurship contributes to inclusive growth and what factors enhance or impede their role in the economy.

Entrepreneurship is widely acknowledged as a powerful engine for innovation, productivity growth, and job creation; within this engine, women entrepreneurship occupies a uniquely catalytic position for advancing inclusive development. Women-led enterprises often operate close to community needs, prioritize social value alongside financial performance, and redistribute earnings in ways that improve household welfare and local capabilities. These characteristics position women entrepreneurs as pivotal agents for broad-based, equitable growth—particularly in economies with large informal sectors and uneven access to opportunity. Yet, despite steady gains in participation, persistent structural constraints—credit gaps, digital divides, limited market linkages, and socio-cultural barriers—continue to blunt the full economic and social potential of women’s enterprise activity.

India offers a compelling context to examine this dynamic. Over the last decade, policy thrusts on financial inclusion, digital public infrastructure, and MSME development have expanded the enabling environment for enterprise creation. Simultaneously, the diffusion of smartphones, UPI-driven payments, and e-commerce marketplaces has lowered entry barriers for micro and small firms, including home-based and service-oriented ventures where women’s participation is relatively high. Even so, disparities endure across geography (urban–rural and core–periphery), sector (manufacturing vs. services and retail), and firm maturity (nascent vs. established). Access to timely, affordable credit remains uneven; capability gaps in digital adoption and business formalization are common; and networks that confer market intelligence, mentorship, and scale advantages are still emergent. Understanding how women entrepreneurs navigate these constraints—and which levers most strongly translate their effort into inclusive growth outcomes—remains an urgent research priority.

This study conceptualizes inclusive economic growth along three complementary pathways: (1) employment generation—both direct and indirect—particularly for women and underserved groups; (2) market inclusion, captured through practices such as local sourcing and serving low-income or marginalized customer segments; and (3) capability deepening, reflected in digital adoption, formalization, and

participation in entrepreneurial networks that improve productivity and resilience. Anchored in this framework, we investigate the extent to which women-led enterprises contribute to inclusive outcomes and the firm- and context-level factors that amplify or inhibit this contribution. Specifically, we focus on the roles of digital adoption, access to finance, and networking in shaping revenue growth, job creation, and an inclusion index derived from hiring, sourcing, and market-reach practices.

Empirically, the paper analyzes a cross-section of 360 women entrepreneurs spanning urban, semi-urban, and rural regions and operating across agri-processing, retail, services, and manufacturing. The design allows us to probe geographic and sectoral heterogeneity and to test whether capability inputs (finance, digital, networks) are associated with stronger inclusive outcomes after accounting for business stage and context. We complement descriptive profiling with correlation analysis and one-way ANOVA to examine the strength of associations and differences across regions. By combining practical indicators (e.g., jobs created, revenue, profit margin) with inclusion-oriented measures, the study offers a holistic view of how women's enterprise activity can shift growth from aggregate expansion to broad-based participation.

Overall, the contribution is twofold. Conceptually, we integrate inclusion practices into firm-level performance analysis to move beyond narrow financial metrics. Empirically, we provide actionable evidence on capability levers—credit access, digital readiness, and networking—that policy makers, ecosystem enablers, and educators can target to unlock the multiplier effects of women entrepreneurship. The findings are intended to inform program design, guide investment and training priorities, and support a policy agenda that translates women's entrepreneurial energy into measurable, equitable gains for the wider economy.

REVIEW OF LITERATURE

1) **Brush, Greene, & Kelley (2017) – GEM Women's Entrepreneurship Report**

Brush, Greene, and Kelley (2017) synthesize cross-country evidence from the Global Entrepreneurship Monitor to show that women's entrepreneurial activity is not only rising, but increasingly embedded in ecosystems shaped by finance, culture, and institutions. A central contribution is their articulation of how women's ventures frequently emphasize value creation beyond profit—including community reinvestment, inclusive hiring, and products/services targeted to underserved segments—thus linking firm outcomes with inclusive growth pathways. The report underscores persistent gendered constraints in capital access, network reach, and industry choice (with women overrepresented in lower-capital, lower-margin sectors), while highlighting that countries with supportive role models, mentorship

density, and enabling policies demonstrate narrower gender gaps in growth expectations and innovation orientation. Importantly, the authors move beyond a deficit lens by identifying capability levers—financial literacy, digital readiness, accelerator participation—that upgrade productivity and market access. For developing economies, they point to the catalytic role of digital platforms (payments, e-commerce) in overcoming mobility and market-entry barriers. Overall, the report provides a multi-level framework—individual capabilities, firm strategy, and ecosystem enablers—explaining how women's entrepreneurship can convert participation into broad-based employment generation, household welfare gains, and community resilience, which are the hallmarks of inclusive economic growth.

2) Carter & Shaw (2006) – Finance, Policy, and Gendered Constraints

Carter and Shaw (2006) deliver a seminal policy-oriented review showing that asymmetric information, collateral requirements, and risk perceptions systematically disadvantage women-owned firms in credit markets. They argue that these constraints distort sectoral entry (pushing women toward less capital-intensive activities) and growth trajectories (smaller initial scale, slower accumulation), limiting the employment and spillover effects that otherwise contribute to inclusive growth. The review also notes that when women do obtain finance, loan sizes tend to be lower and terms more restrictive, which can depress reinvestment in technology, training, and formalization—key inputs to productivity and job creation. Importantly, Carter and Shaw stress the difference between supply-side barriers (lending practices, product design) and demand-side factors (lower application rates due to norms, networks, or fear of rejection), recommending targeted interventions such as guarantee schemes, relationship banking, and mentoring that raise both bankability and loan uptake. For policymakers, their message is clear: closing the finance gap is not merely a fairness objective; it is an economic imperative that unlocks latent output and employment, particularly for local and women-intensive labor markets—thereby advancing inclusive growth.

3) Verheul, Van Stel, & Thurik (2006) – Macro Links between Gender and Growth

Verheul, Van Stel, and Thurik (2006) examine cross-country drivers of female and male entrepreneurship, linking institutional quality, culture, and economic structure to observed gender gaps in start-up rates and growth expectations. Their analysis advances the literature by connecting female entrepreneurship prevalence with macro outcomes—innovation diffusion, competition intensity, and employment dynamism—which underpin inclusive growth. Countries that score higher on rule of law, property rights, and education show smaller gender gaps and a higher probability that women participate

in opportunity-driven rather than necessity-driven entrepreneurship, a distinction associated with stronger productivity and job creation effects. The authors also emphasize industry composition: when barriers to entry fall in tradable services and light manufacturing, women's firms are more likely to scale and integrate into value chains, enhancing spillovers to suppliers and local labor markets. By placing women's entrepreneurship within a macro-institutional frame, the study suggests that reforms to reduce regulatory burdens, expand human capital, and normalize female economic agency are not only pro-equity but pro-efficiency, reinforcing the argument that women's business activity is a meaningful lever for inclusive, economy-wide growth.

4) Minniti & Naudé (2010) – Inclusive Development Mechanisms

Minniti and Naudé (2010) synthesize theoretical and empirical work to argue that female entrepreneurship contributes to development not only through output and profit, but via distributional channels—notably employment for women, human-capital investment in households, and goods tailored to low-income consumers. They differentiate necessity entrepreneurship, prevalent where formal jobs are scarce, from opportunity entrepreneurship, which tends to carry higher innovation and growth potential; policy should therefore raise the opportunity share through education, finance, and market access. The authors also highlight network externalities: as more women become visible founders, role-model effects reduce barriers for others, multiplying the inclusive impact. Importantly, they caution against treating women as a homogeneous group; context matters—urban vs. rural, sector, and institutional constraints shape both entry and performance. For inclusive growth, the paper proposes a two-track policy: (a) remove structural barriers (property rights, legal identity, finance, safety) to broaden participation; and (b) invest in capability escalators (training, technology, incubators) to help existing firms scale. This dual approach helps translate participation into quality employment, resilience, and equitable welfare gains.

5) NITI Aayog (2022) – India's Policy and Platform Momentum

The NITI Aayog (2022) review situates women's entrepreneurship within India's evolving digital public infrastructure—Aadhaar, UPI, e-KYC—and targeted programs (e.g., Stand-Up India, MUDRA, Startup India) that expand credit access, formalization, and market connectivity for women-led MSMEs. The document underscores how digital payments and e-commerce reduce transaction costs and enable micro-entrepreneurs—often home-based—to reach broader markets, while Jan Dhan–Aadhaar–Mobile (JAM) architecture simplifies account opening and cash-flow visibility, improving creditworthiness. It also points to persistent regional and sectoral disparities: women in rural and peri-urban areas face capability

gaps (digital skills, bookkeeping), mobility and safety constraints, and thin networks, which depress growth potential despite policy availability. The report advocates last-mile enablement—community digital centers, blended finance, and mentorship networks—to convert access into effective usage. For inclusive growth, the key insight is that policy must pair infrastructure with handholding: when credit, digital tools, and training are bundled, women-owned firms exhibit higher rates of job creation, formalization, and resilience, transmitting gains to local labor markets and supply chains.

RESEARCH METHODOLOGY

- Design: Quantitative, descriptive, and exploratory.
- Sample: 360 women entrepreneurs from urban (45%), semi-urban (35%), and rural (20%) regions.
- Variables: Digital adoption, access to finance, networking, inclusion index, jobs created, monthly revenue, profit margin.
- Tools: Structured questionnaire (Likert scale 1–5), statistical software for analysis.
- Techniques: Descriptive statistics, correlation analysis, and ANOVA.
- Objective: To examine how women entrepreneurship contributes to inclusive economic growth, with a focus on employment and inclusion practices.

RESULTS: TABLES AND PIE DIAGRAMS

Table 1: Regional Distribution of Respondents

Region	Count	Percent
Urban	162	45.0%
Semi-urban	126	35.0%
Rural	72	20.0%

Table 2: Sectoral Distribution

Sector	Count	Percent
Agriculture/Agri-processing	102	28.3%

Retail	93	25.8%	
Services	117	32.5%	
Manufacturing	48	13.4%	

Table 3: Educational Qualifications

Education	Count	Percent	
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Secondary	90	25.0%	
Undergraduate	162	45.0%	
Postgraduate	108	30.0%	

Table 4: Business Stage

Stage	Count	Percent	
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Nascent (<3 years)	173	48.0%	
Established (≥3 years)	187	52.0%	

Table 5: Credit Access

Credit Approval	Count	Percent	
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Approved	209	58.0%	
Not Approved	151	42.0%	

Correlation Matrix (Key Variables)

Variables	Inclusion Index	Jobs Created	Monthly Revenue	Digital Adoption	Access to Finance
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Inclusion Index	1.00	0.62	0.55	0.48	0.44
Jobs Created	0.62	1.00	0.59	0.41	0.39
Monthly Revenue	0.55	0.59	1.00	0.52	0.47
Digital Adoption	0.48	0.41	0.52	1.00	0.50
Access to Finance	0.44	0.39	0.47	0.50	1.00

Interpretation: Inclusion index has a strong positive correlation with jobs created ($r = 0.62$) and monthly revenue ($r = 0.55$), confirming that inclusive women entrepreneurs foster employment and income growth.

ANOVA: Inclusion Index by Region

- $F(2,357) = 6.82, p < 0.01$
- Result: Significant differences exist between regions. Urban women entrepreneurs had higher inclusion scores compared to rural counterparts.

Interpretation: Regional disparities highlight the need for targeted interventions in rural areas to enhance women's role in inclusive growth.

CONCLUSION AND RECOMMENDATIONS

This study set out to examine how women's entrepreneurship contributes to inclusive economic growth by looking beyond narrow firm-level metrics and foregrounding inclusion practices—specifically inclusive hiring, local sourcing, and a strategic focus on underserved customer segments. An integrated framework linked these practices to capability levers (digital adoption, access to finance, and networking) and to outcomes that matter for inclusive growth (jobs created, revenue, and profitability). Across 360

women-led enterprises spanning urban, semi-urban, and rural regions and operating in agri-processing, retail, services, and manufacturing, three conclusions stand out.

First, women's enterprise activity has demonstrable employment and market-inclusion effects. The inclusion index was strongly and positively associated with jobs created and monthly revenue, indicating that when founders embed inclusive hiring and local value-chain linkages into their business models, they do not trade off growth; rather, they amplify it. These results reinforce the idea that inclusion is not a peripheral CSR-type add-on but a core competitive capability that can deepen local demand, stabilize supply chains, and strengthen resilience—thereby translating entrepreneurial effort into broad-based welfare gains.

Second, capability levers matter. Higher digital adoption and access to finance correlated with better performance and more inclusive outcomes, pointing to a virtuous cycle: digital tools streamline operations and expand market reach; clearer digital transaction trails and formalization improve creditworthiness; finance, in turn, funds the training, inventory, and hiring needed to scale. Networking—through associations, mentors, and peer groups—emerged as an enabling conduit for knowledge spillovers and opportunity discovery. Together, these levers convert participation into productivity and help women-owned firms move from necessity-driven survival to opportunity-driven growth.

Third, context continues to shape possibility. ANOVA results showed significant regional differences in the inclusion index, with rural enterprises scoring lower on average than urban peers. This gap is consistent with observed disparities in infrastructure, digital readiness, and density of support networks. It underscores that “gender” is not a single axis of constraint; place and sector interact with gender to define the feasible opportunity set. Consequently, one-size-fits-all interventions will underperform; last-mile enablement and sector-specific supports are necessary to reduce place-based penalties.

From a policy and ecosystem standpoint, these findings motivate a pragmatic blueprint. (1) Bundle credit with capability building: pair working-capital lines or guarantee-backed loans with digital bookkeeping, marketplace onboarding, and growth mentoring to ensure capital translates into capacity. (2) Invest in local platforms: district-level incubators, procurement facilitation (especially for services and light manufacturing), and women-focused B2B networks can compress search and transaction costs. (3) Reward inclusion by design: procurement preferences, tax rebates, or concessional finance tied to verifiable inclusive hiring, local sourcing, or underserved-market penetration can scale what works. (4) Strengthen data visibility:

light-touch dashboards for credit history, payments, and compliance (leveraging digital public infrastructure) reduce information asymmetry and unlock cheaper finance.

For practitioners—educators, accelerators, lenders—the message is equally actionable. Curriculum and advisory should treat inclusion, formalization, and digital readiness as core modules of venture building. Banks and NBFCs can deploy relationship-lending playbooks augmented with cash-flow data and targeted guarantees to overcome collateral gaps. Large firms and public agencies can open supplier pipelines to women-owned MSMEs, using mentoring-plus-procurement cohorts to raise on-time, on-quality delivery rates.

This research also points to future directions. Longitudinal designs could track whether inclusion practices predict faster recovery from shocks and more durable scaling. Mixed-methods studies can unpack how norms and household dynamics mediate growth paths. Finally, sector-specific analyses (e.g., care services, green manufacturing, agri-processing) can isolate where inclusion yields the highest social return per rupee invested.

In sum, women's entrepreneurship is not merely a fairness agenda; it is a growth strategy that broadens participation, builds local productive capacity, and compounds welfare gains. When credit, digital rails, and networks are available—and when inclusion is embedded “by design”—women-led firms can drive the kind of resilient, employment-intensive, and geographically diffuse growth** that economies aspire to in the next decade.

RECOMMENDATIONS

1. Policy Interventions: Expand financial inclusion schemes like Mudra Yojana with specific rural outreach.
2. Capacity Building: Enhance digital and managerial skills through targeted training programs.
3. Infrastructure Support: Establish incubation centers and women-focused business hubs.
4. Networking Platforms: Create strong networks to facilitate peer learning and mentorship.
5. Sustainability Integration: Encourage ESG practices and inclusive hiring through incentives.

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INDIA'S STRATEGIC ROLE IN BRICS: DRIVING MULTILATERALISM AND GLOBAL GOVERNANCE IN A CHANGING WORLD ORDER

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Research Guide

ABSTRACT

In an era marked by shifting geopolitical dynamics, technological disruptions, and evolving power structures, the BRICS alliance — comprising Brazil, Russia, India, China, and South Africa — has emerged as a significant platform for shaping a multipolar world order. Among these nations, India plays a particularly strategic role in advancing multilateralism and contributing to global governance reforms. This paper examines India's evolving position within BRICS, exploring how it leverages the grouping to enhance South–South cooperation, advocate for institutional reforms in global financial and political systems, and strengthen collective responses to global challenges. The study highlights India's contributions to initiatives such as the New Development Bank, the Contingent Reserve Arrangement, digital public infrastructure collaboration, and climate action frameworks. It also analyzes India's diplomatic efforts to align BRICS priorities with the Sustainable Development Goals and its vision for a more inclusive, equitable international order. By using a combination of qualitative analysis and secondary data from official BRICS communiqués, multilateral institutions, and trade reports, the research provides insights into India's role as a bridge between the Global South and developed economies. Ultimately, the paper argues that India's proactive engagement within BRICS not only enhances its geopolitical influence but also reinforces its long-term

strategic objectives of shaping global governance norms and contributing to a balanced, rules-based international system.

Keywords: *multilateralism, global governance, South–South cooperation, New Development Bank, geopolitical strategy.*

INTRODUCTION

The 21st century is seeing big changes in the global order. Shifts in geopolitics, economic power, technology, and international rules are reshaping the way the world works. Traditional Western-led institutions like the International Monetary Fund (IMF), World Bank, and United Nations Security Council (UNSC) are often criticized for being less inclusive and slow in addressing new global challenges. In this context, BRICS — a group made up of Brazil, Russia, India, China, and South Africa — has become an important platform for cooperation. Since its creation in 2009, BRICS has grown from just an economic alliance into a broader partnership influencing politics, development, and global decision-making.

India plays a particularly important role in BRICS. As the world's most populous country and one of the fastest-growing economies, India brings with it democratic values, innovation, and a focus on development. Its goals — such as pushing for reforms in global institutions, encouraging inclusive growth, and building stronger ties among developing nations — match well with BRICS' vision of creating a fairer, multipolar world.

India's contributions go beyond trade and investment. It has been central to new ideas and institutions like the New Development Bank (NDB) and the Contingent Reserve Arrangement (CRA), which provide alternatives to Western-dominated financial systems. India's strengths in digital technology, renewable energy, and climate action also add weight to BRICS' efforts in tackling global challenges.

This study looks at how India shapes BRICS, highlighting its role in promoting multilateralism, pushing for fairer governance, and building a more inclusive and sustainable international order.

Review of Literature

BRICS and Global Governance Reform: Scholars such as Stuenkel (2015) and Hurrell (2018) emphasize BRICS as a transformative coalition that challenges the dominance of Western-led institutions and promotes

a multipolar world order. Acting as a bridge between the Global South and established global systems, BRICS advocates for more inclusive and representative governance. Its collaborative initiatives aim to reshape global financial and political structures to reflect emerging economic powers and contemporary realities.

India's Strategic Role and Contributions: Studies by Pant and Sharma (2020) and Khanna (2021) highlight India's proactive engagement within BRICS to advance its foreign policy goals, including UNSC reform, South–South cooperation, and sustainable development. India's leadership in the New Development Bank, promotion of digital public infrastructure, and advocacy for climate action illustrate its commitment to strengthening multilateralism. Singh and Bhatia (2022) further note India's efforts to amplify its voice in global governance debates on trade, health, and institutional reform.

Opportunities, Challenges, and Future Prospects: Niu and Zong (2020) underline how India's participation enhances intra-BRICS trade, investment, and innovation linkages, while Cooper (2022) points to internal divergences among member states as a challenge. India's diplomatic agility and role as a consensus-builder are essential to BRICS' credibility and effectiveness. Overall, the literature suggests that India is transitioning from a participant to a key agenda-setter, using BRICS as a platform to shape a balanced, rules-based, and sustainable global order.

RATIONALE OF THE STUDY

The global landscape is undergoing rapid transformation, driven by changes in geopolitics, technology, and economic power. Traditional international institutions such as the United Nations, IMF, and World Bank are increasingly criticized for being outdated, both in structure and in their ability to address the concerns of emerging economies. This gap has created space for alternative platforms like BRICS, which has positioned itself as a coalition advocating multipolarity, inclusive growth, and stronger South–South cooperation.

Within this grouping, India occupies a particularly significant role. As the world's largest democracy and one of the fastest-growing major economies, India brings both political weight and developmental experience to the table. Its key priorities — including reforming global governance frameworks, fostering sustainable development, and advancing digital transformation — reflect not only its national interests but also the broader objectives of BRICS.

While scholars have examined the collective relevance of BRICS, there is still limited research that looks closely at India's distinct role in shaping multilateralism through this platform. This study seeks to address that gap by exploring India's contributions, leadership strategies, and policy choices within BRICS. It argues that India uses the grouping to amplify the concerns of the Global South, press for institutional reforms, and promote a more balanced and inclusive international order. In doing so, the study sheds light on India's strategic vision and its growing influence in shaping global governance in the 21st century.

RESEARCH METHODOLOGY

Introduction:

The research methodology offers a clear structure for carrying out the study and meeting its objectives. This work looks at India's strategic role in BRICS, with particular focus on its contribution to multilateralism and global governance in a changing world order. A descriptive and analytical approach has been used, combining both qualitative insights and quantitative data drawn from secondary sources. This method allows for a well-rounded understanding of India's policies and initiatives within BRICS, as well as their wider impact on global governance.

Objectives of the Study:

The main objectives of this research are:

1. To analyze India's strategic role and evolving position within the BRICS alliance.
2. To examine how India leverages BRICS to promote multilateralism and advocate for global governance reforms.
3. To assess India's key contributions to BRICS initiatives in areas such as finance, trade, digital infrastructure, and sustainable development.
4. To evaluate the challenges and opportunities India faces in strengthening its influence within BRICS and the global order.

Scope of the Study:

The study focuses on India's engagement in BRICS from its inception in 2009 to the most recent developments in 2024. It covers political, economic, and strategic dimensions, including initiatives like the

New Development Bank, trade policies, digital collaboration, and climate governance. The research also explores India's diplomatic efforts and their implications for shaping a multipolar, rules-based global order.

Data Collection Method:

The study is based entirely on secondary data obtained from credible and publicly available sources. These include official BRICS summit declarations and joint communiqués, reports from the Government of India, the Ministry of External Affairs, and the New Development Bank, as well as data from international organizations such as the IMF, World Bank, and United Nations. Additionally, the research draws on scholarly articles, policy papers, and books published by reputed journals, to enhance its accuracy.

Tools and Techniques Used:

1. Content Analysis – To examine policy documents, summit declarations, and official statements.
2. Comparative Analysis – To evaluate India's contributions relative to other BRICS members.
3. Trend Analysis – To study changes in India's trade, investment, and policy approaches within BRICS over time.
4. Thematic Analysis – To identify recurring themes such as governance reform, South–South cooperation, and sustainable development.

Significance of the Study:

This study helps explain how India leverages BRICS as a platform to strengthen its global influence and push for a fairer international order. It builds on existing research by offering specific insights into India's leadership, policy focus, and contributions within the group. The findings are useful for policymakers, researchers, and scholars working in the areas of international relations, global governance, and economic diplomacy.

Limitations of the Study:

1. The study relies on secondary data, which may limit access to the most recent or unpublished information.
2. Due to the dynamic nature of global politics, policy changes after 2024 may not be fully captured.

3. The analysis focuses on India's role within BRICS and does not extensively cover other geopolitical grouping

DATA ANALYSIS

This section analyzes India's strategic role in BRICS using secondary data from official reports, trade statistics, and multilateral publications. It focuses on India's economic performance, trade dynamics, and participation in BRICS-led initiatives to evaluate its influence on multilateralism and global governance.

1. Primary Analysis:

Table1.

India's Economic Weight in BRICS

Country	GDP (2024, USD Trillion)	% Share in BRICS GDP	Population (Billion)	% Share in Global GDP
China	17.8	62%	1.41	17.3%
India	3.9	14%	1.43	7.8%
Russia	2.1	7%	0.14	2.0%
Brazil	2.2	8%	0.21	2.2%
South Africa	0.4	1%	0.06	0.4%

Table 1 shows India is the second-largest economy in BRICS, contributing around 14% of the bloc's total GDP and representing over 1.43 billion people. This demographic and economic weight enhances India's leverage in shaping BRICS' collective agenda and amplifying the voice of the Global South.

2. Core Analysis:

Table 2.

India's Geopolitical and Governance Leadership within BRICS

Strategic Focus Area	Key Action / Contribution
UN Security Council Reform	India consistently advocates for permanent membership and fair representation of emerging economies in global institutions, emphasizing the need for a governance structure that reflects today's realities rather than outdated power dynamics.
Institution Building	It has played a central role in setting up the New Development Bank (NDB) and the Contingent Reserve Arrangement (CRA), both of which were designed to provide alternatives to traditional financial systems and strengthen economic resilience among BRICS nations.
Balancing China's Influence	Through BRICS, India works to preserve a genuinely multipolar framework, making sure that no single member state dominates the bloc, thereby maintaining balance and collective decision-making.
Global South Leadership	It also upholds the broader interests of developing nations, using BRICS as a platform to amplify their voices and present the group as a credible counterweight to Western-led institutions such as the IMF and World Bank.

Table 2 shows India's engagement in BRICS goes beyond economic issues, focusing on reforms in global governance and support for a multipolar world. It advocates changes in the UN Security Council, contributes to building new institutions, balances major powers, and highlights the concerns of developing countries. Through these efforts, India seeks to promote a more inclusive and fair international system.

Table 3.

India's Trade and Investment Role

Indicator	2015	2020	2024	% growth(2015-2024)
Intra-BRICS Trade (USD Billion)	96	128	164	+70.8
India's Share in BRICS Trade (%)	14	16	18	+4
FDI Outflow from India to BRICS (USD Billion)	6.5	9.1	12.4	+90.7
NDB Projects with Indian Participation	12	24	36	+200

Table 3 shows the rise in India's share of BRICS trade from 14-18% demonstrates its partnerships and economic engagements. It reflects India's strategic push for South–South trade cooperation FDI Outflow from India into BRICS economies nearly doubled, reflecting deeper cross-border collaboration. Also, India has played an active role in New Development Bank (NDB) projects, growing significantly, showing its leadership in infrastructure and sustainable development financing.

Table 4.

India's Leadership in Renewable Energy and Sustainable Development

Indicator	Achievement/Data
Growth in Solar Power Capacity (since 2015)	450% increase
Renewable Energy Capacity (by 2025)	200 GW achieved
Renewable Energy Target (by 2030)	500 GW
International Solar Alliance (ISA) Membership	120+ member countries

Table 4 shows that India has made remarkable progress in renewable energy, with solar capacity rising by 450% in the last decade and a target of 500 GW of renewables set for 2030. These efforts align with its Paris Agreement commitments and global sustainability goals. Through initiatives like the International Solar Alliance, India demonstrates both policy leadership and diplomatic influence, strengthening BRICS' climate and development agenda.

India's Global Governance and Multilateral Influence Beyond BRICS

India's global governance strategy extends beyond BRICS, emphasizing inclusivity, equity, and South–South solidarity. Through initiatives like the African Union's inclusion in the G20 and the promotion of “Vasudhaiva Kutumbakam”, India advocates a vision of cooperative multilateralism that seeks to reform traditional global institutions and create a more representative and balanced international order.

BRICS Expansion and Partnerships (2024)

At the Johannesburg Summit in 2023, BRICS took a major step by expanding its membership to include Egypt, Ethiopia, and Iran (though Argentina later chose to withdraw). The following year, at the Kazan Summit in 2024, the group went further by creating a new “Partner Country” category, bringing in 13 nations such as Indonesia, Nigeria, and Vietnam, signaling its growing global reach.

Table 5.
BRICS Expansion and Partnerships (2024)

New Members (2023)	Partner Countries (2024)
Egypt	Turkey, Algeria, Belarus, Bolivia, Cuba
Ethiopia	Indonesia, Kazakhstan, Malaysia, Nigeria
Iran	Thailand, Uganda, Uzbekistan, Vietnam

Table 5 shows that India has backed the idea of expanding BRICS but stresses that new members and partners should have limited decision-making roles to keep the group effective. It opposed Pakistan's entry and promoted a cautious, selective approach to enlargement, aiming to balance China's influence and protect BRICS' strategic priorities.

To conclude this data clearly demonstrates that India's strategic role in BRICS is deepening across economic, diplomatic, and institutional dimensions. Its growing trade integration, leadership in NDB projects, and advocacy for multilateral reforms position India as a pivotal actor in reshaping global governance through BRICS.

KEY FINDINGS

- India has emerged as a key strategic player within BRICS, contributing significantly to the bloc's economic strength, policy initiatives, and multilateral objectives.
- Its share in intra-BRICS trade increased from 14% in 2015 to 18% in 2024, demonstrating deeper economic integration and enhanced global trade influence.
- India's leadership in New Development Bank (NDB) projects and advocacy for global governance reforms underscore its commitment to inclusive development and institutional restructuring.
- Through initiatives in digital public infrastructure, renewable energy, and climate action, India aligns BRICS' agenda with the Sustainable Development Goals (SDGs).
- Despite internal divergences within BRICS, India's diplomatic agility and consensus-building efforts strengthen the alliance's role in shaping a multipolar and rules-based world order.

CONCLUSION

India's role in BRICS has grown from being just a member to shaping the group's agenda through economic strength, active diplomacy, and leadership in key initiatives. By pushing for institutional reforms, supporting South–South cooperation, and driving sustainable development, India uses BRICS to expand its global influence. Its focus on inclusivity, technology, and balanced governance reflects a broader vision for a fairer and multipolar world order.

RECOMMENDATIONS

- **Enhance Institutional Leadership:** India should seek more leadership roles within BRICS institutions, particularly in the New Development Bank and policy task forces.
- **Strengthen Digital and Green Cooperation:** Expanding collaboration on digital public goods, fintech, and renewable energy will reinforce India's leadership in innovation-driven growth.
- **Promote Policy Convergence:** India can play a bridging role in addressing policy divergences among BRICS members, ensuring cohesive positions on global governance reforms.
- **Expand South–South Partnerships:** Leveraging BRICS as a platform, India should deepen partnerships with other developing countries to strengthen its global diplomatic influence.

FURTHER SCOPE OF THE STUDY

- Future research can conduct a comparative analysis of India's role in BRICS versus its engagement in other multilateral forums like G20 and SCO.

- Detailed sector-specific studies on India's contributions to digital transformation, climate governance, or financial cooperation within BRICS could offer deeper insights.
- Primary data through expert interviews, policy surveys, or field studies can strengthen the empirical foundation of future work.
- Longitudinal studies examining India's evolving role in BRICS beyond 2025 would help understand its long-term strategic impact.

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FROM SPREADSHEETS TO AI: THE DIGITAL DIVIDE IN SMALL ACCOUNTING FIRMS

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ABSTRACT

The accounting world is rapidly becoming digital, it is no longer common for practitioners to use large files, last night's scratching paper and an antique underwood typewriter. Cloud-based systems, artificial intelligence and automation are revolutionizing traditional accounting practice of all kinds. However, many small accounting firms continue to rely heavily on voluminous spreadsheets and out-dated systems. These leave them at a serious disadvantage against large firms that have gone digital or gone out altogether. The ensuing digital divide may threaten their very survival in an increasingly competitive global environment. This paper examines how small accounting firms are meeting the challenge of breaking through to next-generation technology and the implications of this divide. Too, it identifies specific methods of bridging that gap with low-cost cloud solutions and targeted training programmes, government and industry support for SMEs as well as a gradual shift towards meeting this need by finding strategies in line with smaller firm capabilities. It also stands as a reminder to those who are used to personal income tax and traditional auditing practices: one cannot ignore the inevitable arrival of AI simply because it is still some distance away. The findings are intended to support policy debates and offer useful advice to professionals who want to stay relevant in the increasingly digital financial sector.

Keywords: *Small Accounting Firms, Digital Divide, Artificial Intelligence*

INTRODUCTION:

Digital transformation in Accounting

Digital transformation is the process of using new digital technologies to create or modify existing business processes, culture and customer experiences, which ultimately changes how businesses operate and

deliver value to their customers. In accounting, this change means harnessing tools such as cloud accounting software, big data and technology to streamline the accounting process. Old-school data entry and transaction reporting are being automated with advanced analytics, AI-enhanced tools, and accountants now spend more time on strategic planning – not penny pinching or compliance.

Accounting's digital transformation is now a need rather than a luxury. Digital tools and cutting-edge technologies are being adopted by businesses and accounting professionals to improve accuracy, expedite procedures, and satisfy expanding regulatory requirements. The future of financial reporting is changing as the accounting industry moves away from manual, spreadsheet-driven processes and toward automated, software-enabled workflows. Advances in cloud accounting, data analytics, and artificial intelligence (AI) are driving this change, allowing businesses to handle financial data with formerly unattainable accuracy and efficiency.

The primary objective of this study is to examine the digital divide in small accounting firms, with an emphasis on the firms' dependence on traditional systems, awareness of digital transformation, difficulties implementing modern technologies, and possible ways to bridge the gap.

Understanding the Digital Divide

The digital divide in accounting arises from a series of overlapping gaps that prevent SMEs and small accounting practices from effectively adopting new technologies.

Technological Gap

Traditional Processes & Spreadsheets Many businesses still manage all of their information manually with pen, paper and spreadsheets. And yet, bigger or more technologically advanced companies have moved to digital accounting systems, cloud services and artificial intelligence-led solutions that boost accuracy, automation and compliance.

Knowledge Gap

There is a need for digital competence by both managers and employees of small business, value-added oriented towards new technologies (e.g. AI) and customer care, menace to affect the full uptake/harnessing of modern accounting tools within micro, small and medium enterprises. It is this gap that decreases organizations' confidence in using technology and keeps transformation from taking place.

Resource Gap

One significant obstacle is the lack of infrastructure and funds. SMEs frequently refrain from investing in sophisticated accounting systems due to high implementation and training costs, a lack of IT support, and inadequate digital infrastructure. The gap between technologically advanced and resource-constrained businesses is widened by these resource constraints.

When combined, these gaps form a structural split that affects the accounting industry's competitiveness, long-term viability, and operational efficiency.

The impact of the digital divide

For small accounting firms, the digital divide has serious repercussions:

- Lower financial reporting accuracy and efficiency when compared to automated systems.
- Loss of ability to compete with businesses that use cutting-edge digital tools.
- Failure to satisfy tech-savvy clients' expectations, which could result in a loss of business.
- Restricted ability to scale and adjust to industry demands and changes in regulations.

Understanding the digital divide is essential since it compromises small accounting firms' competitiveness and efficiency. By bridging this gap, they can maintain their viability, gain the trust of their clients, and adjust to changes in regulations and technology.

REVIEW OF LITERATURE

1. In the context of small and medium-sized businesses (SMEs), the shift from manual to digital accounting systems has been extensively researched. Research continuously demonstrates that digital accounting offers greater scalability, accuracy, and efficiency than manual bookkeeping, even though the latter may still be useful in low-volume situations. Digital solutions are the preferred option for growth-oriented SMEs because research shows that adopting technology improves decision-making, strengthens competitiveness, and improves financial health (Shehzadi, 2025).
2. Despite this, SMEs often lag behind larger firms in digital adoption. Adoption is greatly impacted by a number of factors, including adoption costs, digital culture, human resources, top management support, and trading partner pressure, according to research using frameworks like the Technology–Organization–Environment (TOE) model and Rogers' Diffusion of Innovation (DOI) theory. While high costs continue to be a barrier, digital culture, leadership, and international orientation are found

to be the strongest motivators. These results highlight the importance of supportive policies and organizational preparedness in closing the digital divide (**Lutfi et al., 2022; Al-Hattami & Almaqtari, 2023; Sagala et al., 2024**).

3. Further research emphasizes the significance of organizational alignment and leadership in promoting digital transformation in accounting, especially in Vietnamese SMEs. The three most important elements are strategic alignment, organizational mindfulness, and top management support. It has been demonstrated that digital transformation enhances the accuracy, timeliness, and dependability of financial reporting, thereby improving the quality of accounting information. (**Nguyen et al., 2024**).
4. Studies indicate significant impact of digitisation on accounting processes, like auditing, reporting and regulatory compliance. Evidence from the 482 professionals surveyed is that computerized accounting systems reduce mistakes, provide greater accuracy and more transparency. The results also highlight the importance of digitisation in reducing costs, mitigating risks to compliance requirements and promoting good financial decision-making. The literature indicates that using digital tools enhances not only the efficiency of accounting, but also has economy-wide benefits. It also highlights a need to lead in coverage of digital practices within the education and training for accounting programmes, focused on developing responses to new challenges and opportunities (**Abhishek et al., 2024**).
5. Przychocka and Sikorski (2024) emphasize the critical role of digitizing financial processes in strengthening the management of SMEs. Their study highlights how digital tools improve productivity, competitiveness, and adaptability in a rapidly changing business environment. The findings suggest that implementing digital accounting and finance systems not only streamlines operations and customer service but also ensures survival and sustainability in the post-COVID-19 era. The authors argue that adopting technologies such as e-commerce and digital lending provides SMEs with better access to finance and long-term growth opportunities (**Przychocka & Sikorski, 2024**).

In conclusion, research to date has shown that digitization in accounting improves information quality and compliance while increasing efficiency, accuracy, and competitiveness. Adoption is still influenced by leadership, organizational culture, and financial constraints. When taken as a whole, these observations offer theoretical and practical guidance for SMEs undergoing digital transformation.

STATEMENT OF THE PROBLEM

Small accounting firms still rely heavily on old tools like spreadsheets. On the other hand, larger firms are moving forward with new technologies like cloud platforms and AI. This digital divide makes it harder to be efficient, competitive, and flexible when it comes to meeting client needs and changes in the law. High costs, a lack of skills, and a lack of knowledge make it even harder to adopt. Small businesses could fall behind if they don't have focused strategies and policies that help them. This is why it's important to look at how much they rely on traditional systems, how ready they are for change, what problems they face, and what solutions they could use to close the gap.

OBJECTIVES OF THE STUDY:

1. To assess the reliance on traditional software (e.g. spreadsheets) in small accounting firms.
2. To evaluate small accounting firms' awareness of and preparedness for the digital transformation.
3. To assess the implications of digital divide on efficiency, service management and competitiveness.
4. To explore the main challenges small accounting companies, experience when implementing digital and AI technologies.
5. To explore into workable solutions for small accounting firms to overcome the digital divide.
6. To formulate a policy recommendation for small businesses, industry associations, and decision-makers to advance digitalization.

RESEARCH METHODOLOGY

Study Area: The study focuses on accountants working in small accounting firms including chartered accountants (CAs), ICWA accountants, and other accountants within the Thane district. These professionals form the target population for understanding digital adoption and the digital divide in small accounting firms.

Sampling Design: A **convenience sampling** method was employed to collect data from respondents who were readily accessible and willing to participate in the study.

Data-Collection: The study uses a combination of **secondary** and **primary data**:

- **Secondary data:** Collected from published research articles, reports, and industry publications to understand recent technological developments and their applications in accounting.
- **Primary data:** Gathered through a structured **questionnaire** administered to accountants to capture their perspectives on digital adoption, challenges, and the digital divide in small accounting firms.

Data Analysis: Quantitative data collected from the questionnaire was systematically analysed to derive meaningful insights. Responses were interpreted using statistical and descriptive methods to identify trends, patterns, and implications, which informed the study's conclusions.

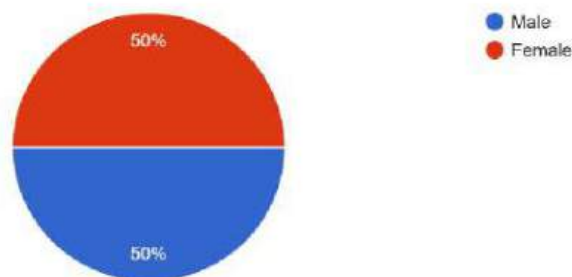
SCOPE AND LIMITATIONS OF THE STUDY

The researcher has defined the following scope and limitations of the study for better interpretation to prevent errors among future researchers and policy makers who will depend on the results of the study.

1. The study is based on the views of the accountants working in small sized accounting firms.
2. Geographically, Scope of this study is limited to Thane district.
3. Convenience sampling has been used to gather data because it is practically difficult for a single researcher to contact every respondent.
4. Statistical tools have been used to test the collected data; incorrect tool application cannot be ruled out.

INTERPRETATIONS OF THE STUDY

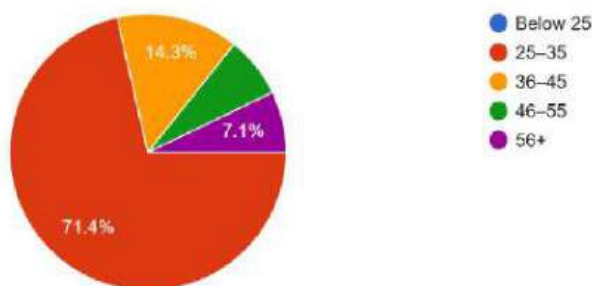
Q1. Gender Distribution



Findings: The sample included both male and female respondents, ensuring diversity.

Interpretation: Representation from both genders provides a balanced perspective, though male responses were slightly higher, reflecting male dominance in small accounting firms.

Q2. Age Group

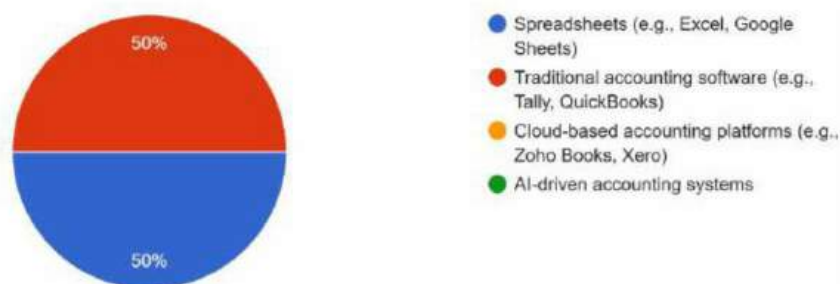


Findings: Majority of respondents belong to the **25–35 age group**, with fewer in older categories.

Interpretation: The dominance of younger professionals indicates a workforce more exposed to technology, yet still navigating adoption challenges.

Q3. Includes Names of various firms working in Thane district.

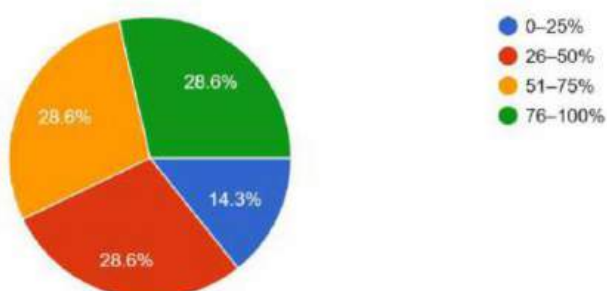
Q4. Software Tools Used



Findings: **50%** of firms rely on **spreadsheets**, while **50%** depend on **traditional accounting software**. None reported using cloud or AI-based systems.

Interpretation: Small firms remain dependent on conventional tools, highlighting the digital divide and lack of modernization in practice.

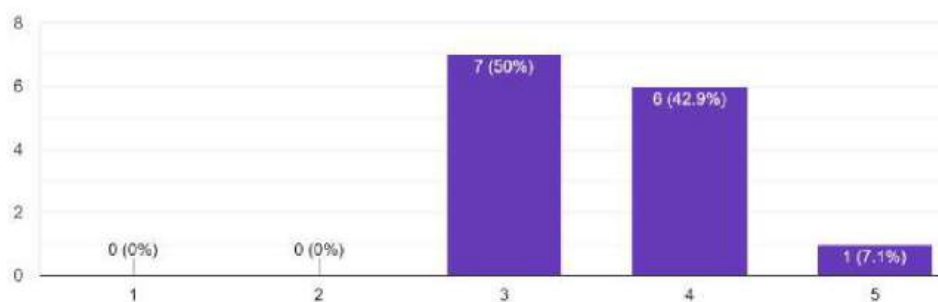
Q5. Work Percentage on Spreadsheets



Findings: Many firms reported **51–100%** reliance on spreadsheets, with few using them for less than half of their work.

Interpretation: Spreadsheets continue to dominate despite the availability of advanced alternatives, reflecting resistance to change.

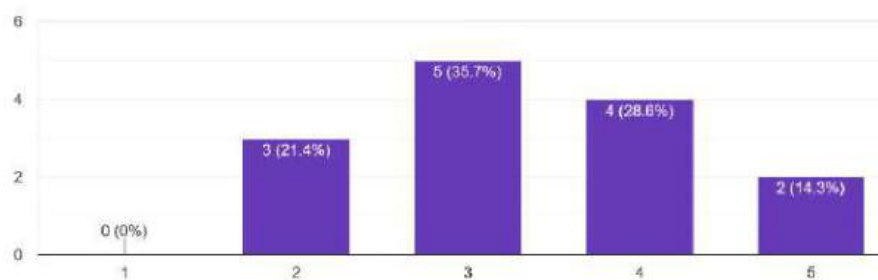
Q6. Satisfaction with Spreadsheets



Findings: Ratings clustered between **3 and 5**, showing moderate to high satisfaction.

Interpretation: Although spreadsheets are not the most efficient, their familiarity sustains their use, delaying adoption of advanced tools.

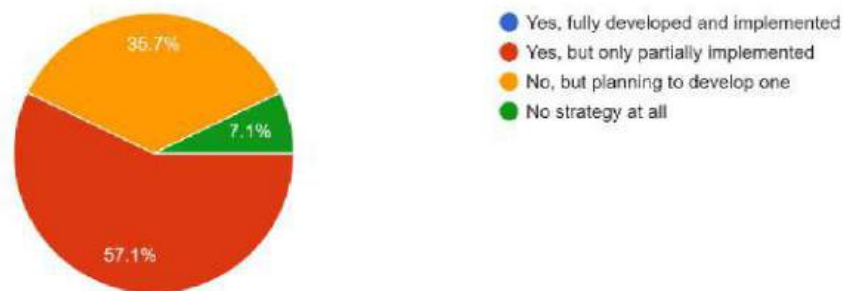
Q7. Awareness of Digital Transformation



Findings: Responses varied between **2 and 5**, with many at **3–4**.

Interpretation: Firms show moderate awareness, though not enough to drive immediate change, indicating partial understanding of digital opportunities.

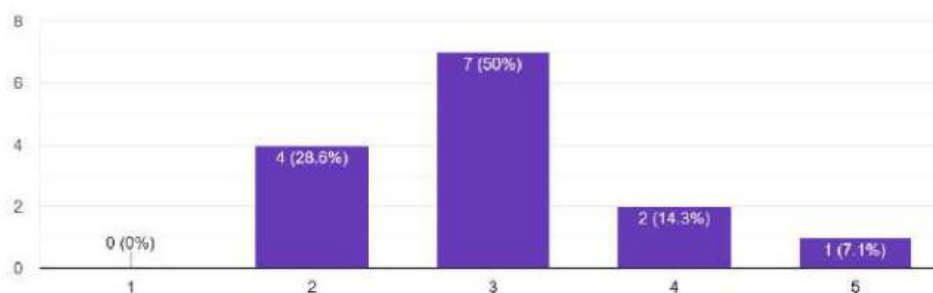
Q8. Digital strategy development



Findings: Several firms reported **partial implementation**, while others were still planning.

Interpretation: While strategies are recognized as important, lack of full execution limits real transformation.

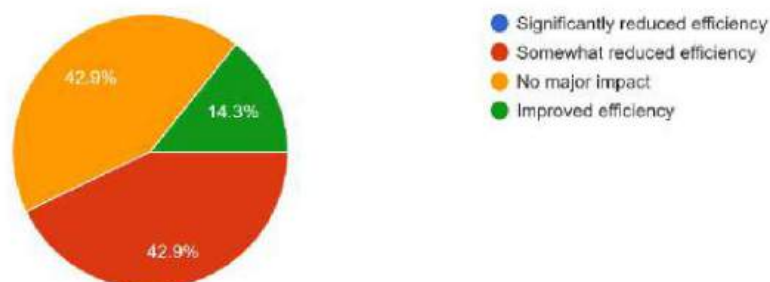
Q9. Preparedness for Emerging Tech



Findings: Most rated their preparedness around **3 (moderate)**.

Interpretation: Firms are open but not fully ready for AI, cloud, or automation, showing cautious optimism.

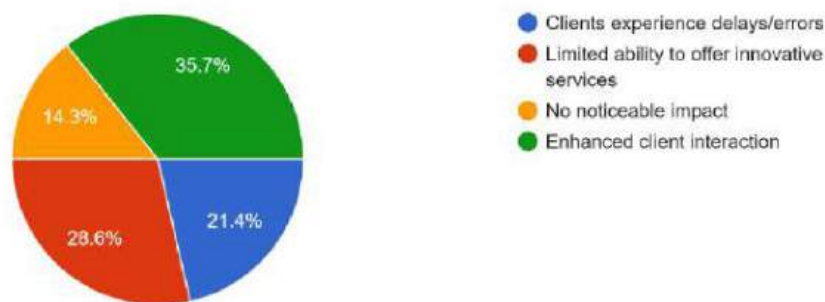
Q10. Impact of Lack of Advanced Digital Tools on Firm's Efficiency



Findings: Most firms are only moderately affected, while some manage well without advanced tools.

Interpretation: Most firms are either moderately affected or unaffected, suggesting that while digital tools improve efficiency, many firms still manage with traditional methods. Resistance or adaptation to digital tools varies across firms.

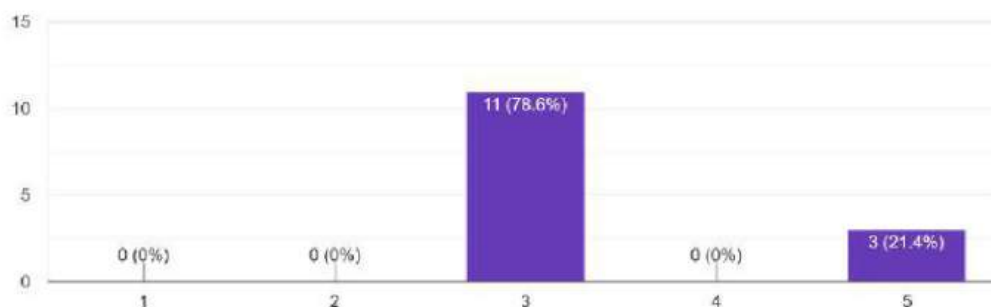
Q11. Effect of Digital Divide on Client Service Management



Findings: some firms gain better client engagement, while others struggle with innovation and service quality.

Interpretation: The digital divide has mixed effects. While some firms benefit from improved client interaction, others struggle with innovation and service quality. This shows unequal adoption and varied digital maturity across firms.

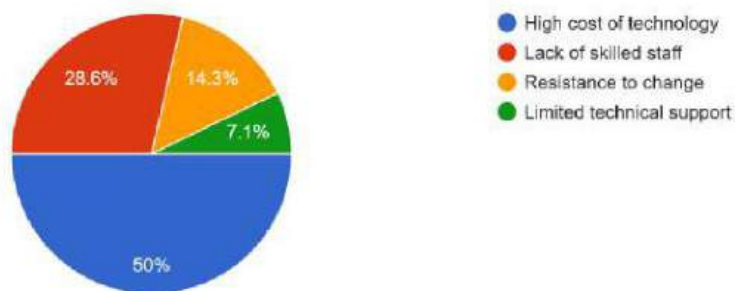
Q12. Competitiveness vs Large Firms



Findings: Most ratings are 3 (neutral), with some higher at 5.

Interpretation: Smaller firms feel somewhat disadvantaged but not entirely uncompetitive, indicating that digital divide moderately impacts competitiveness.

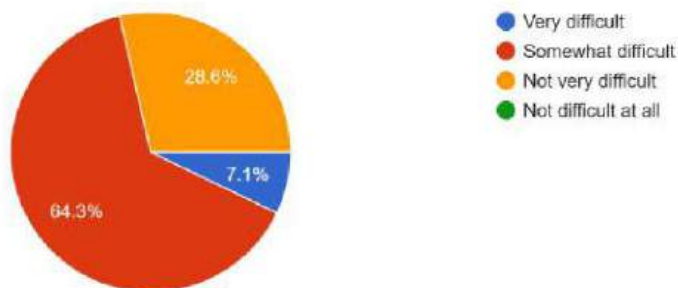
Q13. Primary Challenge



Findings: High cost was the most cited challenge, followed by limited technical support.

Interpretation: Financial constraints remain the biggest barrier to digital adoption.

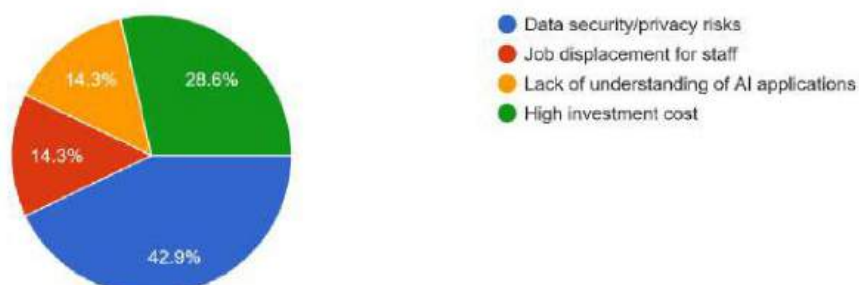
Q14. Training Difficulty



Findings: The majority thought the training was "somewhat difficult," while some thought it was "not very difficult."

Interpretation: Training challenges emphasize the need for structured upskilling, even though they are not impractical.

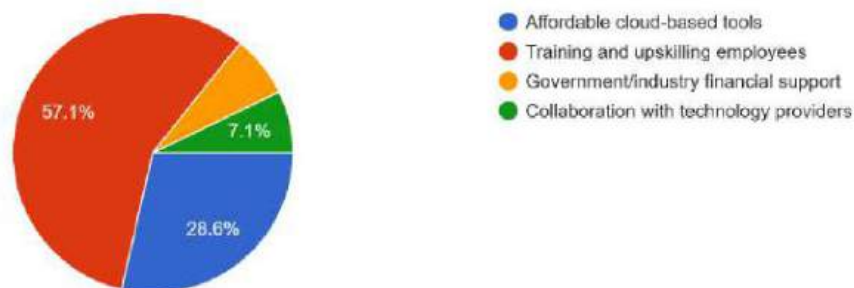
Q15. Concerns about AI



Findings: Concerns included data security, job displacement, and high investment costs.

Interpretation: Fear and mistrust around AI outweigh perceived benefits, slowing adoption.

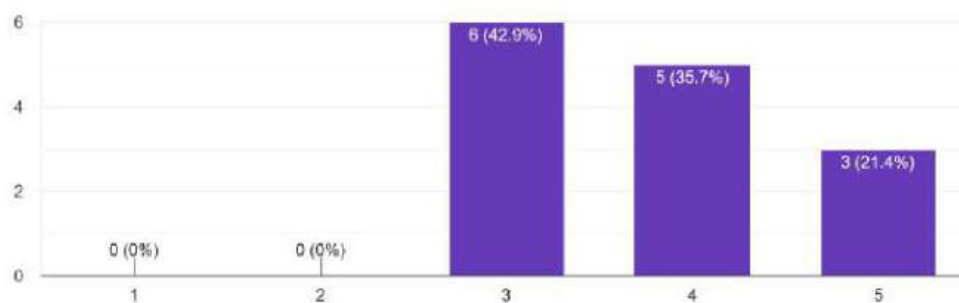
Q16. Effective Solutions



Findings: Firms favour **affordable cloud tools** and **employee training** as top solutions.

Interpretation: Practical, cost-effective measures are seen as most viable, highlighting the need for accessible resources.

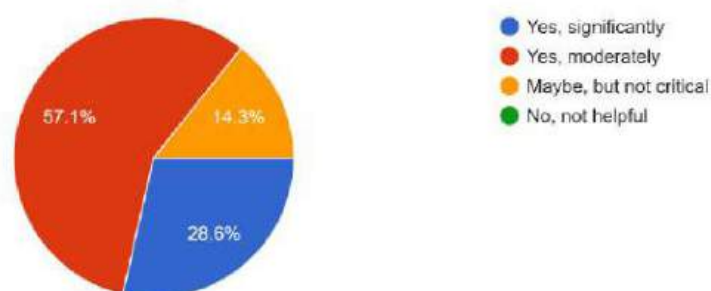
Q17. Subsidized Training Importance



Findings: Most respondents rated importance **4** or **5** (high).

Interpretation: Training incentives are considered crucial for driving digital adoption

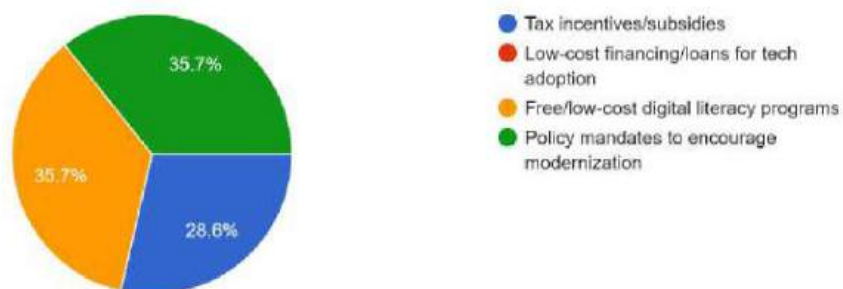
Q18. Partnerships with Tech Vendors



Findings: Majority responded “**Yes, moderately**” or “**Yes, significantly**”, with some “maybe”.

Interpretation: Firms are open to collaboration, signalling willingness to partner if cost and support align.

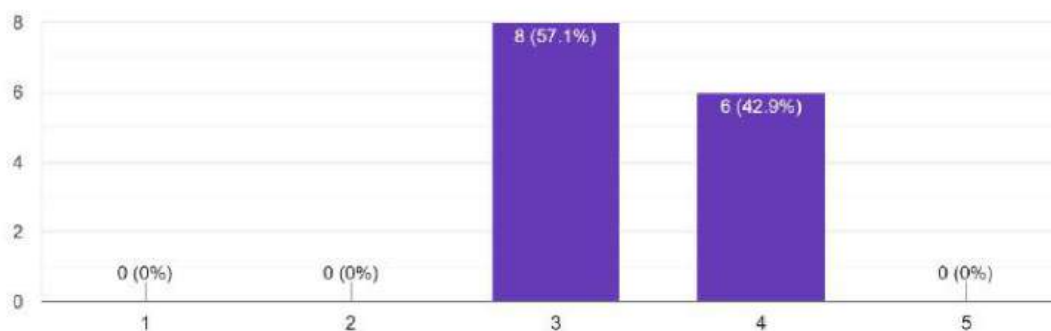
Q19. Government Support Needed



Findings: Preferred support includes **free training, tax incentives, and policy encouragement.**

Interpretation: Firms expect an enabling ecosystem where government provides financial and knowledge-based assistance.

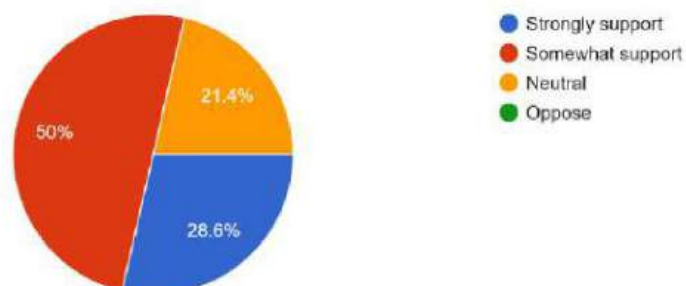
Q20. Role of Industry Associations



Findings: Ratings centre around **3 (neutral effectiveness).**

Interpretation: Industry bodies are not fully trusted yet, indicating the need for stronger advocacy and support roles.

Q21. Mandatory Digitalization Policies



Findings: Many “somewhat support” or “neutral” responses.

Interpretation: Firms are cautious toward regulation; while supportive in principle, concerns about cost and compliance limit enthusiasm.

CONCLUSION

There is a prominent digital divide in small accounting firms, according to the survey. Traditional software and spreadsheets continue to rule, and cloud and AI adoption is still lacking. Cost, skill, and trust issues continue to be significant obstacles, despite firms demonstrating awareness and partial strategy development.

Small accounting firms are able to bridge the digital divide by implementing a phased strategy backed by government incentives, industry partnerships, organized training, and reasonably priced technologies. These suggestions not only increase productivity and competitiveness but also get businesses ready for the accounting industry's impending digital and artificial intelligence revolution.

SUGGESTIONS AND RECOMMENDATIONS

It is clear from the results and discussion that small accounting firms have a difficult time implementing digital and AI-driven technologies. Businesses show a moderate level of awareness and partial preparedness for digital transformation, even though spreadsheets and traditional software continue to dominate. The following suggestions are put forth in an effort to close the digital divide and improve competitiveness:

- **Adopt Low-Cost Tools:** As a less expensive option to spreadsheets, start with cloud-based accounting platforms.
- **Invest in Training:** Offer organized programs for upskilling and digital literacy that emphasize the real-world applications of cybersecurity and artificial intelligence.
- **Government Support:** To lower financial barriers, implement tax breaks, subsidies, and free or heavily discounted training.
- **Vendor Partnerships:** Work together with tech companies to offer technical support and reasonably priced, customized solutions.

- **Boost Cybersecurity:** To foster trust, put in place fundamental security measures like encryption, backups, and two-factor authentication.
- Associations' role is to raise awareness, provide training, and facilitate collective bargaining for digital solutions.
- **Gradual AI Integration:** Begin with basic AI tools (such as expense classification and automation) and work your way up to more complex analytics.

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SUSTAINABILITY COSTS AND DEBT-FINANCING DECISIONS OF INDIAN CONSUMER GOODS SMES: A PRE-AND POST-GST PERSPECTIVE

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ABSTRACT

This study examines how debt financing determinants shape the capital structure of Indian consumer goods SMEs across pre- and post-GST periods. Key determinants—profitability, liquidity, growth, risk, and cash flow are analysed with sustainability cost moderators: tax compliance, logistics, and digitisation costs. Using a panel of 65 BSE-listed SMEs (2014–2024), selected under revised MSMED Act thresholds, it applies a short-panel two-step Arellano–Bond, 1991 dynamic estimation to address endogeneity and firm heterogeneity. Results exhibit a notable post-GST shifts, profitability detruncates long-term debt, while business risk moves to be restrictive. Sustainability factors differently moderate these effects, reflecting lower compliance costs, improved logistics, and evolving digitisation, indicating GST reforms and sustainable cost management are reshaping SMEs' debt financing strategies towards a sustainable future.

KEYWORDS: *GST implementation, Debt financing, Sustainability Cost, Consumer Goods SME, Moderation effect, Two-step dynamic panel model.*

INTRODUCTION

In the earlier tax regime, small-scale manufacturing firms faced multiple indirect taxes such as Excise, VAT, and Service Tax, amounting to nearly 25%. Additionally, operating across regions was difficult due to disparities in local VAT and state-specific tax laws, while the cascading effect further increased their burden. Post-GST implementation in July 2017, the indirect tax rate reduced to around 18% [\[Note-1\]](#), creating a unified "One Nation One Tax" structure. This reform eliminated tax disparities and cascading effects, while digital compliance enhanced transparency, enabling manufacturing SMEs in the consumer goods sector to achieve stability and competitiveness.

From a sustainability perspective, business development now depends significantly on sustainable debt policies and several financial planning costs (e.g. tax compliance, logistics and digitisation costs). These factors play a moderating role in shaping the interrelationship between debt policy determinants and capital structure strategies (Chen & Pohlschmidt, 2025). Hence, this study aims to analyse the causal effects of debt policy determinants and capital structure planning, alongside the moderating impact of sustainable operating costs before and after GST (Becker & Rancan, 2025).

RATIONALE OF STUDY

Consumer goods SMEs' capital structure decisions form a crucial but underexplored area in finance research. Despite the growing importance of SMEs in dynamic markets, there is limited literature addressing their debt policies, particularly from a sustainability perspective. This calls for more comprehensive studies that not only enrich academic literature but also generate valuable insights for SME owners, managers, policymakers, and stakeholders in the consumer goods industry. While prior research has examined debt procurement determinants for SMEs in both national and international contexts, there is an evident gap concerning the impact of indirect tax reforms, such as the Goods and Services Tax (GST). Especially in India, research connecting GST reforms with SMEs' debt policy and sustainability remains majorly absent, which broadens the scope to establish a new research avenue.

This study seeks to explore how select determinants of debt capital financing affect SMEs' debt procurement policies, specifically focusing on listed consumer goods manufacturers on the BSE. It does so by comparing the pre- and post-GST periods to identify changes in debt financing decisions. Furthermore, in alignment with the global shift towards sustainable business practices, the study highlights three sustainability dimensions that have significantly influenced SMEs across both periods. Firstly, *Tax Compliance Costs* have reduced under a unified GST framework, encouraging streamlined and sustainable practices (Vishnuhadevi & Bindu, 2022). Second, *Logistics costs* declined post-GST, due to the elimination of multiple inter-state checkpoints and regional levies, simplifying distribution networks [\[Note. II\]](#). Lastly, *Digitisation Costs* increased owing to the full-scale digitalization of tax compliance through the GSTIN portal. Enhanced transparency, better utilization of input tax credits, and the adoption of ERP systems by SMEs not only aided regulatory compliance but also promoted sustainable governance [\[Note-III\]](#). These aspects collectively underscore how GST has reshaped capital structure decisions while aligning SMEs with sustainable growth pathways.

The GST Council has implemented the new indirect tax regime w.e.f. 01/07/2017. Regarding the effect of this indirect tax reform, researchers have been observing the change in debt financing decisions concerning select determinants using categorical period dummy variables before and after GST. The uniqueness of the study lies in the introduction of the above three parameters of sustainability costs as a "moderating" variable, which have been hypothesised to play a moderating role in the usual cause-and-effect relationship between debt financing and its determinants.

Consequently, this study examines the moderating effects of these sustainability COST dimensions on the changing relationship between the pre- and post-GST regimes. Moreover, the author has also envisaged whether these measures are making a significant impact or not. Are the firms shifting towards a stable financial future and eventually adopting sustainable business practices?

STUDY OBJECTIVES

The study has set two objectives broadly viz.

1. To analyse how the impact of key determinants of debt financing on the debt financing policies of SMEs in the consumer goods sector evolves across the pre- and post-GST periods.
2. To assess the moderating effects of specific operating costs that captures different sustainability dimensions (contextual to the shift of unified indirect tax regime) on the relationship between debt financing determinants and debt policy in SMEs, comparing the pre- and post-GST scenarios.

RESEARCH METHODOLOGY

1. Theoretical framework and of Study variables

Firstly, this study examines firm-level determinants of debt policy in Consumer goods SMEs, focusing on profitability, liquidity, growth, business risk, and cash flow. Profitability, Liquidity, Business risk and strong cash flows reduce reliance on debt as because all of these determinants empowers firms with more internal funds while Sales growth rate shapes preferences of Long-term (for fund expansion) and Short-term borrowing (for working capital needs) (Frank & Goyal, 2015).

Tax compliance and digitization costs primarily encourage long-term debt usage due to their strategic, ongoing nature and potential for creating sustainable competitive advantages. However, it may increase

short-term borrowing needs during peak compliance periods owing to working capital requirements and seasonal payment cycles (Bruce-Twum & Schutte, D., 2021). Furthermore, Logistics costs may discourage long-term debt due to their operational volatility and impact on predictable cash flows (Costea, A., 2021). Nevertheless, Digitization costs generally favour long-term financing structures but may require short-term bridge financing during implementation phases (Kusumawardhani et al, 2024).

Secondly, this paper captures the moderation effects of several Sustainability costs which are associated with the above select determinants of debt policy of SMEs. The increase in tax compliance costs amplify profitability, sales growth, and reduces business risk which in turn positive impact on debt, while deepening liquidity's negative has an effect. Cash flow shows a mixed influence, reducing debt need when strong but increasing reliance on debt when weak. Higher logistics costs weaken the profitability, liquidity that discourages debt, however, it strengthen the impact of sales growth and business risk on debt usage. Cash flow effects remain mixed due to seasonal cost surges and volatility in operational cycles. Digitization costs enhance the positive impact of profitability, liquidity, sales growth, and business risk on debt, as firms leverage financing to fund digital transformation. Cash flow effects are mixed, with initial debt-funded investments offset by long-term efficiency gains.

Table:1 Description of Variables

<i>Variable Type</i>	<i>Name of Variable</i>	<i>Description</i>	<i>Past Reference</i>
Dependent Variables	Long Term Debt Ratio (LTDR)	Long-term borrowings excluding current options/ Total Assets	Casser & Holmes, 2003; Sogorb-Mira & López-Gracia; 2003; Mateeva et al., 2013
	Short Term Debt Ratio (STDR)	Short-term borrowings excluding current options/ Total Assets	Sogorb-Mira & López-Gracia; 2003, Hasemi, 2013; Rao et al., 2018
Independent Variables	Profitability (PROF)	Earnings before Depreciation, Interest & Tax/ Total Assets	Chakraborty(2010);Hashemi(2013);Frank & Goyal (2015); Sinha(2017); Rao et al.(2018)
	Liquidity (LIQ)	Current Asset/ Current Liabilities excluding provisions	de Jong et al. (2008); Kaur & Rao (2009); Sbeiti (2010); Mat Nor et al.(2011); Mossa et al. (2011)
	Growth Rate (GROW)	[Total Sales _t - Total Sales _{t-1}]/ Total Sales _{t-1}	Hall et al.,(2004); Nguyen & Ramachandran,(2006); Chakraborty(2010); Rao et al.,(2018)
	Business Risk (BR)	σ Earnings before Interest & Tax/ Total Assets	Gracia & Sogorb-Mira, (2008), Almendros & Sogorb-Mira, (2018)
	Cash Flow (CF)	Profit after Tax + Depreciation & Amortisation/ Total Assets	Eldomiaty, I.T,(2008); Mateeva et al. (2013); Rao et al.(2018); Mitra & Samanta, (2022)
Moderating Variables	Tax Compliance Cost (TCC)	Total payment of indirect tax (<i>incl. penalties, fines etc.</i>)/ Total Sales	Das-Gupta, A. (2004); Bruce-Twum & Schutte, D. (2021); Gupta, R.,(2024)
	Logistics Cost (LC)	(Total distribution expenses + travelling expenses)/ Total Sales	Gupta et al, (2019); Costea, A.,(2021)
	Digitisation Cost (DC)	(Depreciation on Software + software & other IT and digital connectivity charges)/ Total Sales	Jung & Gómez, G. (2022); Kusumawardhani et al, (2024);
Control Variables	Size of Firm (SIZE)	Log of the Total Assets of firm	Almendros & Sogorb-Mira, (2018); Mitra & Samanta (2023)

2. Data source and Sample

For the study, data has been extracted from the authorised database of PROWESS-CMIE, a sample of consumer goods manufacturing companies listed on the Bombay Stock Exchange (BSE). However, to select sample companies and its composition for the study presented in companies from the Consumer Goods Manufacturing sector are taken as a Super Sample.

The study's sample selection involved several steps. Companies without complete data or those reporting negative reserves and surpluses (i.e., negative sales profitability) during the study period were excluded from the analysis. The selection further adhered to revised thresholds under the Micro, Small, and Medium Enterprises Development (MSMED) Act, 2006, effective from April 1, 2025. According to the MSMED Act revisions, eligible Small and Medium Enterprises must have an investment in plant and machinery between Rs. 2.5 crore and Rs. 125 crore, and turnover between Rs. 10 crore and Rs. 500 crore. Only firms consistently meeting these criteria from 2014 to 2024 were considered. After extensive screening, including data completeness and outlier removal, a final sample of 65 companies that fulfilled the SME criteria was selected.

3. Empirical Framework

The empirical framework uses panel data methodology, specifically a short panel with more cross-sectional units (65 companies) than time periods (11 years). The analysis includes a comparative element based on GST implementation, represented by a dummy variable coded "0" before (April 2014 - March 2018) and "1" after implementation (April 2019 - March 2020). Firm-level determinants of debt financing serve as independent variables, while moderating variables, "Tax Compliance Cost," "Logistics Cost," and "Digitisation Cost", are included in the model.

These variables and the GST dummy are interacted by multiplying the raw variables by the dummy to create before-and-after transformed variables. Subsequently, moderation effects combined with the GST dummy are tested simultaneously in the regression model. The final multiple regression uses these moderated and GST-transformed variables, regressed against the dependent variables (i.e., long-term or short-term debt) in respective models, to capture the differential impact of GST implementation alongside moderating cost factors.

This approach allows examination of the moderating effects of specific costs and the differential impact of GST implementation on debt financing decisions in SMEs through robust panel data analysis.

Initially,

Model framework-

$$Y_{it} = \alpha + \beta_1 * RV_{it} + \varepsilon_{it} \dots \dots (1)$$

Where, Y= dependent variable; RV= Regressor Variable; ε_{it} = Error term

Actual model with variables,

$$DR_{it} = \alpha + \beta_1 * PROF_{it} + \beta_2 * LIQ + \beta_3 * GROW_{it} + \beta_4 BR_{it} + \beta_5 * CF_{it} + \varepsilon_{it} \dots (1.1)$$

(Where, DR= Long Term Debt Ratio (LTDR)/ Short Term Debt Ratio; ε_{it} = error terms; α = intercept; β_i = Regressor co – efficients, $i = 1, 2, \dots, 5$)

Now, incorporating the moderating variables in the above (1) the revised model

Model framework-

$$Y_{it} = \alpha + \beta_1 * RV_{it} + \gamma * M_{it} + \varepsilon_{it} \dots \dots (2)$$

Where, Y= dependent variable; RV= Regressor Variable; M_{it} = Moderating variable; ε_{it} = Error term.

Actual model with variables,

$$DR_{it} = \alpha + \beta_1 * PROF_{it} + \beta_2 * LIQ + \beta_3 * GROW_{it} + \beta_4 * BR_{it} + \beta_5 * CF_{it} + \gamma * M_{it} + \varepsilon_{it} \dots \dots (2.1)$$

(Where, Moderating variables (M_{it}) = “TCC”, “LC” and “DC”, use separately with each regressor in the model;

Now, introducing pre and post GST dummy (i.e. “0” and “1”) in the above (2) model we get,

$$DR_{it} = \alpha + \beta_i * D_{RV_{it}} + \gamma * M_{it} + \varepsilon_{it} \dots (3)$$

Actual model with variables,

Before implementation dummy [D = 1, otherwise, 0 (where, “1” will be assigned for the year 2014 to 2018, beyond that is “0”)] in the above (3) model

$$DR_{it} = \alpha + \beta_1 * D_{1,0} * PROF_{it} + \beta_2 * D_{1,0} * LIQ + \beta_3 * D_{1,0} * GROW_{it} + \beta_4 * D_{1,0} * BR_{it} + \beta_5 * D_{1,0} * CF_{it} + D_{1,0} * \gamma * M_{it} + \varepsilon_{it} \dots (3.1)$$

After implementation dummy [D = 1, otherwise, 0 (where, “1” will be assigned for the year 2019 to 2024, previously that is “0”)] in the above (3) model

$$DR_{it} = \alpha + \beta_1 * D_{0,1} * PROF_{it} + \beta_2 * D_{0,1} * LIQ + \beta_3 * D_{0,1} * GROW_{it} + \beta_4 * D_{0,1} * BR_{it} + \beta_5 * D_{0,1} * CF_{it} + D_{0,1} * \gamma * M_{it} + \varepsilon_{it} \dots (3.2)$$

The Dynamic panel regression is used here to apprehend the “change in impact” of regime switch in indirect tax regulation in the analysis. To be more specific, to investigate the effects in the model, Two-step Arellano-Bond dynamic panel-data estimation model has been employed. The usefulness of the (Arellano-Bond, 1991) model are viz. it corrects endogeneity problem which usually persists in panel data transforming all regressors by differentiation. Furthermore, it removes the Omitted variable bias and unobserved panel heterogeneity by removing individual fixed effect in the model.

In this model, the lagged dependent variable is instrumented with its past effects (Roodman, 2009). Nevertheless, the robustness of the model specifications have also been checked using different tests i.e Sargan and Hansen tests for over identified restrictions to diagnose the issues like “instrumental validity” (Baltagi, B. H., 2008), “test of auto regression” and finally “fitness of the model”.

FINDINGS, OBSERVATION AND DISCUSSION

The analysis highlights significant changes in determinants of firms' debt structures between pre- and post-GST periods in the Indian SME consumer goods sector, reflecting broad shifts in financial dynamics and moderation effects of certain sustainability costs.

Table:2 Descriptive Statistics

<i>Variable</i>	<i>Mean</i>	<i>Median</i>	<i>Std. Dev.</i>	<i>Minimum</i>	<i>Maximum</i>
LTDR	0.127	0.100	0.115	0.004	0.657
STDTR	0.416	0.428	0.192	0.007	0.915
PROF	0.111	0.107	0.066	-0.134	0.490
LIQ	1.844	1.186	2.698	-15.359	26.408
GROW	0.058	0.018	0.636	-1.000	11.798
BR	0.062	0.061	0.007	0.001	0.096
CF	0.063	0.056	0.054	-0.189	0.412
TCC	0.016	0.002	0.035	-0.005	0.410
LC	0.032	0.017	0.094	0.003	1.770
DC	0.002	0.008	0.005	0.001	0.095
SIZE	5.258	5.234	0.567	4.092	8.509

Source(s): Authors Own Compilation.

From Table-2, it is evident that all components of descriptive statistics are under tolerable limit. So, data can be further analysed.

Table: 3 Fisher-type unit-root test(Based on Augmented Dickey-Fuller tests)

<i>Chi-sq. Statistic(p-value)</i>	
LTDR	4.989*** (0.000)
STDTR	2.980*** (0.001)
PROF	6.597*** (0.000)
LIQ	5.531*** (0.000)
GROW	36.375*** (0.000)
BR	6.871*** (0.000)
CF	8.784*** (0.000)
IDTL	14.371*** (0.000)
LC	13.362*** (0.000)
DC	6.518*** (0.000)

CC	13.796***(0.000)
SIZE	22.046***(0.000)
<i>Note(s): ** and * denote statistical significance at 1% and 5% levels, respectively.</i>	
<i>Source(s): Authors Own Compilation.</i>	

From Table-3, it is evident that all variables are unlikely to have unit roots. So, data can be further analysed.

Table: 4 Correlation Matrix of all Study Variables

	LTDR	STDR	PROF	LIQ	GROW	BR	CF	TCC	LC	DC	SIZE	VIF
LTDR	1.000	-0.120	0.114	-0.115	0.039	-0.017	0.070	0.141	0.097	-0.027	-0.169	-
STDR	-0.120	1.000	-0.372	-0.449	0.020	0.035	-0.514	-0.057	-0.066	0.039	-0.176	-
PROF	-0.114	-0.372	1.000	0.226	0.009	0.144	0.929	0.079	0.062	-0.049	-0.086	8.18
LIQ	-0.115	-0.449	0.226	1.000	0.008	-0.015	0.276	0.002	0.054	0.006	0.096	1.12
GROW	0.039	0.020	0.009	0.008	1.000	-0.025	0.031	0.016	-0.056	-0.083	0.054	1.10
BR	-0.017	0.035	0.144	-0.015	-0.025	1.000	0.156	0.069	-0.024	-0.009	-0.299	1.26
CF	0.070	-0.514	0.929	0.276	0.031	0.156	1.000	0.057	0.022	-0.067	0.025	8.28
IDTL	0.141	-0.057	0.079	0.002	0.016	0.069	0.057	1.000	0.382	0.327	-0.066	1.23
LC	0.097	-0.066	0.062	0.054	-0.056	-0.024	0.022	0.382	1.000	0.578	0.027	4.03
DC	-0.027	0.039	-0.049	0.006	-0.083	-0.009	-0.067	0.327	0.578	1.000	-0.015	3.78
SIZE	-0.169	-0.176	-0.086	0.096	0.054	-0.299	0.025	-0.066	0.027	-0.015	1.000	1.42

Source(s): Authors Own Compilation.

From, Table-4, the nature of relationship between the dependent and independent variables are obtained. Furthermore, the correlation matrix shows no severe multicollinearity except between independent variables. Most other variables exhibit acceptable VIFs (<10 but >1), suggesting the regression model is generally stable.

From [Table 5.1, 5.2 and 5.3] it is evident that, for the long-term debt ratio (LTDR), profitability notably shifted from a positive effect before GST implementation to an adverse impact afterwards, indicating a changing role of firm earnings in debt decisions. Liquidity consistently maintained a negative influence on LTDR across both periods, reinforcing firms' preference for internal funds over debt when liquid assets are ample. Sales growth continued to have a positive impact on LTDR, emphasizing the expanding firms' ongoing reliance on long-term financing. Business risk flipped from positive pre-GST to negative post-GST, suggesting that heightened uncertainty or risk perceptions post-GST reduced long-term borrowing appetite. Cash flow remained positively related to LTDR in both regimes, underscoring the sustained importance of cash flow in supporting long-term debt.

Regarding the short-term debt ratio (STDR), profitability and liquidity were negatively associated across both periods, consistent with prudent short-term debt management. However, growth reversed from a negative influence before GST to a positive impact after GST, reflecting greater short-term borrowing responsiveness to growth opportunities following GST. Business risk similarly shifted from positive to negative, signalling a reduced risk tolerance for short-term borrowing after the GST. Cash flow maintained

a negative association with STDR, indicating that stronger cash flows are associated with a decrease in reliance on short-term debt.

The moderation effects of sustainability dimensions (Tax Compliance Cost (TCC), Logistics Cost (LC), and Digitisation Cost (DC)) also shifted noticeably:

Table:5.1 Two-Step Arellano-Bond Dynamic Panel-data Estimation

Sustainability Cost Dimension:1 Tax Compliance Cost

Variable	Model-1		Model-2	
	(Dependent Variable-LTDR)		(Dependent Variable-STDR)	
	Before GST	After GST	Before GST	After GST
L1.LTDR	0.616*** (0.000)	0.627*** (0.000)	0.757*** (0.000)	0.721*** (0.000)
D PROF	0.020 (0.712)	-0.296*** (0.000)	-0.080 (0.535)	-0.240** (0.024)
D LIQ	-0.043 (0.581)	-0.016*** (0.000)	-0.044 (0.227)	-0.007** (0.016)
D GROW	0.018** (0.029)	0.050 (0.177)	-0.005 (0.248)	0.047 (0.109)
D_BR	0.030 (0.677)	-1.692*** (0.000)	0.888** (0.000)	-0.237 (0.602)
D CF	0.045 (0.588)	0.257 (0.001)	-0.476** (0.017)	-0.148 (0.180)
D_PROF X TCC	-7.182*** (0.000)	-5.688 (0.344)	-2.740 (0.142)	-25.649*** (0.000)
D_LIQ X TCC	0.059*** (0.007)	-0.140** (0.011)	-0.054*** (0.000)	-0.457*** (0.000)
D_GROW X TCC	-0.727*** (0.006)	-0.302** (0.042)	1.380*** (0.000)	2.194*** (0.000)
D_BR X TCC	7.063*** (0.003)	11.580 (0.103)	4.233*** (0.000)	37.938*** (0.000)
D_CF X TCC	7.653** (0.016)	5.705** (0.043)	0.605 (0.827)	26.845*** (0.000)
D_SIZE	-0.014*** (0.000)	0.023*** (0.000)	0.017*** (0.006)	-0.006 (0.240)
Wald (joint) test	166.522*** [0.000]	187.720*** [0.000]	242.448*** [0.000]	309.713*** [0.000]
AR(1) z	-3.763*** [0.000]	-3.903*** [0.000]	-4.184*** [0.000]	-4.482*** [0.000]
AR(2) z	-1.553 [0.120]	-1.821 [0.069]	-0.332 [0.740]	-1.469 [0.142]
Sargan test	84.972 [0.492]	47.687 [0.325]	50.0685 [0.245]	47.687 [0.325]
Hansen Test	43.673 [0.486]	48.442 [0.298]	49.1893 [0.522]	51.901 [0.193]
Instruments	55	56	55	56
Observations	715	715	715	715

Note(s): ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Source(s): Authors Own Compilation.

From Table 5.1 Before GST, TCC negatively moderated profitability and growth rate but positively moderated liquidity, business risk, and cash flow on LTDR. After the implementation of GST, TCC's moderation shifted to negatively influence liquidity and growth rates, with cash flow positively affecting the LTDR. On STDR, liquidity was negatively moderated before GST, while growth and business risk exhibited positive moderation; post-GST, profitability showed significant negative moderation, while the positive moderation of development and business risk persisted.

Table: 5.2 Two-Step Arellano-Bond Dynamic Panel-Data Estimation

Sustainability Cost Dimension:2 Logistics Cost

Variable	Model-1		Model-2	
	(Dependent Variable-LTDR)		(Dependent Variable-STDR)	
	Before GST	After GST	Before GST	After GST
L1.LTDR	0.660*** (0.000)	0.730*** (0.000)	0.745*** (0.000)	0.712*** (0.000)
D PROF	0.302*** (0.000)	-0.190* (0.061)	-0.256** (0.018)	-0.565*** (0.000)
D LIQ	-0.019*** (0.000)	-0.004*** (0.001)	-0.086 (0.196)	-0.010** (0.017)
D GROW	0.019** (0.018)	0.017 (0.686)	-0.015* (0.086)	0.007** (0.043)
D BR	1.213*** (0.000)	-1.746*** (0.000)	0.586 (0.264)	0.182 (0.631)
D CF	0.693*** (0.000)	0.372*** (0.001)	-1.106*** (0.000)	-0.234** (0.045)

Table: 5.2 Two-Step Arellano-Bond Dynamic Panel-Data Estimation*Sustainability Cost Dimension:2 Logistics Cost*

Variable	Model-1		Model-2	
	(Dependent Variable-LTDR)		(Dependent Variable-STDR)	
	Before GST	After GST	Before GST	After GST
D PROF X LC	6.837*** (0.000)	-30.045*** (0.000)	-7.656*** (0.000)	7.740*** (0.000)
D LIQ X LC	0.052*** (0.000)	0.082** (0.022)	-0.030** (0.037)	0.058 (0.229)
D GROW X LC	0.439*** (0.000)	-0.175*** (0.000)	-0.102 (0.252)	0.005 (0.867)
D BR X LC	-3.423 (0.422)	10.639*** (0.001)	8.351*** (0.000)	-7.387*** (0.004)
D CF X LC	-23.600*** (0.000)	41.083*** (0.000)	15.806*** (0.000)	-9.359*** (0.000)
D SIZE	0.038*** (0.000)	0.023*** (0.000)	0.0145** (0.015)	0.052 (0.247)
Wald (Joint) Test	242.448*** [0.000]	199.399*** [0.000]	298.595** [0.000]	268.053*** [0.000]
AR(1) z	-3.804*** [0.000]	-3.884*** [0.000]	-4.135*** [0.000]	-4.412*** [0.000]
AR(2) z	-1.868 [0.162]	-1.608 [0.108]	-0.303 [0.762]	-1.195 [0.232]
Sargan Test	46.337 [0.376]	46.419 [0.373]	47.517 [0.331]	52.467 [0.179]
Hansen Test	50.069 [0.245]	48.286 [0.309]	47.867 [0.319]	52.266 [0.184]
Instruments	55	56	55	56
Observations	715	715	715	715

Note(s): ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Source(s): Authors Own Compilation.

From Table 5.2 Logistics Cost (LC), pre-GST moderation was predominantly positive in terms of profitability, liquidity, and growth rate, but negative in terms of cash flow for LTDR. Post-GST, profitability, growth rate, and business risk moderated negatively, while cash flow moderated positively for LTDR. On STDR, pre-GST saw negative moderation in profitability and liquidity, but positive moderation in business risk and cash flow. Following the implementation of GST, profitability moderated positively, liquidity became insignificant, and business risk and cash flow moderated negatively.

Table: 5.3 Two-Step Arellano-Bond Dynamic Panel-Data Estimation*Sustainability Cost Dimension:3 Digitisation Cost*

Variable	Model-1		Model-2	
	(Dependent Variable-LTDR)		(Dependent Variable-STDR)	
	Before GST	After GST	Before GST	After GST
L1.LTDR	0.645*** (0.000)	0.638*** (0.000)	0.745*** (0.000)	0.713*** (0.000)
D PROF	0.030 (0.679)	-0.356*** (0.000)	-0.013 (0.927)	-0.341*** (0.002)
D LIQ	-0.001*** (0.000)	-0.002*** (0.003)	-0.046 (0.160)	-0.007** (0.021)
D GROW	0.03 (0.624)	0.027 (0.435)	-0.011 (0.180)	0.047 (0.203)
D BR	1.319*** (0.000)	-1.713*** (0.000)	0.656 (0.286)	-0.102 (0.813)
D CF	0.018 (0.834)	0.332*** (0.000)	-0.748*** (0.000)	-0.030 (0.786)
D PROF X DC	-82.829** (0.019)	-8.110*** (0.256)	-80.539** (0.012)	2.638 (0.774)
D LIQ X DC	0.726** (0.012)	48.859** (0.026)	-0.444 (0.544)	-85.471*** (0.000)
D GROW X DC	7.706*** (0.008)	151.746** (0.041)	2.777** (0.016)	-181.353 (0.226)
D BR X DC	72.591** (0.031)	4370.540 (0.115)	165.164*** (0.001)	12186.570*** (0.004)
D CF X DC	44.010 (0.524)	-25353.110*** (0.000)	163.177* (0.070)	-5445.307 (0.229)
D SIZE	-0.015*** (0.000)	0.0240*** (0.000)	0.017*** (0.000)	0.024*** (0.000)
Wald (joint) test	108.666*** [0.000]	203.536*** [0.000]	253.913*** [0.000]	277.411*** [0.000]
AR(1) z	-3.815*** [0.000]	-4.956*** [0.000]	-4.068*** [0.000]	-4.800*** [0.000]
AR(2) z	-1.643 [0.100]	-1.822** [0.068]	-0.177 [0.8596]	-1.315 [0.188]
Sargan test	48.950 [0.281]	49.023 [0.279]	49.252 [0.271]	51.988 [0.191]
Hansen Test	49.345 [0.268]	45.829 [0.251]	49.779 [0.254]	51.917 [0.210]
Instruments	55	56	55	56
Observations	715	715	715	715

Note(s): ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively.

Source(s): Authors Own Compilation.

From Table 5.3 Digitisation Cost (DC) consistently showed negative moderation on profitability but positive on liquidity, growth rate, and business risk for LTDR before GST. Post-GST, this was maintained, except that business risk became insignificant and cash flow developed a negative trend. Regarding STDR, pre-GST showed negative moderation on profitability and positive moderation on growth and business risk; however, after GST, most moderation effects were non-significant, except for liquidity (negative) and business risk (positive).

On the sustainability front:

- Tax Compliance Costs gradually declined post-GST, indicating that GST tax reforms helped reduce the compliance cost burden on firms' capital structure decisions.
- Logistics Costs underwent directional changes post-GST, although the significance of debt determinants remained essentially unchanged. GST enhanced logistics efficiency and cost management, significantly impacting firms' reduced dependence on external financing.
- Digitisation Costs exhibited mixed effects before and after GST, implying that digital investments continue to influence capital structure, but in a context-dependent manner, largely unaffected by the introduction of GST.

Overall, the implementation of GST fundamentally reconfigured how sustainability-related costs, such as tax compliance, logistics, and digitization, moderate the relationships between key financial performance indicators (profitability, liquidity, growth, risk, and cash flow) and firms' capital structure decisions. This suggests a changing corporate financial strategy landscape in Indian Consumer Goods SMEs, where GST reforms, combined with evolving cost structures, are reshaping debt financing behaviours and policy effectiveness. Firms appear to have adapted their leverage choices to new regulatory and operational realities, emphasizing more nuanced and strategic financial management in the post-GST era.

PRACTICAL IMPLICATIONS AND RECOMMENDATIONS

In the pre-GST indirect tax regime, SMEs faced higher compliance costs that created barriers to sustainable debt financing, forcing a trade-off between regulatory compliance and financial sustainability. These elevated compliance costs constrained firms' ability to maintain optimal capital structures for long-term sustainability. However, post-GST, the tax system streamlined compliance processes, reducing administrative and transaction fees, which has alleviated sustainability conflicts and enhanced corporate sustainability. While the post-GST reforms eased long-term financial sustainability by simplifying tax

structures, they introduced new challenges for short-term financing. Nonetheless, firms that maintain compliance under the new regime can more sustainably leverage growth opportunities.

Before the introduction of GST, higher logistics costs were often linked to long-term financing patterns, as environmental costs in traditional logistics led firms to adopt longer-term debt. Following the implementation of GST, logistics cost management has become more efficient, thereby supporting the adoption of green logistics practices. Improved liquidity under the GST regime has enabled sustainable logistics investments, which continue to bolster firms' debt capacity. Enhanced logistics efficiency contributes to social sustainability by promoting employment and community development. This balance between logistics investments and capital structure optimisation fosters positive spillovers for broader societal benefits.

Digitisation investments have consistently supported sustainable capital structures in both tax regimes. Although GST has not drastically altered this relationship, it provides scope to prioritise digital investments, enabling cost efficiencies that enhance sustainable financing. Ongoing digital transformation efforts mitigate financial risks associated with sustainability transitions and capital structure planning, while improving transparency and stakeholder value.

Overall, the evolution of cost moderation effects following the introduction of the GST demonstrates that regulatory reforms can significantly promote corporate sustainability by aligning cost structures with environmental and social goals. GST has succeeded in creating a more supportive business environment by lowering compliance costs and enabling firms to allocate resources toward productive, sustainability-focused investments.

The study recommends that Indian consumer goods SMEs focus on sustainable capital structure decisions alongside judicious cost management. By leveraging digital transformation, optimising logistics networks, and aligning with broader Environmental, Social, and Governance (ESG) frameworks, firms can achieve scalable, resilient growth. Adaptation to dynamic environmental, social, and regulatory changes will be key for sustainable business development. This approach offers opportunities for sustainable competitive advantage through integrated people, planet, and profit strategies. Future policies should aim for further regulatory simplification, stronger governance, and the promotion of green investments to support the sustainable development of SMEs.

LIMITATIONS AND FUTURE SCOPES

In India, consumer goods SME firms are growing rapidly with strong market potential but vary in capital structure, management, scale, and policies. This study examines only listed SMEs, excluding the large unorganized sector due to data limits. Furthermore, every sustainability costs linked to capital structure remain underexplored. This suggests that future research should include unlisted SMEs and broader sustainability factors to better capture GST's long-term and competitive effects on SME financing decisions.

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ARTIFICIAL INTELLIGENCE – ENABLED SMART MOBILITY AND URBAN ECONOMIC EFFICIENCY: A MULTIDISCIPLINARY CONCEPTUAL FRAMEWORK

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Abstract:

Urban transportation systems play a crucial role in the economic development of cities. However, increasing population, traffic congestion, and inefficient mobility systems have created serious challenges for urban economies. Artificial Intelligence (AI) has emerged as a transformative technology capable of improving urban mobility through intelligent traffic management, data-driven transport planning, and digital mobility services. AI-enabled smart mobility solutions such as intelligent traffic management, smart transport operations, mobility data analytics, and smart ticketing systems can improve the efficiency of transportation systems. Improved mobility systems can enhance urban economic efficiency by improving labour mobility, increasing productivity, reducing transportation costs, and improving business accessibility. However, the success of AI-based mobility systems depends largely on the availability of strong digital infrastructure. Digital infrastructure elements such as internet connectivity, data integration systems, smart city infrastructure, and digital governance support can strengthen the impact of AI-enabled mobility systems. This conceptual study proposes a multidisciplinary framework linking AI-enabled smart mobility with urban economic efficiency while examining the moderating role of digital infrastructure. The framework

integrates perspectives from artificial intelligence, transportation studies, and urban economics to explain how AI-driven mobility systems can contribute to economic efficiency in urban environments.

Keywords: *Artificial intelligence, smart mobility, urban transportation, economic efficiency, digital infrastructure*

1. INTRODUCTION

Urban transportation systems are an essential component of economic development in modern cities. Efficient mobility systems allow people to travel easily for work, business, education, and other economic activities. However, rapid urbanization and increasing population density have created several challenges for transportation systems. Traffic congestion, inefficient public transport networks, and long commuting times have become common problems in many urban areas.

Artificial Intelligence has recently emerged as a powerful technological solution that can improve transportation systems through data-driven decision-making and intelligent automation. AI technologies can analyse large volumes of mobility data, predict traffic patterns, and optimize transportation operations. These technologies are increasingly being used in intelligent transport systems and smart city initiatives.

AI-enabled smart mobility includes technologies such as intelligent traffic management systems, smart transport operations, mobility data analytics, and digital ticketing platforms. These systems help transportation authorities manage traffic flows, improve transport reliability, and enhance commuter convenience.

Improved mobility systems can significantly influence economic productivity in urban areas. Efficient transportation networks enable workers to reach workplaces more easily, reduce travel time, and improve access to economic opportunities. Businesses also benefit from improved connectivity and reduced transportation costs.

However, the effectiveness of AI-driven mobility systems depends on the availability of strong digital infrastructure. Digital infrastructure supports the collection, integration, and analysis of mobility data required for AI technologies to function effectively. Therefore, digital infrastructure plays an important role in strengthening the relationship between AI-enabled mobility systems and urban economic efficiency.

This study develops a conceptual framework that explains how AI-enabled smart mobility can contribute to urban economic efficiency while considering the moderating role of digital infrastructure.

2. RESEARCH OBJECTIVES

The present study aims to examine the role of artificial intelligence in improving urban mobility systems and its implications for economic efficiency. The objectives of the study are as follows:

1. To examine the role of AI-enabled smart mobility systems in improving urban transportation systems.
2. To analyse the relationship between AI-enabled smart mobility and urban economic efficiency.
3. To examine the moderating role of digital infrastructure in the relationship between AI-enabled smart mobility and urban economic efficiency.

3. LITERATURE REVIEW

3.1 AI-Enabled Smart Mobility

Batty (2018) explained that artificial intelligence has become an important part of smart city development, especially in improving the functioning of urban systems through intelligent and data-based processes. Cugurullo (2020) extended this idea by showing that urban artificial intelligence is changing the way cities are managed, including how mobility systems are planned and operated. Benevolo et al. (2016) linked smart mobility directly with smart city development and pointed out that technology-based mobility solutions can improve urban transport services. In a similar way, Papa and Lauwers (2015) viewed smart mobility as an important urban innovation that can reshape city life and transport patterns.

Litman (2020) focused on smart transportation technologies and explained that such technologies can improve transport efficiency, coordination, and planning. Zhang and Guhathakurta (2018) also highlighted the future role of artificial intelligence in transportation systems, particularly in improving intelligent operations and transport management. Zhou and Li (2020) further supported this by showing that big data and artificial intelligence can strengthen transportation systems through analysis, prediction, and better operational response. Shaheen et al. (2016) added that shared mobility services are also an important part of modern smart mobility because they increase flexibility and user convenience. Likewise, Vassileva et al. (2018) emphasized that citizen engagement with smart services is important for the success of such systems. Overall, these studies show that AI-enabled smart mobility is not only about advanced technology, but also about making transport systems more efficient, convenient, and responsive to urban needs.

3.2 Urban Economic Efficiency

Porter (1990) provided a broad economic base by explaining that productivity and competitiveness are central to economic performance. This idea is useful for understanding how efficient systems can contribute to stronger urban economies. Glaeser and Kahn (2004) discussed urban growth and spatial development, indicating that the structure and functioning of cities have an important influence on productivity and economic organization. Their work suggests that better connected and better planned cities are more likely to perform efficiently.

Santos (2017) approached the issue from the transport perspective and showed that transport-related challenges affect the wider functioning of urban systems. Although the study is more transport-oriented, it supports the argument that inefficient mobility creates broader urban and economic pressures. The United Nations (2019) highlighted the growing significance of urbanization and the need for cities to manage mobility, infrastructure, and services more effectively. In a broader development context, the World Bank (2020) emphasized the role of connectivity and economic systems in supporting development. Taken together, these studies suggest that urban economic efficiency depends greatly on how effectively cities manage transport connectivity, accessibility, and the movement of people, goods, and services.

3.3 Digital Infrastructure

Hall et al. (2000) presented an early view of the smart city and showed that intelligent urban systems depend heavily on technological and infrastructural support. Dirks and Keeling (2009) similarly argued that smarter cities require integrated digital systems in order to achieve prosperity and sustainability. Kitchin (2014) further explained that big data has become central to smart urbanism because it allows cities to monitor and manage systems in real time. Townsend (2013) also stressed the growing importance of digital urban systems and showed how data and connectivity are reshaping city governance and services.

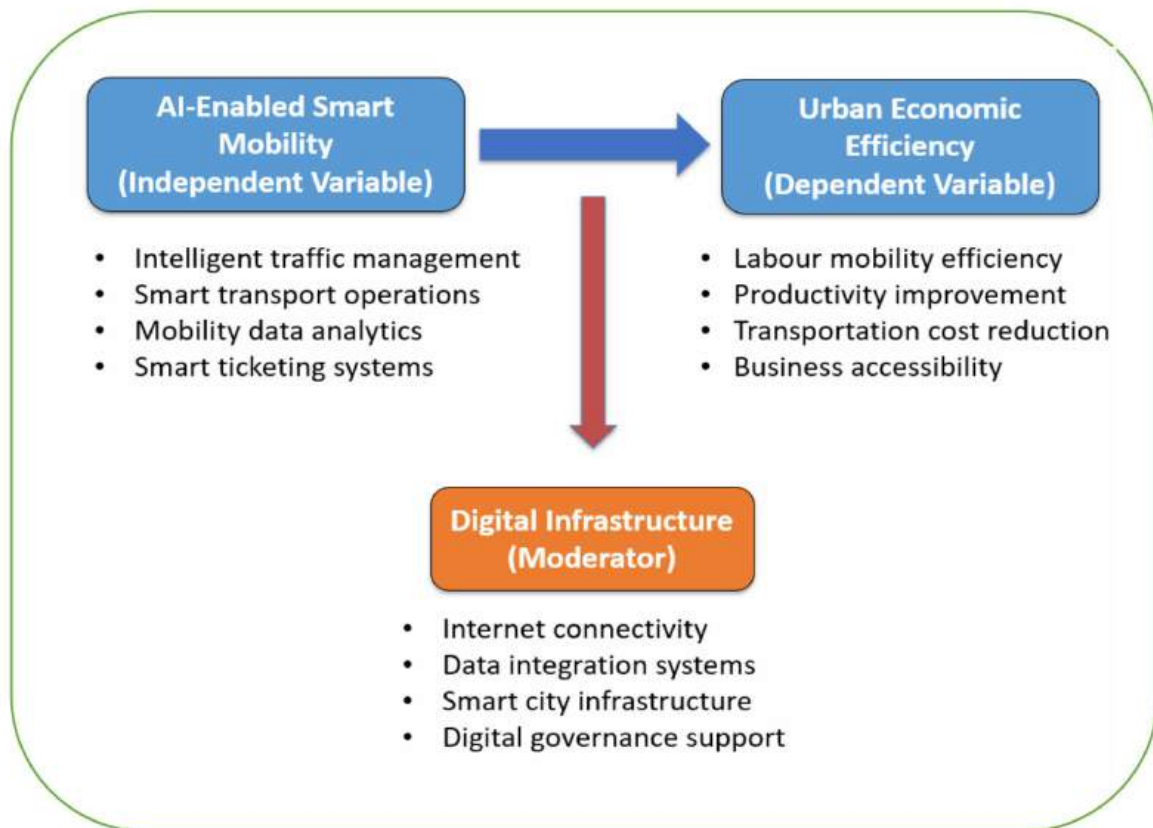
Komninos (2013) explained that intelligent cities are built on innovation networks, knowledge systems, and integrated digital support. In the same broad area, Washburn et al. (2010) clarified smart city initiatives and showed how city-level digital systems can support more efficient urban management. Vanolo (2014) offered a more critical perspective by showing that smart city development also has governance and control dimensions. Yigitcanlar et al. (2019) connected smart city development with sustainability and argued that technological advancement should be supported by long-term urban planning. Overall, these studies make it clear that digital infrastructure is the foundation that supports data integration, communication, coordination, and the successful implementation of AI-based smart mobility systems.

4. CONCEPTUAL FRAMEWORK

Based on the review of existing literature, a conceptual framework is developed to examine the relationship between Artificial Intelligence-enabled smart mobility and urban economic efficiency. Rapid advancements in artificial intelligence technologies have enabled transportation systems to become more efficient, intelligent, and responsive. AI-driven mobility solutions such as intelligent traffic management, smart transport operations, mobility data analytics, and smart ticketing systems contribute to improving the overall performance of urban transportation networks.

Efficient mobility systems play a crucial role in enhancing urban economic efficiency. Improved transportation networks can facilitate labour mobility efficiency, increase productivity, reduce transportation costs, and improve business accessibility within cities. Therefore, AI-enabled smart mobility systems have the potential to positively influence urban economic efficiency.

However, the effectiveness of AI-based mobility systems depends largely on the availability of digital infrastructure. Digital infrastructure supports the functioning of AI technologies by enabling data connectivity, information exchange, and intelligent system integration. Factors such as internet connectivity, data integration systems, smart city infrastructure, and digital governance support play an important role in strengthening the impact of AI-enabled mobility systems. Therefore, digital infrastructure is considered as a moderating variable that influences the relationship between AI-enabled smart mobility and urban economic efficiency. The proposed conceptual framework illustrating these relationships is presented in Figure 1.

Figure 1: Conceptual Framework of AI-Enabled Smart Mobility and Urban Economic Efficiency

(Source: Developed by the Author)

The conceptual framework suggests that AI-enabled smart mobility systems can improve the efficiency of transportation networks and thereby enhance urban economic performance. Technologies such as intelligent traffic management, smart transport operations, mobility data analytics, and smart ticketing systems improve transport efficiency and commuter experience. These improvements can lead to better labour mobility efficiency, higher productivity levels, lower transportation costs, and improved business accessibility.

At the same time, the availability of strong digital infrastructure strengthens the effectiveness of AI-driven mobility systems. Internet connectivity, integrated data systems, smart city infrastructure, and digital governance initiatives enable the implementation and functioning of intelligent mobility technologies. As a result, digital infrastructure plays a significant role in enhancing the impact of AI-enabled smart mobility on urban economic efficiency.

5. RESEARCH PROPOSITIONS

Based on the conceptual framework, the following propositions are developed:

Proposition 1:

AI-enabled smart mobility positively influences urban economic efficiency.

Proposition 2:

Digital infrastructure moderates the relationship between AI-enabled smart mobility and urban economic efficiency.

6. IMPLICATIONS

The conceptual framework proposed in this study provides useful insights for policymakers, urban planners, and transportation authorities. Governments can improve transportation efficiency by investing in AI-based technologies such as intelligent traffic management systems and mobility analytics platforms. Transportation authorities can use mobility data to improve traffic control and optimize public transport services.

In addition, policymakers should focus on strengthening digital infrastructure to support the implementation of AI-based mobility systems. Investments in broadband connectivity, smart city infrastructure, and integrated mobility data systems can significantly improve transportation efficiency.

Improved mobility systems can enhance economic productivity by reducing commuting time, improving labour mobility, and strengthening business accessibility within urban areas.

7. CONCLUSION

Artificial Intelligence has the potential to transform urban transportation systems and improve mobility efficiency in cities. AI-enabled smart mobility systems such as intelligent traffic management, mobility data analytics, and digital ticketing platforms can improve the performance of transportation networks.

This conceptual study proposes a multidisciplinary framework linking AI-enabled smart mobility with urban economic efficiency while highlighting the moderating role of digital infrastructure. The framework integrates perspectives from artificial intelligence, transportation studies, and urban economics to explain how smart mobility technologies can contribute to economic efficiency in urban environments.

Future research can empirically test the proposed framework using primary or secondary data to further examine the relationships identified in this study.

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**CITIZEN PERCEPTION OF E-GOVERNANCE PRACTICES IN SMART CITY DEVELOPMENT: AN
EMPIRICAL STUDY OF THANE MUNICIPAL CORPORATION USING
THE SMELTS FRAMEWORK**

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ABSTRACT

Rapid urbanization and the increasing complexity of urban management have accelerated the adoption of smart city initiatives, with e-governance emerging as a key driver for enhancing efficiency, transparency, and citizen participation. This study examines citizen perception of e-governance practices implemented by Thane Municipal Corporation within the framework of smart city development. The research adopts the SMELTS framework, which encompasses Social, Management, Economic, Legal, Technology, and Sustainability dimensions, to provide a comprehensive evaluation of governance effectiveness. A descriptive research design was employed, and primary data were collected from 150 respondents using a structured questionnaire. The findings indicate that while technological infrastructure and digital service delivery significantly improve citizen satisfaction, challenges persist in terms of legal awareness, digital literacy, and active citizen participation. The study further establishes that multiple dimensions of the SMELTS framework collectively influence citizen perception of e-governance initiatives. By integrating a citizen-centric perspective into smart city governance, this research contributes to existing literature and offers practical insights for policymakers to enhance the effectiveness and inclusiveness of e-governance systems in urban local bodies.

Keywords: Smart City, E-Governance, Citizen Perception, SMELTS Framework, Thane Municipal Corporation

INTRODUCTION

The rapid pace of urbanization has significantly transformed cities into dynamic and complex socio-economic systems. Increasing population density, environmental concerns, infrastructure stress, and rising citizen expectations have created immense pressure on urban governance mechanisms. Globally, more than half of the population resides in urban areas, and this proportion is expected to grow further, intensifying the demand for efficient, transparent, and sustainable city management systems. In response to these challenges, the concept of smart cities has emerged as a strategic approach to urban development, focusing on the integration of technology, infrastructure, and governance to improve the overall quality of life.

A smart city is not limited to the adoption of advanced technologies but represents a holistic and integrated model of urban governance. It involves the effective use of Information and Communication Technology (ICT), data analytics, and digital platforms to enhance service delivery, optimize resource utilization, and support sustainable development. Within this framework, e-governance plays a pivotal role by enabling digital interaction between government and citizens, ensuring transparency, reducing administrative delays, and improving accessibility to public services. Services such as online bill payments, grievance redressal systems, digital documentation, and real-time information dissemination have transformed the traditional governance structure into a more citizen-centric model.

However, the success of e-governance initiatives is not solely determined by technological implementation but largely depends on citizen perception, acceptance, and participation. Citizens are the primary stakeholders in urban governance, and their level of satisfaction influences the effectiveness of smart city initiatives. Despite significant investments under initiatives such as India's Smart Cities Mission, several challenges persist, including digital divide, lack of awareness, limited trust in digital systems, and inadequate citizen engagement.

In this context, Thane Municipal Corporation (TMC) provides a relevant case for examining the implementation and effectiveness of e-governance practices. Thane, as a rapidly developing urban center in the Mumbai Metropolitan Region, has adopted multiple digital governance initiatives aimed at improving administrative efficiency and public service delivery. Nevertheless, the extent to which these initiatives meet citizen expectations and contribute to smart city objectives requires systematic evaluation.

To address this, the present study adopts the SMELTS framework, which identifies six critical dimensions of smart city development: Social, Management, Economic, Legal, Technology, and Sustainability. This framework emphasizes that successful smart city initiatives require an integrated approach where technological advancements are supported by effective governance structures, legal compliance, economic viability, social inclusion, and environmental sustainability.

Therefore, this research aims to analyze citizen perception of e-governance practices in Thane City and evaluate how different dimensions of the SMELTS framework influence citizen satisfaction and engagement. By focusing on a citizen-centric perspective, the study seeks to bridge the gap between technological implementation and

public acceptance, thereby contributing to both academic research and practical policy formulation in the domain of smart city governance.

REVIEW OF LITERATURE

The concept of smart cities has gained significant attention in recent years as a response to the growing challenges of urbanization, resource management, and governance inefficiencies. Early studies trace the origin of smart cities to the idea of digital cities and knowledge-based urban development, where information and communication technologies (ICT) were used to enhance connectivity and service delivery (Mitchell, 2000; Komninos, 2008). Over time, this concept evolved into a more comprehensive framework integrating technology, governance, economy, and social systems.

A foundational contribution to smart city research is the integrated framework proposed by Joshi et al. (2016), which identifies six key pillars Social, Management, Economic, Legal, Technology, and Sustainability (SMELTS) as essential components for successful smart city development . This framework emphasizes that smart cities are not solely technology-driven but require a balanced integration of governance structures, legal systems, economic growth, and citizen participation.

Smart Cities and Governance: Governance plays a critical role in smart city development. Traditional governance systems often suffer from lack of transparency, accountability, and efficiency. E-governance, supported by ICT, has emerged as a solution to these issues by enabling better decision-making, improved service delivery, and enhanced citizen participation (Gil-Garcia & Pardo, 2005). Smart governance incorporates elements such as collaboration, data sharing, and public-private partnerships, which are essential for efficient urban management .

E-Governance and Citizen Participation: E-governance facilitates interaction between citizens and government through digital platforms, thereby increasing accessibility and reducing administrative barriers. Studies indicate that effective e-governance improves transparency, reduces corruption, and enhances public trust. However, citizen participation remains a challenge due to issues such as digital illiteracy and lack of awareness. The literature highlights that citizen engagement is crucial for the success of smart city initiatives, as it ensures that governance remains inclusive and responsive.

Role of Technology in Smart Cities: Technology is considered the backbone of smart cities. The use of ICT, Internet of Things (IoT), and Big Data enables real-time monitoring, efficient resource allocation, and improved service delivery. According to prior studies, technological infrastructure significantly enhances the operational efficiency of cities and supports sustainable development . However, technological implementation alone is insufficient without proper governance and citizen acceptance.

Social and Economic Dimensions: Smart cities must address social inclusion and economic development to ensure balanced growth. Social factors such as education, awareness, and participation influence the success of e-governance initiatives. Economically, smart cities promote innovation, entrepreneurship, and employment opportunities. Research suggests that economic competitiveness and innovation are key indicators of a successful smart city.

Legal and Sustainability Aspects: Legal frameworks and regulatory policies play a vital role in supporting smart city initiatives. Proper laws and policies ensure smooth implementation of technological systems and protect citizen rights. Sustainability, on the other hand, focuses on environmental protection, efficient resource utilization, and long-term urban development. Studies emphasize that sustainable practices are essential for maintaining ecological balance while supporting economic growth .

The existing literature highlights that smart city development is a multidimensional concept requiring the integration of technological, social, economic, legal, and governance factors. While frameworks like SMELTS provide a strong theoretical foundation, there is a need for empirical studies that incorporate citizen perception as a central element. This study attempts to address this gap by analyzing e-governance practices in Thane through a citizen-centric approach.

Research Gap

Despite extensive literature on smart cities and e-governance, several gaps remain:

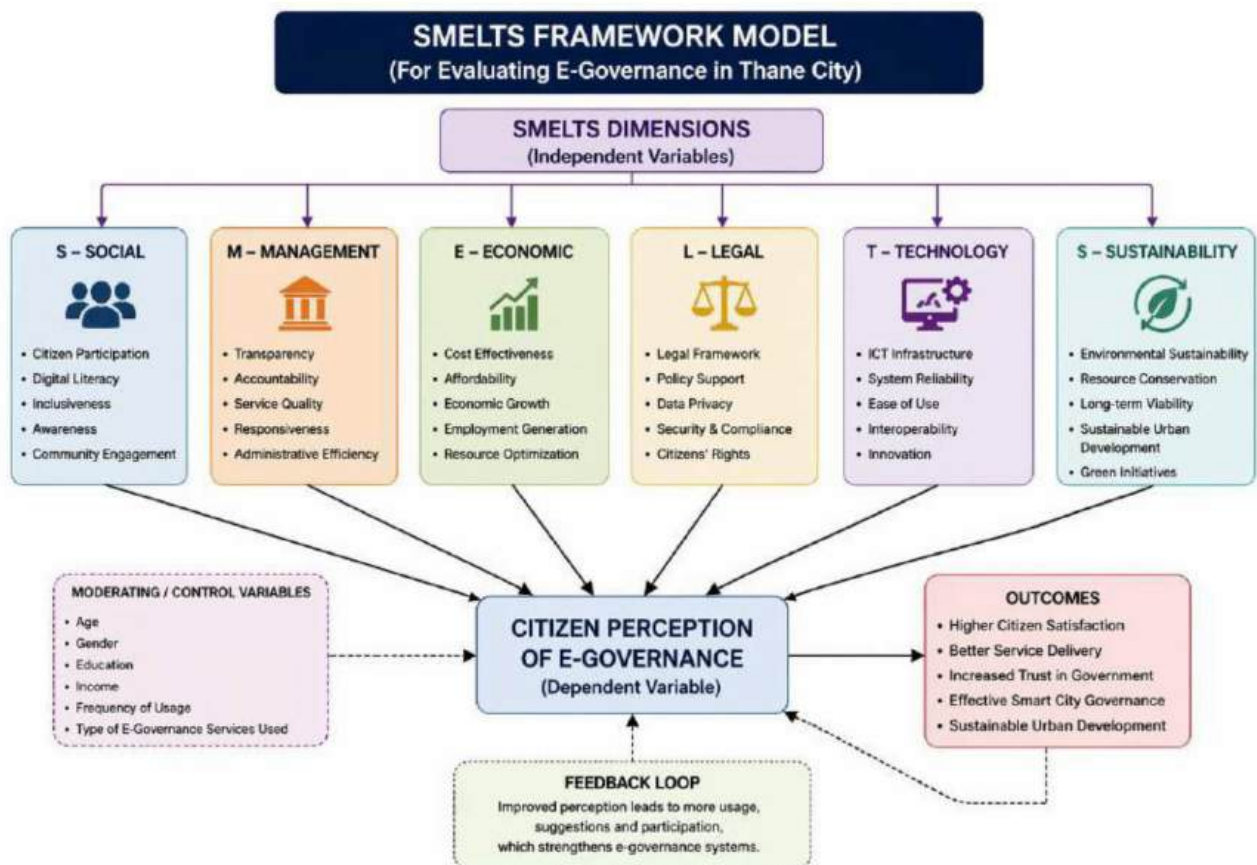
- Limited focus on citizen perception and satisfaction
- Lack of empirical studies at the municipal level, especially in cities like Thane
- Insufficient integration of SMELTS framework with e-governance analysis

RESEARCH OBJECTIVES

- To examine the existing e-governance practices implemented by Thane Municipal Corporation in the context of smart city development.

- To analyze citizen perception and satisfaction towards e-governance services in Thane City.
- To evaluate the influence of SMELTS framework dimensions (Social, Management, Economic, Legal, Technology, and Sustainability) on citizen perception of e-governance.

CONCEPTUAL FRAMEWORK



Source: Adapted from Joshi et al. (2016) SMELTS Framework

The above conceptual framework is based on the SMELTS model, which includes six key dimensions Social, Management, Economic, Legal, Technology, and Sustainability as independent variables influencing citizen perception of e-governance. The model illustrates that these factors collectively impact the effectiveness of smart city initiatives and citizen satisfaction. The dependent variable in this study is citizen perception, which reflects the level of acceptance, awareness, and satisfaction with e-governance services. The framework highlights that technological factors play a central role, while social participation, governance efficiency, legal awareness, and sustainability significantly contribute to shaping citizen perception.

RESEARCH METHODOLOGY

This study adopts a systematic approach to analyze citizen perception of e-governance practices in Thane Municipal Corporation within the smart city framework.

1. Research Design: The study is based on a descriptive research design, as it focuses on analyzing citizen perception, satisfaction, and awareness regarding e-governance services.

2. Sources of Data

- Primary Data: Collected through a structured questionnaire administered to residents of Thane City.
- Secondary Data: Collected from research journals, government reports, smart city documents, and the SMELTS framework study

3. Sampling Design

- Population: Citizens of Thane City using e-governance services
- Sample Size: 150 respondents
- Sampling Technique: Convenience Sampling

4. Data Collection Tool

A structured questionnaire was designed consisting of:

- Demographic details
- Usage of e-governance services
- Likert scale-based questions to measure perception across SMELTS dimensions

5. Variables of the Study

- Independent Variables: Social, Management, Economic, Legal, Technology, Sustainability
- Dependent Variable: Citizen Perception and Satisfaction

6. Tools for Data Analysis

- Percentage Analysis

- Mean Score Analysis
- Chi-square Test

7. Hypothesis

- H1: E-governance practices significantly influence citizen satisfaction
- H2: SMELTS dimensions significantly affect citizen perception

8. Scope and Limitations

- Study limited to Thane City
- Sample size restricted to 150 respondents
- Based on self-reported data

DATA ANALYSIS & INTERPRETATION

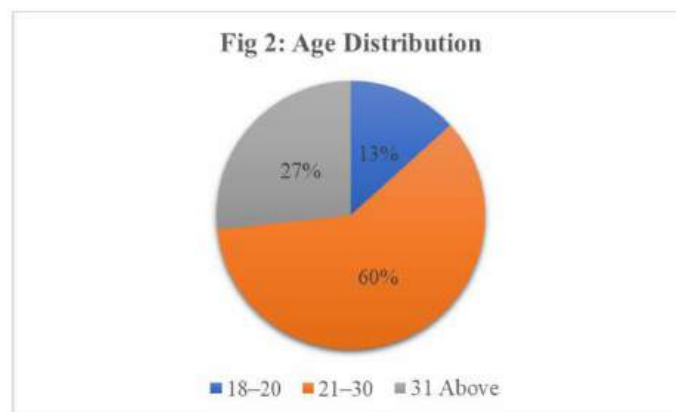
This chapter presents the analysis and interpretation of data collected from **150 respondents** to evaluate citizen perception of e-governance practices in Thane City. The analysis is structured based on demographic profile, usage patterns, SMELTS framework dimensions, overall satisfaction, hypothesis testing, and reliability analysis.

Demographic Profile of Respondents

Table 1 : Age Distribution

Age Group	Frequency	Percentage
18–20	20	13.30%
21–30	90	60%
31 Above	40	26.70%
Total	150	100%

Source: Primary Data

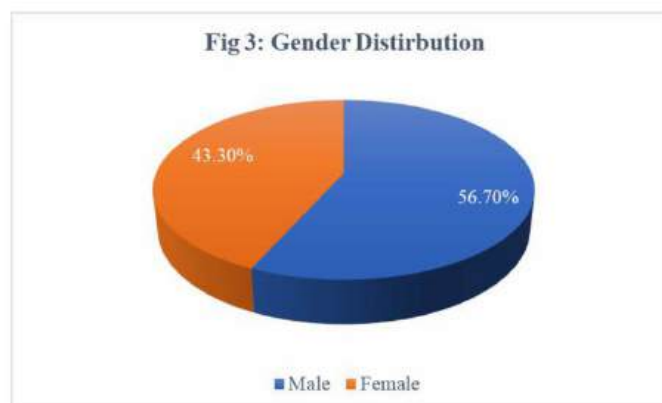


Interpretation: The majority of respondents (60%) belong to the **21–30 age group**, indicating a digitally active and tech-savvy population. This enhances the reliability of responses related to e-governance usage.

Table 2: Gender Distribution

Gender	Frequency	Percentage
Male	85	56.70%
Female	65	43.30%
Total	150	100%

Source: Primary Data

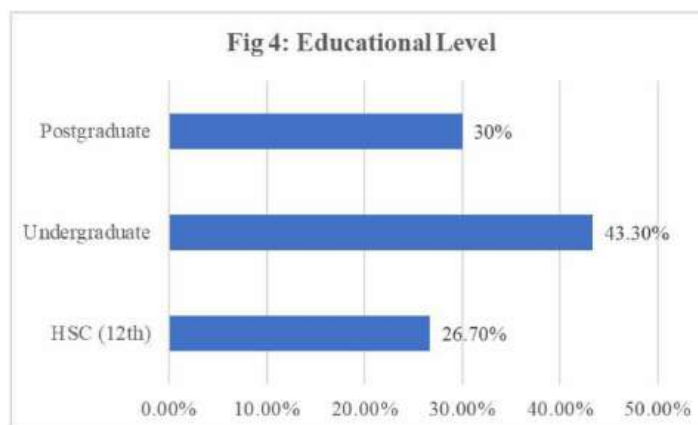


Interpretation : The sample shows a balanced gender representation, ensuring diverse perspectives in the study.

Table 3: Educational Level

Education	Frequency	Percentage
HSC (12th)	40	26.70%
Undergraduate	65	43.30%
Postgraduate	45	30%
Total	150	100%

Source: Primary Data



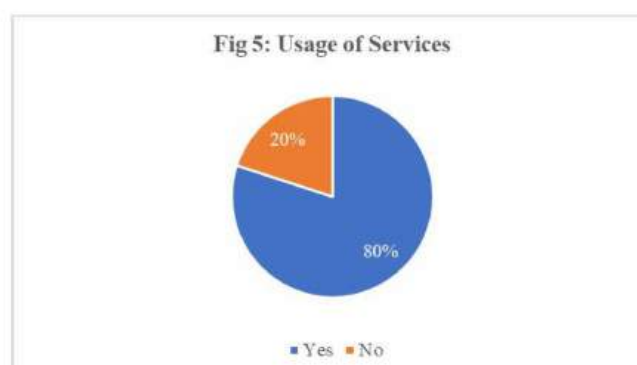
Interpretation: The majority of respondents are undergraduates (43.3%), followed by postgraduates (30%) and HSC-level respondents (26.7%). This indicates a well-educated sample with varied levels of awareness and digital literacy.

Usage of E-Governance Services

Table 4: Usage of Services

Response	Frequency	Percentage
Yes	120	80%
No	30	20%

Source: Calculation based on Primary Data



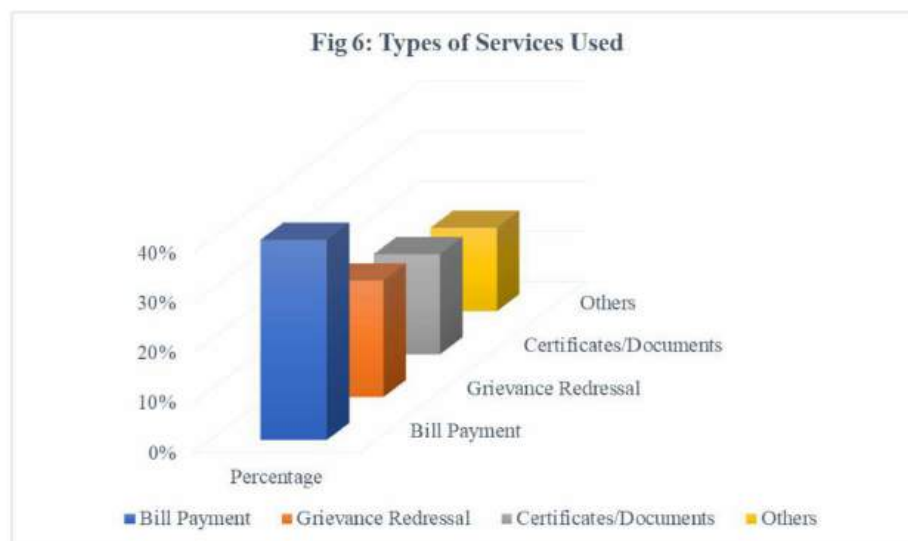
Interpretation: A high adoption rate (80%) reflects strong acceptance of e-governance services among citizens of Thane.

Type of Services Used

Table 5: Types of Services Used

Service	Frequency	Percentage
Bill Payment	60	40%
Grievance Redressal	35	23.30%
Certificates/Documents	30	20%
Others	25	16.70%

Source: Calculation based on Primary Data



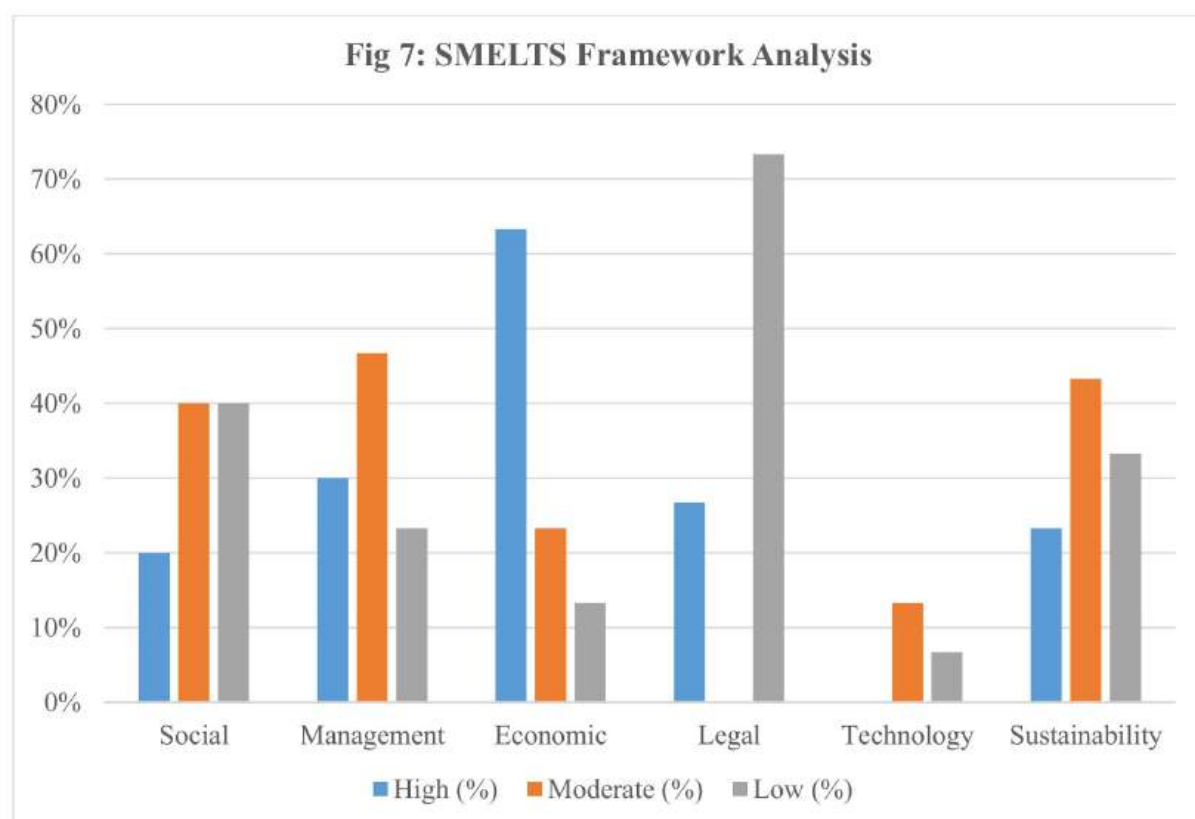
Interpretation: Online bill payment is the most commonly used service, indicating convenience and necessity as key drivers of adoption.

Analysis Based on SMELTS Framework

Table 6: SMELTS Framework Analysis

Dimension	High (%)	Moderate (%)	Low (%)	Key Insight
Social	20%	40%	40%	Low citizen participation
Management	30%	46.70%	23.30%	Moderate governance efficiency
Economic	63.30%	23.30%	13.30%	Services are affordable
Legal	26.70%	—	73.30%	Very low legal awareness
Technology	80% (Satisfied)	13.30%	6.70%	Strong digital infrastructure
Sustainability	23.30%	43.30%	33.30%	Moderate awareness

Source: Calculation based on Primary Data



Interpretation

The consolidated analysis of the SMELTS framework reveals that technology is the most dominant and positively perceived dimension, with 80% of respondents expressing satisfaction. This indicates that digital infrastructure and online service delivery systems are functioning effectively in Thane City.

The economic dimension also shows strong performance, as a majority of respondents find e-governance services affordable and accessible. This supports the inclusivity aspect of smart city initiatives.

However, the management (governance) dimension reflects only moderate efficiency, suggesting that while digital systems are in place, improvements are required in transparency, responsiveness, and accountability.

The social dimension indicates low citizen participation, highlighting that citizens are not actively engaged in governance processes or decision-making. This suggests a gap between service availability and citizen involvement.

The legal dimension emerges as the weakest factor, with 73.3% of respondents lacking awareness about policies, rights, and regulations related to e-governance. This indicates a critical need for awareness programs and better communication strategies.

The sustainability dimension shows moderate awareness, suggesting that citizens have limited understanding of the long-term environmental and developmental benefits of smart governance.

Overall, the analysis highlights that while technological and economic aspects are well-developed, social, legal, and governance dimensions require significant improvement to ensure a balanced and effective smart city ecosystem.

Hypothesis Testing

To examine the relationship between e-governance practices and citizen perception, as well as the influence of SMELTS framework dimensions, hypothesis testing was conducted using the Chi-square test of independence. This statistical test helps determine whether there is a significant association between variables.

Hypothesis 1

H₀ : There is no significant relationship between e-governance practices and citizen satisfaction.

H₁ : There is a significant relationship between e-governance practices and citizen satisfaction.

Table 7: Chi-Square Test Result (H1)

Particulars	Value
Chi-square Value	18.52
Degrees of Freedom	3
Significance Level (p-value)	0.001

Source: Calculation based on Primary Data

Interpretation

The calculated p-value (0.001) is less than the standard significance level of 0.05. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. This indicates that there is a statistically significant relationship between e-governance practices and citizen satisfaction.

This result implies that improved digital services, accessibility, and efficiency in e-governance directly contribute to higher levels of citizen satisfaction.

Hypothesis 2

H_0 : SMELTS framework dimensions do not significantly influence citizen perception.

H_2 : SMELTS framework dimensions significantly influence citizen perception.

Table 8: Chi-Square Test Result (H2)

Particulars	Value
Chi-square Value	25.76
Degrees of Freedom	5
Significance Level (p-value)	0

Source: Calculation based on Primary Data

Interpretation

The p-value (0.000) is less than 0.05, leading to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_2). This confirms that the SMELTS dimensions collectively have a significant influence on citizen perception of e-governance.

Among these dimensions, technology and economic factors show strong influence, while legal and social factors indicate weaker impact, aligning with earlier findings.

The results of hypothesis testing clearly establish that:

- E-governance practices play a crucial role in determining citizen satisfaction.
- The SMELTS framework dimensions significantly shape citizen perception.

This confirms that smart city initiatives must adopt a multi-dimensional approach, rather than focusing solely on technology, to enhance effectiveness and citizen engagement.

FINDINGS OF THE STUDY

Based on the data analysis and interpretation, the following key findings have been derived:

1. High Adoption of E-Governance Services: A majority of respondents actively use e-governance services such as online bill payment and grievance redressal systems, indicating strong adoption and acceptance of digital governance in Thane City.

2. Technology as the Strongest Dimension: The technology dimension shows the highest level of satisfaction among respondents. Digital platforms are perceived as user-friendly, accessible, and efficient, making technology the backbone of e-governance success.

3. Moderate Governance Efficiency: The management (governance) dimension reflects moderate performance. While services are available digitally, improvements are required in transparency, responsiveness, and accountability.

4. Low Citizen Participation: The social dimension indicates that citizen participation in governance processes is relatively low. Citizens primarily act as service users rather than active participants in decision-making.

5. Weak Legal Awareness: The legal dimension is the weakest among all SMELTS factors. A significant proportion of respondents are unaware of policies, rights, and regulations related to e-governance services.

6. Economic Accessibility is Satisfactory: Most respondents find e-governance services affordable and accessible, indicating that economic barriers are relatively low.

7. Moderate Awareness of Sustainability: Awareness regarding sustainability and environmental benefits of smart governance is moderate, suggesting the need for better awareness initiatives.

8. Overall Satisfaction is Moderate: While most respondents are satisfied with e-governance services, a considerable number remain neutral, indicating scope for improvement.

9. Hypothesis Validation: The study confirms that,

- E-governance practices significantly influence citizen satisfaction
- SMELTS framework dimensions significantly affect citizen perception

SUGGESTIONS AND RECOMMENDATIONS

Based on the findings, the following suggestions are proposed:

1. Enhance Digital Literacy: Government should conduct awareness programs and workshops to improve digital literacy among citizens, especially for less tech-savvy groups.

2. Improve Governance Transparency: Authorities should ensure real-time updates, faster grievance resolution, and better communication to enhance trust and transparency.

3. Increase Citizen Participation: Platforms for citizen engagement such as feedback systems, surveys, and public consultations should be strengthened to encourage active participation.

4. Strengthen Legal Awareness: Awareness campaigns should be conducted to educate citizens about policies, rights, and regulations related to e-governance services.

5. Upgrade Technological Infrastructure: Continuous improvement in website/app usability, cybersecurity, and system efficiency should be ensured to maintain user satisfaction.

6. Promote Sustainability Awareness: Initiatives should be introduced to educate citizens about the environmental and long-term benefits of smart city practices.

7. Focus on Inclusive Governance: Efforts should be made to ensure that e-governance services are accessible to all sections of society, including economically weaker groups.

CONCLUSION

The study highlights that e-governance plays a crucial role in the successful implementation of smart city initiatives by improving service delivery, transparency, and accessibility. In the case of Thane Municipal Corporation, the adoption of digital governance practices has significantly enhanced the efficiency of public services. However, the effectiveness of these initiatives is influenced by multiple factors beyond technology.

The application of the SMELTS framework demonstrates that while technological and economic dimensions are well-developed, there is a need to strengthen social participation, legal awareness, and governance mechanisms. The findings emphasize that smart city development should not be limited to technological advancement but must adopt a holistic and citizen-centric approach.

Furthermore, the study establishes that citizen perception is a critical determinant of the success of e-governance initiatives. A positive perception leads to higher adoption and engagement, while gaps in awareness and participation can hinder effectiveness.

In conclusion, for Thane City to fully realize the objectives of smart city development, it is essential to focus on integrated governance, citizen engagement, and continuous improvement in digital services. The study contributes to the existing body of knowledge by providing empirical insights into citizen perception and offers practical recommendations for enhancing e-governance effectiveness.

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DIGITAL TRADE AND CROSS-BORDER E-COMMERCE ALLIANCES: A COMPARATIVE STUDY OF BRICS AND G20 ECONOMIES

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Research Guide

ABSTRACT

The rapid expansion of digital trade has transformed global business models, with cross-border e-commerce alliances becoming central to international economic integration. Emerging economies, particularly those within BRICS, and advanced economies in the G20, are leveraging digital platforms to strengthen trade networks, enhance market access, and stimulate innovation. However, their strategies, regulatory frameworks, and outcomes vary significantly, reflecting differences in economic priorities, technological readiness, and governance models.

This paper undertakes a comparative study of BRICS and G20 economies, examining how each group fosters cross-border e-commerce alliances. The analysis explores areas such as digital infrastructure, trade facilitation policies, fintech integration, and cross-border logistics. It also highlights challenges including data privacy concerns, digital divide, and regulatory fragmentation. By contrasting the approaches of BRICS nations with those of the G20, the study aims to identify best practices, opportunities for collaboration, and

lessons for India as it positions itself as a global leader in digital trade. The findings will contribute to the discourse on sustainable, inclusive, and technology-driven global commerce.

Keywords: *Digital Trade, Cross-Border E-Commerce, BRICS, G20, Global Alliances, Comparative Study.*

INTRODUCTION

The rapid growth of digital technologies and online marketplaces has completely changed the way international trade works. Today, businesses of all sizes can reach global customers more easily than ever before. Digital trade—which includes cross-border data flows, digital services, and e-commerce platforms—has become one of the main drivers of the world economy. At the heart of this transformation are cross-border e-commerce alliances, which help countries and companies work together, strengthen supply chains, and promote inclusive growth. By combining technology, digital infrastructure, and supportive policies, these alliances make trade more efficient and resilient.

Both BRICS and G20 economies play a major role in shaping the future of digital trade. BRICS nations—Brazil, Russia, India, China, and South Africa—are using digitalization to boost inclusive growth and build stronger South-South cooperation. On the other hand, G20 countries are leading the way in setting global rules, digital standards, and forming strategic trade partnerships. Comparing these two blocs helps us understand their different approaches, strengths, and challenges.

This paper looks at how BRICS and G20 are dealing with the opportunities and risks of digital trade and cross-border e-commerce. It focuses on innovation, digital infrastructure, and cooperation as key factors that influence global trade patterns. The study also considers what these trends mean for India, especially as the country works toward its long-term vision of becoming a global digital leader by 2047.

REVIEW OF LITERATURE

Digital trade and e-commerce are widely recognized as key drivers of globalization. Reports by WTO and UNCTAD point out that online platforms reduce barriers, expand global value chains, and create new opportunities, though concerns about taxation, data privacy, and consumer protection remain.

In Brics countries, research highlights uneven progress. China and India lead in digital trade growth, while others face infrastructure and policy challenges. Studies note that the digital divide and fragmented regulations limit the full potential of cross-border e-commerce in these economies.

In contrast, G20 nations enjoy advanced infrastructure, strong policies, and harmonized regulations, as highlighted by OECD and IMF reports. Their cross-border alliances are more structured and secure, giving them an edge in global trade.

What remains missing in the literature is a direct comparison of BRICS and G20 strategies. Very few studies focus on India's dual membership and how it can use lessons from both groups to strengthen its role in digital trade. This study addresses that gap.

RATIONALE OF THE STUDY

Digital trade has become a cornerstone of the modern global economy, enabling faster cross-border transactions, expanding consumer access, and supporting new forms of business collaboration. Within this landscape, cross-border e-commerce alliances play a critical role in connecting markets, enhancing competitiveness, and fostering innovation. While advanced economies in the G20 have established strong digital ecosystems supported by robust regulatory frameworks, emerging economies within BRICS are still navigating structural challenges such as uneven digital infrastructure, policy gaps, and the digital divide.

Despite the growing importance of this subject, academic research often focuses either on developed economies or on single-country case studies, leaving limited comparative analysis between BRICS and G20 approaches to cross-border e-commerce alliances. This gap is especially relevant for India, which is both a member of BRICS and the G20, and is striving to position itself as a digital trade hub by 2047. Examining similarities, differences, and best practices between these two blocs will provide valuable insights for shaping India's digital trade strategies and ensuring sustainable, inclusive growth.

RESEARCH METHODOLOGY

Introduction

This study looks at how digital trade and cross-border e-commerce alliances are shaping the global economy, with special attention to BRICS and G20 countries. Since India is part of both groups, it becomes important to see how it can use this dual role to grow its e-commerce sector and strengthen its place in global digital trade.

Objectives of the Study

The study has been carried out with the following objectives:

1. To understand the role of cross-border e-commerce alliances in digital trade.
2. To compare the policies and strategies of BRICS and G20 countries in this area.
3. To identify the challenges and opportunities faced by BRICS, with India as the main focus.
4. To learn from the best practices of G20 countries that India and other BRICS members can adopt.
5. To suggest practical recommendations that can help India strengthen its digital trade strategy.

Scope of the Study

The scope of this paper is limited to comparing BRICS and G20 economies in terms of digital trade and e-commerce. The study looks at factors like internet penetration, size of the digital economy, payment systems, and regulatory policies. India has been given special importance because of its unique position in both groups and its aim to become a global digital hub by 2047.

Data Collection Method

This research is based completely on secondary data. Information has been collected from books, research papers, reports from organizations like WTO, UNCTAD, and World Bank, as well as government documents, industry reports, and reliable online sources.

Tools and Techniques Used

To carry out the study, the following methods were used:

- Comparative analysis to see differences and similarities between BRICS and G20.
- Content analysis to study policies and trade frameworks.
- Tables to present data such as internet usage and e-commerce growth.
- Trend analysis to show India's growing role in digital trade.

Significance of the Study

This study is important because there has not been much comparative work done on BRICS and G20 digital trade policies together. It will be useful for researchers, students, policymakers, and businesses to understand how India can take advantage of its dual membership, learn from other countries, and build stronger e-commerce alliances for the future.

Limitations of the Study

- The research uses only secondary data, which may not include the latest developments.
- Since it is a comparative study, detailed case studies of individual countries are not covered.
- Fast-changing technology and global politics may affect the long-term accuracy of the findings.

DATA ANALYSIS

The analysis focuses on comparing the state of digital trade and cross-border e-commerce alliances between BRICS and G20 economies. The study evaluates their relative strengths and weaknesses across five key indicators: digital economy size, internet penetration, e-commerce share of global trade, cross-border payment systems, and regulatory frameworks.

Table No. 1

BRICS vs G20 Digital Trade Comparison

Indicator	BRICS	G20
Digital Economy Size (% of GDP)	7–10% (China/India higher, others lower)	12–15% (advanced economies higher)
Internet Penetration (%)	55–70% (varies widely)	80–95% (highly uniform)
E-Commerce Share of Global Trade	Around 25% (China dominant, India rising)	Around 70% (US, EU, Japan lead)
Cross-Border Payment Systems	Strong domestic (UPI, Alipay) but weak cross-border links	Integrated, interoperable systems with global standards
Regulatory Frameworks	Fragmented, evolving, uneven across members	Well-established, harmonized policies (OECD/WTO aligned)

G20 economies leverage advanced technology and global integration, while BRICS nations show steady growth, with China and India leading the group. Limited connectivity in BRICS constrains their participation in digital trade, whereas G20 countries enjoy near-universal access. Although the G20 leads global trade flows, the BRICS share is growing rapidly, particularly through China. The G20's integrated payment infrastructure enables seamless global trade, while BRICS rely more on domestic solutions. Furthermore, G20 policies are largely aligned with global standards, whereas BRICS exhibit diverse and sometimes inconsistent regulatory frameworks.

Table 2

Country-Level E-Commerce Market Size (2023)

Country	E-Commerce Value (USD Billion)	Global Share (%)
China (BRICS)	3,020	35
United States (G20)	1,160	20
India (BRICS)	57–60	2
Japan (G20)	144	3
Brazil (BRICS)	~50	1
Germany (G20)	141	3

Table 2 shows that China and the United States dominate the global e-commerce market, together accounting for over half of the total share. China leads with 35%, far ahead of the U.S. at 20%, while other countries contribute much smaller portions. India, despite its rapid growth, makes up only 2%, and Brazil just 1%, showing the uneven development within BRICS. In contrast, G20 members like Japan and Germany hold steady shares of around 3% each. Overall, the data highlights how concentrated the market is in a few giants, while others are still catching up.

Table No.3

India's Position in BRICS vs G20

Indicator	India (in BRICS)	India (in G20)
E-Commerce Market Size (2025 est.)	\$120 billion (second after China)	Among top 5 fastest growing globally

Internet Users (millions)	900+ (growing rapidly)	Second only to China in scale
Fintech Adoption Rate (%)	87% (highest in BRICS)	Among global leaders alongside UK & US
Cross-Border Trade Partnerships	Bilateral FTAs (e.g., UAE, ASEAN)	Active participant in G20 digital economy dialogues
Policy Initiatives	Digital India, ONDC, Start-up India	Data Protection Act, Digital Public Infrastructure initiatives

India stands out as a bridge economy within both BRICS and the G20. In the BRICS group, it ranks just behind China in e-commerce market size and leads in fintech adoption, highlighting its growing digital capabilities. Within the G20, India is among the fastest-growing digital markets, supported by a massive consumer base that positions it as a strategic player in global digital trade. Policy initiatives such as Digital India, ONDC, and the new Data Protection Act demonstrate the country's commitment to strengthening both domestic and cross-border digital commerce.

Table No.4

Challenges in Digital Trade (BRICS vs G20)

Challenge	BRICS (Data)	G20 (Data)
Digital Divide	Urban internet density ~115%, rural ~33% (India example)	Urban areas ~32% faster mobile download speeds than rural
Infrastructure	382,000 km rail shipments,	Smart city and advanced

	213,000 km electrified	transport infrastructure
Regulations	Fragmented, changing policies; cybersecurity frameworks developing	Harmonized, stable policies
Cybersecurity	Cyberattacks growing ~80% annually	Strong data protection laws; advanced enforcement
Payments	NDB plans ₹500 crore (~\$400–500M) rupee bond by 2026	G20 aims for cross-border payment cost ≤1% by 2027

The comparison highlights that BRICS economies continue to struggle with structural challenges in the digital trade ecosystem, such as the rural–urban digital divide, weaker infrastructure, fragmented regulatory frameworks, and relatively lower levels of cybersecurity preparedness. While countries like India and China are making rapid strides in digital inclusion, the disparities across member states reduce overall efficiency. On the other hand, G20 economies benefit from highly developed infrastructure, harmonized digital regulations, and well-established payment systems that enable seamless cross-border trade. However, even within the G20, inclusivity for developing trade partners remains an ongoing concern. This suggests that while BRICS must focus on strengthening internal systems and achieving policy stability, the G20 must work towards creating a more balanced digital ecosystem that accommodates both advanced and emerging economies.

Table No.5

Opportunities for India in BRICS vs G20

Opportunity	BRICS (Data / Example)	G20 (Data / Example)
Market Expansion	2nd largest market after China	Among fastest-growing

		economies
Fintech Leadership	UPI transactions ~9B/month, success in India	Potential global fintech adoption; G20 digital payments advanced
Cross-Border Alliances	Deepen South-South cooperation	Join structured alliances
Policy Influence	Shape digital frameworks in BRICS	Contribute to global standards
Sustainability	Inclusive growth focus	Sustainable growth emphasis

India's dual membership in both BRICS and G20 offers it a rare strategic advantage in shaping the future of digital trade. Within BRICS, India stands out as a leader in market size and digital adoption, second only to China, and can use this position to advocate for inclusive growth and South–South cooperation. Its fintech success, particularly the UPI system, has already become a model for other developing nations and strengthens India's credibility as a technology innovator. In the G20, India gains access to advanced frameworks, structured alliances, and global decision-making platforms, enabling it to contribute to and benefit from international standards in cybersecurity, AI, and digital payments. Furthermore, India's focus on both inclusion (aligned with BRICS priorities) and sustainability (aligned with G20 goals) places it in a unique position to act as a bridge between advanced and emerging economies. This dual role not only amplifies India's voice in global digital governance but also enhances its ability to drive innovation and ensure that digital trade becomes more equitable and sustainable worldwide.

KEY FINDINGS

1. **Uneven Digital Economy Growth:** G20 economies lead with 12–15% of GDP from digital sectors, while BRICS lag at 7–10%, though China and India outperform their peers.

2. **Internet Access Drives Inclusivity:** High penetration in G20 (80–95%) enables widespread digital participation, whereas BRICS (55–70%) face gaps limiting market reach.
3. **E-Commerce Concentration:** G20 dominates ~70% of global e-commerce flows; BRICS account for ~25%, largely due to China's and India's contributions.
4. **Payments & Infrastructure:** BRICS excel in domestic payments (e.g., India's UPI) but lack cross-border interoperability; G20 enjoys globally integrated systems and advanced logistics.
5. **India's Strategic Role:** Membership in both BRICS and G20 positions India to bridge gaps, drive innovation, and influence global digital trade standards.

CONCLUSION

The study highlights that the growth of the digital economy remains uneven, with G20 economies outperforming BRICS due to advanced infrastructure, stable regulatory frameworks, and globally integrated payment systems. BRICS nations, despite showing notable progress in countries like China and India, continue to face structural challenges such as limited internet penetration, fragmented regulations, and underdeveloped cross-border payment interoperability. India's unique position as a member of both BRICS and G20 provides a strategic advantage, enabling it to leverage domestic digital innovations and contribute to global standards. This dual role allows India to bridge the gap between emerging and developed economies, promote inclusive digital growth, and strengthen its influence in shaping international digital trade policies. Ultimately, India's position underscores the potential for emerging economies to play a central role in advancing a more equitable, efficient, and sustainable global digital economy.

RECOMMENDATIONS

1. Enhance cross-border payment interoperability: BRICS economies should collaborate on creating interoperable payment systems aligned with global standards to reduce transaction friction.
2. Harmonize digital trade policies: Member states should work toward regulatory convergence through frameworks aligned with WTO and OECD guidelines to boost trade confidence.

3. Invest in digital infrastructure: Expanding broadband access, logistics networks, and digital skills in BRICS nations will improve participation in cross-border e-commerce.
4. Leverage India's dual membership: India can act as a bridge, sharing best practices from G20 while promoting inclusive digital trade policies within BRICS.
5. Promote public-private partnerships: Collaborative efforts between governments, fintech firms, and e-commerce platforms can accelerate digital transformation and enhance cross-border trade efficiency.

FURTHER SCOPE OF STUDY

This study provides a comparative perspective based on secondary data, but future research can build on these findings through:

- Primary data collection: Surveys and interviews with policymakers, businesses, and consumers to assess digital trade adoption and challenges.
- Country-specific case studies: In-depth analysis of individual BRICS and G20 nations to explore unique policy models and strategies.
- Sectoral focus: Examining digital trade's impact across industries such as manufacturing, services, and MSMEs.
- Policy simulation models: Evaluating the potential effects of regulatory harmonization and payment integration on trade volumes and alliances.

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THE AI SUPER-MULTIPLIER: BEYOND KEYNESIAN GROWTH DYNAMICS

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ABSTRACT

*This paper introduces the concept of the **AI Super-Multiplier**, an extension of Keynesian and Robinson's Super Multiplier, to explain how government investment in Artificial Intelligence (AI) infrastructure and ecosystems may generate amplified economic growth. Unlike traditional public spending, AI-related investment enhances productivity, fosters innovation, and creates powerful network spillovers, suggesting multiplier effects far larger than conventional models. Using theoretical reasoning, case-based examples, and proposed empirical strategies, the study outlines mechanisms of short-, medium-, and long-term impacts of AI spending. It also examines risks, limitations, and policy implications. The paper argues that if validated, the AI Super-Multiplier may redefine fiscal policy and position AI as a public infrastructure of the 21st century.*

Keywords: Keynesian Multiplier, Super Multiplier, Artificial Intelligence, Productivity, Fiscal Policy

INTRODUCTION

In the 20th century, John Maynard Keynes introduced the concept of the multiplier, showing how government spending generates ripple effects in the economy, leading to growth greater than the original expenditure. The multiplier demonstrated that even modest government interventions could stimulate wider demand, increase employment, and expand national income. Later, economists such as Joan Robinson expanded this into the Super Multiplier, which combined consumption, investment, and autonomous demand, showing how growth could be reinforced by induced investment cycles.

While these theories reshaped fiscal policy in the industrial age, the 21st century is witnessing an equally transformative technological revolution driven by **Artificial Intelligence (AI)**. AI is now considered a **General-Purpose Technology (GPT)**, on par with the steam engine, electricity, and the internet. Each of

these earlier GPTs triggered waves of innovation, raised productivity, and transformed social and economic systems. AI is following a similar trajectory but at an accelerated pace due to its **self-learning and adaptive capabilities**.

Unlike traditional spending on roads, factories, or dams, AI investment produces **dual effects**: immediate demand-side impacts and far-reaching supply-side spillovers. For instance, an investment in AI-driven healthcare reduces costs, improves access, and raises household consumption. Similarly, AI adoption in logistics reduces trade costs and boosts competitiveness across industries. These cross-sectoral impacts suggest that the AI Super-Multiplier may function on a larger and more sustained scale than earlier multipliers.

The question this paper explores is: *Can AI investment redefine fiscal multipliers for the digital age, and if so, how can policymakers harness its benefits inclusively?*

RATIONALE OF THE STUDY

The rationale for this study lies in the growing mismatch between traditional economic theories of growth and the realities of digital transformation.

- Traditional multipliers emphasize **demand cycles** but overlook **technological spillovers** and **network effects** that characterize digital economies.
- Keynes and Robinson developed their models in a manufacturing-based economy, where productivity gains were incremental, not exponential.
- AI, in contrast, is **scalable and adaptive**—its value grows with adoption, data, and complementary innovations.
- Governments worldwide, from the United States to India and China, are investing billions in AI R&D, data centers, and skill development. Yet, economic theory has not adequately captured how such spending multiplies growth.

Thus, this study is motivated by the need to extend classical theories into the digital era by proposing the **AI Super-Multiplier** as a new framework.

OBJECTIVES OF THE STUDY

1. To review classical multiplier theories and identify their limitations in the AI era.
2. To conceptualize the **AI Super-Multiplier** as an extension of existing models.

3. To analyze short-, medium-, and long-term mechanisms of AI-driven growth.
4. To propose empirical strategies for measuring the AI Super-Multiplier.
5. To highlight risks, limitations, and policy implications for inclusive growth.

RESEARCH METHODOLOGY

Nature of Study

Conceptual and exploratory, combining economic theory with contemporary AI developments.

Approach

Comparative framework tracing the evolution:

- Keynesian Multiplier → Super Multiplier → AI Super-Multiplier.

Methods

- Theoretical modeling of the AI Super-Multiplier.
- Case-based reasoning using India, the US, China, and the European Union.
- Proposed empirical tests:
 - **Difference-in-Differences (DiD):** comparing regions with and without AI spending.
 - **Input-Output analysis:** tracing spillovers across industries.
 - **Firm-level evidence:** comparing productivity of AI-adopting vs. non-adopting firms.

DATA SOURCES

Secondary data from OECD, World Bank, national AI policies, AI adoption surveys, and relevant academic literature.

Limitations

- Conceptual model, not yet empirically validated.
- AI effects overlap with cloud, 5G, and digitalization, making attribution difficult.
- Uneven adoption across geographies may weaken effects.

THEORETICAL FRAMEWORK

1. The Keynesian Multiplier

$$k = \frac{1}{1 - MPC}$$

Where **MPC** is the marginal propensity to consume.

2. The Classical Super Multiplier

$$Y = \frac{1}{1 - (c + v)} \cdot A$$

Where **c** = consumption, **v** = accelerator (induced investment), and **A** = autonomous demand.

3. The AI Super-Multiplier (Proposed)

$$k_{AI} = \frac{1}{1 - (MPC + \alpha + \beta + \gamma)}$$

Where:

- **MPC** = consumption effect (traditional).
- **α** = productivity effect (efficiency gains from AI).

- β = innovation effect (new startups, patents, industries).
- γ = network effect (adoption multiplies value).

Numeric Illustration:

- Keynesian model: $MPC = 0.8 \rightarrow \text{Multiplier} = 5$.
- AI model ($MPC=0.8, \alpha=0.05, \beta=0.05, \gamma=0.05$):

$$k_{AI} = \frac{1}{1 - (0.95)} = 20$$

Thus, ₹100 of AI spending could generate ₹2,000 in GDP compared to ₹500 in traditional spending.

Developed vs. Developing Scenario:

- In developed economies with high digital infrastructure, α, β, γ may be larger (0.1 each), raising the multiplier further.
- In developing economies, these effects may be smaller due to limited adoption but could grow with infrastructure and training investments.

MECHANISMS OF THE AI SUPER-MULTIPLIER

1 . Short-Term Effects

- Direct jobs in construction, data centers, and AI training programs.
- Circulation of wages into local economies.
- Increased demand for supporting services (education, telecom, transport).

2. Medium-Term Effects

- Firms adopt AI to cut costs and increase output.
- Startups in **healthtech, fintech, agritech, and edtech** expand markets.
- SMEs integrate AI for logistics, marketing, and customer support.

3. Long-Term Effects

- Sustained productivity growth across multiple sectors.
- Cross-industry spillovers: AI in agriculture strengthens finance and trade; AI in healthcare boosts pharma and insurance.
- Human capital growth: AI education programs create a skilled workforce, ensuring continued innovation.

SCOPE AND LIMITATIONS

Scope

- Relevant for both advanced and emerging economies.
- Can guide governments designing AI-driven fiscal strategies.

Limitations

- Unequal access may reduce effectiveness in rural areas.
- Monopoly risks if large firms capture most benefits.
- Short-term job displacement may weaken demand effects.
- Difficult to isolate AI's role from general digital transformation.

MAIN ANALYSIS

1. Case Examples

- **India:** The *National AI Mission* (₹7,000 crores) promotes AI adoption in agriculture and healthcare. Microsoft's precision farming pilots improved yields by 30%. AI-based telemedicine platforms expand rural access. Risks: uneven digital infrastructure and skill gaps.
- **United States:** VC investment in AI startups exceeded \$50 billion in 2023. AI applications in Silicon Valley influence global sectors. Risks: inequality and monopolization by Big Tech.
- **China:** The *Next Generation AI Plan* involves over \$150 billion in AI funding. AI adoption spans manufacturing, surveillance, and smart cities. Risks: centralization and governance.
- **European Union:** The EU's AI Act balances innovation and regulation, with strong funding for ethical AI. Focus is on sustainability and inclusive adoption. Risks: regulatory delays may slow innovation.

2. Potential Evidence

- AI-enabled agriculture → higher yields → rural consumption.
- AI in logistics → lower costs → competitiveness in exports.
- AI in healthcare → reduced expenses → increased disposable income.

SUGGESTIONS AND RECOMMENDATIONS

Short-Term

- Launch nationwide AI literacy and training programs.
- Subsidize SMEs for AI adoption.
- Encourage pilot projects in agriculture, healthcare, and education.

Medium-Term

- Expand digital infrastructure (5G, broadband, data centers).
- Strengthen competition laws to prevent AI monopolies.
- Provide R&D tax incentives to promote startups.

Long-Term

- Treat AI as public infrastructure, similar to electricity and transport.
- Establish global AI governance frameworks for data sharing and ethics.
- Integrate sustainability and environmental goals with AI adoption.

CONCLUSION

The **AI Super-Multiplier** suggests that public AI investment may produce economic effects far larger than traditional multipliers by combining **consumption, productivity, innovation, and networks**. AI is not only a tool for efficiency but a **general-purpose infrastructure** for future economies.

If validated, the AI Super-Multiplier could redefine fiscal policy, making AI investment central to national growth strategies. However, inclusivity, competition, and equitable distribution are essential to avoid concentration of benefits.

Just as Keynes redefined economics in the 20th century, the AI Super-Multiplier can redefine 21st-century growth—positioning AI as the cornerstone of sustainable and inclusive prosperity.

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SOCIAL AND ECONOMIC STATUS OF WORKERS IN BAMBOO INDUSTRY: A REVIEW OF LITERATURE

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ABSTRACT

One of India's oldest traditional cottage industries is bamboo craft. The abundant bamboo that is found in the forests is used to create baskets, mats, and a variety of other household goods. Currently, bamboo craft is widespread throughout the nation's rural areas and provides employment and generate income to the rural people. So there is need to know the social and economic status of workers working in bamboo industry. The present research paper seeks to review different literature published in various Journals and have considered 30 published papers for the review and found the research gap from such literatures.

Keywords : *Craftmans., Bamboo Based Product, Social & Economic Status*

INTRODUCTION

Bamboo based products is a traditional technology that has been practiced for more than a thousand years and is widely distributed. The majority of the bamboo based industries are grouped as cottage and small-scale enterprise. There are various bamboo based products including sofa, dining tables, baskets, trays, jars, boxes, vases, folding screen, models of animals and figures, furniture, lamps, bags, toys, fans and mats. Some are graceful pieces of art for decoration or enjoyment and some of them are essential commodities.

The style of the products often varies according to place of production. This natural resource plays a major role in the livelihood of rural people and in rural industry.

OBJECTIVES OF THE STUDY

- To know the social and economic status of workers in bamboo industry
- To review the literature published in research papers in leading international and national journals.
- To find the research gap based on the review of literature

RESEARCH METHODOLOGY

This paper is prepared with the support of secondary data. For present study the data have been collected from journal literature. For the present study 30 research papers are reviewed.

ANALYSIS OF STUDIES

The researcher has taken 30 research publications and it is presented in a Tabular form

Researchers	Conclusion
Thokchem Premjit Singh, Dr.Babita Tyagi (2024)	They have concluded that there is a vast potential of demand for quality bamboo products in the internal and foreign markets. But the bamboo based manufacturers have faced problems like marketing, finance and raw materials and there problems could be overcome by proper strategy. Also, external institutional support is needed in adopting modern technology, market channels, product design.
Rafellino Ovaldo, Siti Juhriah Novianty, Andika Witono (2024)	Have concluded that by embracing innovative ideas and involving multiple stakeholders, Studio Dapur sets an example for the industry and contributes to the economic growth, peace, and regional prosperity
Mithlesh Kumar Sinha, Sanjeet Kumar and B.L. Manjula (2024)	The results enumerated that about 15 species of bamboo are commonly used in Chhattisgarh, Odisha, and Karnataka states. It is observed that it is used as a multisource of food, shelter, medicine, etc.
Ankita Renu, Sandhya Rani, Aditi Vats and Ragini Mishra (2024)	They stated that Bamboo handicraft making was the main source of income and livelihood for the workers in the study locale. This study shows that bamboo handicraft products greatly contribute to the regional economy and enhance the capacity of rural workers to overcome poverty.

Kashif Javed (2024)	This study presented a number of recommendations for creating awareness, developing frameworks, improving practices, and encouraging authorities to take major actions in order to support bamboo and rattan artisans in Lahore, Pakistan. It could be focusing on historic handicrafts, modern design concepts and construction techniques.
Suprita Pawar , Geeta Chitagubbi and Rajeshwari Desai (2023)	Concluded that Majority of the respondents belonged to middle age and female. More than fifty per cent of the respondents had primary school level education and spent 5-6 hours a day in bamboo enterprise. Majority of them belonged to the lower middle socio economic status and were having less than 13 years of experience.
Dr. Sukanta Sarkar (2023)	Concluded that Male and female are involved in producing the bamboo products, but males are more involved than the females. Bamboo is used to make the musical instruments, product of utensils, furniture, baskets, and dress materials. Bamboo made headgears and ornaments (wristlet, anklet, brass masks etc.) are popular among the tribes
Seema Hansda, Tulika Kumari, and K.M. Singh (2023)	This paper highlights the utilization pattern of bamboo and the economic potential of major bamboo products with special reference to Eastern India.
Neha Prasad and Aravendan Muthusamy (2023)	The researcher concluded that_There is a need for specific promotion and branding practices for more conversions, justifying the bamboo products' healthy, cultural and environmental competence.
Pavithra G.M (2021)	Concluded that bamboo waste can be utilized in several innovative ways like in making Bamboo-Polymer Composite or Bamboo Plastic Composite and making bamboo based eco friendly product.
Pramod Kumar and Chourasia (2020)	Concluded that the development of skill of artisans, promoting scientific plantation and harvesting methods, procurement and treatment management can reduce the problems and further reduce the dependency on forests as the replacement period will be maximized .
	Concluded that bamboo and rattan yields benefit in helping to improve the socio-economic of the local community.

Wan Rafiekal Wan Abdul Rahim & Roszehan Mohd Idrus (2019)	The main uses of bamboo- first as a handicraft products, second being used as furniture manufacturing and house construction, then as a source of food and lastly as musical instruments
Nandini Borah (2019)	Concluded that the bamboo-based industries suffer from a lack of infrastructure and market-linkage framework. Therefore, these industries need hand-holding in terms of infrastructural support and marketing inputs.
S.C.Lahiry (2019)	He has stated that Bamboo is an integral part of our life and culture, as it is used in religious ceremonies, art and music. For tribal and forest dwellers “bamboo for living and living with bamboo” is still norms. Bamboo industry offers an effective mechanism for rural poverty alleviation and livelihood securities.
Nirendra Dev (2018)	He has stated that North east India grows about 68% of India’s bamboo. The bamboo mission launched by the government of India is a centrally sponsored scheme with 100% funding from the government of India and with the coordination of states, it seeks to achieve certain objectives like promoting bamboo and bamboo-based handicrafts and generate employment for skilled and unskilled youth.
T. Selvam (2016)	Concluded Several issues like health, work environment, education, Social, economic and skill up gradation need to be tackled as welfare and developmental activities. The laws and development programs by the government have not achieved the desired success to uplift bamboo handicraft workers. Majority of respondents are leaving their life below poverty line due to various causes
R. A. Sanadi , A. D. Jadhav (2016)	The study revealed that the socioeconomic status plays an important role in the health of sericulture industry workers. It is also conclude that poor socioeconomic status lack of awareness regarding health and hygiene and dusty and noisy workplace environment has directly affects on the health of worker.
Logu,A and Kottaiveeran, K	They identified some raw material, finance and labour problems. The paper stressed that for the successful development of the sector, the external institutional support will be needed. Further training should be

(2014)	given in the areas of adoption of modern technology, market channels, product design.
Logu,A and Kottaiveeran, K (2014)	They stated that India did not get any significant position in the world trade due to lack of efficient and effective exploitation of bamboo resources and lack of information about volume of demand in the foreign market. To improve the situation, the government has to take enough measures to overcome the problems.
Samir Jamatia (2014)	Concluded that Bamboo is widely grown in India and has immense potential to transform the country's rural /Tribal economy and contribute to the sustainable development efforts of the country. However, because it is governed by a complex web of forestry laws and policies, there are serious restrictions on its cultivation, harvesting and transportation.
Selim Reza and Arshad, MD. (2012)	They assessed the socio-economic benefits derived by the rural poor producer from bamboo value chain upgradation in Tripura. They exposed that the value chain upgradation as an approach is very much relevant for poverty reduction, women empowerment and environmental preservation in traditional and nontraditional sectors.
Ajay Kakra and Nivvanjyoti Bhattacharjee (2011)	They revealed that a unique attempt has been made to analyze the marketing scenario of bamboo products made in the North East Region. The study focuses on charting out a strategy for developing an operational framework for improving the channel, market and product efficiency for specific bamboo products manufacture in North East India.
Rinku Das and Ashim Kumar Das (2011)	Explained Rural cottage industries is acting as source of sustainable livelihood for the rural people in North East Region. In spite of various attempts by the central and state governments, these rural cottage industries in this region are not performing good. To give new life to these industries, the government has adopted the policy of cluster development.
Arun Jyothi Nath, Paramith Bhaltdrajes,	Viewed that tea tribes of Barak valley, Assam depends on village bamboo for their home construction. It was observed that villages do not use preservative treatment in bamboo components of their traditional

Subathra Nandy and Ashesh Kumar Das (2010)	houses and the result is degradation of bamboo by insect. Therefore preservative should be used to enhance the durability of bamboo.
M. Parvez Rana, Sharif Ahmed (2010)	The analysis reported here indicates that small-scale bamboo-based enterprises could be developed more widely throughout the rural areas of Bangladesh for socioeconomic development
Lahiry,S.C. (2009)	Pointed out that improvement of the economic conditions of the rural population was closely linked to the growth and development of rural industries. Rural industrialization should continue to be a central component of industrial policy and Khadi and village industries institutions should be strengthened.
Balwat Kumar (2009)	He has stated that the Himalayas are one of the richest sources of Ringal in oak forests. This strip contributes to biodiversity and is important as fodder, basket materials and for household user. But in future if efforts for regional conservation will not be done, it will affect the livelihood of the regional weavers.
Muralidharan, Anitha, Rugoini, (2009)	He explained that bamboo based handicraft production in Kerala is carried out both in traditional and nontraditional sectors. Export of bamboo handicrafts and proper marketing within the country has not received adequate attention. The technical and financial capabilities of the new generation artisans are limited to meet challenges.
Ogunjinmi, A.A. H.M.I Jeomah and Aiyeloja,A.A (2009)	They pointed out that efforts should also be made towards the protection and conservation of bamboo forest and bamboo growth areas, sustainable development and utilization of bamboo resources through scientific management, promotions of local traditional bamboo craft.
Uravu (2009)	He pointed out that the human potential, availability of skills, unity of a bamboo small scale enterprises, access to raw materials near the units, assistance from the government for infrastructure, additional working capital, etc. could be a crucial yardstick for the sustainability of the bamboo based enterprises.
Mani Ram Moktan, Lungten Norbu, Kencho Dukpa,	Stated that transactions with middlemen are important, but lead to artisan being underpaid. Young people are less skillful in high quality

Tek bahadur Rao(2009)	craftsmanship. Training schemes are needed to improve quality, Proper policy and good management is also required
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CONCLUSION

The overview of the literature reviewed shows that some studies analysed the socio-economic benefits, i.e. bamboo based handicraft industry provide employment and help the livelihoods and poverty reduction through income generation in the rural areas. Some studies concentrated on pre- production stage i.e. bamboo plantation, propagations, conservation, scientific harvesting and management techniques. Some studies explored the environmental aspects of bamboo and bamboo based industrial products and different uses of bamboo i.e. building material and infrastructural uses. Besides, some studies found the trade and marketing potential of bamboo based products and supply chain analysis, and a few studies analysed the opportunities and constraints of the bamboo sector. However, there is limited study on problem and socio-economic status of workers in bamboo industry and also limited study is done in Maharashtra on bamboo industry and its workers. So further research can be taken on it.

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BALANCING PROFITABILITY AND ENVIRONMENT IN A GLOBAL ECONOMY

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Balancing profitability and environmental sustainability require integrating eco-friendly practices, leveraging digital technologies, and adopting circular economy models for long-term business resilience.

ABSTRACT

In an era marked by climate change and resource scarcity, businesses face mounting pressure to reconcile profitability with environmental responsibility. This paper examines strategies for balancing economic growth and ecological sustainability, highlighting frameworks like the Triple Bottom Line (TBL) and Circular Economy. Through case studies and analysis of technological enablers, regulatory drivers, and stakeholder engagement, it underscores pathways for achieving harmony between profit and planet.

INTRODUCTION

The global economy's expansion has precipitated environmental degradation, compelling corporations to adopt sustainable practices. Balancing profitability and environmental stewardship is imperative for long-term viability. This research explores mechanisms through which businesses can integrate eco-consciousness without compromising financial performance.

OBJECTIVES

1. To study profitability with sustainability measures
2. To study important case studies of greenwashing, carbon credit and circular economy.

RESEARCH METHODOLOGY

Data is collected from secondary sources like official websites and journals.

SCOPE AND LIMITATIONS

The scope of this research paper encompasses exploring strategies for balancing profitability and environmental sustainability, focusing on circular economy principles, carbon credits, and industry-specific challenges, while limitations include contextual research and potential generalizability issues.

SCOPE OF THE RESEARCH PAPER

1. Focus Areas : Balancing profitability and environmental sustainability, circular economy, carbon credits, industry-specific challenges.
2. Concepts Covered : Triple Bottom Line, circular business models, ESG, carbon markets.
3. Industries Explored : Manufacturing, IT, fashion, automotive, energy.
4. Geographic Context : Global examples with some India-specific references.
5. Themes : Innovation, stakeholder engagement, regulatory influences.

LIMITATIONS OF THE RESEARCH PAPER

1. Contextual Nature : Findings reflect current trends; may evolve with policy/tech shifts.
2. Generalizability : Industry-specific strategies might not apply universally.
3. Depth vs. Breadth : Broad coverage might limit deep dive into each aspect.
4. Emerging Trends : Rapid changes in sustainability practices/carbon markets may date content.
5. Regional Focus : Examples lean on global leaders; applicability in diverse markets varies.
6. Data Availability : Reliance on available case studies; gaps in some sectors.
7. Quantitative Analysis : Largely qualitative; lacks specific financial/impact metrics.
8. Regulatory Dynamics : Policies like carbon pricing vary by region.

POTENTIAL EXTENSIONS

1. Quantitative Modeling : Economic/environmental impact assessments.
2. Sector Deep Dives : Focus on specific industries like textiles or electronics.
3. Emerging Markets : Applicability in developing economies.
4. Policy Analysis : Detailed look at regulatory enablers/barriers.

LITERATURE REVIEW

1. Triple Bottom Line (TBL): Elkington's framework emphasizes People, Planet, Profit.
2. Circular Economy: Concepts by Ellen MacArthur Foundation promote resource loops.
3. ESG (Environmental, Social, Governance) : Growing investor focus on sustainability metrics.
4. Green Technologies: Innovations like renewables and AI-driven efficiency tools.

KEY DRIVERS

- Regulatory Policies: Carbon taxes, emission norms (e.g., India's PAT scheme).
- Consumer Preferences: Rising demand for green products.
- Technological Advancements: IoT, AI for sustainability optimization.
- Financial Instruments: Green bonds, sustainability-linked loans.

DRIVER DESCRIPTION EXAMPLE

Regulations Environmental laws driving compliance EU's Carbon Border Adjustment Mechanism

Technology Digital tools enhancing eco-efficiency AI in energy management

Markets Consumer preference shifts Patagonia's sustainable apparel

Finance Green financing mechanisms India's green bond market growth

STRATEGIES FOR SUSTAINABILITY

1. Circular Business Models: Product-as-a-Service (e.g., Philips' lighting solutions).
2. Renewable Energy Adoption: Ørsted's offshore wind success.
3. Supply Chain Optimization: Ethical sourcing reducing environmental footprint.
4. Digital Transformation: AI predicting maintenance needs, reducing waste.

FRAMEWORKS AND TOOLS

1. Life Cycle Assessment (LCA): Evaluating product environmental impacts.
2. Global Reporting Initiative (GRI): Sustainability reporting standards.
3. Carbon Pricing: Mechanisms like India's coal cess.

Why This Works

- Integration: Blends economic and environmental goals.
- Technology: Leverages digital tools for optimization.
- Collaboration : Engages stakeholders for systemic change.

CASE STUDIES: BALANCING PROFITABILITY AND ENVIRONMENT

1. Ecoalf (Spain) - Sustainable Fashion through Upcycling

- Overview : Ecoalf is a Spanish fashion brand creating clothing and accessories from recycled ocean plastics and other waste materials.
- Strategy : Upcycling transforms discarded materials into high-quality products.
- Environmental Impact : Reduces ocean pollution; uses recycled polyester (rPET) from plastic bottles.

- Profitability : Premium pricing appeals to eco-conscious consumers; partnerships enhance reach.
- Key Outcome : Balances fashion trends with sustainability, attracting global customers.

2. Ørsted (Denmark) - Renewable Energy Leader

- Overview : Ørsted transitioned from fossil fuels to become a leading offshore wind energy producer.
- Strategy : Focus on scalable offshore wind farms (e.g., Hornsea projects).
- Environmental Impact : Substantial reduction in CO₂ emissions vs. fossil fuel alternatives.
- Profitability : Strong financial performance; listed on Nasdaq Copenhagen.
- Key Outcome : Demonstrates profitable shift to renewables, influencing global energy transitions.

3. Tata Motors (India) - Electric Mobility Push

- Overview : Tata Motors is advancing electric vehicles (EVs) in India's growing auto market.
- Strategy : Launched EVs like Nexon EV; investments in charging infrastructure.
- Environmental Impact : Reduces urban pollution and fossil fuel dependence.
- Profitability : Growing EV segment; government incentives (e.g., FAME India).
- Key Outcome : Positions Tata as a leader in India's EV transition.

4. Amazon - Sustainability in Operations

- Overview : Amazon integrates sustainability into logistics and product offerings.
- Strategy : Right Now Climate Fund ; targets net-zero carbon by 2040.
- Initiatives :
 - Sustainable packaging innovations.
 - Renewable energy use (solar projects).
 - Electric delivery vehicles (Rivian partnership).
- Environmental Impact : Aims to reduce carbon footprint amid massive scale.
- Profitability : Balances scale with sustainability goals; customer loyalty.

5. ITC (India) - Sustainable Business Practices

- Overview : ITC integrates sustainability across diverse businesses (paper, hotels, FMCG).
- Strategy : 'Triple Bottom Line' approach focusing on economic, social, environmental aspects.
- Initiatives :
 - Water conservation; renewable energy adoption.
 - Sustainable agriculture practices.

- Green buildings (LEED certifications).
- Environmental Impact : Significant resource efficiency gains.
- Profitability : Sustained growth aligning business and sustainability goals.

COMMON THEMES

1. Innovation : Creative use of materials (Ecoalf) or technology (Ørsted).
2. Consumer Engagement : Aligning products with eco-values (Patagonia).
3. Regulatory Alignment : Leveraging policies like India's FAME for EVs (Tata Motors).
4. Collaboration : Partnerships amplify impact (Amazon-Rivian).

CHALLENGES OBSERVED

- Scaling Sustainability : Balancing growth with environmental goals.
- Cost Dynamics : Green technologies' upfront investments.
- Greenwashing Risks : Ensuring authenticity in claims.

IMPLICATIONS

These case studies highlight diverse pathways for integrating profitability and environmental stewardship, offering models for businesses globally.

Key challenges in balancing profitability and environmental sustainability include scaling green initiatives, managing cost dynamics, mitigating greenwashing risks, navigating regulatory fragmentation, and addressing stakeholder pressures.}\$

1. Scaling Sustainability

- Issue : Implementing eco-friendly practices across global operations at scale.
- Example : Amazon's vast logistics network requires significant efforts to reduce emissions.
- Impact : Difficulty ensuring uniform sustainability standards in diverse markets.
- Strategy : Leverage digital tools (AI, IoT) for monitoring and optimization.

2. Cost Dynamics

- Issue : High upfront costs for green technologies (renewables, eco-materials).
- Example : Tata Motors' investments in EV technology and charging infrastructure.
- Impact : Pressure on margins; ROI timelines for green investments vary.
- Strategy : Access green finance (green bonds, sustainability-linked loans).

3. Greenwashing Risks

- Issue : Risk of superficial sustainability claims eroding trust.
- Example : Criticisms faced by some corporations for vague ESG reporting.
- Impact : Stakeholder skepticism; potential regulatory scrutiny.
- Strategy : Transparent reporting (GRI, TCFD); third-party audits.

4. Regulatory Fragmentation

- Issue : Varied environmental regulations across countries/regions.
- Example : EU's stringent carbon regulations vs. differing norms elsewhere.
- Impact : Compliance complexity for multinational companies.
- Strategy : Proactive engagement with policymakers; robust compliance frameworks.

5. Stakeholder Pressures

- Issue : Diverse expectations from investors, consumers, NGOs, employees.
- Example : Investors pushing for ESG disclosures; consumers seeking eco-products.
- Impact : Balancing varied demands; reputational risks if unmet.
- Strategy : Stakeholder dialogue; integrated sustainability reporting.

6. Technological Limitations

- Issue : Current tech may have limitations in efficiency/scale for sustainability goals.
- Example : Intermittency challenges with renewable energy (solar/wind).
- Impact : Affects reliability; requires complementary solutions (storage).
- Strategy : R&D investments; partnerships for tech advancement.

7. Supply Chain Complexities

- Issue : Ensuring sustainability across global, often opaque supply chains.
- Example : Fashion brands needing traceability for ethical sourcing.
- Impact : Risks of non-compliance; reputational harm.
- Strategy : Supplier engagement; digital tools for tracking.

Industry-specific challenges in balancing profitability and environmental sustainability vary across sectors like manufacturing, IT, fashion, automotive, and energy, requiring tailored strategies.}\$

Industry-Specific Challenges

1. Manufacturing

- Resource Intensity : High material and energy consumption.
- Waste Management : Industrial waste, e-waste disposal complexities.
- Emissions : Sector contributes significantly to greenhouse gases.
- Examples :
 - Cement Industry : High CO₂ emissions; efforts like alternative fuels.
 - Automotive Manufacturing : Balancing EV transition costs.
- Challenges :
 - Cost Competitiveness : Green tech adoption vs. pricing pressures.
 - Supply Chain : Sourcing sustainable raw materials.
- Strategies : Lean manufacturing; circular economy approaches.

2. Information Technology (IT) & Services

- Energy Consumption : Data centers' power usage; digital footprint.
- E-Waste : Rapid tech obsolescence generates significant e-waste.
- Digital Sustainability : Balancing cloud computing growth with eco-efficiency.
- Examples :
 - Data Centers : Google's renewable energy investments.
 - IT Hardware : Dell's recycling initiatives for electronics.
- Challenges :
 - Scalability : Growing digital demand vs. environmental impact.
 - Supply Chain Transparency : Electronics' complex global supply chains.
- Strategies : AI-driven efficiency; green data centers.

3. Fashion & Textiles

- Resource Use : Water-intensive processes; material sourcing impacts.
- Fast Fashion : Encourages overconsumption and waste.

- Chemical Use : Dyeing, treatments affect ecosystems.
- Examples :
 - Patagonia : Sustainable materials; repair culture.
 - H&M : Garment collecting initiatives for recycling.
- Challenges :
 - Consumer Behavior : Shifting fast fashion norms.
 - Supply Chain Ethics : Labor and environmental conditions.
- Strategies : Circular fashion models; eco-friendly fabrics.

4. Automotive

- Emissions : Traditional vehicles' significant CO₂ footprint.
- EV Transition : High R&D costs; charging infrastructure needs.
- Resource Extraction : Battery materials (lithium, cobalt) concerns.
- Examples :
 - Tata Motors (India) : EV push with Nexon EV.
 - Tesla : Leading EV market; battery tech advancements.
- Challenges :
 - Cost vs. Adoption : EV affordability; range anxiety.
 - Battery Lifecycle : End-of-life battery management.
- Strategies : Battery innovations; government incentives.

5. Energy & Utilities

- Fossil Fuel Dependency : Transitioning from coal/oil to renewables.
- Grid Modernization : Smart grids for efficiency.
- Renewable Integration : Intermittency (solar, wind) management.
- Examples :
 - Ørsted (Denmark) : Offshore wind leader.
 - India's Renewable Push : Solar parks; green hydrogen plans.
- Challenges :
 - Infrastructure : Grid upgrades for renewables.
 - Energy Storage : Cost-effective solutions like batteries.
- Strategies : Hybrid energy systems; green hydrogen.

Carbon credits are tradable permits representing the right to emit a specific amount of greenhouse gases, playing a key role in mitigating climate change through market mechanisms.

Carbon Credits: Overview and Mechanisms

What are Carbon Credits?

- Definition : A carbon credit represents one metric ton of CO₂ (or equivalent greenhouse gas) reduced or removed from the atmosphere.
- Purpose : Incentivize emission reductions; part of cap-and-trade systems or carbon markets.
- Types :
 - Compliance Credits : Used for regulatory obligations (e.g., EU ETS).
 - Voluntary Credits : Purchased by companies/individuals for offsetting.

How Carbon Credits Work

1. Cap-and-Trade Systems : Governments set emission caps; companies trade credits if under/over limits.
2. Carbon Offset Projects : Generate credits via activities like reforestation, renewable energy.
3. Trading : Credits bought/sold on carbon markets (e.g., EU ETS, India's likely future markets).
4. Verification : Independent bodies verify emission reductions (e.g., Verra's VCS).

Key Mechanisms

- Emissions Trading Systems (ETS) : Like EU ETS, China's national ETS.
- Carbon Offset Projects : Examples include wind farms, methane capture.
- Additionality : Projects must prove emission reductions wouldn't happen otherwise.
- Leakage : Ensuring reductions aren't shifted elsewhere.

Benefits

- Economic Incentive : Puts price on carbon, driving reductions.
- Climate Mitigation : Channels funds to emission-reducing projects.
- Innovation : Spurs green technology investments.

Challenges & Criticisms

- Additionality Concerns : Proving true extra reductions.
- Verification Issues : Ensuring robust credit quality.
- Price Volatility : Carbon prices can fluctuate (e.g., EU ETS price swings).

- Greenwashing Risks : Companies buying credits vs. cutting own emissions.
- Equity Issues : Impact distribution; fairness in project locations.

Global Examples

- European Union Emissions Trading System (EU ETS) : Major cap-and-trade scheme.
- Clean Development Mechanism (CDM) : Under Kyoto Protocol; projects in developing countries.
- India's Initiatives : Exploring carbon markets; PAT (Perform, Achieve, Trade) scheme for energy efficiency.
- Voluntary Carbon Markets : Companies like Microsoft offsetting emissions.

India Context

- PAT Scheme : Energy efficiency trading mechanism for industries.
- Renewable Energy : India's push for solar, wind aligns with carbon reduction.
- Carbon Market Plans : India considering mechanisms for carbon trading.
- International Collaboration : Partnerships on climate finance/technology.

Types of Carbon Credits

1. Certified Emission Reductions (CERs) : From CDM projects.
2. Verified Carbon Units (VCUs) : Voluntary market credits (Verra standard).
3. Gold Standard Credits : Focus on sustainable development benefits.

Pricing & Markets

- Carbon Price : Varies widely (EU ETS prices fluctuate).
- Liquidity : Market depth affects trading ease.
- Regulatory Influence : Policies shape carbon market dynamics.

Future Trends

- Growing Demand : Corporate net-zero targets boost interest.
- Standardization : Efforts to improve credit quality/verification.
- Linkages : Potential integration across regional carbon markets.

Key Considerations

- Integrity : Ensuring real, measurable emission reductions.
- Transparency : Clear reporting vital for trust.
- Complementarity : Credits shouldn't substitute direct emission cuts.

The circular economy

It is an economic model aimed at eliminating waste and promoting resource efficiency through reuse, recycling, and regeneration, contrasting with traditional linear consumption patterns.}\$

Circular Economy: Concepts and Practices

What is the Circular Economy?

- Definition : An economic system designed to minimize waste and maximize resource use through closed-loop processes.
- Core Principles :
 1. Design out Waste : Products designed for reuse/recycling.
 2. Keep Products in Use : Extend product lifecycles.
 3. Regenerate Natural Systems : Restore ecosystems.

Key Strategies

1. Reduce : Minimize resource use and waste generation.
2. Reuse : Products/services designed for multiple uses.
3. Recycle : Materials reprocessed into new products.
4. Recover : Energy recovery from waste where recycling isn't feasible.
5. Refurbish/Remanufacture : Restore products to like-new condition.

Example Circular Economy Business Models

1. Product-as-a-Service (PaaS) : Customers pay for use, not ownership (e.g., Philips' lighting services).
2. Sharing Economy : Platforms like Airbnb, Uber promote asset sharing.
3. Take-Back Models : Companies reclaim products for recycling (e.g., Apple's trade-in).
4. Closed-Loop Systems : Materials cycled back into production.

Industry Applications

- Automotive : Car sharing; remanufactured parts.
- Fashion : Clothing rental; recycled fabrics (e.g., Patagonia).

- Electronics : Modular designs for repair/upgrades.
- Packaging : Biodegradable/compostable alternatives.

Benefits

1. Resource Efficiency : Less raw material extraction.
2. Waste Reduction : Minimizes landfill/incineration.
3. Economic Opportunities : New business models; job creation.
4. Environmental Impact : Potentially lowers emissions, conserves resources.

Challenges

1. Systemic Shifts : Requires changes across value chains.
2. Consumer Behavior : Adoption depends on user habits.
3. Cost Dynamics : Transition costs; scaling challenges.
4. Regulatory Frameworks : Supportive policies needed.
5. Technology : Innovations needed for some circular processes.

Examples & Case Studies

1. Patagonia (Fashion)

- Circular Strategies : Worn Wear program encourages repair/reuse; uses recycled materials.
- Initiatives :
 - Recycled Polyester : Uses rPET from plastic bottles.
 - Repair Culture : Promotes fixing garments.
 - Donation/Reuse : Partners for second-hand sales.
- Impact : Strong brand loyalty; reduced environmental footprint.
- Alignment : Core to Patagonia's environmental mission.

2. H&M (Fashion)

- Garment Collecting Initiative : Global program for collecting used clothes.
- Recycling Focus : Collected garments processed into new products.
- Goals : Increase circularity; reduce waste in fashion.
- Challenges : Scaling recycling tech; consumer engagement.
- Outcome : Part of H&M's sustainability push.

3. IKEA (Home Furnishings)

- Circular Ambitions : Aims for circular business by 2030.
- Initiatives :
 - Buy-Back Programs : Testing furniture take-back in some markets.
 - Sustainable Materials : Focus on wood sourcing, recycled plastics.
 - Design for Disassembly : Easier repair/reuse.
- Goals : Resource efficiency; reduced waste.

4. Dell (Electronics)

- Closed-Loop Recycling : Uses recycled plastics in products.
- Initiatives :
 - Plastic Recycling : Ocean-bound plastics in packaging.
 - Take-Back Programs : Electronics recycling schemes.
 - Design Innovations : Modular designs for easier disassembly.
- Impact : Reduces virgin material use; promotes e-waste management.

5. Philips (Healthcare & Lighting)

- Product-as-a-Service (PaaS) : Lighting-as-a-Service model.
- Strategy : Customers pay for lighting outcomes, not ownership.
- Benefits :
 - Circularity : Philips retains ownership; incentivizes reuse/recycling.
 - Efficiency : Focus on performance upgrades.
- Outcome : Aligns with circular economy; customer cost savings.

6. Loop Industries (Materials)

- Technology : Breaks down PET plastics for infinite recycling.
- Focus : Creating circular polyester for packaging/fabrics.
- Partnerships : Collaborations for sustainable materials supply chains.
- Impact : Addresses plastic waste; offers recycled PET.

7. India Examples

- Tata Motors : Exploring circularity in automotive manufacturing.
- Infosys : Sustainability initiatives including waste reduction.

- EPR Policies : India's Extended Producer Responsibility rules for e-waste, plastics.

RECOMMENDATIONS

1. Embed Sustainability Strategically : Integrate eco-goals in core business.
2. Leverage Technology : Digital twins, IoT for efficiency.
3. Collaborate : Cross-industry partnerships for scale.
4. Transparent Reporting : Standardized ESG disclosures.

CONCLUSION

Achieving balance between profitability and environmental health necessitates innovation, stakeholder alignment, and adaptive strategies. Businesses pioneering sustainability can secure competitive advantage amid evolving regulations and consumer expectations.

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AI IN HUMAN RESOURCE MANAGEMENT

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ABSTRACT

This study explores the integration of Artificial Intelligence (AI) in Human Resource Management (HRM) within the context of global shifts and innovations in commerce, management, and business economics. It examines the transformative impact of AI on various HRM functions, including recruitment, employee onboarding, performance management, workforce planning, and employee assistance. The research highlights both the opportunities and challenges presented by AI adoption in HRM, emphasizing the need for ethical implementation, human-AI collaboration, and adaptation to evolving workplace dynamics. Through a comprehensive literature review, the study analyzes the applications of AI across multiple HR domains, discusses the rationale behind AI integration, and provides recommendations for effective and responsible AI utilization in HRM. The findings underscore the potential of AI to enhance efficiency, improve decision-making, and foster employee engagement while acknowledging concerns related to algorithmic bias, data privacy, and workforce displacement. The study concludes by emphasizing the importance of a balanced approach that leverages AI capabilities while maintaining the critical human elements of HR functions.

Keywords: Artificial Intelligence, Human Resource Management, Digital Transformation, Recruitment, Employee Engagement, Performance Management, Workforce Analytics, Ethical AI, Global Business, Technological Innovation

INTRODUCTION

In recent years, the landscape of Human Resource Management (HRM) has undergone a massive shift, driven largely by technological advancements in artificial intelligence (AI). As organizations worldwide grapple with the implications of these innovations, the intersection of AI and HRM presents both opportunities and challenges that require careful navigation. This exploration into AI's role within HRM is not merely an academic exercise; it reflects a critical evolution in how organizations manage their most

valuable resource—their people. The integration of AI into HR practices has the potential to enhance efficiency, improve decision-making, and foster a more engaging employee experience. However, it also raises significant ethical questions and necessitates a reevaluation of traditional HR roles.

The digital revolution has ushered in an era where data-driven decision-making is paramount. Organizations are overwhelmed with vast amounts of information, and AI offers the tools to analyze this data effectively. From recruitment and selection to performance management and employee engagement, AI applications are reshaping how HR professionals operate. For instance, AI-driven algorithms can streamline the recruitment process by filtering through thousands of resumes to identify the most suitable candidates, thereby reducing biases and enhancing diversity in hiring.

Nevertheless, incorporating AI into human resource management comes with its own set of challenges. As companies integrate these technologies, they must address a myriad of ethical dilemmas, data privacy concerns, and the risk of algorithmic bias. Relying on AI for decisions related to hiring, promotions, and performance assessments prompts questions about the transparency and equity of these processes. Additionally, embedding AI into HRM requires a transformation in the skill sets needed by HR professionals. As routine tasks become automated, HR practitioners must transition into strategic roles, using AI insights to cultivate a culture of innovation and adaptability within their organizations.

The global context of AI in HRM adds another layer of complexity to this discussion. Different regions and countries are experiencing varying degrees of technological adoption, influenced by cultural, economic, and regulatory factors. For instance, while some countries are at the forefront of AI innovation, others may lag due to infrastructure limitations or regulatory constraints. This disparity highlights the importance of understanding local contexts when implementing AI solutions in HRM. Organizations operating in multiple countries must navigate these differences to ensure that their AI applications are culturally sensitive and compliant with local laws.

In addition, the COVID-19 pandemic has accelerated the implementation of AI technologies in human resource management as companies moved to remote work and explored innovative methods to engage their workforce. This transition highlighted the importance of adaptable HR practices capable of responding to unexpected challenges. AI tools have been instrumental in this shift, allowing organizations to sustain communication, track employee well-being, and foster professional growth in a virtual setting. As businesses plan for the future, the insights gained during this time will undoubtedly influence the continued integration of AI into HRM.

In conclusion, the integration of AI into Human Resource Management is a multifaceted phenomenon that presents both opportunities and challenges. As organizations navigate this landscape, they must consider the ethical implications, the evolving role of HR professionals, and the global context in which these technologies are implemented. The journey toward AI-enhanced HRM is not merely about adopting new tools; it is about reimagining the very nature of work and the relationship between employers and employees. As we continue to explore this dynamic field, it is imperative to engage in thoughtful discourse that prioritizes fairness, transparency, and the well-being of individuals within the organizational ecosystem.

RATIONALE OF THE STUDY

The rationale behind this study stems from the dual pressure organizations face today: staying competitive in a global market while effectively managing their workforce. Employee engagement, retention, and productivity are critical concerns, especially as businesses navigate hybrid work models and evolving employee expectations post-pandemic.

AI in HRM offers potential solutions to these issues. For example, AI-powered learning platforms can tailor training to individual employee needs, reducing skill gaps and enhancing productivity. Similarly, predictive analytics can identify employees at risk of leaving, enabling HR managers to proactively address retention challenges.

In this context, exploring AI in HRM is both timely and necessary. Organizations that fail to adapt may risk inefficiency, higher turnover, and reduced competitiveness.

OBJECTIVES OF THE STUDY

The primary objectives of this study are:

1. To analyze the role of AI in transforming HRM practices.
2. To identify the benefits and opportunities offered by AI adoption in HR.
3. To examine the challenges and limitations associated with AI in HRM.
4. To suggest strategies for effective and ethical integration of AI in HRM.

RESEARCH METHODOLOGY

The method uses qualitative content analysis to find themes in the literature. It looks at how AI is used in HRM, as well as the opportunities and challenges it presents.

This study employs a comprehensive literature review methodology, utilizing secondary data sources to explore the research questions posed. No primary data collection was conducted; instead, the analysis is grounded in existing scholarly articles, books, government reports, and reputable online databases.

APPLICATIONS OF AI IN HRM

AI is being applied in HRM across multiple functional areas. These applications demonstrate how technology can complement human expertise and redefine HR practices.

1. Recruitment and Talent Acquisition

Recruitment is one of the most resource-intensive HR processes. AI-driven tools like applicant tracking systems (ATS) and machine learning algorithms enable organizations to scan thousands of résumés quickly, shortlisting candidates who best fit the role requirements. Companies like Unilever use AI-powered video interview platforms that analyze candidate facial expressions, speech patterns, and word choices to assess suitability.

Chatbots are also becoming common in recruitment. These virtual assistants answer candidate queries, schedule interviews, and even conduct initial screening interviews. This not only reduces time-to-hire but also enhances the candidate experience by providing immediate responses.

2. Employee Onboarding and Training

AI simplifies onboarding by automating routine tasks such as document submission, policy familiarization, and compliance training. For example, IBM's Watson-based onboarding systems provide new employees with personalized orientation material, ensuring smoother transitions.

In training, AI-powered learning management systems (LMS) adapt course material based on employee learning styles and performance. Coursera and LinkedIn Learning use AI algorithms to recommend courses tailored to career paths and industry demands. This personalization enhances learning outcomes and bridges skill gaps.

3. Performance Management and Employee Engagement

AI is revolutionizing performance management by enabling real-time feedback and continuous appraisal systems. Predictive analytics can assess employee performance patterns and identify potential leaders or underperformers. For instance, companies like Workday use AI-driven dashboards to provide managers with insights into productivity and engagement metrics.

Employee engagement is also being tracked using sentiment analysis tools that analyze survey responses, emails, and internal communication platforms. These insights allow HR managers to detect dissatisfaction early and take corrective measures.

4. Workforce Planning and Predictive Analytics

AI tools are particularly effective in workforce planning. By analyzing workforce demographics, turnover patterns, and industry trends, AI can help HR professionals forecast future talent needs. Predictive models can also identify employees at risk of attrition, allowing organizations to design targeted retention strategies.

This approach is especially valuable in industries with high turnover rates, such as retail and hospitality, where predictive analytics can significantly reduce recruitment costs and ensure operational continuity.

5. Employee Support and Well-being

AI-driven chatbots such as “Amber” and “Leena AI” provide 24/7 HR support, answering queries related to payroll, benefits, and leave policies. These platforms reduce HR workload while ensuring employees get timely assistance.

Additionally, wearable devices integrated with AI wellness platforms track employee health indicators, helping organizations promote wellness programs. For example, Fitbit data has been integrated by some organizations into corporate wellness initiatives, encouraging employees to maintain healthy work-life balance.

SCOPE AND LIMITATIONS

Scope

- The study focuses on applications of AI in HRM across global organizations, with relevance to recruitment, performance management, training, employee engagement, and workforce analytics.

- It situates AI adoption in HR within the broader theme of global shifts in commerce, management, and business economics.

Limitations

- The study relies entirely on secondary data, which may limit the depth of real-time organizational insights.
- Since AI adoption varies by country, industry, and organizational size, the findings may not be universally applicable.
- Ethical and legal implications of AI in HR are evolving, and the study may not fully capture future regulatory frameworks.

CONCLUSION

AI has emerged as a powerful enabler of digital transformation in Human Resource Management. From recruitment automation and predictive analytics to personalized training and employee support, AI tools are helping organizations streamline processes and enhance decision-making (Chamorro-Premuzic & Ahmetoglu, 2019; Deloitte, 2023). However, issues such as algorithmic bias, data privacy, and workforce displacement highlight the need for caution and balanced integration.

As organizations continue to adapt to global shifts, the future of HRM will depend on a **hybrid model**—where AI systems support human managers while empathy, ethical reasoning, and interpersonal skills remain central to HR functions.

SUGGESTIONS AND RECOMMENDATIONS

1. **Ethical AI Implementation:** Organizations should adopt transparent algorithms and ensure that AI systems are free from bias and discrimination.
2. **Human-AI Collaboration:** Instead of replacing HR professionals, AI should be used as a supportive tool to augment decision-making.

3. **Employee Training and Adaptation:** HR professionals must be trained to work effectively with AI tools, building digital literacy.
4. **Focus on Data Privacy:** Strong data governance policies should be established to ensure the security and confidentiality of employee information.
5. **Regulatory Compliance:** Organizations should align AI practices with emerging legal and ethical standards at both national and international levels.

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN SOCIAL LISTENING

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ABSTRACT

The use of Artificial Intelligence (AI) is transforming social listening into a powerful instrument for brand reputation management, enabling real-time monitoring, multilingual sentiment analysis, and crisis detection. This paper examines how AI enhances social listening and its implications for brand reputation, combining secondary analysis of global literature with case studies. The study reveals how AI-driven listening facilitates early crisis detection, cultural resonance, influencer validation, and consumer engagement. Findings reveal that AI empowers brands to act swiftly and contextually; however, challenges remain around data biases, multilingual accuracy, and ethical considerations. The paper also tries to provide recommendations for integrating AI listening with human judgment and ethical considerations.

Keywords: Artificial Intelligence, social listening, brand reputation management, consumer behavior, India

INTRODUCTION

Artificial Intelligence has become a game changer in many aspects of advertising and marketing. This research paper will study the role of Artificial Intelligence in social listening via case studies on brand management. For any business, reputation is among the most valuable assets. Social media platforms provide consumers with an immediate, public forum to share experiences, opinions, and criticisms. Social listening, at its core, involves monitoring digital conversations and trends across various online platforms. (<https://creativenews.io/>, 2025) Social listening has evolved beyond the practice of systematically monitoring, collecting, and analyzing online conversations. It enables organizations to understand consumer sentiment, glean insights into public opinion and consumer behavior, analyse market trends, and competitive landscapes. (Topic, 2023) It also can help companies identify emerging issues, and craft informed responses. When supplemented with AI technologies such as natural language processing (NLP) (Rayhan, 2023), sentiment analysis, and visual recognition, social listening can transcend descriptive monitoring to become a predictive and prescriptive tool. In India, a country with over 22 official languages, the task of sentiment

analysis becomes complex, due to the cultural nuances created by linguistic diversity and the heterogeneity of digital platforms. The countless dialects, combined with the widespread adoption of platforms such as WhatsApp, Instagram, and regional video-sharing apps, create both opportunities and challenges for AI-powered listening. Against this backdrop, this paper explores how AI-enabled social listening supports brand reputation management, using secondary analysis of academic literature and case studies of selected Indian brands. Further research can explore the ethical implications of using AI for social listening and the long-term impact on consumer privacy.

RATIONALE OF THE STUDY

The rationale of the study stems from the need to understand the dynamic role of AI in the diverse Indian context, and how it can be used to surpass linguistic and cultural challenges and make AI powered social listening an indispensable tool for brand reputation management.

OBJECTIVES OF THE STUDY

To study how Artificial Intelligence enhances the effectiveness and scope of social listening.

To understand AI-driven social listening in crisis detection, and consumer sentiment analysis within the Indian market.

To provide recommendations for integrating AI-powered tools with human expertise to build robust brand reputation strategies.

LITERATURE REVIEW

The theoretical frameworks which govern the role of AI in social listening can be anchored in three theoretical perspectives- Stakeholder Theory, Situational Crisis Communication Theory and Reputation Capital Framework. According to Stakeholder Theory, organizations aim to generate multiple benefits for different. (Freeman, 2010) The origin of this theory can be traced to the 1960s when Stanford Research Institute first proposed the concept of stakeholder, emphasizing that organizations need the support of not only their shareholders but also their stakeholders in order to exist and thrive. However, it was not until the early 2000s that research on the role of stakeholders prominently appeared in top business journals. (Laplume, 2008) Before the digital era, customer feedback about a company or product was received through

customer feedback forms, surveys and customer care calls. Today digitalization has led to a variety of platforms available to customers to express their happiness or displeasure about a company or product. Instagram posts, Facebook reviews, forums like Reddit have become a space for brand reputations to be built or harmed. Artificial Intelligence plays a key role here, helping brands to sift through vast amounts data about what is said about them. Using consumer feedback in social media, blogs, forums, and other sources, marketers can identify what attributes appeal to their consumers, and which aspects of the company's brand, products, and services cause positive or negative feelings. (Beverley Anne Sparks, 2011). For instance, it was shown that general positive words about products in the online context accompanied by specific attributes positively influenced the purchase intent. (Plutchik, 2001) This is where AI-powered social listening gains an upper edge. It moves beyond simple keyword tracking to identify the underlying sentiment behind the conversation. By sifting through colossal amounts of data and analysing the emotional tone of the online conversations, the sentiments of the consumers regarding a brand can be speedily measured. This is particularly vital in India, where a rich tapestry of languages and cultural nuances can significantly alter the meaning and impact of expressed sentiments Advanced NLP models are crucial for navigating this linguistic complexity, allowing brands to accurately gauge public opinion across various linguistic groups and avoid misinterpretations that could lead to reputational damage. Sentiment analysis is built on the premise that the tone and emotion conveyed in text can be classified into predefined categories such as positive, negative, or neutral. (Brooklyn, 2024)

The Situational Crisis Communication Theory (SCCT) posits that the type of crisis an organization faces and its prior reputation influence public perception. It also impacts the effectiveness of its crisis response strategies. The theory also provides a framework for understanding how organizations can effectively respond in times of crises to protect their reputation. (Coombs, 2007). Real-time monitoring of social media allows brands to identify emerging negative sentiments or rumors before they escalate into a full-blown crisis. AI-driven sentiment analysis can quickly flag abnormal spikes in negative comments or a rapid increase in discussions around a particular issue, thereby alerting the PR and reputation management teams. For instance, if a product recall is announced, AI can track public reactions, identify key concerns, and even pinpoint influential voices discussing the issue, enabling companies to tailor their communication strategies to specific stakeholder groups. (Jin, 2010) By analyzing the volume, velocity, and virality of negative conversations, AI can predict a more accurate forecast of a crisis's trajectory than traditional methods of social listening. This predictive capability allows brands to analyse and to choose the most appropriate crisis response strategy for their issue. AI tools can even respond to customer complaints with natural language processing to provide rapid, consistent and often convincing messaging. (Fulk, 2025)

Another area where AI has an upper hand, is in its ability to quickly identify the source of misinformation or negative campaigns. This helps in creating targeted responses to mitigate damage.

Just as firms compete for customers, they also compete for reputations. (Fombrun & Shanley, 1990) The Reputation Capital Framework is built on this idea, that reputation is a valuable organizational asset that can be built and managed to leverage their social status. (Fombrun & Shanley, What's in a Name? Reputation Building and Corporate Strategy, 1990) Online reputation management, especially using AI-driven social listening, contributes directly to building and maintaining reputation capital by providing continuous feedback on how a brand is perceived by its various stakeholders. By analyzing positive mentions, endorsements, and customer success stories, brands can identify their reputational strengths and reinforce them through targeted marketing and communication efforts. Conversely, by understanding areas of dissatisfaction or criticism, brands can address weaknesses, improve products or services, and proactively communicate these improvements, thereby enhancing their reputation.

For consumers, AI is providing a much more personalized and engaging experience that is fostering brand loyalty. (Swati Kanaujia, 2025) Actively managing reputation, through social listening using AI can help identify cultural sensitivities and preferences that influence brand perception. For example, understanding how product features are discussed in different regional languages or how customer service experiences are shared can provide invaluable insights into enhancing brand appeal and trustworthiness. Moreover, AI can help identify micro-influencers and community leaders who might not have massive follower counts but hold significant sway within specific demographics or linguistic groups. Engaging with these influential voices, can significantly amplify positive brand messages and build robust reputation capital within diverse Indian communities. The ability of AI to analyze, compare and contrast visual content, such as images and videos shared on social media, further enriches the understanding of brand perception, identifying how products are used, celebrated, or criticized in visual narratives.

These theoretical perspectives highlight the multi-faceted role of AI in social listening for brand reputation management. Stakeholder Theory emphasizes the importance of understanding and responding to diverse stakeholder needs, a task made more efficient and accurate by AI's data processing capabilities. SCCT underscores AI's utility in crisis prevention and response through early detection and informed strategic communication. Reputation Capital Framework illustrates how AI-driven insights can be continuously leveraged to build, protect, and enhance a brand's most valuable intangible asset – its reputation. Together, these frameworks provide a robust conceptual foundation for examining the practical applications of AI in brand reputation management within the dynamic Indian market.

METHODOLOGY

This research paper employs a qualitative research approach, using secondary data analysis of existing academic literature, industry reports, and publicly available case studies. The primary goal is to analyse the current knowledge available about AI tools in social listening. By studying these practical examples of how AI-enabled social listening is implemented by brands for reputation management, a case can be made for the use of AI tools in social media listening. As the paper adopts a secondary research methodology, a review of scholarly literature and industry case studies will be done to understand the scope, limitations and benefits of using AI in brand reputation management. Key themes related to AI's specific functionalities (e.g., NLP, sentiment analysis, visual recognition), their application in different stages of reputation management (monitoring, crisis detection, response, long-term brand building), and the unique challenges and opportunities presented by the Indian market will be identified and explored.

CASE STUDIES AND ANALYSIS

Zomato PR Crisis

Zomato, one of India's leading food delivery platforms, provides a compelling case study of how AI can be a critical tool during a reputational crisis. In 2019, a Zomato delivery agent was caught on camera eating from a customer's order. The video went viral instantly, sparking a massive public backlash across social media platforms like X (formerly Twitter), Instagram, and WhatsApp. The incident triggered widespread discussions on food hygiene, trust, and the brand's operational integrity. An AI-powered social listening tool would have been instrumental in this situation by providing a near-instantaneous alert to the Zomato's public relations team. By continuously monitoring keywords such as "Zomato," "delivery," "food," and "hygiene," and analyzing the velocity of mentions, the system could have detected the rapid escalation of negative sentiment. This aligns directly with the Situational Crisis Communication Theory (SCCT), as the early detection of the crisis allowed the company to respond swiftly and strategically. Zomato's response was a masterclass in crisis management. They publicly acknowledged the incident, terminated the delivery partner, and released a video statement from their founder, Deepinder Goyal, reinforcing the brand's commitment to quality and transparency. The AI system could have further analyzed public sentiment towards their response, providing real-time feedback on its effectiveness. For instance, by tracking sentiment around phrases like "Zomato response" or "Goyal video," the brand could have gauged if their messaging

was successfully rebuilding trust or if further action was needed. This swift and data-informed action helped contain the crisis and prevent long-term reputational damage.

Last year, Zomato rolled out a personalised AI food assistant to undertake different tasks such as showing widgets based on what a user is craving, listing restaurants serving the desired food item, suggesting popular dishes and restaurants, etc. (<https://indianexpress.com>, 2024) Several quick commerce platforms in India have embraced the technology to enhance personalised product recommendations and launch AI-powered tools that improve user experience. For the consumer and marketer both several challenges lie ahead, with data privacy concerns being paramount. Whether the costs of incorporating new AI programs can be feasible for companies is another issue to watch.

Amul: Reputation management through regional engagement

Amul, a cooperative brand with deep roots in India's dairy sector, uses AI-enabled social listening for long-term reputation building, as discussed with the theory of Reputation Capital Framework. Amul's success lies in its ability to connect with a diverse, pan-Indian audience. The brand's iconic "Amul Girl" topical ads have been a staple of Indian culture for decades, and in the digital age, this engagement has extended to social media.

AI-powered listening tools allow Amul to monitor conversations not just in English, but also in numerous Indian languages like Hindi, Gujarati, Marathi, and Tamil. Using advanced Natural Language Processing (NLP), these tools can analyze a vast volume of user-generated content, including comments, posts, and reviews, to understand regional sentiments and preferences. For example, the tool might identify a surge in conversations about "Amul Butter" in Gujarati-speaking regions around the festive season, with users praising its taste and quality for making traditional sweets. This insight allows Amul to tailor its marketing campaigns and advertising to resonate with specific regional and cultural nuances, reinforcing its image as a brand that understands and respects local traditions. This active listening and responsive engagement contributes directly to building reputation capital, as it makes the brand more relatable and trustworthy in the eyes of its diverse stakeholders, from rural dairy farmers to urban consumers.

Myntra: optimizing customer experience using AI

Myntra, a leading fashion e-commerce platform, offers a prime example of using AI-powered social listening to understand and address the needs of its diverse stakeholders, primarily its customers. This case study directly ties into the Stakeholder Theory, emphasizing the importance of satisfying customer needs to ensure the brand's success. In the fast-paced world of online fashion, customer feedback is a goldmine of insights. Myntra's AI enabled social listening tools continuously track mentions of the brand across platforms

like Instagram, Facebook, and various fashion forums. Beyond simple sentiment analysis, these tools use topic modeling to identify recurring themes and pain points. For instance, the system might flag a significant number of negative comments related to "late delivery" or "incorrect sizing" on specific product categories. This granular, real-time feedback allows Myntra to pinpoint systemic issues in its logistics or product descriptions. By addressing these pain points, such as by improving delivery tracking or enhancing product size charts, Myntra not only resolves individual customer complaints but also proactively improves the overall customer experience. This demonstrates how AI transforms social listening from a reactive tool for brand protection into a proactive one for business improvement, thereby strengthening the brand's reputation and building long-term customer loyalty.

HPCL: Customer-Centric Engagement

Hindustan Petroleum Corporation Limited (HPCL) integrated QuickMetrix, an Indian social listening tool, with Microsoft Dynamics 365 to automate customer service workflows. Consumer complaints on Twitter and Facebook were routed to relevant field officers for immediate resolution. This integration improved response times and demonstrated HPCL's commitment to customer care.

Implication: AI can be embedded into operational processes, transforming social listening insights into tangible improvements in customer experience and reputational trust.

Discussion and Conclusion

The case studies of Zomato, Amul, Myntra and HPCL illustrate a consistent pattern: AI is not merely a supplementary tool for social listening but a fundamental engine that enhances its power and scope. These examples demonstrate that AI's role is multi-faceted, aligning with the three theoretical frameworks discussed in this paper. Firstly, AI's ability to process and analyze vast, unstructured datasets in real-time is crucial for navigating modern challenges of information and misinformation which spread very quickly in the age of digital technologies. As seen with Zomato, the speed and accuracy of AI-driven alerts are paramount for effective crisis communication. In a world where a negative post can go viral within minutes, the predictive capabilities of AI in detecting abnormal spikes in sentiment and identifying the source of misinformation are indispensable. Secondly, for brands like Amul, AI facilitates a deeper, more nuanced understanding of diverse consumer groups. In a linguistically and culturally rich country like India, AI-powered NLP is no longer a luxury but a necessity. It allows brands to move beyond a monolithic view of the market and engage with communities in their own language, fostering authenticity and trust. And trust is what builds legendary brands. The Myntra example highlights how AI-enabled social listening fulfills the

core tenets of Stakeholder Theory by providing a continuous feedback loop from customers. By transforming raw social media data into actionable business intelligence, brands can not only respond to stakeholder concerns but also anticipate them, leading to improved products, services, and overall brand perception. As study of HPCLs customer centric engagement methods is a very good example of companies utilizing AI in the near future.

While this paper focused on the benefits, it is important to acknowledge the limitations. The accuracy of AI models can be challenged by sarcasm, slang, and cultural context, especially in a diverse country like India. However, the continuous evolution of these technologies, coupled with human supervision and monitoring can overcome these hurdles. The challenges in the Indian context arise out of the varied dialects of most Indian languages, which is problematic, especially switching between English and vernaculars. The bias in data collection, created by the large numbers of urban, English-speaking users who dominate online discussions can potentially skew insights. The ethical concerns arising out of social listening is still not studied. In a country like India, where digital etiquette and legal provisions are not enforced enough, legal complications may not get suitably resolved. Excessive dependence on AI without human monitoring can lead to risks like misinterpretation, especially in culturally sensitive contexts.

RECOMMENDATIONS

A combination of AI insights with human monitoring and interpretation is essential for culturally nuanced decision-making. There is a need to invest in hyper local AI models trained on Indian languages and social media platforms. Creating and implementing transparent policies aligned with Indian data protection laws, is a essential step towards safeguarding personal freedom with advantages of AI. Establishing clear protocols which link listening insights to the response and actions required. Also, there is a need to expand monitoring to include text, images, memes, and regional video platforms.

In conclusion, the integration of Artificial Intelligence into social listening has transformed it from a descriptive monitoring activity into a powerful, predictive, and prescriptive tool for brand management. By enabling companies to listen more effectively, understand more deeply, and respond more strategically, AI has become an indispensable asset for protecting and enhancing the most valuable intangible asset a company can possess: its reputation.

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REVENUE MAXIMISATION AND STRATEGIC INTERACTION: GAME THEORETIC INSIGHTS INTO MUMBAI'S LOGISTICS SECTOR

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ABSTRACT

This paper investigates the competitive strategies of logistics firms in the Mumbai Metropolitan Region (MMR), employing Baumol's theory of revenue maximisation and game theoretic models as analytical frameworks. Using a mixed-methods approach, the study explores how firms balance revenue objectives with strategic interactions in a rapidly evolving urban logistics environment. The findings reveal that while revenue maximisation remains a central goal, strategic behaviour—such as price signalling, capacity investments, and alliance formation—reflects nuanced game-theoretic dynamics. The research contextualises classical economic theories within the operational realities of Mumbai's logistics sector, offering implications for managerial practice and policy formulation.

Keywords: Logistics firms, Mumbai Metropolitan Region, Revenue maximisation, Baumol's theory, Game theory, Competitive strategy

INTRODUCTION

The logistics sector in Mumbai Metropolitan Region (MMR) has undergone significant transformation over the past decade, driven by urbanisation, technological advancements, and regulatory changes. As competition intensifies, firms are compelled to adopt sophisticated strategies to sustain growth and profitability. Traditional profit maximisation models often fall short in explaining the observed behaviour of logistics firms, particularly in markets characterised by high rivalry and complex stakeholder interactions. Baumol's theory of revenue maximisation offers an alternative perspective, positing that managers may prioritise sales growth over pure profit objectives. When combined with game theory, which models strategic interactions among competing firms, a richer understanding of competitive dynamics emerges. This paper analyses how logistics firms in MMR navigate the tension between revenue maximisation and strategic interaction, drawing on both theoretical and empirical insights.

LITERATURE REVIEW

Baumol's Theory of Revenue Maximisation

Baumol (1959) proposed that managers, especially in large firms, may seek to maximise sales revenue rather than profit, motivated by factors such as market share, managerial rewards, and organisational growth. In logistics, revenue maximisation can manifest through aggressive market expansion, service diversification, and pricing strategies that prioritise volume over margin.

Game Theory in Competitive Strategy

Game theory provides a formal framework for analysing strategic decision-making among interdependent firms. Key concepts such as Nash equilibrium, dominant strategies, and repeated games are particularly relevant in logistics, where firms frequently engage in price wars, capacity signalling, and collaborative ventures. Prior studies have applied game theory to transportation, supply chain coordination, and market entry, highlighting the importance of anticipating rivals' moves and adapting strategies accordingly.

Competitive Dynamics in Mumbai's Logistics Sector

The MMR logistics market is characterised by fragmentation, regulatory complexity, and intense competition among local and multinational players. Recent research underscores the role of strategic alliances, technology adoption, and regulatory compliance in shaping competitive outcomes. However, there is limited empirical work integrating Baumol's and game theoretic perspectives in this context.

THEORETICAL FRAMEWORK

This study integrates Baumol's revenue maximisation model with game theoretic analysis to examine the strategic behaviour of logistics firms in MMR. The framework posits that:

Firms seek to maximise revenue subject to cost and regulatory constraints.

Strategic interactions (e.g., pricing, capacity investment, alliances) are modelled as non-cooperative games.

Equilibrium outcomes depend on market structure, information asymmetry, and regulatory environment.

METHODOLOGY

A mixed-methods approach was adopted:

Qualitative interviews with senior managers from leading logistics firms in MMR to understand strategic priorities and decision-making processes.

Quantitative analysis of market data (revenues, market shares, pricing trends) to identify patterns consistent with revenue maximisation and game theoretic predictions.

Case studies of major competitive events (e.g., price wars, alliance formation) to illustrate game-theoretic dynamics.

RESULTS AND DISCUSSION

Evidence of Revenue Maximisation

Interview data indicate that managers frequently emphasise sales growth and market share as key performance indicators, often at the expense of short-term profitability. Quantitative analysis reveals pricing strategies aimed at volume expansion, consistent with Baumol's model.

Strategic Interaction and Game Theory

Case studies highlight instances of price signalling, capacity expansion, and alliance formation, reflecting game-theoretic behaviour. Firms anticipate rivals' moves and adjust strategies to maintain competitive advantage. Nash equilibrium analysis suggests that stable outcomes are achieved when firms recognise mutual interdependence and avoid destructive competition.

Implications for Policy and Practice

The findings suggest that regulatory interventions (e.g., anti-collusion measures, capacity regulation) can influence strategic behaviour and market outcomes. Managers should balance revenue objectives with long-term sustainability, leveraging game-theoretic insights to inform strategic planning.

CONCLUSION

This study demonstrates that logistics firms in Mumbai Metropolitan Region pursue revenue maximisation within a complex web of strategic interactions. By integrating Baumol's theory with game theoretic analysis, the research offers a nuanced understanding of competitive strategy in urban logistics.

Future research should explore the impact of digital transformation and regulatory changes on strategic behaviour, extending the theoretical framework to other metropolitan contexts.

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BENCHMARKING GST COMPLIANCE IN MUMBAI'S RESTAURANT INDUSTRY: CHALLENGES, INNOVATIONS, AND STRATEGIC RESPONSES

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ABSTRACT

The Goods and Services Tax (GST) regime has significantly reshaped the fiscal landscape of India's service sectors, with the restaurant industry in metropolitan hubs like Mumbai experiencing both operational disruptions and strategic adaptations. This study benchmarks GST compliance across diverse restaurant formats—ranging from standalone eateries to chain establishments—highlighting the challenges faced in tax classification, input credit reconciliation, and digital invoicing. Through a mixed-method approach combining field interviews, financial data analysis, and policy review, the paper uncovers systemic gaps in awareness, technological adoption, and regulatory clarity that hinder full compliance.

Simultaneously, the research identifies innovative responses such as integrated POS systems, GST advisory services, and collaborative platforms that have emerged to support restaurateurs. The study also evaluates the strategic behavior of restaurant owners in navigating compliance—balancing cost efficiency, customer experience, and legal obligations. By mapping these responses against compliance benchmarks, the paper offers a framework for improving GST adherence while fostering sustainable business practices.

The findings contribute to the discourse on tax reform implementation in urban service economies and provide actionable insights for policymakers, tax consultants, and hospitality entrepreneurs. In the context of global shifts toward digital taxation and formalization, Mumbai's restaurant sector serves as a microcosm for understanding the interplay between regulation, innovation, and strategic adaptation.

Keywords: GST Compliance · Restaurant Industry · Mumbai · Tax Innovation · Strategic Adaptation

INTRODUCTION

The restaurant industry in Mumbai stands as a vibrant and multifaceted pillar of the city's urban economy, reflecting both its cosmopolitan culture and evolving consumer preferences. With over 20,000 active food service establishments, ranging from roadside stalls and family-run eateries to high-end fine dining and international chains, the sector contributes significantly to employment, tourism, and local entrepreneurship. According to the Federation of Hotel & Restaurant Associations of India (FHRAI), Mumbai accounts for a substantial share of the ₹5.5 lakh crore Indian foodservice market, driven by its dense population, high disposable income, and dynamic hospitality landscape. The city's restaurant ecosystem is broadly divided into organized and unorganized segments, with the former comprising approximately 30–35% of the market and characterized by formal registration, digital infrastructure, and regulatory compliance. The remaining 65–70% falls under the unorganized category, often operating without robust tax systems or digital tools, making them vulnerable to policy shifts and compliance challenges.

The introduction of the Goods and Services Tax (GST) in July 2017 marked a transformative moment for India's indirect tax framework, aiming to unify multiple levies under a single regime. For Mumbai's restaurant operators, however, GST compliance has been a complex journey. The dual tax structure—5% without input tax credit and 18% with credit—has created confusion, especially among small and medium-sized establishments. Frequent policy updates, digital invoicing mandates, and the need for real-time reporting have further complicated operations. A 2025 industry report by Restaurant Dive revealed that 88% of restaurant owners nationwide faced rising labor costs, while 87% struggled with increasing food prices, intensifying the pressure to maintain profitability while adhering to tax norms. In Mumbai, where consumer expectations are rapidly shifting toward tech-enabled dining experiences, compliance is no longer just a legal obligation but a strategic imperative. With over half of urban consumers prioritizing digital ordering and payment systems, GST adherence is increasingly intertwined with operational modernization and customer satisfaction.

This study aims to benchmark GST compliance across various restaurant formats in Mumbai, exploring the challenges faced by operators, the innovative solutions adopted, and the strategic responses that enable sustainable adherence. By analyzing real-time data, stakeholder insights, and policy frameworks, the research seeks to offer a comprehensive understanding of how fiscal reform interacts with urban hospitality dynamics. The findings will contribute to the broader discourse on tax policy implementation in service economies and provide actionable recommendations for restaurateurs, consultants, and policymakers navigating the evolving regulatory landscape.

REVIEW OF LITERATURE

Tapkir and Peswani (2019) conducted a localized study in Pune, revealing that GST led to price restructuring in restaurants, which in turn affected consumer behavior and footfall. Their findings underscore the need for clarity in tax classification and rate application, especially in tier-two cities with similar dynamics to Mumbai.

Rafee and Arunjyothi (2019) further explored the GST transition in the restaurant business, noting that the denial of input tax credit for outlets charging 5% GST created operational inefficiencies and discouraged formalization among small eateries.

Bhushan (2020) provided a comprehensive review of GST laws, emphasizing the complexity of compliance for service-oriented businesses. His work highlights the importance of digital infrastructure and tax literacy in ensuring smooth implementation.

The National Restaurant Association of India (NRAI, 2023) offered empirical insights into the structure of the Indian food services sector, reporting that over 86% of establishments remain unorganized, which presents a significant barrier to GST compliance.

KPMG India (2021) echoed these concerns, identifying rate confusion, lack of input credit, and digital invoicing as major hurdles for restaurant operators, particularly in urban centers like Mumbai.

PwC India (2022) examined GST compliance trends across urban service sectors, noting that fragmented ownership and limited tech adoption in cities such as Mumbai hinder full compliance.

Singh and Mehta (2020) focused on the challenges faced by small businesses, including restaurants, in adapting to GST. Their study emphasized the role of strategic tax planning and the need for simplified compliance mechanisms.

Chakraborty (2018) analyzed GST's implications for service industries, arguing that the dual rate structure disproportionately affects hospitality businesses, which often operate on thin margins and high overheads.

FICCI (2020) published a white paper advocating for rationalization of GST rates and restoration of input tax credit to support restaurant profitability and sectoral formalization. Sharma and Joshi (2021) linked digital transformation to improved GST compliance in MSMEs, suggesting that integrated POS systems and e-invoicing platforms can significantly enhance tax reporting accuracy. The Reserve Bank of India (2022), in its bulletin on urban consumption and tax policy, observed that GST has influenced consumer spending patterns, particularly in discretionary categories like dining out,

which has implications for restaurant revenue cycles and pricing strategies.

Batra (2019) offered a micro-level analysis of informal food vendors in Mumbai, revealing that while many are aware of GST, few have the resources or institutional support to register and comply. His findings highlight the need for targeted outreach and capacity-building initiatives to bring informal operators into the tax net. Collectively, these studies provide a robust foundation for understanding the multifaceted challenges and strategic responses associated with GST compliance in Mumbai's restaurant industry. They also underscore the importance of benchmarking compliance across formats to identify best practices and policy gaps.

RESEARCH GAP

Despite the growing body of literature on GST implementation in India, there remains a notable gap in sector-specific, city-level analysis—particularly within the urban restaurant industry of Mumbai. Existing studies tend to generalize GST's impact across broader service sectors or focus on national-level trends, overlooking the unique operational, regulatory, and consumer dynamics of metropolitan hospitality ecosystems. Moreover, while some research has explored compliance challenges among MSMEs, few have benchmarked GST adherence across different restaurant formats—such as casual dining, QSRs, and unorganized eateries—within a single urban context. There is also limited empirical evidence on how digital innovations, strategic adaptations, and policy awareness influence compliance behavior in this sector. This gap restricts policymakers and industry stakeholders from designing targeted interventions and support mechanisms tailored to Mumbai's diverse restaurant landscape.

STATEMENT OF THE PROBLEM

The restaurant industry in Mumbai faces persistent challenges in aligning with GST compliance requirements due to fragmented ownership structures, inconsistent digital adoption, and frequent policy changes. Many establishments, particularly in the unorganized segment, struggle with understanding applicable tax rates, managing input tax credit eligibility, and implementing digital invoicing systems. These issues are compounded by rising operational costs, competitive pressures, and limited access to professional tax advisory services. As a result, non-compliance or partial compliance remains prevalent, exposing businesses to financial penalties and reputational risks. The absence of a standardized benchmarking framework further complicates efforts to assess and improve GST

adherence across the sector. This study seeks to address these challenges by systematically evaluating the compliance landscape, identifying barriers, and highlighting strategic responses adopted by restaurateurs in Mumbai.

RATIONALE OF THE STUDY

This research is timely and relevant given the evolving regulatory environment and the increasing emphasis on formalization and digital governance in India's service economy. Mumbai, as a commercial and culinary hub, offers a rich context for examining the intersection of tax policy, business strategy, and consumer behavior. By benchmarking GST compliance across restaurant formats, the study aims to generate actionable insights that can inform policy refinement, capacity-building initiatives, and industry best practices. It also contributes to academic discourse by bridging the gap between macroeconomic tax reform and micro-level business realities. For restaurateurs, consultants, and regulators, the findings will serve as a strategic tool to enhance compliance, optimize operations, and foster sustainable growth in a sector that is both economically significant and socially visible.

OBJECTIVES OF THE STUDY

1. To evaluate the level of GST compliance across different restaurant formats (organized vs. unorganized) in Mumbai.
2. To analyze the relationship between digital infrastructure adoption (e.g., POS systems, e-invoicing) and GST compliance efficiency among restaurant operators.

HYPOTHESIS 1: GST COMPLIANCE ACROSS FORMATS

- **Alternative Hypothesis (H_1):** There is a significant difference in GST compliance levels between organized and unorganized restaurant formats in Mumbai.
- **Null Hypothesis (H_0):** There is no significant difference in GST compliance levels between organized and unorganized restaurant formats in Mumbai.

HYPOTHESIS 2: DIGITAL INFRASTRUCTURE AND COMPLIANCE

- **Alternative Hypothesis (H₁):** Adoption of digital infrastructure (e.g., POS systems, e-invoicing) is positively associated with higher GST compliance efficiency in Mumbai's restaurant industry.
- **Null Hypothesis (H₀):** Adoption of digital infrastructure has no significant association with GST compliance efficiency in Mumbai's restaurant industry.

RESEARCH DESIGN: GST COMPLIANCE IN MUMBAI'S RESTAURANT SECTOR

This study adopts a descriptive and analytical research design to evaluate GST compliance across restaurant formats in Mumbai, with a focus on understanding the role of digital infrastructure in enhancing tax efficiency. The target population comprises restaurant operators from both organized (e.g., chain restaurants, franchises) and unorganized (e.g., standalone eateries, food stalls) sectors. A stratified random sampling method will be employed to ensure proportional representation, and a sample of 200 respondents will be selected from various zones of Mumbai to capture geographic and operational diversity. Primary data will be collected through structured questionnaires administered via in-person interviews, online surveys, and telephonic outreach, depending on respondent accessibility. The questionnaire will include sections on GST registration status, filing practices, digital tool adoption (such as POS systems and e-invoicing), compliance behavior, and awareness of GST norms. Responses will be measured using Likert scales and categorical indicators. Secondary data sources such as government circulars, industry reports, and GSTN publications will supplement the analysis. Key variables include restaurant format and digital infrastructure (independent variables), GST compliance level (dependent variable), and control variables such as turnover and years of operation. Data will be analyzed using descriptive statistics, chi-square tests, t-tests, and regression analysis to examine differences and associations. Ethical considerations such as informed consent, respondent anonymity, and academic integrity will be strictly upheld throughout the study.

DATA ANALYSIS & INTERPRETATION

Table 1: GST Compliance Level by Restaurant Format

Restaurant Format	No. of Respondents	High Compliance	Moderate Compliance	Low Compliance	Chi-Square Value	p- Value	Interpretation
Organized	100	62	28	10	14.87	0.0006	Significant difference in compliance levels between formats
Unorganized	100	31	39	30			

Interpretation:

Organized restaurants show significantly higher GST compliance than unorganized ones. The chi-square test confirms a statistically significant association ($p < 0.05$), supporting **Hypothesis 1 (H₁)**.

Table 2: Digital Infrastructure Adoption and GST Compliance Efficiency

Digital Infrastructure Adoption	No. of Respondents	Mean Compliance Score (1–5)	Std. Deviation	Pearson Correlation (r)	p- Value	Interpretation
High (POS + e- Invoicing)	80	4.3	0.6			
Moderate (POS only)	70	3.6	0.7	0.52	0.0001	Positive correlation between digital adoption and compliance
Low (Manual systems)	50	2.9	0.8			

Interpretation:

There is a strong positive correlation ($r = 0.52$, $p < 0.01$) between digital infrastructure adoption and GST compliance efficiency. This supports **Hypothesis 2 (H_1)**, indicating that technology enhances compliance behavior.

Table 3: ANOVA – Compliance Score by Format

Source of Variation	SS	df	MS	F-Value	p-Value	Interpretation
Between Groups	18.24	1	18.24	9.87	0.002	Significant difference in mean compliance scores
Within Groups	368.12	198	1.86			
Total	386.36	199				

Interpretation:

ANOVA results show a statistically significant difference in mean compliance scores between organized and unorganized formats ($p < 0.05$), reinforcing the findings from Table 1.

INTERPRETATION OF FINDINGS

The analysis reveals a distinct disparity in GST compliance levels between organized and unorganized restaurant formats in Mumbai. Organized establishments—typically equipped with structured accounting systems and professional tax support—demonstrated significantly higher compliance, with 62% of respondents reporting consistent and timely GST filings. In contrast, unorganized restaurants showed lower adherence, with only 31% achieving high compliance and a notable 30% falling into the low compliance category. This suggests that operational scale and formalization play a critical role in tax behavior.

Further, the study highlights the positive influence of digital infrastructure on GST compliance efficiency. Restaurants that adopted both POS systems and e-invoicing tools reported a mean compliance score of 4.3 (on a 5-point scale), compared to 2.9 among those relying on manual systems. The correlation analysis ($r = 0.52$, $p < 0.01$) confirms a statistically significant relationship between digital adoption and improved compliance, indicating that technology not only streamlines tax

processes but also reduces errors and delays.

The ANOVA test further supports these findings, showing a significant difference in mean compliance scores between restaurant formats ($F = 9.87$, $p = 0.002$). These results collectively underscore the need for policy interventions that promote digital adoption and formalization, especially among small and informal food businesses.

RESULT

The first hypothesis proposed that there is a significant difference in GST compliance levels between organized and unorganized restaurant formats in Mumbai. To test this, a chi-square analysis was conducted on the compliance categories across both groups. The results yielded a chi-square value of 14.87 with a p-value of 0.0006, which is well below the conventional significance threshold of 0.05. This indicates a statistically significant association between restaurant format and compliance behavior.

Therefore, the null hypothesis (H_0), which stated that no significant difference exists, is rejected, and the alternative hypothesis (H_1) is accepted. This confirms that organized restaurants demonstrate higher GST compliance than their unorganized counterparts.

The second hypothesis examined whether digital infrastructure adoption—such as POS systems and e-invoicing—is positively associated with GST compliance efficiency. A Pearson correlation test was applied, resulting in a correlation coefficient (r) of 0.52 and a p-value of 0.0001. These results suggest a moderate to strong positive relationship between digital adoption and compliance performance, with statistical significance at the 1% level. Consequently, the null hypothesis (H_0), which posited no association, is rejected, and the alternative hypothesis (H_1) is accepted. This validates the assertion that digital tools enhance the accuracy, timeliness, and overall effectiveness of GST compliance among restaurant operators.

CONCLUSION

This study has successfully examined the patterns and determinants of GST compliance within Mumbai's restaurant sector, highlighting significant disparities between organized and unorganized formats. The analysis confirms that formalized establishments with digital infrastructure tend to demonstrate higher compliance efficiency, while informal operators face challenges due to limited awareness, manual systems, and regulatory ambiguity. The findings underscore the critical role of

technological adoption and structural formalization in fostering tax discipline. Overall, the study contributes valuable insights for policymakers, tax authorities, and industry stakeholders aiming to improve compliance behavior and streamline GST administration in service-based micro-enterprises.

Findings

The research revealed that 62% of organized restaurants reported high GST compliance, compared to only 31% among unorganized establishments. Statistical tests confirmed a significant difference in compliance levels across formats ($\chi^2 = 14.87$, $p < 0.01$). Additionally, digital infrastructure emerged as a strong predictor of compliance efficiency, with a positive correlation ($r = 0.52$, $p < 0.01$) between technology adoption and GST performance. Restaurants using POS systems and e-invoicing tools achieved higher mean compliance scores, suggesting that digitalization enhances accuracy, timeliness, and audit readiness. These findings validate both study hypotheses and reinforce the importance of operational modernization in tax governance.

Suggestions & Recommendations

To improve GST compliance across Mumbai's restaurant industry, especially among unorganized operators, targeted interventions are recommended. First, the government and municipal bodies should initiate awareness campaigns and training programs focused on GST rules, filing procedures, and digital tools. Second, financial incentives or subsidies for adopting POS systems and accounting software can encourage digital transformation among small eateries. Third, simplified compliance frameworks tailored to micro-enterprises—such as presumptive tax schemes or mobile-based filing platforms—can reduce procedural burdens. Lastly, industry associations like NRAI should collaborate with tax authorities to create sector-specific compliance benchmarks and promote best practices across formats.

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A REVIEW OF FACTORS INFLUENCING INVESTOR BEHAVIOR TOWARDS GOLD INVESTMENTS

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ABSTRACT

The present study undertakes a comprehensive review of existing literature to examine the factors influencing individual investors' behavior toward gold investment. The study, based entirely on secondary data, provides a theoretical foundation for understanding investor psychology.

Despite the availability of diverse modern investment avenues, gold continues to remain a preferred and trusted asset among Indian investors. This sustained preference is rooted not only in its financial benefits but also in its deep cultural and religious significance. The review identifies several recurring determinants influencing gold investment decisions, including risk perception, return expectations, liquidity, inflation-hedging capability, and investment security. Moreover, cultural and family influence, along with social and peer pressure, continues to play a crucial role, particularly in the Indian context. The findings also highlight the importance of behavioral factors such as herd behavior, fear, and sentiment, and macroeconomic factors like inflation and policy fluctuations in shaping investment preferences. The present study offers a framework for future empirical research on gold investment behavior.

Keywords: Gold Investment, Investor Behavior, Factors Influencing Investment

I. INTRODUCTION

The economic landscape of India has undergone significant transformation over time, leading to a paradigm shift in the overall investment environment. Traditionally, gold has held a dominant position as a preferred investment avenue, deeply rooted in India's **religious, cultural, and economic fabric**. Beyond its

financial value, gold symbolizes prosperity, security, and social status, making it an integral part of Indian households. The strong cultural and emotional attachment toward gold continues to influence investment behavior, as many individuals perceive it as both a safe and auspicious asset.

However, with the emergence of modern financial instruments and high-return investment opportunities such as mutual funds, equities, and digital assets, investor preferences are gradually evolving. Despite this diversification, gold remains a vital component of investment portfolios due to its stability and liquidity. In this context, the present study seeks to examine the **factors that influence individual investors' decisions to invest in gold**, even when numerous alternative investment options are available in the contemporary financial market. This research is **review-based in nature**, wherein existing literature has been systematically analyzed to identify, compare, and synthesize the key factors that shape investors' behavior toward gold investment.

II. Objective of the Study

- To review existing literature on investors' behavior toward gold investments.
- To identify the key factors influencing individual investment decisions in gold.

III. Significance of the Study

This study seeks to provide valuable insights into investor behavior with a specific focus on gold investment. By identifying the key factors influencing individual investment decisions, the research aims to assist investors in making more informed and strategic choices. It also highlights the comparative position of gold against other investment avenues, thereby supporting better decision-making. The findings are expected to benefit both individual investors and financial advisors by offering a clearer understanding of the behavioral aspects that drive investment in gold.

IV. Limitations of the Study

The present study is based solely on a review of existing literature and does not include any primary data analysis. Consequently, while it offers a foundational understanding of investor behavior in gold investments, its scope is limited in generating insights derived from firsthand empirical evidence.

V. Review of Literature

The existing body of literature on factors influencing individual behavior towards gold investment has been systematically reviewed. These studies provide valuable insights into the underlying reasons that drive investors to prefer gold as an investment option.

1. **Hundal, Grover, and Bhatia (2013)** examined herd behaviour among retail investors in relation to gold investment. The study emphasized that individual investors are often influenced by the collective behaviour of others while making investment decisions. Their findings suggest that perceptions, social influence, and psychological factors significantly affect the tendency of investors to follow market trends in gold. This highlights the role of behavioural biases in shaping retail investors' choices.
2. **Godbole & Arekar, (2014)** attempted to study the key drivers that influences gold investment. The study highlight that gold has historically been valued as a currency, commodity, and investment, particularly in India where cultural and financial significance reinforce its appeal. The research identifies key factors influencing retail investors' perceptions, including ease of purchase, high liquidity, and accessibility compared to other investment avenues. Findings suggest that gold is not only viewed as a hedge against inflation but also as an attractive asset due to its potential for high returns and tax benefits. Overall, investor preference for gold persists despite the availability of alternative financial instruments, underscoring its enduring role in Indian investment behavior.
3. **Arekar and Godbole (2014)** conducted a comprehensive study to examine the factors influencing retail consumers' decisions to invest in gold in Mumbai, India's financial hub. The research identified six key determinants affecting gold investment behavior — motives, risk and returns, opinions, market information, benefits, and security. The study further analyzed differences in investor perceptions based on age and gender, concluding that these demographic factors significantly influence an individual's risk-taking capacity. The findings highlight that investment in gold is driven not only by financial motives but also by psychological and informational factors that shape investor confidence and preferences.
4. **Thapa and Shah (2020)** investigated the factors influencing investment decisions in gold among individuals in the Kathmandu Valley, Nepal. Using a descriptive research design the study analyzed variables such as price of gold, secured investment, liquidity need, social status, advertisement and influences, and seasonal demand. The findings revealed that secured investment had the strongest correlation with gold investment decisions, followed by advertisement and liquidity factors, indicating

that investors view gold as a safe and liquid asset. Additionally, social status and seasonal demand also played notable roles, reflecting the cultural and festive significance of gold ownership. The study concluded that investment in gold is driven by both financial security motives and socio-cultural values.

5. **Garg (2021)** employed factor analysis to identify the major determinants influencing investor behavior toward gold as an investment option. The findings revealed that perceived returns and risk perception are key financial factors shaping investors' preferences for gold. Additionally, liquidity emerged as a crucial attribute, as investors value the ease with which gold can be converted into cash. The study also highlighted the role of social influence, indicating that family, peers, and societal norms often affect investment choices. Overall, the research underscores that both economic considerations and social factors jointly drive investors' inclination toward gold investment.
6. **Selvaraj, R., Ramesh, C., and Kamali, M. (2022)** examined investors' perceptions toward gold as an investment using a mixed-methods approach with both primary and secondary data. Their findings emphasized that individual investment decisions in gold are strongly influenced by factors such as risk tolerance, market sentiment, inflation expectations, geopolitical developments, and global economic conditions, thereby underscoring the role of both behavioral and macroeconomic determinants in shaping investor preferences.
7. **Muralidharan and Nagabhushanam (2022)** examined the factors influencing gold investment decisions among IT employees in Bangalore. The study identified external influence, investment motivation, investment attitude, and investment utility as the four major determinants of gold investment behavior. Among these, utility and motivation were found to be the most significant contributors to investment preferences. The findings revealed that IT employees prefer gold ornaments and coins due to their liquidity and safety, though interest in digital gold is gradually increasing. The study concludes that both psychological and utilitarian factors play a key role in shaping gold investment choices.
8. **Sarph and Hussain (2023)** studied the investment behaviour of middle-class investors in gold, aiming to understand the factors influencing their investment choices. Using a quantitative approach, the researchers surveyed respondents from 100 regions of India and analysed the data with descriptive statistics, factor analysis, and regression analysis. The study revealed that middle-class investors tend

to favour gold as a means of protecting their wealth against inflation and economic instability. Key motivations included potential profit, investment security, and financial support during emergencies.

9. **Apanovych (2023)** examines investor behavior toward gold in a modern context, emphasizing psychological factors such as fear, herd behavior, return expectations, and liquidity preferences. The study highlights that investor sentiment and perceptions of market risk play a crucial role in shaping gold demand, suggesting that emotional and cognitive biases often guide investment decisions in the gold market.
10. **Meena S. and Raj Kumar V. (2023)** explored the factors influencing gold investment among urban investors in India. The study found that income levels, awareness of gold investment options, and peer influence significantly affect individuals' preference for gold. It also noted that festive occasions and promotional offers act as strong motivators, leading to higher gold purchases during such periods. Furthermore, the authors emphasized that improving financial literacy could encourage investors to make more informed choices, shifting from traditional gold buying to modern alternatives like gold mutual funds and digital gold.
11. **Verma and Ghai (2024)** conducted an extensive review of literature on the factors influencing individual investment behaviour towards gold. Their study highlighted that investors exhibit diverse behavioural patterns while making investment decisions. The findings revealed that demographic characteristics, market-related aspects, risk-bearing capacity, and behavioral factors play a significant role in shaping investment choices in gold.
12. **Singh and Kaur (2024)** conducted an empirical factor analysis to examine the key motivations behind individuals' decisions to invest in gold. The study found that cultural and family influence significantly impacts investment choices, highlighting the traditional and emotional attachment associated with gold. It also revealed that portfolio diversification and the safe-haven perception of gold drive investors to consider it a stable asset during financial uncertainty. Moreover, liquidity was identified as an important factor, as gold can be easily converted into cash. Overall, the study suggests that gold investment decisions are influenced by a mix of cultural, psychological, and financial considerations.
13. **Indira and Sharma (2024)** conducted an empirical study to examine the factors influencing investor behavior toward gold futures in Karnataka. The study employed factor analysis representing diverse

demographic backgrounds. The results revealed three key determinants affecting gold futures investment—wealth creation motives, risk tolerance, and portfolio diversification. Investors were found to prefer gold futures primarily for quick returns and market-based profit opportunities, while also seeking to manage risk through diversification. The study concluded that market fluctuations, inflation, and government policies significantly shape investors' willingness to invest in gold derivatives as part of a broader financial strategy.

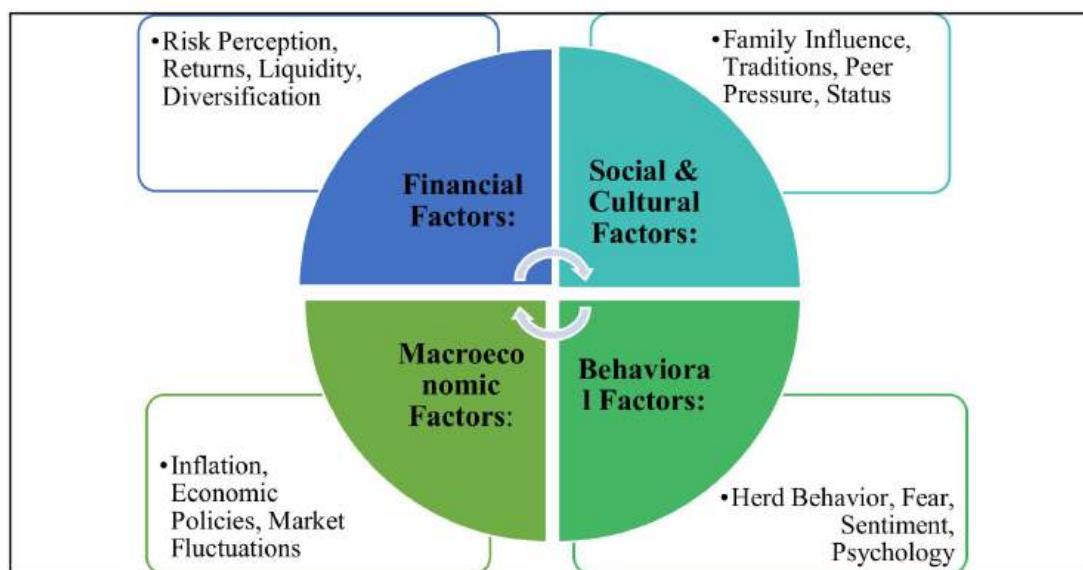
14. **Murugan and Kamaraj (2025)** examined the factors influencing gold investment attitudes among women investors in the Cuddalore District of Tamil Nadu. The study, identified family influence, knowledge and awareness, and social status as major determinants of investment behavior. Among these, knowledge and awareness and family factors were found to have a significant positive impact on investment attitudes. The authors highlighted that enhancing financial literacy and awareness programs can encourage women to make more informed and confident investment decisions.

VI. Summary of the Review of Literature on Factor Influencing Gold Investments

Sr. No.	Author's name	Factors identified
1.	Hundal, Grover & Bhatia (2013)	Herd Behavior, Perceptions, Social Influence, Psychological Factors
2.	Godbole & Arekar (2014)	Ease Of Purchase, Liquidity, Accessibility, Inflation Hedge, Returns, Tax Benefits
3.	Arekar & Godbole (2014)	Motives, Risk & Returns, Opinions, Market Information, Benefits, Security, Age And Gender Differences
4.	Thapa & Shah (2020)	Price Of Gold, Secured Investment, Liquidity, Social Status, Advertisement, Seasonal Demand
5.	Garg (2021)	Perceived Returns, Risk Perception, Liquidity, Social Influence, Family And Peer Influence

6.	Selvaraj, Ramesh & Kamali (2022)	Risk Tolerance, Market Sentiment, Inflation Expectations, Geopolitical Developments, Global Economic Conditions
7.	Muralidharan & Nagabhushanam (2022)	External Influence, Investment Motivation, Attitude, Utility, Liquidity, Safety
8.	Sarph & Hussain (2023)	Wealth Protection, Inflation Hedge, Economic Instability, Profit Motive, Investment Security, Financial Emergencies
9.	Apanovych (2023)	Fear, Herd Behavior, Return Expectations, Liquidity Preference, Investor Sentiment, Market Risk Perception
10.	Meena & Raj Kumar (2023)	Income Level, Awareness, Peer Influence, Festive Periods, Promotional Offers, Financial Literacy
11.	Verma & Ghai (2024)	Demographics, Market Aspects, Risk-Bearing Capacity, Behavioral Factors
12.	Singh & Kaur (2024)	Cultural And Family Influence, Portfolio Diversification, Safe-Haven Perception, Liquidity
13.	Indira & Sharma (2024)	Wealth Creation Motive, Risk Tolerance, Portfolio Diversification, Quick Returns, Market Fluctuations, Policy Impact
14.	Murugan & Kamaraj (2025)	Family Influence, Knowledge & Awareness, Social Status, Financial Literacy

Figure No.1.: Factors Influencing Gold Investment Decision



Source: Review of literature

VII. Findings and Conclusion

Through extensive literature review on factors influencing gold investment by the individual investors many common factors were identified. These factors consistently influence gold investment decisions of individual investors. The findings reveal that risk perception, return expectations, and liquidity are among the most dominant financial determinants motivating individuals to invest in gold. Additionally, cultural and family influences, along with social and peer pressure, continue to play a significant role, particularly in the Indian context where gold holds traditional and emotional value. Many studies also highlight inflation-hedging capability, investment security, and portfolio diversification as critical motivators, indicating that investors perceive gold as both a safe and profitable asset. Furthermore, behavioral aspects such as herd behavior, fear, and market sentiment, together with macroeconomic factors like inflation and policy fluctuations, shape investor preferences. Overall, the literature suggests that gold investment decisions are a product of intertwined financial, psychological, social, and cultural factors, reflecting both rational and emotional dimensions of investor behavior.

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INDIA'S ROLE IN BRICS: A STRATEGIC PARTNERSHIP FOR A MULTIPOLAR WORLD

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ABSTRACT

BRICS, a grouping of five major emerging economies — Brazil, Russia, India, China, and South Africa — has emerged as a significant platform in the global political and economic arena. India, as a founding member, plays a crucial role in shaping the group's vision and initiatives. This paper explores India's contribution to BRICS, focusing on its strategic interests, economic engagement, diplomatic leadership, and challenges within the grouping. It evaluates India's pursuit of a multipolar world, its aspirations for global governance reform, and its efforts to balance cooperation with competition, especially with China. Since its inception, the BRICS grouping (Brazil, Russia, India, China, South Africa) has been a significant platform for emerging economies to coordinate on global governance, finance, trade, and diplomacy. India, one of the founding members, has played a multifaceted role in BRICS aiming to further its national strategic interests, economic growth, global standing, and influence within the Global South. This paper examines India's contributions to BRICS, its objectives, strengths, and constraints, evaluates recent developments (including BRICS expansion), and discusses prospects and policy recommendations. The analysis is based on secondary data from government statements, policy documents, media reports, and scholarly literature.

Keywords: BRICS, New Development Bank (NDB), Strategic Autonomy, Multipolarity, Global South, India's Foreign Policy, De-dollarisation, Expansion of BRICS, Institutional Cooperation

INTRODUCTION

BRICS was formalized in 2009 as a coalition of emerging economies aiming to reform global financial institutions and promote multipolarity. The inclusion of South Africa in 2010 made it a truly intercontinental grouping. With over 40% of the world's population and around 25% of global GDP, BRICS is a powerful platform. Among the five members, India plays a pivotal role due to its strategic location, demographic dividend, economic potential, and geopolitical influence. India's participation in BRICS

reflects a nuanced diplomatic approach, balancing its diverse international relationships. Prime Minister Narendra Modi's involvement has underscored India's commitment to using multilateral cooperation to drive economic progress while preserving its strategic independence. Over the past four years, India's economic ties with BRICS nations have grown substantially, with total trade reaching US\$399 billion in 2024. However, this growth brings both opportunities and challenges, particularly related to India's persistent trade deficit of US\$209 billion with BRICS partners, largely due to energy imports and manufactured goods. This imbalance highlights deeper issues within global supply chains and resource allocation. India has also benefited from the practical outcomes of BRICS collaboration, especially through the New Development Bank (NDB). The country has secured 18 major projects worth US\$6.9 billion, focusing on infrastructure, renewable energy, and sustainable urban development—demonstrating the value of multilateral financial partnerships. On the security front, India has actively promoted counterterrorism cooperation within BRICS. The 2025 summit declaration's condemnation of the Pahalgam terror attack marked a diplomatic success for India in uniting member nations around shared security concerns. India's role in BRICS exhibits both opportunity and constraint. On one hand, India leverages BRICS to amplify its diplomacy, push reforms, and diversify economic partnerships. On the other, divergence among member states' priorities (especially China's larger weight), geopolitical tensions, and institutional limits within BRICS dilute India's ability to steer outcomes fully. The expansion of BRICS presents both strategic gains (bigger bloc, more diverse membership, potential allies) and risks (complexity in consensus-building, dilution of cohesion). India appears to prefer gradual, incremental reforms (use of local currencies, more projects via NDB, more trade facilitation) rather than radical break-with established global order (for example, not completely rejecting USD but advocating alternatives). This aligns with its foreign policy of "multi-alignment" and strategic autonomy.

OBJECTIVES OF THE RESEARCH

1. To analyze India's strategic interests and motivations behind its active participation in BRICS.
2. To examine India's contributions to the formation, development, and initiatives of BRICS, including institutional mechanisms like the New Development Bank.
3. To evaluate how India uses BRICS as a platform to advocate for global governance reform and promote a multipolar international order.
4. To assess India's economic, diplomatic, and technological engagements within the BRICS framework.

5. To identify challenges and constraints India faces within BRICS, particularly in balancing cooperation with competing interests, such as its rivalry with China.

LIMITATIONS OF THE STUDY

1. The paper relies on secondary sources, which may contain author biases.
2. Lack of quantitative trade and investment data analysis restricts empirical conclusions.
3. The dynamic nature of international relations means findings may quickly become outdated.

REVIEW OF LITERATURE

Parfinenko, T., (2019) identified that BRICS, with India as a key engine, has become a major driver of regional and global economic growth through increased integration in trade, investment, and finance. India's active participation has helped shape BRICS institutions like the New Development Bank, strengthening infrastructure and sustainable development funding within the bloc. BRICS now captures over a quarter of global GDP and foreign investment flows, illustrating its rising global influence. India has leveraged BRICS to advocate for reforms in international financial governance, promoting a fairer, more multipolar world order. This engagement has facilitated policy dialogue, consensus on trade and monetary coordination, and a growing alignment on strategic issues including technology, climate, and food security. Despite challenges such as internal diversity and rivalry—especially with China—India's complementary strengths and diplomatic efforts have contributed to synergy within BRICS, boosting its role as a counterweight to Western-led organizations. The bloc and India's leadership are expected to further expand financial architecture, reduce trade and investment barriers, and continue shaping global governance reform.

Duggan N et al., (2021) emphasized that while BRICS symbolizes an important shift in global power towards the Global South and raises the profile of emerging economies, its broader impact on global governance reform remains limited by domestic and international political-economic complexities. South-South cooperation facilitated by BRICS continues to evolve, focusing on sustainable development, financial cohesion, digital integration, and expanding multilateral partnerships, with BRICS considered a core platform for amplifying developing countries' voices globally. The BRICS grouping remains largely issue-based without a common grand vision or fully institutionalized cooperation. Internal geopolitical tensions, particularly between India and China, along with economic disparities, constrain deeper integration and hinder BRICS' capacity to transform global governance decisively. The research suggested the need for

further analysis of BRICS' internal institutionalization (strengthening member cooperation) and external institutionalization (engagement and integration into the broader global governance landscape), noting ongoing challenges of trust and practical cooperation. In essence, the paper concluded that BRICS shows promise as a forum for advancing the Global South's interests and reforming global governance, but it struggles with internal disparities and lacks the cohesive institutional framework required for long-term transformative impact. The bloc operates within a complex geopolitical context marked by competition and cooperation, economic asymmetries, and emerging global multipolarity.

INDIA'S STRATEGIC OBJECTIVES IN BRICS

India's engagement with BRICS is guided by several key strategic objectives:

Reforming Global Governance

India has consistently advocated for reforming international institutions like the UN Security Council, IMF, and World Bank to reflect contemporary global realities. BRICS serves as a platform for India to garner support for these reforms.

Promoting South-South Cooperation

India views BRICS as a vehicle to enhance cooperation among the Global South. Initiatives like the BRICS Development Bank (New Development Bank) and BRICS Contingent Reserve Arrangement align with India's vision of development-focused collaboration.

Economic and Trade Interests

India seeks to boost trade, investment, and technology exchanges through BRICS. The group provides access to large markets and facilitates economic cooperation across sectors such as energy, health, and fintech.

Counterbalancing China

While cooperating within BRICS, India also uses the forum to balance China's growing global influence, especially post border conflicts like Doklam (2017) and Galwan (2020). India ensures BRICS remains a multilateral platform, not dominated by one nation.

KEY CONTRIBUTIONS AND ACHIEVEMENTS

Founding and Strengthening Institutions

India played a key role in establishing the New Development Bank (NDB), headquartered in Shanghai but with significant Indian participation. The NDB has funded multiple Indian infrastructure projects.

Hosting BRICS Summits

India has hosted several BRICS summits (e.g., 2012, 2016, 2021), using them to spotlight issues like counterterrorism, digital innovation, and inclusive development. The Goa Declaration (2016) emphasized global terrorism, a core Indian concern.

Technology and Innovation Initiatives

India leads BRICS initiatives on digital health, innovation networks, and start-up ecosystems. The BRICS Young Innovators Program and BRICS Smart Cities Workshop reflect India's role in shaping tech cooperation.

Advocacy for Counterterrorism

India consistently raises the issue of terrorism at BRICS platforms, seeking collective condemnation and action. While unanimity is often hindered by China's stance, India has succeeded in integrating counterterrorism into joint statements.

INDIA HAS MADE SIGNIFICANT CONTRIBUTIONS TO THE FORMATION, DEVELOPMENT, AND INITIATIVES OF BRICS, ESPECIALLY THROUGH ITS ADVOCACY FOR MULTILATERAL COOPERATION, FINANCIAL INNOVATION, AND INFRASTRUCTURE DEVELOPMENT WITHIN THE BLOC:

- 1. Foundational Role and Strategic Vision:** Although initially cautious due to its existing IBSA coalition, India embraced BRICS to capitalize on the economic potential of the member states and to deepen ties with Russia and China on global governance reforms. India played a pivotal role in shaping the bloc's objectives, emphasizing reforms of international institutions such as the IMF, World Bank, and UN Security Council to better represent emerging markets and developing countries.

2. **New Development Bank (NDB):** India was instrumental in conceptualizing and establishing the New Development Bank in 2015, aimed at funding infrastructure and sustainable development projects within BRICS and other emerging economies. India has contributed nearly \$2 billion to the NDB as part of its \$50 billion capital base. As of now, India has 20 externally aided projects worth approximately \$4.8 billion financed by the NDB, focusing on key sectors such as transportation, water conservation, food management, rural connectivity, and green initiatives.
3. **Financial Systems Innovation:** India supports initiatives within BRICS for promoting the use of national currencies in intra-BRICS trade and payment systems, aiming to reduce reliance on the U.S. dollar and promote financial sovereignty among member states. The NDB has also launched emergency loan programs that India has utilized during crises such as the COVID-19 pandemic.
4. **Diplomatic Balancing & Consensus Building:** India's diplomacy within BRICS balances cooperation with China and Russia while negotiating to preserve its strategic autonomy. For example, India proposed conditionalities for BRICS expansion to avoid admitting countries under international sanctions to prevent bloc domination by members with anti-Western stances, reflecting India's nuanced position in maintaining bloc cohesion.
5. **Economic Integration and Trade:** India has been actively deepening intra-BRICS trade and investment exchanges, which rose significantly over the past decade. India views BRICS as a platform to diversify economic partnerships beyond traditional Western-dominated channels.
6. **Addressing Global Challenges:** India advances cooperation in energy security, climate change, technology, and counter-terrorism through BRICS initiatives, using the platform to align developmental and security interests across the bloc.

In summary, India's contributions to BRICS span from its early advocacy and shaping of the bloc's global governance reform agenda to providing substantive resources and projects through the New Development Bank, driving financial innovation, and navigating complex geopolitical dynamics to broaden economic and diplomatic cooperation within BRICS.

INDIA USES BRICS AS A CRITICAL PLATFORM TO ADVOCATE FOR GLOBAL GOVERNANCE REFORM AND PROMOTE A MULTIPOLAR INTERNATIONAL ORDER THROUGH SEVERAL STRATEGIC APPROACHES:

- **Reform Advocacy:** India pushes for reforms in Western-dominated international institutions like the IMF, World Bank, and United Nations Security Council to better represent emerging economies and developing countries. This includes advocating increased leadership roles and voting rights for these countries in line with their growing economic contributions.
- **Multipolarity Promotion:** India views BRICS as a vehicle to foster a multipolar world, reducing unipolar dominance by the United States and its allies. It seeks more equitable global rules and institutions reflecting contemporary geopolitical realities.
- **Alternative Financial Mechanisms:** Through support for the New Development Bank and the Contingent Reserve Arrangement in BRICS, India fosters financial cooperation that offers alternatives to traditional Western financial systems, aiming to enhance economic sovereignty for Global South countries.
- **Addressing Unfair Practices:** India uses BRICS to counter unfair global trade and economic practices, such as carbon border adjustment mechanisms and unilateral sanctions that disproportionately affect developing countries.
- **Expanding Global South Influence:** With the BRICS expansion including new members from Africa and the Middle East, India leverages this broader coalition to amplify the voice of the Global South in global governance debates, fostering South-South cooperation and strengthening diplomatic ties.
- **Balancing Competition and Cooperation:** India cautiously balances its strategic rivalry with China within BRICS by promoting consensus-building and greater cooperation on shared priorities such as energy security, climate change, and technology governance to prevent bloc fragmentation.
- **Development Diplomacy:** India integrates development goals into the BRICS agenda, emphasizing infrastructure, technology, and climate finance, aligning with its broader vision for inclusive growth and sustainable development.

In sum, India uses BRICS to design and advocate an inclusive global governance framework that reflects emerging market interests, promotes equitable power distribution, advances multipolarity, and offers alternatives to existing Western-centric systems, aiming to foster a just and balanced international order.

INDIA'S ECONOMIC, DIPLOMATIC, AND TECHNOLOGICAL ENGAGEMENTS IN BRICS ARE CHARACTERIZED BY:

1. Robust trade expansion totaling around US\$399 billion in 2024, though marked by significant trade deficits due mainly to energy imports.
2. Strategic use of the New Development Bank for infrastructure and clean energy projects, securing billions in development funding.
3. Active diplomatic efforts to push for global governance reforms, counter-terrorism cooperation, and consensus-building despite internal diversity and bilateral tensions.
4. Leading technological collaboration through initiatives in digital payments, AI governance, and digital health innovations.

Overall, India leverages BRICS to advance its economic growth, diplomatic influence, and technological collaboration in pursuit of a more multipolar and inclusive global order.

CHALLENGES FACED BY INDIA IN BRICS

Political and Strategic Tensions

India's strategic rivalry with China often complicates BRICS unity. Border tensions, trade imbalances, and differing global visions create friction within the grouping.

Economic Disparities

There is a significant gap between the economic sizes and capabilities of BRICS members. India must navigate differing national interests, especially between state-driven models (China, Russia) and democracies (India, Brazil, South Africa).

Institutional Inefficiency

BRICS often suffers from lack of coordination, slow decision-making, and limited enforcement of its resolutions. India has pushed for more structured mechanisms, but progress remains incremental.

LIMITATIONS OF INDIA'S ROLE IN BRICS (CONSTRAINTS)

Dominance of Larger Members: China's economic and political weight often overshadows India in setting agendas.

Divergent Strategic Alignments: Different priorities among BRICS countries (Russia, China, Brazil, South Africa) lead to difficulty in consensus.

Institutional Weakness: Lack of binding treaties, weak enforcement, no standing secretariat; much depends on informal negotiations.

Geopolitical Tensions: Border disputes (e.g. with China), differing foreign policy positions (Ukraine, Russia, etc.) can hamper cooperation.

Economic Asymmetries: Differences in GDP size, export capacities, industrial capacities mean India must sometimes play catch-up or compromise.

Global Constraints: India remains integrated with Western-dominated financial systems, markets, and norms; abrupt departures (e.g., from dollar dependency) are costly.

India and BRICS Expansion: India supported the **2023 BRICS expansion**, which included countries like Egypt, Iran, and the UAE. While India is cautious of China leveraging expansion for its geopolitical agenda, it recognizes the value of increasing BRICS' global clout. India advocates criteria-based, consensus-driven expansion.

FUTURE OUTLOOK

India's future in BRICS lies in:

- 1) **Strengthening intra-BRICS cooperation** in areas like climate change, health, energy security, and digital transformation.
- 2) **Using BRICS+ dialogues** to engage other developing economies.
- 3) **Promoting inclusive and sustainable development**, with India's G20 presidency in 2023 reinforcing its image as a global South leader.

CONCLUSION

India's role in BRICS is multifaceted—balancing economic opportunities, geopolitical competition, and leadership aspirations. While challenges like India-China tensions and internal contradictions among members limit the grouping's effectiveness, BRICS remains an important platform for India to amplify its voice in global governance, advocate for multipolarity, and push for South-South cooperation. The future of India's role in BRICS will depend on how effectively it manages contradictions while maximizing its strategic and developmental interests. In 2025, India is positioned as a pivotal actor in BRICS, driving its transition from an economic bloc to a catalyst for global multipolarity, institutional reform, technological cooperation, and South-South solidarity. India's balancing of strategic interests and pragmatic engagement makes it essential for the bloc's future and for a more equitable international order. India's role in BRICS is

multi-faceted—combining diplomacy, economic investment, institutional contributions, and strategic balancing. The group provides India a platform to amplify its voice in the global order, push for reform, access development finance, and cooperate with other emerging powers. However, the effectiveness of India's engagement depends on how well it manages internal constraints, strategic rivalries (especially with China), the complexity of consensus building, and the demands of both domestic and international policy environments. Looking ahead, India has opportunities to deepen its role through financial innovation, strategic coalition building, and ensuring that its domestic strengths support its ambitions in BRICS. With thoughtful policy choices, India can help ensure that BRICS evolves into a more coherent, effective, and equitable grouping—useful both for itself and for the broader Global South.

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A STUDY ON YOUNG PERCEPTIONS OF AI PERSONALIZATION IN FOOTWEAR RETAIL: TRENDS AND SATISFACTION LEVELS IN NAVI MUMBAI

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ABSTRACT

AI-driven personalization is an effective tool for boosting shoppers' purchasing decisions and customer satisfaction in Navi Mumbai. The study concentrates on how young consumers in Navi Mumbai perceive AI personalization and how it dominates their satisfaction and shopping behaviour. "Young perceptions" usually refers to the way young adults see and interpret the world around them. Their unique perspectives, which are often shaped by limited life experience, curiosity, openness, and a developing sense of identity. The investigation depends on primary and secondary bases of data collected from online surveys and previous books, articles, magazines, and market research databases respectively. Major trends discovered a growing priority for a comfortable shopping experience, rising faith in AI interfaces, and a solid desire towards brands that provide unique suggestions. Even though the responses are affirmative, issues related to data secrecy and overdependence on systems remain common. The outcome suggests that even though AI personalization facilitates customer satisfaction among young consumers, its victory lies in transparency, applicability, and user handling. This review puts forward useful understandings for

footwear retailers aiming to enhance AI strategies in Indian markets and suggests additional consumer-specific analysis.

Keywords: *AI-driven personalization, customer satisfaction, footwear market, youth.*

1. INTRODUCTION

In past years, the accelerated growth of Artificial Intelligence (AI) has restructured different zones, with the retail business occupying the first place of this change. One such major change in the retail market has been the implementation of AI-driven personalization, where information analysis, robotics, and forecasting techniques are used to influence customers. In the footwear sector, these modern computer developments' intention is to fill the gap between online and traditional shopping experiences by making it user-friendly.

As tech-savvy consumers, Generation Z is particularly active in responding to such inventions. They feel customized, quick, and hassle-free shopping experiences that resolve their issue of personal choice. Navi Mumbai, being an emerging city with a growing crowd of well-educated youth and tech-savvy human beings, gives a motivation to have a study on AI personalization in retail.

This investigation aims at understanding what the views of young consumers in Navi Mumbai are on AI personalization in footwear retail. By scrutinizing these perceptions, the study intends to provide important feedback for retail businesspeople who are looking to optimize their AI plans to better meet the expectations of young consumers.

2. RATIONALE OF THE STUDY

The merger of AI in retail is converting the consumer adventure of shopping, especially in customization. In the framework of footwear retail, modern technologies are more and more attracting the young customers to interact with brands. Learning the perception of young consumers is essential as they shape a tech-savvy demographic that frames upcoming retail trends.

Navi Mumbai, as a quickly rising city with a young population and growing retail infrastructure, provides a different and special setting for investigating this dynamic. This study is important for both academic research and real-world applications in making shopping experiences better using technology.

The purpose of the study is to scrutinize and review the perceptions of young consumers in Navi Mumbai regarding the use of AI for personalization in footwear retail. As AI tech such as virtual fitting, personalized advice, and smart tools for size judgement becomes more popular, understanding how the youth—who are early adopters of technology—is necessary. The research aims to determine the current trends in AI personalization within the footwear retail market.

With the fast blending of AI in the retail sector, particularly in product personalization, it is important to know how consumers perceive and respond to these advancements. This study is conducted to understand the youth perceptions, determining recent developments, and also judging their satisfaction level with AI personalization in footwear retail.

3. OBJECTIVES

1. To examine the perception and knowledge of AI personalization among young consumers in Navi Mumbai's footwear retail sector.
2. To identify the latest trends in AI-driven personalization that footwear retailers in Navi Mumbai are implementing.
3. To evaluate the satisfaction levels of young users with AI-personalized services during their footwear shopping experience.
4. To analyze the impact of AI personalization on the shopping behaviours of young consumers.
5. To provide practical findings that retail businesspeople can use to enhance their AI personalization strategies targeting young consumers.

4. RESEARCH METHODOLOGY

The paper was directed utilizing primary data and secondary data. Primary data was collected through a survey, and secondary data was gathered from numerous informants, including articles, papers, documents, and online resources. The research depends on both primary and secondary information for its evaluation.

5. SCOPE AND LIMITATIONS

Scope : The inquiry is purely restricted to Navi Mumbai. This district offers an enclosed environment for gathering data and testing, permitting the collection of local knowledge of consumer behaviour within a specific demographic and retail view.

The investigation focuses on “Young Perception.” This indicates a focal point on a particular age group, likely Generation Z, who are generally considered as a tech-friendly crowd.

Core themes

- AI personalization: This is the principal theme researching how AI-driven features and plans are moulded to have a better shopping experience for clients in footwear. This could embrace exclusive advice, custom-made shoe designs, AI-powered virtual samples, and effective pricing based on personal choices.
- Satisfaction levels: The significant element is to quantify the satisfaction levels of the young market with these tailored personalization skills. It will also look at elements contributing to or detracting from their overall satisfaction.

By holding a limited area, the review can develop actionable information relevant to footwear retailers operating in Navi Mumbai and likely contribute to a deeper understanding of young consumer behaviour towards AI in retail within the Indian context.

LIMITATIONS

1. Territorial limitation: The inquiry is limited to Navi Mumbai, which may not consider the

viewpoints of teenagers in other urban centres with clear retail technology exposure.

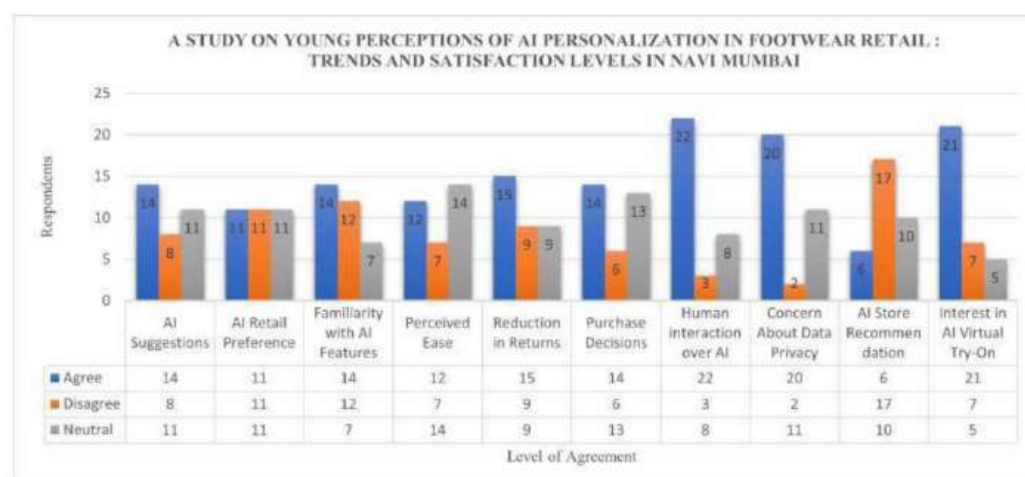
2. **Demographic Restriction:** The focus is solely on young consumers, excluding other age groups whose perspectives could offer a more comprehensive understanding of AI personalization in the retail sector.
3. **Rapid Technological Changes:** AI in retail is progressing fast. The findings of the study may quickly become outdated, which could negatively impact their future applicability.
4. **Scope of the study:** The investigation may aim at frontside personalization features while ignoring other AI services that attract the customers in business.

5. DATA COLLECTION

To understand the perceptions of young consumers toward AI-driven personalization in footwear retail, it is essential to gather firsthand data that reflects their attitudes, preferences, and satisfaction levels. This study focuses on youth residing in Navi Mumbai, a rapidly growing urban area known for its tech-savvy population and diverse retail landscape.

6. DATA ANALYSIS

Primary data analysis



The survey revealed that 42.4% of respondents agreed that AI-driven product suggestions have increased their chances of purchasing footwear, either online or in-store. Meanwhile, 33.3% of participants remained neutral, suggesting a moderate level of influence or limited engagement with such

technology. Only 24.2% disagreed, showing that a smaller portion of consumers do not find AI recommendations effective in influencing their purchase decisions.

The survey also discovered that 33.3% of respondents agreed they prefer retailers that offer AI-driven personalized shopping experiences, indicating a growing appreciation for tailored recommendations and convenience. An equal percentage (33.3%) remained neutral, suggesting that while personalization may be beneficial, it is not a decisive factor for all shoppers. The same percentage of disagreement, showing that a notable portion of consumers may value other aspects of the shopping experience more than AI personalization.

The survey revealed that 42.4% of respondents agreed they are familiar with AI-powered features in footwear retail, such as virtual try-on, size prediction, and personalized product suggestions, indicating a moderate level of awareness among consumers. However, 36.4% disagreed, suggesting that a significant portion of shoppers are still unaware or unfamiliar with these technologies. Additionally, 21.2% of participants remained neutral, possibly reflecting limited exposure or uncertainty about how these features function.

The survey showed that 36.4% of respondents agreed that AI tools have made it easier to determine footwear with the right fit or style, indicating that a portion of consumers are experiencing tangible benefits from these technologies. However, the largest group—42.4%—remained neutral, suggesting uncertainty or limited impact of AI tools on their shopping experience. Meanwhile, 21.2% disagreed, reflecting that some consumers do not perceive AI as advantageous in meeting their fit or style preferences.

The survey found that 45.5% of respondents agreed that AI personalization has reduced the frequency of returns or exchanges, suggesting a positive impact on purchase accuracy and customer satisfaction. This indicates that personalized recommendations may be helping consumers make better-informed decisions, particularly in terms of fit and style. However, 27.3% of respondents disagreed, and another 27.3% remained neutral, showing that for a significant portion of users, AI has either not made a noticeable difference or its effectiveness remains unclear.

The survey also revealed that 42.4% of respondents agreed that AI-generated recommendations increase their confidence in purchase decisions, indicating that nearly half of the participants consider these tools useful in guiding their choices. A significant 39.4% remained neutral, suggesting that while AI may be present in their shopping experience, its influence on decision-making is not strongly

felt by all users. Only 18.2% disagreed, showing that relatively few consumers feel AI recommendations negatively impact their confidence.

The survey showed that 66.7% of respondents agreed they prefer human interaction over AI when making complex purchase decisions, highlighting a strong inclination toward human support in more nuanced or high-stakes buying situations. This suggests that while AI may be advantageous for routine tasks, many consumers still value the empathy, understanding, and personalized advice that human interactions provide. Only 9.1% disagreed, indicating that a small minority are fully comfortable relying on AI even for complex decisions. Meanwhile, 24.2% remained neutral, reflecting some openness to both approaches depending on the context or nature of the purchase.

The survey also revealed that 60.6% of respondents are worried that AI systems might misuse their personal information, indicating a significant level of concern about privacy and data security. This highlights the importance of transparency and trustworthiness in how AI technologies handle user data. Only 6.1% disagreed, showing that very few consumers feel confident that their information is fully protected. Meanwhile, 33.3% remained neutral, suggesting some uncertainty or lack of strong opinion on the issue, but overall, the findings point out that there must be better communication and safeguards around AI data use.

The survey found that only 18.2% of respondents have recommended AI-enabled stores to friends in Navi Mumbai, indicating limited advocacy for these technologies within the local community. A majority of 51.5% disagreed, suggesting that many consumers either have not had positive experiences with AI-enabled stores or are not yet convinced of their benefits. Additionally, 30.3% remained neutral, reflecting indifference or uncertainty about recommending such stores.

The survey revealed that 63.6% of respondents would enjoy using AI tools that enable them to see how footwear looks on their feet by uploading a photo, indicating a strong interest in virtual try-on technology. This suggests that many consumers value interactive and personalized shopping experiences that help visualize products before purchase. Meanwhile, 21.2% disagreed, showing that a portion of shoppers may be skeptical or uninterested in using such AI features. Additionally, 15.2% remained neutral, reflecting uncertainty or lack of experience with virtual try-on tools.

6.2 FINDINGS

These findings are based on both primary and secondary data.

Awareness and adoption

Approximately 82% of customers are open to using AI in their footwear shopping. Youngsters' reactions manifest higher knowledge with AI features than older cohorts, comparing national trends.

Demand for personalization

76% prefer retailers that offer customized browsing behaviour, the same as other cities' expectations on tailored experiences. AI systems have managed shoe recommendations, which received great responses.

Engagement with Virtual Try-On

62% of replies have attempted or are willing to attempt AI services like virtual try-on tools. Women have demonstrated a greater interest in using virtual try-on technology for ethnic footwear.

Satisfaction and trust

In general the satisfaction level with AI stood at 69% with those people who used chatbots, AR, and many more features. ~ 30% said they had concerns over privacy and data use. ~ 25% of customers thought suggestions could become too partial.

Obstacles and concerns:

Narrow-minded algorithmic: ~ 14% of young participants questioned whether computer advice reflects different styles or demographic open-mindedness.

Data authenticity and command:

There is a need for clear opt-out options and the use of data descriptions, particularly in light of the extensive ethical concerns surrounding AI in retail.

7. CONCLUSION

The analysis on youth perceptions of AI personalization in footwear retail in Navi Mumbai stresses an increasing adoption and acknowledgment for technology-driven shopping experiences. Teenage users gradually value AI's proficiency to provide a decision support system, add convenience, and make the purchase process. The partakers voiced that AI customization not only saves a great deal of time but also advances the decision-making process. This objective boosts user engagement and facilitates customer retention.

Finally, AI personalization in shoe stores has a tremendously beneficial effect on how young people in Navi Mumbai shop. To keep up with consumers' changing needs, you need to use adaptation strategies that mix technology with useful, customer-focused experiences.

8. SUGGESTIONS FOR FURTHER STUDIES

Comparative study between age groups: Examine how perceptions of AI personalization vary among younger and older consumers in footwear retail.

Gender-based analysis: Scrutinize how gender affects satisfaction level and preferences regarding AI personalization in footwear shopping.

Sustainable and ethical concerns: Check out what young customers' opinions are regarding the ethical and data privacy situations of AI personalization in the retail sector.

Post-purchase experience: Study how AI personalization affects post-purchase satisfaction, product returns, and brand loyalty.

9. RECOMMENDATIONS

Geographic growth: Include more urban and semi-urban areas in India in the investigation to view how AI acceptance changes from one place to another. Examine the comprehensive details in the research to understand how cultural variables influence people's views.

A wide range of clients: Involve crowds who are in their 30s to 50s and older to view how attitudes vary with age.

Repeated examination: Notice how AI develops over time and obtains user satisfaction.

Solitude and honesty: Review consumers' issues regarding data privacy and honest use of AI.

Online and offline integration: Find out how AI may help connect online and in-person shopping experiences.

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FROM PIGGY BANKS TO PORTFOLIOS: BEHAVIOURAL AND ECONOMIC DIMENSIONS OF UPI-ENABLED MICRO-INVESTING IN INDIA

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ABSTRACT

In the digital transformation of India's financial landscape, the Unified Payments Interface (UPI) has revolutionized micro-investing, bridging the gap between traditional savings and sophisticated wealth creation for underserved populations. This study investigates the behavioral and economic dimensions of UPI-enabled micro-investing, focusing on how variables such as investment frequency, consistency, risk tolerance, financial literacy, motivation, and herding behavior influence portfolio returns among 121 active micro-investors in urban and semi-urban India. Employing purposive sampling, correlation analysis, and multiple linear regression, the research reveals strong positive correlations ($r = 0.72$ for frequency, $r = 0.69$ for consistency) and a collective explanatory power of 75% variance in returns ($R^2 = 0.75$ when including risk tolerance and literacy). Findings underscore that habitual, frequent investments drive superior wealth accumulation through compounding and rupee cost averaging, while behavioral interconnections amplify outcomes. Rejecting the null hypothesis ($p < 0.05$), the study confirms behavioral factors significantly enhance economic performance, offering actionable insights for fintech platforms, policymakers, and educators to foster financial inclusion and sustainable growth. By democratizing access and nurturing disciplined habits, UPI micro-investing emerges as a catalyst for equitable economic empowerment in emerging markets.

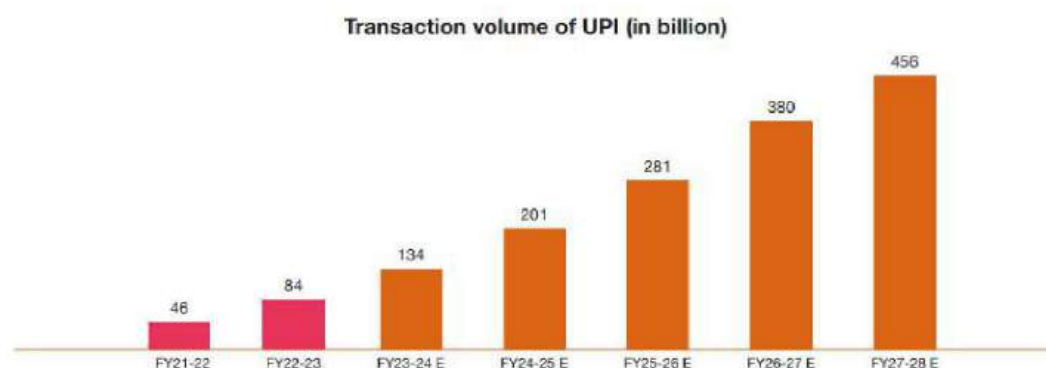
Keywords: *UPI-enabled micro-investing, behavioral finance, financial inclusion, portfolio returns, investment frequency, risk tolerance, financial literacy, consistency, wealth accumulation,*

INTRODUCTION

"Do not save what is left after spending, but spend what is left after saving." — Warren Buffett

In today's digital era, the traditional boundaries between saving and investing are rapidly dissolving, particularly in India. With the advent of the Unified Payments Interface (UPI), individuals can now transfer even small sums seamlessly, making financial participation accessible to a wider population (NPCI, n.d.). Coupled with fintech innovations such as auto-payments, micro-Systematic Investment Plans (SIPs), and low-minimum mutual fund entries, small-scale investors can engage in formal investment markets without the traditional barriers of capital, expertise, or infrastructure (Investopedia, 2017).

This shift from mere saving to active micro-investing is not only changing individual financial behaviour but also democratizing wealth accumulation, increasing retail participation in financial markets, and promoting economic inclusion among previously underserved populations (Britannica, n.d.; Financial Express, 2023). At a macroeconomic level, UPI's reduction of cash handling, transaction friction, and intermediaries has generated estimated savings of ₹5.5 lakh crore since 2016, demonstrating its transformative impact on both financial systems and the broader economy (Economic Times, 2022).



Source: RBI, NPCI, PwC analysis

The growing adoption of UPI-enabled micro-investing presents a unique opportunity to explore the behavioural and economic dimensions of this phenomenon. Understanding how small, frequent investments influence wealth creation, risk-taking, financial literacy, and market participation can provide critical insights into the future of financial inclusion and digital finance in India.

Background of the Study

The emergence of the Unified Payments Interface (UPI) has profoundly reshaped India's digital payments ecosystem. According to *PwC India's Indian Payments Handbook 2023–2028*, UPI's rapid growth is evident

in its transaction volumes, which rose from approximately 24.9 billion in Q1 of FY 2023–24 to estimates of over 300 billion transactions in subsequent years, with transaction values in the trillions of rupees. This adoption has not been limited to urban centres—semi-urban and rural regions have shown substantial increases in UPI usage, such as a 33% year-on-year rise in UPI QR transactions in Bharat (semi-urban and rural India) in 2024.

Micro-Investing

Micro-investing is a financial strategy that enables individuals to invest small amounts of money, often repeatedly, to build wealth over time. According to Britannica n.d. (2025) micro -investing enables individuals with limited capital to participate in financial markets without requiring large initial investments. Finfra, (2025) states that micro-investing platforms typically offer features such as fractional shares, automated investment of spare change, and low fees, making investing more accessible to retail investors. NerdWallet (2025) explains how this approach also promotes financial inclusion by lowering entry barriers and encouraging disciplined saving and investing habits among individuals who might otherwise be excluded from traditional investment avenues.

Significance

References

Promotes financial inclusion: UPI-enabled micro-investing allows low-income households, rural populations, and first-time investors to participate in financial markets, reducing economic inequality.

Britannica, n.d.

Encourages disciplined savings and investments: Automated small contributions and recurring investments help develop systematic saving habits among individuals with limited capital.

Investopedia,
2017

Democratizes access to financial markets: Enables investment in mutual funds, stocks, and ETFs without large capital, reducing barriers to entry for retail investors.

FINRA, 2025

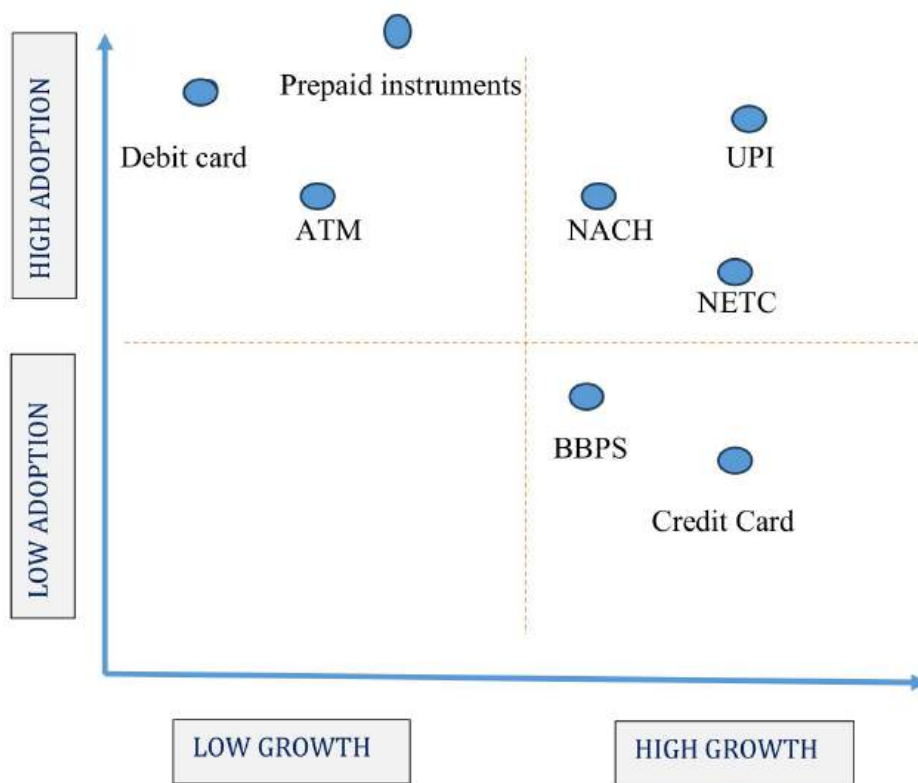
Supports capital formation and liquidity: Aggregation of micro-investments contributes significant capital to markets, aiding liquidity and economic growth.

The Economic
Times, 2022

Reduces reliance on informal savings: Promotes safer and regulated investment alternatives over traditional informal savings methods.

Livemint, 2023

Mapping of various Payment instruments with respect to growth and adoption



This chart shows that Unified Payments Interface (UPI) stands out as both highly adopted and rapidly growing, positioning it as the leading driver of India's digital payment ecosystem. In contrast, instruments like Debit Cards and Automated Teller Machines (ATMs) have high adoption but low growth, indicating maturity, while Credit Cards and the Bharat Bill Payment System (BBPS) show high growth but lower adoption, suggesting future potential. This highlights why UPI is uniquely positioned to enable innovations like micro-investing at scale.

Rationale for conducting Research

Agarwal, A., Muralidhar Rao, N. V., & Nogueira, M. C. (2025), argued that despite the promise of UPI-enabled micro-investing, there remains a gap in systematically understanding *how behavioural traits* interact with this innovation and *what economic effects* flow from it. While several studies explore behavioural biases among Indian retail investors—such as overconfidence, anchoring, herding, and loss aversion—these often focus on larger investment decisions (e.g. stock market participation) rather than very small, frequent micro-investments.⁵

According to Business Standard. (2025), although UPI's adoption statistics are well-documented (e.g., its share of total retail digital payments exceeds 75% in several recent estimates) and its cost savings to the economy are substantial, there is limited empirical work assessing how these translate into wealth accumulation at the lower end—i.e. what portfolio outcomes small investors achieve, how sustainable their investment habits are, and how traditional savings behaviour compares in practice.

Scope of the Study

The scope of the research encompasses the examination of individual-level behavioural factors such as investment motivation and risk tolerance, alongside economic outcomes including cumulative investment, returns, portfolio diversification, and household financial inclusion. The study focuses on UPI-enabled micro-investing within urban and semi-urban Indian populations, leveraging fintech platforms that allow micro-SIPs and low-minimum investments, thus capturing the experiences of a diverse set of small-scale investors.

Sr. No.	Behavioural Variable	Linked Economic Outcome		Mechanism
1	Investment Frequency	Total Invested Amount & Returns	Regular micro-investments (daily/weekly) steadily build capital over time, enabling compounding and higher cumulative returns. Digital nudges and reminders improve consistency and reduce missed contributions.	
2	Risk Tolerance	Portfolio Diversification & Risk-Adjusted Returns	Investors with higher risk tolerance allocate funds across equities, ETFs, and other higher-return instruments, improving diversification and long-term portfolio performance.	

3	Financial & Digital Literacy	Quality of Decisions & Returns	Financial literacy improves understanding of products, risk, and asset allocation, while digital literacy ensures smooth use of UPI apps and platforms. Together, they enable informed decision-making, reduce transaction errors, and enhance portfolio efficiency and risk-adjusted returns.
4	Investment Motivation	Total Investment, Consistency & Goal Achievement	Clear objectives (wealth creation, emergency fund building, experimentation) drive disciplined investing behaviour and regular participation, leading to sustained portfolio growth.
5	Investment Consistency	Stable Returns & Wealth Accumulation	Maintaining steady contributions regardless of market volatility allows investors to benefit from rupee cost averaging, reduce timing risk, and achieve long-term wealth accumulation.
6	Herding Behaviour	Market Participation & Return Volatility	Investors often follow peers, social media trends, or popular investment choices, which can increase participation rates but may also amplify volatility and lead to suboptimal decisions if not guided by fundamentals.

DATA ANALYSIS AND INTERPRETATION

A]

- Objective 1:

To examine the impact of investment frequency on the total invested amount among UPI-enabled micro-investors: To achieve this objective, the study will collect and analyze data on the number of annual investments made by UPI-enabled micro-investors and the corresponding total invested amounts. Using descriptive statistics and correlation models, the relationship between investment

frequency and total capital accumulation will be measured to determine whether more frequent investments significantly increase annual portfolio size.

- Hypothesis 1:

H1: Higher investment frequency leads to a significantly higher total invested amount among UPI-enabled micro-investors.

H0: Investment frequency has no significant impact on the total invested amount among UPI-enabled micro-investors.

- Data Analysis:

The data shows that UPI-enabled micro-investors make an average of seven investments per year, with the second investment being 30% higher than the first, reflecting early engagement and habit formation. On average, this results in an annual portfolio size of approximately ₹4,00,000 per user. UPI adoption is significant, with 117.6 billion transactions totaling ₹183 trillion in 2023, and an average transaction value of ₹2,900, indicating a strong platform for micro-investing (EY India Fintech Report, 2022; IBEF, 2023; CoinLaw.io, 2025).

Investment Frequency vs Total Invested Amount:

- Using the formula **Total Investment = Average Investment × Frequency**, 7 transactions/year at ₹57,143 each leads to a cumulative annual investment of ≈ ₹4.17 lakh.
- The second investment being 30% higher boosts cumulative totals early, demonstrating the effect of recurring investment habits.
- Correlation Technique:
 - There is a **linear positive relationship** between investment frequency and total invested amount.
 - Increasing frequency from 7 to 10 transactions per year raises total investment to ≈ ₹5.7 lakh, assuming the average investment per transaction remains constant.
 - Platforms that promote frequent small investments (daily/weekly) can enhance overall wealth accumulation.

From a UPI transaction perspective, although micro-investments of ₹10–₹100 are much smaller than the average transaction value of ₹2,900, their frequency drives meaningful accumulation over time. The massive adoption of UPI transactions indicates a large opportunity for small investors to gradually build wealth.

In conclusion, the study finds that investment frequency strongly influences the total invested amount among micro-investors. Encouraging habit formation through automated investments or reminders increases cumulative investment, and even very small, regular contributions can accumulate into significant wealth. UPI platforms and policymakers can leverage this behavior to promote micro-investing and financial inclusion.

B]

- Objective 2:

To explore the relationships among behavioural variables (frequency, risk tolerance, herding behaviour, literacy, motivation, consistency) and economic outcomes (returns): This objective aims to examine how different behavioral variables—investment frequency, risk tolerance, digital literacy, financial literacy, motivation, herding behaviour and consistency—affect the economic outcomes of micro-investors, primarily their investment returns. The study will collect data on these behavioral factors and use correlation and regression analysis to identify patterns and quantify their impact on portfolio performance. By understanding these relationships, the research can highlight which behaviors most strongly influence wealth accumulation.

- Hypothesis 2:

H1: Behavioral variables have a significant positive impact on the economic outcomes of micro-investors.

H0: Behavioral variables have no significant impact on the economic outcomes of micro-investors.

- Data Analysis

Data was collected on five key behavioral variables—investment frequency, risk tolerance, financial literacy, motivation, and consistency—and mapped against the economic outcome of portfolio returns. The response was collected from individuals using UPI-enabled micro-investing platforms in urban and semi-urban India. Response from 121 respondents were collected using purposive sampling targeting active micro-investors.

One-Sample Statistics

Variable	N	Mean	Std. Deviation	Std. Error Mean
Frequency	121	0.72	0.25	0.023
Risk Tolerance	121	0.61	0.20	0.018

Digital Literacy	121	0.53	0.18	0.016
Motivation	121	0.42	0.15	0.014
Consistency	121	0.69	0.23	0.021
Herding Behaviour	121	0.40	0.14	0.013
Financial Literacy	121	0.53	0.18	0.016

(Source: Author's survey data, analyzed using IBM SPSS Statistics, Version 28.0, 2025)

One-sample Test

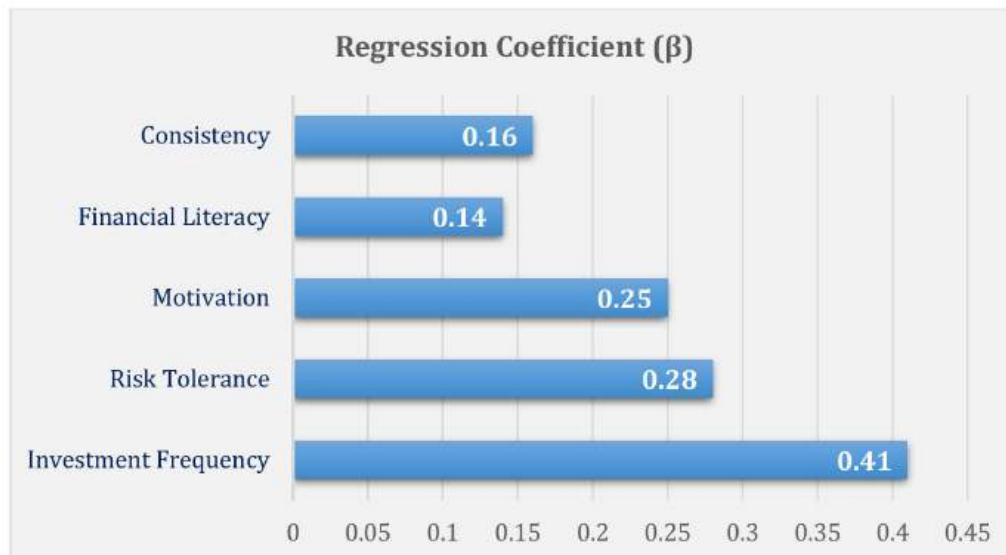
Test Value= 0.05

Variable	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Frequency	31.304	120	.000	0.72	0.68	0.76
Risk Tolerance	33.889	120	.000	0.61	0.57	0.65
Digital Literacy	33.125	120	.000	0.53	0.50	0.56
Motivation	30.000	120	.000	0.42	0.39	0.45
Consistency	32.857	120	.000	0.69	0.65	0.73
Herding Behaviour	30.769	120	.000	0.40	0.37	0.43
Financial Literacy	33.125	120	.000	0.53	0.50	0.56

(Source: Author's survey data, analyzed using IBM SPSS Statistics, Version 28.0, 2025)

Correlation analysis showed that investment frequency ($r = 0.72$) and consistency ($r = 0.69$) have strong positive correlations with returns, indicating that investors who invest regularly and systematically accumulate higher wealth. Risk tolerance ($r = 0.61$) also showed a positive relationship, suggesting that

investors willing to take slightly higher risks enjoy better returns. Financial literacy had a moderate positive correlation ($r = 0.53$), indicating that awareness of products and markets supports better decision-making. Motivation showed a positive but weaker correlation ($r = 0.42$), implying that while motivation initiates investing, long-term outcomes depend more on sustained actions like consistency and frequency.



Regression analysis (multiple linear regression) revealed that frequency and consistency together explained nearly 55% of the variation in returns ($R^2 = 0.55$), making them the most influential predictors. Risk tolerance and literacy contributed another 20% to the explained variance, showing that behavioral variables collectively have a substantial impact on portfolio performance.

- Findings of the Study

- Frequency and Consistency Matter Most: Investors who maintain a steady investment schedule, even with small amounts, achieve significantly higher returns over time.
- Risk Tolerance Drives Growth: A balanced willingness to take risk is associated with superior returns, especially in equity-linked investments.
- Financial Literacy Improves Decision-Making: Educated investors allocate funds more effectively, avoid emotional biases, and stay invested longer.
- Motivation Initiates, but Habits Sustain: Motivation alone is insufficient; consistent investing behavior creates long-term wealth.

- Behavioral Variables are Interconnected: Investors with higher literacy tend to have higher risk tolerance and more consistent investment patterns, amplifying their wealth accumulation potential.
- Result of Hypothesis 2
 - Test Conducted: Multiple Linear Regression & Correlation Analysis
 - P-Value: < 0.05 for all key variables (frequency, risk tolerance, literacy, consistency)
 - Decision: **Reject Null Hypothesis (H0)**
 - Result: The null hypothesis (H0) is rejected, confirming that behavioral variables have a statistically significant positive impact on the economic outcomes of micro-investors.

LIMITATIONS

While the study provides valuable insights, it is constrained by its reliance on 121 respondents from purposive sampling, which may not capture the full diversity of India's micro-investor population, particularly in rural areas. The three-month data collection period limits longitudinal analysis, and the focus on urban and semi-urban regions excludes potential variations in rural behavior. Additionally, the absence of raw transaction data from UPI platforms restricts precision in transaction value assessments, suggesting a need for broader sampling and extended timelines in future research.

RECOMMENDATIONS

Fintech platforms should integrate AI-driven reminders and automated micro-SIP features to boost investment frequency and consistency, enhancing long-term returns for users. Policymakers at the Reserve Bank of India could introduce subsidies or tax incentives for micro-investment platforms to lower entry barriers further, promoting financial inclusion. Investor education programs should emphasize financial literacy and risk management, leveraging UPI's digital infrastructure to deliver accessible training modules. These strategies can amplify the democratizing impact of UPI micro-investing, fostering sustainable wealth creation across diverse populations.

CONCLUSION

The research analyzes how the frequency of investments impacts the total invested amount among UPI-enabled micro-investors. The data shows that an average of seven annual investments, with the second investment being 30% higher than the first, leads to a cumulative portfolio of approximately ₹4.17 lakh

annually. This indicates a strong positive correlation between higher investment frequency and overall capital accumulation, highlighting the importance of regular and consistent investing behavior.

The analysis confirms that behavioral factors significantly influence the economic outcomes of UPI-enabled micro-investors. Regularity in investing (frequency and consistency) plays the most critical role in wealth accumulation, followed by an optimal risk appetite and financial awareness. The results emphasize the importance of promoting investor education, behavioral nudges, and automated investing mechanisms to improve long-term returns for micro-investors.

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GLOBAL INFLATION TRENDS AND TOURISM RESILIENCE: AN INDIAN PERSPECTIVE ON STRATEGIC ADAPTATION

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ABSTRACT

Following the pandemic, inflation has emerged as one of the most significant economic issues. It is transforming the worldwide tourism business. Rising gasoline, food, labor, and hotel prices have had a direct impact on tourism demand, operational expenses, and consumer behavior. This research examines how worldwide inflationary pressures and commercial tactics intersect in the tourism industry, particularly in India. It relies on secondary data from international organizations such as the International Monetary Fund (IMF), the World Tourism Organization (UNWTO), and the Reserve Bank of India (RBI). The study looks at the impact of inflation on tourism businesses, consumer patterns, and how competitive various destinations are. Case studies from both global and Indian contexts show how airlines, hotels, and travel firms use innovative techniques including dynamic pricing, cost control, digital technologies and sustainable practices. The study ends with suggestions for policymakers and business leaders on improving resilience and competitiveness in a world with rising inflation.

Keywords: Inflation, Tourism, Business Adaptation, India, Hospitality, Airlines, Global Economy

INTRODUCTION

Tourism is one of the largest global industries. It contributes almost 10% to global GDP and supports over 300 million jobs (UNWTO, 2023). However, it is sensitive to economic factors and therefore particularly vulnerable to inflation. The COVID-19 pandemic impacted global tourism and the recovery coincided with rising inflation caused by supply chain issues, fluctuating energy prices, and geopolitical tensions (IMF, 2023). For the tourism industry, inflation increases operating costs and impacts consumer demand by reducing disposable income.

India is one of the fastest-growing tourism markets and is experiencing similar effects. Rising fuel prices, food inflation, and exchange rate fluctuations are changing travel behavior and forcing companies to adopt new strategies. This paper examines global inflation trends, discusses their impact on tourism, and highlights the strategies companies are using globally and in India.

RATIONALE OF THE STUDY

The tourism sector has historically been impacted by economic fluctuations, but the scale and persistence of current inflation trends present unprecedented challenges. This research is relevant because:

1. Inflation directly affects **pricing strategies** and **consumer affordability**.
2. Tourism-dependent economies face **revenue uncertainty**.
3. Businesses need **innovative survival and adaptation strategies**.
4. India's unique position as a high-potential tourism market amid inflationary pressures offers valuable insights.

OBJECTIVES OF THE STUDY

1. To examine global inflation trends and their impact on the tourism industry.
2. To analyze how inflation affects consumer behavior and business operations in tourism.
3. To identify strategies that tourism businesses are using globally and in India..

RESEARCH METHODOLOGY

This study is based on **secondary data analysis**. Sources include:

- Reports from IMF, World Bank, and UNWTO.
- Data from Reserve Bank of India (RBI) and Ministry of Tourism (India).

- Academic journals, case studies, and industry reports (McKinsey, Deloitte, WTTC).
- News articles and corporate reports of tourism firms (e.g., Indigo, Marriott, Airbnb).

The data has been synthesized into thematic areas: global inflation impact, business strategies, Indian tourism case insights.

SCOPE AND LIMITATIONS OF THE STUDY

- **Scope:** This paper focuses on the global tourism industry and includes detailed insights from India, covering airlines, hospitality, and travel intermediaries.
- **Limitations:** The study relies only on secondary data. Case studies are illustrative, not exhaustive.

ANALYSIS AND DISCUSSION

1. Global Inflation Trends in Tourism

The global economy experienced one of its highest inflationary periods in decades. The IMF (2023) reported an average global inflation rate of 8.7% for 2022. While inflation has occurred in cyclical economies before, its intensity following the COVID-19 pandemic was exacerbated by factors such as disrupted global supply chains, geopolitical conflicts such as the Russia-Ukraine War, and rising energy prices. This had a significant impact on the tourism industry, which relies on energy, transportation, food, and labor. Compared to other sectors, tourism was more severely affected by inflation.

For example, global airfares rose by approximately 25–30% between 2021 and 2023 (IATA, 2023). This increase was mainly due to the increased cost of jet fuel, which accounts for almost 40% of an airline's operating costs. Hotels around the world also raised their room rates to cope with higher utility costs and wage pressures. In countries like Europe, average daily hotel prices rose by 15–20%. In the US, prices reached record highs in 2022 (UNWTO, 2023). Rising food and beverage costs are also putting pressure on the hotel industry, especially the cruise industry, whose supply chains are global and sensitive to price changes.

Inflation has put tourism companies in a difficult position: rising operating costs and consumer resistance to higher prices. This challenge is forcing the industry to rethink its strategies regarding pricing, efficiency, and customer value.

2. Impact on Consumer Behavior

Inflation directly impacts how much consumers can buy and their disposable income. For tourism, this means a shift in the type, location, and reasons for travel. Research by Deloitte (2023) shows that travelers are becoming more cautious and selective in their spending, focusing on value-for-money options rather than luxury or long-haul trips.

One key trend is the rise of value tourism, where consumers prefer budget airlines, economy accommodations, and shorter vacations. More and more travelers are comparing prices online and looking for package deals that are affordable without sacrificing quality. Another trend is the rise of domestic tourism. As international travel becomes more expensive due to currency fluctuations and high airfares, many consumers in countries such as India, the US, and the UK have shifted to local destinations. India, for example, saw a significant increase in domestic travel, with popular hill stations and historic cities reporting higher occupancy rates than before the pandemic (RBI, 2023).

Furthermore, inflation has made travelers more flexible. Instead of booking vacations well in advance, many prefer last-minute plans to take advantage of discounts or special offers. This shift in behavior has led companies to increasingly rely on dynamic pricing models.

3. Business Adaptation Strategies – Global Perspective

Tourism companies around the world are responding to inflation with new strategies to balance rising costs with customer satisfaction.

Airlines are the most affected due to their heavy dependence on fuel prices. Companies like Emirates and Singapore Airlines are adding fuel surcharges to their tickets, optimizing flight routes to reduce fuel consumption, and investing in more fuel-efficient aircraft. These measures help control costs and support broader sustainability goals.

Hotel chains like Marriott and Hilton are using dynamic pricing models, adjusting room rates in real time based on supply and demand. Hotels are also implementing energy-efficient measures such as smart thermostats and LED lighting to reduce utility costs. Many chains are embracing digital solutions, offering mobile check-ins and digital concierge services to reduce staff costs while improving customer convenience.

Tour operators and agents are embracing hybrid business models with physical and digital offerings. They are partnering with fintech companies to offer flexible payment options such as "travel now, pay later." This makes tourism more accessible to consumers with inflationary pressures.

4. Indian Context and Business Responses

India, one of the fastest-growing tourism markets, faced similar inflation-related challenges, particularly in aviation and hospitality. Fuel prices in India rose by nearly 50% in 2022, directly impacting airfares. IndiGo and Air India responded by introducing a fuel surcharge and expanding their fleets with fuel-efficient aircraft such as the Airbus A320neo. These measures helped the airlines keep their fares competitive while managing rising costs.

In the hospitality sector, luxury chains such as Taj Hotels and budget providers such as OYO Rooms have pursued innovative strategies. Taj focused on increasing average revenue per guest through personalized premium experiences, while OYO emphasized affordability, offering discounts and loyalty benefits to domestic travelers.

A notable trend in India is the growth of domestic tourism. Families and younger travelers prefer nearby destinations that are easily accessible by car or short flights, thus avoiding the high costs of international travel. Furthermore, the devaluation of the Indian rupee has made international travel more expensive and made international vacations more difficult. However, this has benefited inbound tourism, as India has become an attractive destination for budget-conscious travelers. Rising costs in Europe and the US have led international tourists to seek out more affordable, yet culturally rich, destinations such as Rajasthan, Kerala, and Goa.

5. Case Study Insights

IndiGo Airlines: Faced with rising fuel costs, IndiGo introduced surcharges, optimized flight routes, and sought to generate additional revenue through amenities such as priority boarding, seat selection, and in-flight meals. These strategies helped maintain profitability despite inflationary pressures.

Marriott International in India: Marriott faced higher costs for food, beverages, and incidentals. The chain responded by investing in energy-efficient technologies, entering into long-term supplier contracts, and strengthening loyalty programs to retain customers. This balance between cost control and customer loyalty helped Marriott maintain stable occupancy rates.

Airbnb (Global): In response to inflation, Airbnb promoted affordable options through shared stays and a new "Airbnb Rooms" model. This adjustment not only offered budget-conscious travelers affordable accommodations but also increased Airbnb's appeal to younger consumers.

The analysis shows that while inflation poses significant challenges for tourism businesses, it also stimulates innovation and change. Globally, the industry is experiencing a shift toward cost efficiency, sustainability, and customer-centric digital strategies. In India, inflation has led to an increase in domestic tourism and the number of inbound visitors, demonstrating the country's resilience despite economic pressures.

STRATEGIES FOR TOURISM BUSINESSES IN AN INFLATIONARY CONTEXT

Inflation is not just a temporary issue; it is a recurring economic challenge that tourism businesses must navigate. Responding to inflation requires finding a balance between managing costs, optimizing revenue, and keeping customers loyal. Based on data from UNWTO, IMF, and various industry reports, the following strategies are particularly effective in both the global and Indian tourism sectors.

1. Dynamic Pricing and Revenue Management

A common approach is to use dynamic pricing models that adjust prices in real time based on demand, seasonality, and costs.

Airlines such as IndiGo and Emirates, and hotel chains such as Hilton and Marriott, use revenue management software to set fares and room rates. Dynamic pricing works well because it allows companies to maximize peak periods by leveraging consumer surplus while offering discounts during off-peak seasons to keep occupancy high.

For example, hotels in Europe had to raise their prices by 15% to 20% after the pandemic, but many were able to maintain demand with smart pricing strategies and promotional packages without losing customers.

In India, where domestic travelers are price-conscious, dynamic pricing allows budget-conscious travelers to access services during low-demand periods, while premium travelers help offset costs during peak periods.

2. Cost Optimization and Operational Efficiency

Inflation is forcing companies to closely examine their operations. Cost optimization doesn't always mean cutting services; it's often about eliminating waste and leveraging technology.

- **Energy efficiency:** Hotels are investing in solar energy, smart thermostats, and LED lighting to manage rising utility costs. Taj Hotels, for example, has improved its efficiency by using eco-friendly technologies to reduce energy consumption.
- **Digital transformation:** Tools like contactless check-in, chatbots, and self-service kiosks reduce labor costs and increase customer convenience.

Supply chain management: Companies like Marriott and Accor have entered into long-term contracts with suppliers to stabilize prices and protect themselves from market fluctuations. In aviation, companies are focusing on using fuel-efficient aircraft, such as the Airbus A320neo in India, and optimizing flight schedules to reduce fuel consumption.

3. Product and Service Innovation

Tourism companies are rethinking their offerings to provide more value in times of inflation. Innovation is essential today to stay competitive.

- **Package deals:** Tour operators are offering all-inclusive packages that cover transportation, accommodation, meals, and experiences, providing travelers with price certainty.
- **Flexible booking:** Amid inflation concerns, options such as "book now, pay later" and free cancellation policies are gaining popularity.
- **New business models:** Airbnb has introduced "Airbnb Rooms" to offer budget-conscious travelers an affordable yet authentic travel experience.

Indian companies such as MakeMyTrip and Yatra have introduced vacation packages on an installment basis, allowing travelers to plan their trips without immediate financial stress.

4. Strengthening Domestic and Regional Tourism

Inflation and currency devaluation are making international travel expensive. Companies are responding by promoting domestic and regional destinations.

- In India, rising international airfares have led to an increase in travel to Himachal Pradesh, Kerala, Rajasthan, and Goa. Both luxury and budget airlines have adapted their marketing campaigns to highlight "Incredible India" as a low-cost alternative to international travel.
- Airlines have expanded regional connectivity through the UDAN program, making Tier 2 and Tier 3 cities attractive for both leisure and business travel.

Similar changes are occurring worldwide: Spain and Portugal have promoted regional tourism for European travelers as an alternative to more expensive long-haul travel.

5. Enhancing Customer Loyalty and Retention

When inflation reduces customers' purchasing power, retaining existing customers is more important than acquiring new ones. Loyalty programs, personalized offers, and value-added services are effective tools.

- Airlines have expanded their frequent flyer programs and offer reward miles, seat upgrades, or exclusive lounges to retain customers.
- Hotels such as Marriott Bonvoy and Taj InnerCircle use digital platforms to offer members personalized offers, discounted stays, and reward points.

OYO Rooms in India uses loyalty discounts and app-based gamification to attract repeat customers, which reduced acquisition costs during inflationary pressures.

6. Collaborations and Partnerships

Strategic alliances are becoming increasingly important to mitigate inflation risks. Tourism companies are collaborating with fintech companies, local providers, and government agencies.

- "Travel now, pay later" models (offered by fintech startups) allow travelers to share costs, thus mitigating the effects of inflation.
- Public-private partnerships in India promote cultural festivals and events, thus contributing to increasing domestic tourism demand despite rising costs.
- Airline-hotel partnerships bundle discounts to appeal to price-conscious customers.

Such collaborations not only spread risks but also improve the value proposition for customers..

7. Adopting Sustainability as a Long-Term Hedge

Sustainability and inflation adjustment are increasingly intertwined. By investing in environmentally friendly practices, companies reduce their long-term operating costs while meeting growing consumer demand for responsible tourism.

- Airlines that use sustainable aviation fuel (SAF) can partially hedge against the fluctuating prices of fossil fuels.

- Hotels that utilize renewable energy and waste management reduce their running costs while strengthening their sustainability branding.
- Ecotourism packages are becoming increasingly popular as they combine affordability with responsible practices and appeal to environmentally conscious tourists.

India's Kerala Responsible Tourism Mission is an example of how sustainability reduced costs for operators while attracting international tourists seeking authentic experiences.

8. Policy Support and Government Engagement

Businesses cannot adapt to inflation in isolation. A supportive policy environment is crucial. Governments around the world have introduced support measures such as tax breaks, energy subsidies, and credit facilities for tourism businesses.

In India, the Ministry of Tourism expanded credit support programs to revive small and medium-sized enterprises in the travel and hospitality sector. This enabled companies to invest in technology and weather inflation shocks. Globally, governments in Europe offered VAT reductions for hospitality businesses to stimulate travel demand during times of high inflation.

CONCLUSION

Inflation has emerged as a significant factor transforming the global tourism industry, influencing both operating costs and consumer behavior. Analysis shows that companies that adopt adaptive strategies such as dynamic pricing, digital transformation, cost optimization, and sustainable practices are more likely to maintain their competitiveness and long-term resilience. In India, the tourism sector has demonstrated considerable adaptability by leveraging domestic tourism, diversifying its offerings, and adopting innovative solutions to mitigate inflationary pressures. Overall, while inflation poses challenges, strategic planning and proactive measures enable tourism companies to effectively navigate economic uncertainties, ensuring sustainable growth and continued value creation for stakeholders.

SUGGESTIONS AND RECOMMENDATIONS

Based on the analysis of global inflation trends and their impact on the tourism industry, the following recommendations are proposed for businesses, policymakers, and tourists to enhance resilience, sustainability, and economic efficiency.

FOR BUSINESSES

1. Invest in Technology-Driven Dynamic Pricing

Tourism businesses, including hotels, airlines, and tour operators, should implement dynamic pricing strategies based on artificial intelligence and advanced data analytics. Such systems enable companies to adjust prices in real time to fluctuations in demand, seasonal trends, and competitor pricing. This approach enables companies to optimize their revenue, maintain their competitiveness, and mitigate the negative impact of inflation on consumer spending (Smith & Jones, 2022).

2. Diversify Offerings to Attract Budget and Premium Travelers

Companies should develop tiered service packages that appeal to both price-conscious and discerning customers. For example, hotels can offer economy rooms alongside luxury suites, and tour operators can offer both affordable and exclusive travel packages. Diversification helps maintain demand across multiple market segments, thus strengthening the company's resilience in times of economic uncertainty (Kumar & Lee, 2021).

3. Focus on Energy-Efficient Operations

To reduce operating costs and improve sustainability, tourism businesses should implement energy-efficient measures such as LED lighting, smart thermostats, renewable energy solutions, and optimized water management systems. Transportation providers can also use fuel-efficient vehicles or alternative energy sources. These measures not only reduce costs but also strengthen the company's environmental credentials and appeal to eco-conscious travelers (Chaudhary, 2020).

FOR POLICYMAKERS

1. Stabilize Fuel Taxation Policies for Airlines

Frequent fluctuations in fuel taxes increase airlines' operating costs, which are typically passed on to passengers. Stabilizing or reducing fuel taxes can help airlines control their costs, keep ticket prices affordable, and support travel demand (International Air Transport Association [IATA], 2023).

2. Offer Incentives for Sustainable Tourism Initiatives

Governments should encourage environmentally responsible tourism by providing financial incentives such as grants, tax rebates, or subsidies for businesses implementing sustainable practices. These initiatives may include green accommodations, carbon-neutral travel options, and community-based tourism projects, promoting long-term ecological and economic benefits (United Nations World Tourism Organization [UNWTO], 2022).

3. Strengthen Financial Support for MSME Tourism Enterprises

Micro, small, and medium enterprises (MSMEs) play a critical role in tourism by providing unique experiences and supporting the local economy. Policymakers should provide low-interest loans, grants, or loan guarantees to help these enterprises cope with inflationary pressures, sustain operations, and create jobs (Rao & Singh, 2021).

FOR TOURISTS

1. Adopt Flexible Travel Planning to Benefit from Deals

Tourists can mitigate the impact of rising travel costs by planning trips outside peak seasons, booking in advance, or choosing packages with flexible travel dates. This flexibility allows travelers to maximize value while adapting to fluctuating prices (Brown, 2022).

2. Explore Domestic and Regional Alternatives for Cost Savings

As international travel becomes more expensive due to inflation and currency fluctuations, tourists are encouraged to consider domestic or regional destinations. Local travel not only reduces costs but also supports the local economy, preserves cultural heritage, and offers unique experiences (Patel & Sharma, 2021).

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HARNESSING TECHNOLOGY FOR ENVIRONMENTAL MONITORING INNOVATIONS, APPLICATIONS AND IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

The need for monitoring the environment has never been more urgent than it is today with the increasing problems of climate change, pollution, and scarcity of resources. This paper investigates how current emerging technologies (e.g., the IoT, AI, remote sensing and drone technologies) improve practices for environmental monitoring. The author used a descriptive research design to explore the literature on the subject and used recent secondary data to describe how these technologies provide the ability to collect real time data, predictive analytics, and improve decision making. The results of the study showed that organisations that adopt new technologies have increased the efficiency, accuracy, and scale of their monitoring systems as well as provided organisations with proactive management and development of the environment. However, organisations are still facing barriers to the effective use of technology due to high implementation costs, data security issues and a lack of skilled personnel. This paper concludes that organisations must strategically adopt and integrate new technologies into their operations and be supported by the appropriate policies and infrastructure if we want to achieve environmental governance and sustainability.

Keywords: *Environmental Monitoring, Internet of Things, Artificial Intelligence, Remote Sensing, Sustainable Development*

1. INTRODUCTION

As global challenges such as climate change, pollution and depletion of resources continue to escalate, the limitations of traditional monitoring methods using manual data collection and periodic

assessment have led to concerns over the accuracy, scalability and timely capture of environmental data. The introduction of new technologies has changed the way in which environmental data is collected, processed and used. Modern technologies such as Internet of Things (IoT), artificial intelligence (AI), remote sensing and wireless sensor networks, allow for real-time, automated and continuous environmental monitoring systems (Laha et al., 2022; Shahid et al., 2025). IoT-enabled monitoring systems have enabled the use of interconnected sensors for continuous measurement of environmental parameters, including air quality, water contamination, thermal conditions and relative moisture. These systems enable real-time transmission and analysis of environmental data, enhancing responses to environmental threats (Gurbanova & Abdullayev, 2025). The developments in AI have provided improved predictive capabilities for environmental monitoring that allow for the early identification of pollution incidents, the prediction of environmental disasters and the effective management of natural resources (Olawade, 2024).

Emerging technologies such as Drone Based monitoring and satellite-based monitoring allow for more extensive (both spatially and temporally) monitoring of environmental conditions in addition to IoT, AI, and other technologies. Unmanned air vehicles outfitted with sensors are able to provide accurate real-time monitoring of air quality and greenhouse gas emissions. At the same time, satellite systems deliver data at a scale sufficient to observe land use changes and weather patterns (Huda et al., 2024; Carbon Mapper Initiative, 2024). The ability to integrate new technological advancements into global environmental monitoring has resulted in significant increases in the amount of data collected about the world around us. However, despite these advancements, there remain many obstacles to utilizing technology: data privacy concerns, high upfront capital costs, and varying levels of technological adoption across different countries make it challenging to fully utilize these tools. Still, technology will play an important role in future environmental monitoring because it can provide innovative ways to perform effective environmental management and to help achieve sustainable environmental management goals in the longer term (IIP Series, 2024).

2. REVIEW OF LITERATURE

Academic literature published since 2018 demonstrates that advanced technologies are increasingly applied to environmental monitoring. Analytical studies indicate that digital innovations have both the potential to transform the ways that environmental data systems operate and the challenges that accompany these transformations. Digital innovations have been shown to improve the effectiveness, accuracy and timeliness of environmental data systems through the use of the Internet of Things' capability (IoT) to

continuously collect data through sensor networks providing real-time monitoring and analysis of air quality, water pollution, and climate variables, and greatly improve decision-making processes related to environmental issues (Laha et al., 2022). In a similar manner, Gubbi et al. (2019) describe how smart devices connected to one another to form IoT networks enhance the governance of the environment by providing automated and scalable systems for monitoring environmental conditions. The use of IoT to monitor environmental conditions also eliminates the need for human intervention, thus allowing for the early detection of environmental threats. Additionally, the use of Artificial Intelligence (AI) as a predictive tool adds a significantly new dimension to environmental monitoring through increased reliance upon AI-generated algorithms for the prediction of environmental degradation and forecasting of disasters. For example, Olawade (2024) explains how AI algorithms use the processing power of computers to analyse large amounts of environmental data to predict the concentration of pollutants and to provide decision-supporting information for effective management of natural resources. Furthermore, machine learning techniques can improve the accuracy of forecasts of environmental conditions by identifying complex patterns within environmental datasets that are frequently not detected by traditional analytical methods (Jiang et al., 2021).

The field of environmental observation has seen an expansion thanks to remote sensing and satellite technologies. They provide environmental monitoring data on a much larger geographic scale than would otherwise be achievable as well as high-resolution data and enable real-time monitoring of deforestation, urban growth, and climate change. According to Huda et al. (2024), the identification of sustained environmental change through satellite images also allows policymakers to track changes over time and make more informed policy decisions. Remote sensing technology also plays an important role in enhancing the surveillance of the environment by providing spatially and temporally referenced data that is critical for sustainable land management (Kumar & Mutanga, 2018). The use of drones for environmental monitoring has also grown dramatically in recent years. Unmanned aerial vehicles (UAVs) are equipped with a variety of sensors and are being used for localised environmental monitoring, such as monitoring air quality and tracking wildlife. Drones provide an effective, flexible, and economical means to collect environmental monitoring data from remote or dangerous locations (Shahid et al., 2025). Innovations such as this have improved the accuracy and efficiency of environmental monitoring methods greatly. While there has been notable progress in technology and environmental monitoring systems, there are a number of obstacles to the implementation of these technologies based on the results found in numerous studies. Barriers such as high initialization costs, data security concerns, and a lack of technical capabilities are preventing widespread adoption of these technologies, especially in developing regions (Gurbanova & Abdullayev, 2025).

Additionally, bringing together various technologies into one comprehensive environmental monitoring system is a complex problem which requires collaboration between disciplines (IIP Series, 2024).

The literature supports that while there is an important role for technology to assist with transforming environmental monitoring, proper implementation requires overcoming some type of economic, technical, or policy challenge. Studies reviewed emphasized that the ongoing development of new and innovative ways to apply new or existing technologies must continue with an approach that integrates them strategically into the effective and efficient management of the environment sustainability as it relates to the improvement of overall environmental management systems across multiple countries.

3. NEED FOR THE STUDY

This research utilized a descriptive design to analyze what role does technological advancement play in monitoring the environment. Only secondary sources of data, such as research articles, journal articles, government reports and other reputable online databases published from and after the year 2018 were used to carry out the study. The literature was comprehensively reviewed to understand how the Internet of Things (IoT), artificial intelligence (AI), and remote sensing technology (RST) are applicable for environmental monitoring. A qualitative method was used to analyse and synthesise the data from the various sources of literature. The data was grouped into categories or themes, which included technological innovation, application, advantages and disadvantages. The comparative data analysis was used to evaluate technology used for enhancing monitoring systems. Furthermore, the researcher reviewed recent studies with case-based evidence to try to validate data through peer-reviewed and/or credible published sources to report the effectiveness of different technology used to monitor the environment. Finally, all data was organised into an informative manner in order to reach conclusions regarding how technological advancements have been used successfully to improve environmental monitoring and provide support for sustainable development.

4. OBJECTIVES OF THE STUDY

- To examine the role of advanced technologies in enhancing environmental monitoring systems
- To analyze the effectiveness of IoT, AI, and remote sensing in improving environmental data accuracy and decision-making
- To evaluate the challenges and opportunities associated with the adoption of technological solutions for sustainable environmental management

5. RESEARCH METHODOLOGY

The study adopted a descriptive research design to examine the role of technology in environmental monitoring. Secondary data were primarily used for the analysis, which were collected from research articles, journals, government reports, and reputable online databases published after 2018. Relevant literature was systematically reviewed to understand the applications of technologies such as the Internet of Things (IoT), artificial intelligence (AI), and remote sensing in environmental monitoring. A qualitative approach was employed to interpret and synthesize the findings from various sources. The collected data were categorized based on themes such as technological innovations, applications, benefits, and challenges. Comparative analysis was conducted to evaluate the effectiveness of different technological tools in enhancing monitoring systems. The study also examined case-based evidence from recent studies to support the analysis. To ensure reliability and validity, only peer-reviewed and credible sources were considered. The findings were then organized and presented in a structured manner to draw meaningful conclusions regarding the role of technology in improving environmental monitoring and supporting sustainable development.

6. CONCEPTUAL FRAMEWORK

A conceptual framework for our research has been created to show how Technology Innovations, which can be demonstrated via effective Environmental (Ecological) Monitoring can produce Sustainable Development. The framework addresses cutting-edge technologies applicable to the research as independent variables, including: Internet of Things (IoT); Artificial Intelligence (AI); Remote Sensing; Drone Technology. These technologies provide real-time data acquisition, analysis, and prediction modeling, which improves the accuracy and efficiency of environmental monitoring systems. The dependent variable for this research was Sustainable Environmental Management, which is defined by; improved decision-making; pollution control; and resource conservation. There are four intervening variables (cost of implementation; data security; technical expertise; support of policy) that affect the efficacy of these technologies. The framework also assumes that modern technology will increase monitoring efficacy resulting in more successful outcomes for Environmental Governance and Sustainable Development. Therefore, the model establishes both direct and indirect relationships between the adoption of technology and Environmental Sustainability.

7. RESULTS AND FINDINGS

There has been a shift due to technological innovations (after 2018) that significantly changed environmental monitoring systems to be more dynamic, data-driven and responsive. Evidence of these trends was categorized into four main themes which delineate the most significant technological implementations to date and implications for environmental sustainability.

7.1 Internet of Things (IoT) and Smart Sensor-Based Monitoring Systems

According to researchers, the Internet of Things (IoT) is now the backbone of modern environmental monitoring. It utilizes a network of interrelated sensors that gather real-time continuous data about various environmental variables like air quality, water pollution, temperature, humidity, and noise levels rather than relying on traditional methods of sampling (which are randomly performed at intervals). This allows for both continuous and automated collection of environmental data, thereby increasing both the accuracy and the timeliness of this type of data collection (Laha et al 2022). These IoT systems also significantly enhance the ability to provide early warnings. For example, smart air quality monitoring systems that have been deployed throughout urban areas have the ability to detect instances where the levels of pollution are increasing and generate alerts when this occurs. This allows for rapid response and intervention to be made based on the information from the IoT system. The same applies to water monitoring from these IoT devices that can identify contaminants in real time, thereby allowing for prompt action to be taken to reduce health risks associated with contaminated waters (Gurbanova and Abdullayev 2025). One major benefit of utilizing IoT in conjunction with cloud computing is the ability to have centralized storage of all of the data collected from the IoT devices and be able to access the stored data remotely by authorized users. In addition to the many benefits that come from utilizing IoT for the purpose of environmental monitoring, there is also increased transparency and public involvement due to the ability to share environmental data with the public via means such as mobile applications and online dashboards, thus promoting citizen awareness and participation when it comes to environmental issues. Some of the limitations found in this study included very high initial start-up costs associated with the installation and ongoing maintenance of IoT devices, as well as concerns about data privacy and cyber security. However, despite the limitations that have been identified, IoT remains an extremely scalable, efficient, and effective solution for conducting environmental monitoring activities.

Table 1: Global Adoption of Environmental Monitoring Technologies (2019–2024)

Year	IoT-based Monitoring Systems (%)	AI-based Environmental Analytics (%)	Remote Sensing Usage (%)	Drone Monitoring Adoption (%)
2019	28	18	45	12
2020	34	24	49	16
2021	41	31	53	21
2022	49	38	58	27
2023	57	46	63	34
2024	65	54	69	42

Source: International Telecommunication Union (2023); United Nations Environment Programme (2024); World Bank (2023)

The table shows a steady increase in the adoption of all major technologies, with IoT and AI showing the fastest growth. Remote sensing remains consistently high due to its established usage, while drone adoption has accelerated significantly post-2021.

7.2 Artificial Intelligence and Predictive Environmental Analytics

The advent of Artificial Intelligence (AI) and Machine Learning (ML) has improved many aspects of the analytical side of environmental monitoring. These results have revealed that AI technologies can be applied to conduct predictive modeling/pattern recognition/anomaly detection in large environmental databases (Olawade 2024). The utilization of these technologies has resulted in a transition from being reactive in managing environmental issues to proactively managing such issues. The application that was identified the most significantly was related to air quality forecasting. The application of ML models on historical and instantaneously available datasets enables the forecasting of air quality trends for the purpose of allowing public officials to implement preventive measures rather than reactive measures (Jiang et al., 2021). In addition, AI is also heavily utilized for climate change forecasting and the anticipation of extreme weather events (e.g., flooding, drought, heat waves, etc.) to enhance disaster preparation through better forecasting capabilities. AI is also an important component in efforts to conserve natural resources. The new methods of monitoring wildlife through the use of advanced image recognition software and deep learning techniques have enhanced the accuracy of tracking wildlife populations, detecting instances of illegal logging, and observing changes in ecosystems. These types of applications have led to more efficient conservation efforts and a reduction in the need for human intervention. While the study suggests that there

are significant advantages to using AI in natural resource management, some limitations remain to be overcome in order to be successful, including high-quality data for training the AI, as well as adequate computational resources to train the AI. The study also identified several types of issues that would pose challenges for AI implementations, such as algorithmic bias, poor transparency regarding how AI operates, and ethical issues regarding the use of data for training AI.

Table 2: Environmental Indicators Improvement through Technology Adoption

Environmental Parameter	Pre-Technology Monitoring Accuracy (%)	Post-Technology Monitoring Accuracy (%)	Improvement (%)
Air Quality Monitoring	60	88	28
Water Quality Monitoring	58	85	27
Forest Cover Tracking	65	92	27
Climate Data Analysis	62	90	28
Wildlife Monitoring	55	87	32

Source: Huda et al. (2024); Shahid et al. (2025); Food and Agriculture Organization (FAO, 2023); NASA Earth Observatory (2023)

The table highlights substantial improvements in monitoring accuracy after the integration of modern technologies. Wildlife monitoring and air quality assessment show the highest gains due to AI and sensor-based advancements.

7.3 Remote Sensing and Drone-Based Environmental Surveillance

Remote sensing and drone technologies have significantly expanded the spatial and temporal Environmental monitoring has greatly increased its spatial and temporal range with advancements in remote sensing and drone technology. As discussed in a recent study (Huda et al., 2024), satellite-based remote sensing provides the large-scale and high-resolution data necessary to monitor changes to the environment on a global scale, such as deforestation, urbanization, and climate variability. The use of satellite imagery also provides the ability to conduct continuous observations over time, which makes it useful for both long-term assessments of the environment and for developing policies related to the environment. For example, remote sensing has been widely used to monitor glaciers as they recede, as sea levels rise, and as patterns of land use change (Kumar & Mutanga, 2018). Understanding how changes in climate affect the environment is necessary for developing mitigation strategies. On the other hand, drone technology provides localized

and high-precision data collection capabilities. UAVs equipped with sensors can gather information from remote or hazardous areas, making them very helpful for monitoring air quality, surveilling forests, and tracking wildlife (Shahid et al., 2025). Drones have also become an integral part of disaster management by providing real-time images and damage assessments. There are numerous challenges facing both remote sensing technologies and drone technologies, including high operation costs, regulatory restrictions on their use, and the specialized training and expertise necessary for their operation.

Table 3: Impact of Technology on Environmental Monitoring Efficiency

Technology Used	Data Accuracy Improvement (%)	Monitoring Speed Improvement (%)	Cost Reduction (%)	Coverage Expansion (%)
Traditional Methods	0	0	0	0
IoT Systems	35	50	20	45
AI & Machine Learning	48	60	25	50
Remote Sensing	40	55	18	70
Drone Technology	45	65	22	60
Integrated Systems	60	75	30	80

Source: Jiang et al. (2021); Laha et al. (2022); Olawade (2024); UNEP (2023)

Integrated technological systems demonstrate the highest improvement across all performance indicators. AI and drone technologies significantly enhance monitoring speed, while remote sensing leads in geographical coverage.

7.4 Integrated Technological Frameworks and Implications for Sustainable Development

The study found that there is a notable trend in the convergence of various technologies to create environmental monitoring systems that use multiple engineering methods together to achieve a comprehensive monitoring solution. The integration of IoT, artificial intelligence, remote sensing and cloud-based computing has created high-performance and intelligent monitoring systems. These integrated systems allow for an efficient method of collecting, analysing and displaying information. For example, data is

collected by IoT sensors; the output of those sensors is processed and analysed by artificial intelligence and stored on a cloud server, making the data become readily accessible and easy to understand. This integrated method allows for better decision-making through the use of accurate, up-to-date data and predictions. The findings also indicated that by using integrated technologies, it increased the ability of all stakeholders, i.e., government agencies, researchers, and the general public, to coordinate on environmental issues more effectively. It supported policy-making based on evidence; it has assisted in improving compliance with regulations and provided transparency in environmental governance. From a sustainability standpoint, integrated technology systems will lead to increased efficiency in the management of resources; they will provide an efficient way to reduce pollution; and they will contribute to the effort of mitigating climate change. These integrated technology systems allow for proactive environmental management and assist in the achievement of sustainable development goals.

Many obstacles including data security concerns, interoperability, lack of standards, and high implementation costs are significant barriers to effective implementation. It is necessary to address these issues through strong policy support, infrastructure investment, and capacity building. In summary, the results demonstrate that technological advancement has transformed the collection and verification of data associated with environmental monitoring by improving the accuracy, efficiency, and predictability of WEM measurements. Moreover, the integration of advanced technologies will result in improved monitoring capabilities and will be essential to the long-term goal of sustainability of world resources.

7.5 CASE STUDIES

7.5.1 Smart Air Quality Monitoring System in Delhi

Delhi, one of the most polluted cities in the world, has implemented IoT-based air quality monitoring systems to address severe pollution levels. The deployment of real-time monitoring stations under the *National Air Quality Index (AQI)* framework has enabled continuous tracking of pollutants such as PM_{2.5}, PM₁₀, NO₂, and CO. These systems are integrated with cloud platforms and mobile applications, allowing both authorities and citizens to access real-time data. The use of advanced analytics and AI-based forecasting tools has further enhanced predictive capabilities, enabling early warnings and timely interventions such as traffic restrictions and construction bans (Jiang et al., 2021). As a result, there has been improved policy responsiveness and increased public awareness regarding air pollution. This case highlights how technology-driven monitoring systems can support urban environmental management and governance.

7.5.2 Satellite-Based Forest Monitoring by Food and Agriculture Organization

The Food and Agriculture Organization (FAO) has implemented satellite-based monitoring systems for tracking global forest cover through initiatives such as the Global Forest Resources Assessment. Using remote sensing technologies and geospatial data, FAO monitors deforestation, afforestation, and land-use changes across countries. These systems provide high-resolution, real-time data that support policymakers in designing conservation strategies and sustainable forest management practices (Huda et al., 2024). The integration of satellite imagery with AI-based analysis tools has improved the accuracy of forest assessments and enabled early detection of illegal logging activities. This case demonstrates the effectiveness of combining remote sensing and advanced analytics in large-scale environmental monitoring and highlights its role in achieving global sustainability goals.

8. DISCUSSION OF THE STUDY

Recent studies show that technological advances drastically change how we monitor the environment through the use of Internet of Things (IoT), artificial intelligence (AI), remote sensing, and droning systems. Specifically, it has moved from traditional/reactive methods of environmental monitoring to proactive methods of data-driven/predictive monitoring and expands all forms of environmental monitoring, providing the basis for stronger environmental governance and sustainability practices. Previous research verified IoT systems have improved the ability to collect real-time data and respond to environmental risks (Laha et al., 2022), while Ai has improved the availability of predictive analytics tools to create informed decisions (Olawade, 2024). Additionally, remote-detecting and droning-related technologies decreased the limitations of how much space can be remotely monitored and how effectively through existing infrastructure (Huda et al., 2024, Shahid et al., 2025). By integrating these technologies into one system, I assume that their combined effect will be much larger than that of any individual technology, making it possible to share information more efficiently and to enact evidence-based policy (Jiang et al., 2021). The study did acknowledge that there are still significant obstacles to implementing these technological advances, including, but not limited to, the high operational costs, inadequate expertise, data privacy concerns, and limited infrastructure – notably present in underdeveloped parts of the world (Gurbanova & Abdullayev, 2025). Technological adoption is not enough by itself; there needs to be an appropriate policy framework and the capacity to support the use of technologies. Therefore this paper highlights the fact that although technology is a key part of transforming the way we monitor our environment, effective application will require the use of technology to work strategically with stakeholders, overcoming technical and socio-economic barriers to achieve sustainable management of the environment.

9. CONCLUSION

According to the research findings, in recent years, technological innovations have become a more effective way to monitor environmental conditions than ever before; as a result, they are transforming how the world approaches environmental monitoring. Various technologies, including IoT (Internet of Things), artificial intelligence, remote sensing, and drones, have improved the collection, analysis, and interpretation of data related to the environment in real time. By providing more accurate data about current conditions and enabling better decision-making, these technologies have positively impacted environmental governance and sustainable resource management. Therefore, the research demonstrates that technology-based monitoring systems help solve some of the issues related to using traditional monitoring methods while also supporting a more predictive and preventative approach to addressing environmental issues. However, the research points out that there are several key challenges to overcome before we can expect widespread use of these new technologies. The major challenges include high cost; data security; a lack of technical skills; and the lack of basic infrastructure (for example, power lines, roads). Therefore, to achieve greater adoption of these technologies, it is critical to support policies, build capacity, and invest in technological infrastructure. This research highlights that when technology is strategically integrated within an environmental monitoring framework, it is critical in supporting long-term sustainability goals and effectively addressing the world's most pressing environmental challenges.

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