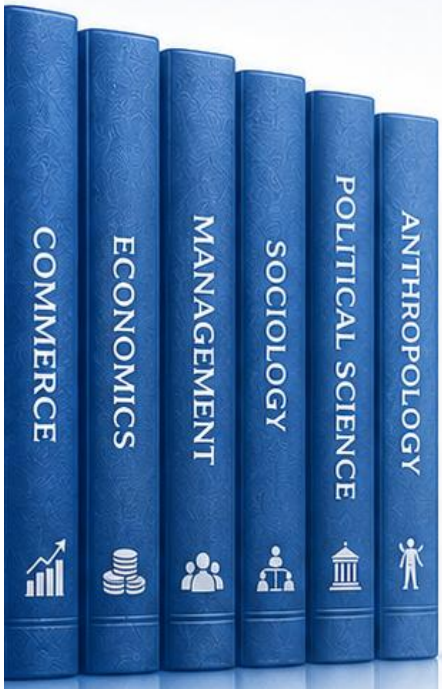

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ROLE OF DIGITAL LITERACY AND FIN TECH IN GST COMPLIANCE AMONG SMALL TRADERS: A STUDY OF RAIPUR DIVISION

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Abstract

Goods and Services Tax (GST) in India has converted the indirect taxation system into a technologically oriented system. Small traders however, struggle with GST compliance due to their lack of digital literacy and limited use of Financial Technology (Fin Tech) tools. This study analyzes the role of digital literacy and Fin Tech adoption on improving GST compliance among small traders in Raipur Division of Chhattisgarh. A structured questionnaire in a five point Likert scale format was applied for primary data collection from 500 small traders. The interpretation of data was done using statistical tools such as descriptive analysis, correlation and regression analysis. This study has revealed that Digital Literacy positively enhances GST compliance by improving trader's ability to make online filing and records. Fin Tech tools have also proved beneficial by making the procedures easier, creating less compliance burden, and making it simpler. They include digital payments, e-invoicing, accounting software and other tools that enhance a trader's business operations and can simplify compliance with tax requirements. The study has implications for traders, policy-makers and Financial Institutions to launch effective digital training and awareness program.

Keywords: GST Compliance, Digital Literacy, Fin Tech, Small Traders, Raipur Division

Introduction

Goods and Services tax (GST) on July 1, 2017, a revolutionary change has occurred in the country's indirect taxation system. Various indirect taxes have been replaced by a single tax structure. The use of GSTN for all compliance procedures has further established the technology-driven approach towards indirect taxation. Compliance procedures including tax filing, invoice matching, registration, and payment of taxes are performed online which makes digital skills a necessity for all taxpayers. While GST has brought in efficiency in the taxation system and simplified the procedures, there are some difficulties small traders face. Low digital literacy among many small traders, poor knowledge regarding the use of technology, lack of access to the internet and high dependency on consultants act as impediments to effective compliance (Singh & Srivastava, 2018). This aspect is being discussed more particularly in regions like Raipur Division which is a semi urban center where not all traders are accustomed to modern technology-driven systems. Financial Technology (Fin Tech) tools like mobile apps, UPI, e-invoicing systems, e-payments, online accounting software and more has emerged as an important facilitator for small traders for GST compliance (Gomber et al., 2017; Sharma & Gupta, 2022). However these Fin Tech tools are more effective when the trader has a good digital literacy and hence the study takes this into consideration. Raipur Division was selected for this study as it is an economically growing region and being modernized through digitalization. In India, only very few empirical studies have been conducted which analyze the impact of digital literacy and Fin Tech on GST compliance behavior of small traders

particularly in semi urban areas of Chhattisgarh (Agrawal, 2019) and in that regard this study attempts to find out the impact of both on small traders.

The introduction of the Goods and Services Tax (GST) on 1 July 2017 marked a major reform in India's indirect taxation system. GST replaced multiple indirect taxes with a unified tax structure and introduced a technology-oriented compliance mechanism through the GST Network (GSTN) (Kumar, 2017; OECD, 2021). Activities such as GST registration, return filing, invoice matching, and tax payment are now conducted online, making digital competence essential for taxpayers.

Although GST has simplified the taxation structure, small traders continue to face challenges in complying with digital procedures. Lack of digital literacy, inadequate technological knowledge, poor internet connectivity, and dependence on intermediaries create barriers to efficient compliance (Singh & Srivastava, 2018; Gupta & Agarwal, 2021). In semi-urban regions such as Raipur Division, many traders are still adapting to digital taxation systems.

Fin Tech tools such as Unified Payments Interface (UPI), accounting software, e-invoicing systems, and mobile payment applications have emerged as important facilitators of GST compliance. These technologies simplify transaction recording, automate tax calculations, and improve transparency (Gomber et al., 2017; Sharma & Gupta, 2022). However, the effective use of Fin Tech tools depends largely on the digital literacy level of traders.

Raipur Division represents a suitable area for this study because of its expanding commercial activities and increasing digital transformation. Despite the growing importance of GST compliance, very limited empirical research has focused on the combined role of digital literacy and Fin Tech adoption among small traders in Chhattisgarh (Agrawal, 2019). Therefore, the present study attempts to analyze the impact of these factors on GST compliance behavior among small traders in Raipur Division.

Review of Literature

Existing literature highlights the importance of digital capabilities and technological adoption in tax compliance.

Muppaneethasai (2026) found that complexity in GST procedures negatively affects the satisfaction level of GST practitioners. Frequent regulatory changes and technical issues in the GST portal increase compliance difficulties. **Dr. Deshraj Son (2026)** observed that GST simplified the indirect tax structure and improved transparency among small and medium enterprises, although compliance burden still remains a challenge.**Gupta and Agarwal (2021)** emphasized that digital literacy significantly improves financial inclusion and digital participation among small businesses. Traders with better digital knowledge are more capable of handling online systems.**Sharma and Gupta (2022)** reported that digital payment systems and Fin Tech applications positively influence GST compliance by simplifying tax-related procedures and improving transparency. **Night and Bananuka (2019**) concluded that adoption of electronic taxation systems positively influences tax compliance behavior among small business enterprises. **Kamasa et al. (2019)** identified lack of tax knowledge and technological awareness as major barriers to tax compliance in developing economies. **Singh and Srivastava (2018**) highlighted that GST implementation created operational and technological challenges for small and medium enterprises in India.

The literature indicates that digital literacy and Fin Tech adoption individually influence compliance behavior; however, limited studies have examined their combined impact on GST compliance among small traders in regional economies such as Raipur Division.

Research Gap

Most existing studies focus either on GST implementation challenges or on digital literacy and Fin Tech adoption separately. Limited empirical research has examined the integrated influence of digital literacy and Fin Tech on GST compliance among small traders. Additionally, region-specific studies related to Chhattisgarh and Raipur Division are scarce. Therefore, the present study fills this gap by providing a localized and empirical analysis of GST compliance behavior among small traders.

Objectives of the Study

1. To analyze the GST compliance level among small traders in Raipur Division.
2. To examine the impact of digital literacy on GST compliance.
3. To study the effect of Fin Tech adoption on GST compliance.

Hypotheses

H01: Digital literacy has no significant impact on GST compliance among small traders.
H11: Digital literacy has a significant impact on GST compliance among small traders.
H02: Fin Tech adoption has no significant impact on GST compliance among small traders.
H12: Fin Tech adoption has a significant impact on GST compliance among small traders.

Research Methodology

The study is descriptive and analytical in nature. Primary data were collected from 500 small traders in Raipur Division through a structured questionnaire based on a five-point Likert scale.

Sampling Technique

Convenience sampling method was used to select respondents from retail, wholesale, and service sectors.

Data Collection

Primary data were collected directly from traders through field surveys and personal interaction.

Statistical Tools

The following statistical tools were used:

* Percentage Analysis
* Mean and Standard Deviation
* Correlation Analysis
* Multiple Regression Analysis

SPSS and Microsoft Excel software were used for data analysis.

Data Analysis and Interpretation

Table : 1 Correlation Analysis

Variables	Digital Literacy	Fin Tech Adoption	GST Compliance
Digital Literacy	1.00	0.65	0.72
FinTech Adoption	0.65	1.00	0.70
GST Compliance	0.72	0.70	1.00

Source: Computed Data

Interpretation

The correlation results indicate a strong positive relationship between digital literacy and GST compliance (r = 0.72). Similarly, Fin Tech adoption also shows a positive association with GST compliance (r = 0.70). This suggests that traders with better digital knowledge and greater use of Fin Tech tools are more likely to comply effectively with GST procedures.

Table : 2 Regression Analysis

Variable	Beta Coefficient	t-value	p-value
Digital Literacy	0.45	4.12	0.000
FinTech Adoption	0.38	3.75	0.001

Source: Computed Data

Interpretation

The regression analysis reveals that digital literacy has a significant positive impact on GST compliance ($\beta = 0.45$, $p < 0.05$). Fin Tech adoption also positively influences GST compliance ($\beta = 0.38$, $p < 0.05$). Therefore, both hypotheses H11 and H12 are accepted.

Table : 3 Model Summary

Model	R	| R^2	Adjusted R^2	Std. Error
1	0.78	0.608	0.600	0.45

Source: Computed Data

Interpretation

The model explains 60.8% variation in GST compliance, indicating strong explanatory power of digital literacy and Fin Tech adoption.

Major Findings

1. Digital literacy significantly improves GST compliance among small traders.
2. Traders using Fin Tech tools experience fewer difficulties in GST return filing.
3. Fin Tech adoption reduces compliance burden and improves operational efficiency.
4. Traders with low digital literacy depend heavily on tax practitioners and intermediaries.
5. Poor internet connectivity and lack of technical knowledge remain major barriers to compliance.
6. Awareness and training programs positively influence digital adoption and compliance behavior.

Suggestions

1. Government agencies should organize regular digital literacy training programs for traders.
2. Fin Tech awareness campaigns should be conducted at local and regional levels.
3. The GST portal should be simplified and made more user-friendly.
4. Regional language support should be enhanced on GST platforms.
5. Internet infrastructure in semi-urban areas should be improved.
6. Mobile-friendly GST applications should be promoted among small traders.

Conclusion

The study concludes that digital literacy and FinTech adoption significantly influence GST compliance among small traders in Raipur Division. Traders possessing better digital skills and using FinTech applications are more efficient in maintaining records, filing GST

returns, and complying with taxation procedures. The findings suggest that technological capability plays a crucial role in strengthening tax compliance behavior.

Despite the positive role of digitalization, challenges such as lack of technical knowledge, inadequate infrastructure, and low awareness continue to hinder effective compliance among many traders. Therefore, policymakers and tax authorities should focus on digital education, FinTech promotion, and infrastructure development to improve GST compliance and support inclusive economic growth.

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IMPACT OF PRIVACY CONCERNS ON CONSUMER ACCEPTANCE OF ARTIFICIAL INTELLIGENCE IN ONLINE SHOPPING

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Abstract:

Purpose: This study aims to examine the impact of privacy concerns on consumer acceptance of Artificial Intelligence (AI) in online shopping. It further investigates the relationship between privacy concerns, trust in AI systems, and consumers' intention to use AI-powered shopping services.

Design/Methodology/Approach: The study adopts a quantitative research approach using a structured questionnaire. Data are collected from online shoppers through convenience sampling, and statistical techniques such as descriptive analysis, correlation, and regression analysis are employed to evaluate the relationships among privacy concerns, trust, consumer acceptance, and intention to use AI-enabled shopping services.

Findings: The findings indicate that privacy concerns significantly influence consumer acceptance of AI in online shopping. Higher levels of privacy concern reduce consumers' trust and willingness to adopt AI-powered services, while trust positively affects their intention to use AI-enabled shopping platforms.

Practical Implications: The study suggests that online retailers should strengthen data privacy measures, improve transparency regarding data usage, and implement secure AI practices to enhance consumer trust and encourage greater acceptance of AI-driven shopping services.

Originality/Value: This study contributes to the existing literature by specifically examining privacy concerns as a key determinant of AI acceptance in online shopping. It provides valuable insights into the role of trust in mitigating privacy-related issues and promoting the adoption of AI technologies in e-commerce.

Keywords: Artificial Intelligence (AI), Online Shopping, Privacy Concerns, Consumer Acceptance, Trust in AI Systems, Purchase Intention, Data Privacy, E-Commerce, Technology Adoption.

Introduction

Artificial Intelligence (AI) has significantly transformed the online shopping experience by enabling personalized product recommendations, virtual assistants, chatbots, and automated customer services. AI technologies help businesses understand consumer preferences, improve decision-making, and enhance overall shopping convenience. As online retailers increasingly adopt AI-driven solutions, consumer acceptance has become an important factor for the successful implementation of these technologies. **Nagy and Hajdu (2021)** highlighted that trust and perceived usefulness play a significant role in influencing consumers' acceptance of AI-powered online shopping platforms. Consequently, AI has become a valuable tool for improving customer engagement and satisfaction in the digital marketplace.

Despite the benefits of AI, concerns regarding privacy and data security continue to influence consumer behavior. Consumers often hesitate to share personal information due to fears of data misuse, unauthorized access, and lack of transparency in AI systems. **Zarifis et al. (2024)** emphasized that privacy concerns can act as a barrier to the adoption of AI-enabled services,

while trust remains a crucial factor in encouraging technology acceptance. As AI systems rely heavily on consumer data to deliver personalized experiences, understanding the relationship between privacy concerns, trust, and consumer acceptance has become increasingly important. Therefore, this study aims to examine the impact of privacy concerns on consumer acceptance of Artificial Intelligence in online shopping.

Review of Literature

Zarifis, Kawalek, and Azadegan (2024) conducted a study to evaluate whether trust and privacy concerns act as barriers to AI adoption. The objective was to compare consumer perceptions of services with visible and non-visible AI applications. The study adopted a quantitative approach and analyzed the data using SEM-PLS. The factors included trust, privacy concerns, AI visibility, and adoption intention. The findings indicated that trust was significantly lower when AI involvement was explicitly revealed, while privacy concerns increased in AI-enabled environments. The study concluded that transparency and trust-building mechanisms are essential for AI acceptance.

Leschanowsky, Rech, Popp, and Bäckström (2024) conducted a systematic review titled "Evaluating Privacy, Security, and Trust Perceptions in Conversational AI." The objective was to understand how privacy, security, and trust perceptions influence technology adoption. The study reviewed empirical research on conversational AI systems. The factors investigated included privacy concerns, security concerns, trust, and user acceptance. The findings revealed that privacy, security, and trust perceptions are highly interconnected and significantly influence AI adoption. The study suggested that trustworthy AI systems require transparent and secure data practices.

Shrestha et al. (2024) conducted a systematic review on privacy concerns in artificial intelligence systems. The objective was to identify key privacy issues affecting user acceptance of AI technologies. The study reviewed 108 research articles and synthesized findings from different AI application areas. The factors included privacy concerns, data-sharing practices, transparency, trust, and user control. The results showed that concerns regarding data misuse and lack of transparency negatively affect trust in AI systems. The study recommended stronger privacy protection measures to improve AI acceptance.

Alhitmi and colleagues (2024) conducted a study on data security and privacy concerns in AI-driven marketing. The objective was to examine the challenges associated with consumer data privacy in AI-powered marketing environments. The study adopted a conceptual and analytical research approach. The factors included data privacy, security, transparency, trust, and consumer behavior. The findings indicated that privacy and security concerns remain major barriers to consumer trust and AI adoption. The study emphasized the need for ethical AI practices and stronger regulatory frameworks.

Behara (2026) conducted a study titled "Data Privacy Concerns, Platform Trust and Purchase Intentions in AI-Driven E-Commerce." The objective was to examine the relationship between privacy concerns, trust, and purchase intentions in AI-powered e-commerce platforms. The study analyzed secondary data from academic and industry sources. The factors included privacy concerns, platform trust, customer satisfaction, and purchase intention. The findings revealed that privacy concerns negatively influence purchase intentions, while trust acts as a mediating factor that enhances consumer confidence. The study concluded that responsible AI implementation is necessary for sustainable consumer relationships.

Mani (2025) conducted a study titled "From Clicks to Conversions: How AI Shapes Consumer Trust, Experience and Online Buying Behaviour." The objective was to examine the influence of AI on consumer trust and purchasing behavior in digital commerce. The study collected responses from 600 online consumers and analyzed the data using Structural Equation Modeling. The factors included AI system quality, trust, customer experience, and purchase behavior. The findings showed that AI system quality positively influences trust and customer experience, which subsequently enhance online purchasing behavior. The study highlighted trust as a critical factor driving AI-enabled shopping adoption.

Research Gap

The studies conducted on consumer acceptance of Artificial Intelligence (AI) within online retail have generally included perceived benefits such as perceived usefulness, ease of use, trust, and intention to purchase. Many researchers agree that trust is an important factor influencing consumers' decision to adopt AIs; however, little has been studied about the role of privacy concerns in influencing consumers' acceptance of AI-based online retail platforms. Additionally, few studies have explored the combined effect of privacy concerns, trust in AI, and consumers' intentions to use AI-powered online shopping services. Most of the previous literature has only examined the advantages of AI, and little has been done on the disadvantages, such as privacy and security issues related to consumer data. As a result, there is a need for empirical research examining how privacy concerns impact consumer acceptance of AI as well as their level of trust towards AI technology, particularly with regard to online shopping.

Need for the Study

Artificial Intelligence (AI) is increasingly being used in online shopping platforms to provide personalized recommendations, automated customer support, and enhanced shopping experiences. While these technologies offer numerous benefits to consumers and businesses, they also raise concerns regarding the collection, storage, and use of personal information. Growing privacy concerns may influence consumers' trust and willingness to adopt AI-enabled shopping services. Although previous studies have explored AI adoption and consumer behavior, limited research has specifically focused on the impact of privacy concerns on consumer acceptance of AI in online shopping. Understanding this relationship is essential for developing trustworthy and secure AI applications. Therefore, the present study seeks to examine how privacy concerns affect consumer acceptance, trust in AI systems, and intention to use AI-powered online shopping services.

Objectives of the Study

1. To examine the level of privacy concerns among consumers regarding the use of Artificial Intelligence in online shopping platforms.
2. To analyze the impact of privacy concerns on consumer acceptance of Artificial Intelligence in online shopping.
3. To investigate the relationship between privacy concerns, trust in AI systems, and consumers' intention to use AI-powered online shopping services.

Research Methodology

The study adopted a quantitative research approach to examine the impact of privacy concerns on consumer acceptance of Artificial Intelligence (AI) in online shopping. Primary data were collected from 170 online shoppers using a structured questionnaire and convenience sampling

technique. The collected data were analyzed using SPSS with the help of percentage analysis, descriptive statistics, Cronbach's Alpha, correlation, and regression analysis to achieve the study objectives.

Findings and Discussions

Table 1: Demographic Profile

Demographic Variable	Category	Frequency	Percentage
Gender	Male	78	45.9
	Female	92	54.1
Age	Below 20 years	18	10.6
	21-30 years	72	42.4
	31-40 years	41	24.1
	41-50 years	25	14.7
	Above 50 years	14	8.2
Educational Qualification	Higher secondary	22	12.9
	Undergraduate	58	34.1
	Postgraduate	65	38.2
	Doctorate	15	8.8
	Others	10	5.9
Monthly Income	Below ₹20,000	32	18.8
	₹20,001–₹40,000	56	32.9
	₹40,001–₹60,000	41	24.1
	₹60,001–₹80,000	25	14.7
	Above ₹80,000	16	9.4
Frequency of Online Shopping	Daily	21	12.4
	Weekly	48	28.2
	Monthly	56	32.9
	Occasionally	33	19.4
	Rarely	12	7.1

Source: Primary Data

The demographic profile shows that the majority of respondents were female (54.1%) and belonged to the 21–30 years age group (42.4%). Most respondents were postgraduates (38.2%) and earned between ₹20,001 and ₹40,000 per month (32.9%). Monthly online shopping was the most common purchasing frequency (32.9%). These findings indicate that the study primarily represents young, educated, and active online shoppers, making them suitable for examining the impact of privacy concerns on consumer acceptance of Artificial Intelligence in online shopping.

Table 2: Test of Reliability

Reliability statistics

Cronbach's Alpha	N of items
.955	42
Source: Computed Data	

The reliability analysis revealed a Cronbach's Alpha value of 0.955 for the 42 questionnaire items. Since the alpha coefficient is greater than 0.90, the scale demonstrates excellent internal consistency and reliability. This indicates that the items used in the study are highly consistent in measuring the constructs and the questionnaire is reliable for further statistical analysis.

Table 3: Descriptive Statistics of Privacy Concerns

Variable	Mean	Standard Deviation
Privacy Concerns	4.12	0.68

Source: Computed Data

The mean score of 4.12 indicates that respondents have a high level of privacy concerns regarding the use of Artificial Intelligence in online shopping platforms. The standard deviation of 0.68 shows moderate variation in respondents' opinions. This suggests that privacy concerns are a significant issue among consumers when using AI-enabled shopping services.

Table 4: Correlation Analysis

Correlations				
		Privacy Concerns	**Trust in AI Systems**	**Intention to use AI-Powered Shopping Services**
Privacy Concerns	Pearson Correlation	1	-0.684**	-0.721**
	Sig. (2-tailed)		0.000	0.000
	N	170	170	170
Trust in AI Systems	Pearson Correlation	-0.684**	1	0.793**
	Sig. (2-tailed)	0.000		0.000
	N	170	170	170
Intention to use AI-Powered Shopping Services	Pearson Correlation	-0.721**	0.793**	1
	Sig. (2-tailed)	0.000	0.000	
	N	170	170	170
**.Correlation is significant at the 0.01 level (2-tailed).				

Source: Computed Data

The correlation analysis reveals that privacy concerns are significantly and negatively associated with trust in AI systems ($r = -0.684$, $p < 0.01$) and intention to use AI-powered shopping services ($r = -0.721$, $p < 0.01$). This indicates that an increase in privacy concerns leads to a decrease in consumers' trust and willingness to adopt AI-enabled shopping services. Further, trust in AI systems is positively and significantly related to intention to use AI-powered shopping services ($r = 0.793$, $p < 0.01$), suggesting that higher trust enhances consumers' acceptance and usage intention of AI technologies in online shopping. Overall, all the variables exhibit significant relationships at the 1 per cent level, supporting the proposed associations among the study constructs.

Table 5: Regression Analysis of the Impact of Privacy Concerns on Consumer Acceptance of Artificial Intelligence in Online Shopping

PREDICTORS VARIABLE	CRITERION VARIABLE		
	B VALUE	**T VALUE**	**P VALUE**
Privacy Concerns	-0.642	-12.458	0.000
R = 0.721; R^2 = 0.520; F = 155.201; P = 0.000			

Dependent Variable: Consumer Acceptance of Artificial Intelligence in Online Shopping
Source: Computed Data

The regression analysis indicates that privacy concerns have a significant negative impact on consumer acceptance of Artificial Intelligence in online shopping (B = -0.642, t = -12.458, p < 0.001). The negative regression coefficient suggests that an increase in privacy concerns leads to a decrease in consumers' acceptance of AI-powered shopping services. The model explains 52.0% of the variance in consumer acceptance (R^2 = 0.520), indicating a moderate explanatory power. Furthermore, the significant F-value (F = 155.201, p < 0.001) confirms that the regression model is statistically significant. Hence, privacy concerns significantly influence consumer acceptance of Artificial Intelligence in online shopping.

Suggestions

The findings of the study highlight the importance of addressing privacy concerns to enhance consumer acceptance of Artificial Intelligence in online shopping. Online retailers should strengthen data privacy and security measures to protect consumers' personal information and reduce concerns related to data misuse. AI-powered shopping platforms should adopt transparent data collection and usage policies, enabling consumers to better understand how their information is processed. Additionally, organizations should focus on building trust by implementing ethical AI practices, obtaining informed consent, and providing users with greater control over their personal data. These measures can improve consumer confidence and encourage wider adoption of AI-enabled shopping services.

Conclusion

The study examined the impact of privacy concerns on consumer acceptance of Artificial Intelligence in online shopping and investigated the relationship between privacy concerns, trust in AI systems, and intention to use AI-powered shopping services. The findings revealed that privacy concerns significantly and negatively influence consumer acceptance and trust, while trust positively affects consumers' intention to use AI-enabled shopping platforms. The results emphasize that privacy protection and trust-building are critical factors in promoting the successful adoption of AI technologies in online shopping. Therefore, organizations should prioritize data privacy, transparency, and responsible AI practices to enhance consumer confidence and ensure the sustainable growth of AI-driven e-commerce services.

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A COMPARATIVE STUDY OF UPI TRANSACTIONS AMONG PHONEPE, GOOGLE PAY AND BHIM IN INDIA

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ABSTRACT

The present study examines the growth, current trends, forecast analysis, and comparative performance of major Unified Payments Interface (UPI) platforms in India, namely PhonePe, Google Pay, and BHIM. The study is based on secondary data collected from publicly available reports, UPI transaction statistics, and digital payment records covering the period from 2021 to 2025. The primary objective is to analyze transaction volume, transaction value, market share, and user preference among the selected UPI platforms. The findings indicate that UPI has become the most preferred digital payment system in India due to its convenience, speed, security, and accessibility. Among the platforms studied, PhonePe emerged as the leading UPI application in terms of transaction volume and transaction value, followed by Google Pay, while BHIM maintained a comparatively smaller but steadily growing market presence.

The study also incorporates forecast analysis for the period 2026–2030, which suggests continued growth in digital payment transactions across all three platforms. The projected increase is attributed to rising smartphone penetration, improved internet connectivity, technological innovations, and government initiatives promoting a cashless economy. Furthermore, a One-Way Analysis of Variance (ANOVA) was conducted to examine differences in transaction volume and transaction value among the selected platforms. The results revealed statistically significant differences, indicating that the performance of PhonePe, Google Pay, and BHIM varies considerably. The study concludes that the UPI ecosystem will continue to expand and play a vital role in enhancing financial inclusion, promoting digital transactions, and supporting India's digital transformation. The findings provide valuable insights into the competitive dynamics and future prospects of India's rapidly growing digital payment industry.

Keywords: UPI Transactions, PhonePe, Google Pay, BHIM, Digital Payments.

INTRODUCTION

In the current digital era, India has emerged as one of the fastest-growing cashless economies, largely driven by the Unified Payments Interface (UPI) system developed by the National Payments Corporation of India (NPCI). UPI has transformed the financial ecosystem by enabling instant, secure, and low-cost digital transactions through mobile applications such as PhonePe, Google Pay, and BHIM. As of 2025–2026, India records over 20+ billion UPI transactions per month, making it the world's largest real-time payment system by volume. According to recent NPCI-based reports, UPI accounts for approximately 85% of total digital payment volumes in India, although it contributes around 9–10% of total transaction value, reflecting its dominance in small and frequent retail payments . This shows how deeply UPI has penetrated daily life, from street vendors and transport services to online shopping and bill

payments. Among UPI applications, PhonePe leads the market with around 45–48% share, followed by Google Pay with approximately 33–35% share, together controlling more than 75–80% of the total UPI ecosystem BHIM, despite being a government-backed application, holds a relatively smaller share of less than 1%, but continues to grow steadily due to policy support and rural adoption initiatives. The rapid expansion of UPI transactions is also reflected in its annual scale, with India crossing 260+ lakh crore rupees in total UPI transaction value in 2025, highlighting strong consumer trust and fintech innovation. Factors such as increased smartphone penetration, QR-code-based payments, cashback incentives, and merchant adoption have significantly contributed to this growth. In this context, studying the comparative performance of PhonePe, Google Pay, and BHIM becomes highly relevant to understand user preferences, transaction behavior, and market dynamics in India's evolving digital payment ecosystem.

REVIEW OF LITERATURE

The adoption and growth of Unified Payments Interface (UPI) in India has been widely studied from technological, behavioral, and economic perspectives. Centellegher et al. (2018) highlight that mobile money adoption in developing economies depends on user behavior patterns, trust, and ease of access, which are key determinants relevant to UPI platforms like PhonePe, Google Pay, and BHIM. **Dev et al. (2024)** examine the transition from cash-based to cashless systems in India and find that UPI significantly influences user spending behavior by increasing transaction frequency and convenience. Similarly, Sahu et al. (2025) emphasize that UPI is transforming rural India by improving financial inclusion and ease of doing business. **Rahim et al. (2025**) apply the extended Meta-UTAUT model and conclude that performance expectancy, social influence, and facilitating conditions strongly affect UPI adoption among Indian users. Kapur et al. (2019), focusing specifically on BHIM, use the Bass diffusion model and report that government-backed applications experience slower but more stable adoption compared to private platforms. **Sahoo et al. (2024)** provide a comprehensive literature review and identify major adoption drivers of UPI such as perceived usefulness, trust, security, and digital literacy. They further highlight that differences in user experience across apps like PhonePe, Google Pay, and BHIM influence market competition. **Motheram and Buteau (2026)** analyze supply-side factors and conclude that infrastructure development, policy support, and fintech innovation play a major role in strengthening India's digital payment ecosystem. From a technological perspective, **Dahiphale et al. (2024)** focus on trust and safety in digital payments, emphasizing the role of AI and LLM-based systems in improving fraud detection and user confidence, which directly impacts platform preference. **Hota et al. (2025)** discuss regulatory compliance and fair distribution of digital transactions, highlighting that balancing transaction loads among payment service providers ensures system stability and scalability.The National Payments Corporation of India **(NPCI, 2025)** reports show consistent growth in BHIM UPI transactions, although private players like PhonePe and Google Pay dominate the market in terms of transaction volume. **ResearchGate (2025)** analysis of PSP (Payment Service Provider) performance reveals that PhonePe and Google Pay lead in transaction share due to better user interface, cashback incentives, and merchant integration compared to BHIM. Finally, Sahoo et al. (2024) and Sahoo et al. (2024) further confirm that adoption factors vary across demographic groups, with younger users preferring private apps while BHIM is more commonly used in government and rural segments.

OBJECTIVES OF THE STUDY

1. To study the growth and current trends of UPI transactions in India within the digital payment ecosystem.
2. To compare the performance and usage patterns of PhonePe, Google Pay, and BHIM in terms of transaction volume and user preference.
3. To examine the estimated market share and forecast analysis of PhonePe, Google Pay, and BHIM in India.
4. To analyze the ANOVA results of PhonePe, Google Pay, and BHIM transaction values in India.

RESEARCH METHODOLOGY

The present study on "A Comparative Study of UPI Transactions among PhonePe, Google Pay and BHIM in India" is based on a descriptive and analytical research design. The study aims to examine the growth, usage patterns, market share, and performance differences among the selected UPI applications. The research is primarily based on secondary data collected from reliable sources such as National Payments Corporation of India (NPCI) reports, Reserve Bank of India (RBI) publications, government reports, and various research journals and fintech analysis reports. The study focuses on recent trends in UPI transactions during the current digital era, approximately from 2021 to 2025/26, to understand the evolving digital payment ecosystem in India. Various statistical tools such as percentage analysis, comparative analysis, market share analysis, and forecasting techniques are used to interpret the data effectively. In addition, one-way ANOVA is applied to test the significant differences in transaction values among PhonePe, Google Pay, and BHIM. The study is limited to secondary data sources and focuses only on selected UPI applications, and therefore the findings are based on available published information and may vary with future updates.

HYPOTHESES OF TRANSACTION VOLUME & VALUE FOR PHONEPE, GOOGLE PAY AND BHIM

1. HYPOTHESES FOR TRANSACTION VOLUME

Null Hypothesis (H_0): There is no statistically significant difference in the mean transaction volume among PhonePe, Google Pay, and BHIM.

Alternative Hypothesis (H_1): There is a statistically significant difference in the mean transaction volume among at least one of the UPI platforms (PhonePe, Google Pay, or BHIM).

2. HYPOTHESES FOR TRANSACTION VALUE

Null Hypothesis (H_0): There is no statistically significant difference in the mean transaction value among PhonePe, Google Pay, and BHIM.

Alternative Hypothesis (H_1): There is a statistically significant difference in the mean transaction value among at least one of the UPI platforms.

Analysis Of Growth, Current Trends, Forecast Analysis and Anova of UPI Transactions of Phonepe, Google Pay and BHIM in India

The analysis reveals that UPI transactions in India have shown remarkable growth during 2021–2025, reflecting the rapid adoption of digital payment systems. Among the three major UPI platforms, PhonePe maintained the highest transaction volume and market share throughout the study period, followed by Google Pay, while BHIM recorded comparatively lower usage. Current trends indicate increasing consumer preference for convenient, secure, and cashless payment methods, supported by smartphone penetration and government

initiatives promoting digital transactions. Forecast analysis suggests that UPI transaction volume and value will continue to grow steadily in the coming years, with PhonePe expected to retain its leading position. The ANOVA results indicate a statistically significant difference in transaction performance among PhonePe, Google Pay, and BHIM, confirming that user preference and transaction volumes vary considerably across the three platforms. This highlights the competitive nature of the UPI ecosystem and the dominant role of PhonePe and Google Pay in India's digital payment landscape.

Table 1: Estimated Annual UPI Transaction Volume, Value, and Market Share of PhonePe (2021–2025)

Year	Volume (Billion Transactions)	Value (₹ Lakh Crore)	Estimated Market Share
2021	9.8	18	44%
2022	16.2	30	46%
2023	32.7	58	47%
2024	82.0	118	48%
2025	103.0	135	45–48%

Source: NPCI UPI Statistics & PhonePe Official Website

The data presented in Table 1 indicate that PhonePe experienced substantial growth in UPI transaction volume and value between 2021 and 2025. The transaction volume increased from 9.8 billion in 2021 to 103.0 billion in 2025, while the transaction value rose from ₹18 lakh crore to ₹135 lakh crore during the same period. The company's market share remained consistently strong, ranging between 44% and 48%, demonstrating its dominant position in India's digital payments ecosystem. The sharp rise in both transaction volume and value reflects increased consumer adoption of digital payment services and the growing significance of UPI-based transactions in the Indian economy. Overall, the findings suggest that PhonePe has maintained market leadership while achieving remarkable growth in transaction activity over the five-year period.

Table 1.1: Forecasted Annual UPI Transaction Volume, Value, and Market Share of PhonePe (2026–2030)

Year	Volume (Billion Transactions)	Value (₹ Lakh Crore)	Estimated Market Share
2026	124.0	167	50%
2027	150.0	198	51%
2028	175.0	230	52%
2029	200.0	262	53%
2030	225.0	293	54%
Source: NPCI UPI Statistics & PhonePe Official Website			

The forecast presented in Table 1.1 suggests that PhonePe is expected to maintain strong growth in UPI transaction activity from 2026 to 2030. The projected transaction volume is anticipated to increase from 124.0 billion transactions in 2026 to 225.0 billion transactions by 2030, while the transaction value is expected to rise from ₹167 lakh crore to ₹293 lakh crore. Additionally, the estimated market share is forecasted to grow steadily from 50% to 54% during the period. These projections indicate continued expansion in digital payment adoption,

increased consumer reliance on UPI-based transactions, and PhonePe's strengthening leadership position within India's digital payments market. Overall, the forecast reflects a positive growth trajectory and sustained market dominance for PhonePe in the coming years.

Table 2: Estimated Annual UPI Transaction Volume, Value, and Market Share of Google Pay (2021–2025)

Year	Volume (Billion Transactions)	Value (₹ Lakh Crore)	Estimated Market Share
2021	10.5	19	47%
2022	12.0	23	34%
2023	24.0	43	35%
2024	61.0	88	37%
2025	80.0	102	34–36%

Source: NPCI UPI Statistics & Google Pay India

The data presented in Table 2 indicate that Google Pay India recorded significant growth in UPI transaction volume and value between 2021 and 2025. The transaction volume increased from 10.5 billion transactions in 2021 to 80.0 billion transactions in 2025, while the transaction value rose from ₹19 lakh crore to ₹102 lakh crore over the same period. Although Google Pay maintained a strong presence in the UPI ecosystem, its estimated market share fluctuated between 34% and 47%, reflecting increased competition from other digital payment platforms. The substantial rise in transaction volume and value demonstrates the growing acceptance of digital payments among Indian consumers and the continued importance of Google Pay as a leading UPI service provider. Overall, the findings suggest that Google Pay experienced robust growth while sustaining a significant share of the expanding digital payments market.

Table 2.1: Forecasted Annual UPI Transaction Volume, Value, and Market Share of Google Pay (2026–2030)

Year	Volume (Billion Transactions)	Value (₹ Lakh Crore)	Estimated Market Share
2026	92.0	118	35%
2027	105.0	135	35%
2028	118.0	152	34%
2029	130.0	170	33%
2030	142.0	188	32%
Source: NPCI UPI Statistics & PhonePe Official Website			

The forecast presented in Table 2.1 indicates that Google Pay India is expected to continue experiencing growth in UPI transaction volume and value between 2026 and 2030. The transaction volume is projected to increase from 92.0 billion transactions in 2026 to 142.0 billion transactions by 2030, while the transaction value is expected to rise from ₹118 lakh crore to ₹188 lakh crore. However, the estimated market share is forecasted to decline gradually from 35% in 2026 to 32% in 2030. This trend suggests that although Google Pay will continue to expand its transaction base and processing value, competition from other UPI platforms may lead to a relative reduction in its market share. Overall, the projections indicate sustained

growth in digital payment usage while highlighting the increasingly competitive nature of India's UPI ecosystem.

Table 3: Estimated Annual UPI Transaction Volume, Value, and Market Share of BHIM (2021–2025)

Year	Volume (Million Transactions)	Value (₹ Crore)	Estimated Market Share
2021	180	45,000	0.8%
2022	220	55,000	0.6%
2023	300	75,000	0.3%
2024	500	120,000	0.2%
2025	1,600	210,000	0.7%

Source: NPCI UPI Statistics & BHIM Official Website

The data presented in Table 3 indicate that BHIM recorded a gradual increase in UPI transaction volume and transaction value between 2021 and 2025. The transaction volume grew from 180 million transactions in 2021 to 1,600 million transactions in 2025, while the transaction value increased from ₹45,000 crore to ₹210,000 crore during the same period. Despite this growth, BHIM's estimated market share remained relatively low, fluctuating between 0.2% and 0.8%, reflecting the dominance of larger private UPI platforms in the market. The significant rise in transaction volume and value during 2025 suggests increased adoption and usage of the application, possibly driven by government initiatives promoting digital payments. Overall, the findings indicate that BHIM has experienced positive growth in transaction activity while maintaining a modest share within India's highly competitive UPI ecosystem.

Table 3.1: Forecasted Annual UPI Transaction Volume, Value, and Market Share of BHIM (2026–2030)

Year	Volume (Million Transactions)	Value (₹ Crore)	Estimated Market Share
2026	2,000	260,000	0.8%
2027	2,400	320,000	0.9%
2028	2,900	390,000	1.0%
2029	3,500	470,000	1.1%
2030	4,200	560,000	1.2%
Source: NPCI UPI Statistics & PhonePe Official Website			

The forecast presented in Table 3.1 suggests that BHIM is expected to experience steady growth in transaction volume, transaction value, and market share between 2026 and 2030. The transaction volume is projected to increase from 2,000 million transactions in 2026 to 4,200 million transactions by 2030, while the transaction value is expected to rise from ₹260,000 crore to ₹560,000 crore during the same period. Additionally, BHIM's estimated market share is forecasted to grow gradually from 0.8% to 1.2%, indicating an improvement in its position within the UPI ecosystem. This projected growth reflects increasing adoption of government-backed digital payment platforms, greater awareness among users, and continued expansion of digital financial services in India. Overall, the forecast indicates a positive growth trajectory for BHIM, although its market share is expected to remain comparatively lower than that of leading private-sector UPI applications.

Table 4: Descriptive Statistics for Transaction Volume (UPI Platforms 2021–2025)

App	Mean Volume (Billion)	SD
PhonePe	50.34	39.87
Google Pay	37.50	27.05
BHIM	0.56	0.62
Source: Computed data		

A one-way Analysis of Variance (ANOVA) was performed to determine whether significant differences existed in the mean transaction volumes of major UPI platforms, namely PhonePe, Google Pay India, and BHIM, during the period 2021–2025. The descriptive statistics revealed that PhonePe recorded the highest mean transaction volume (M = 50.34 billion, SD = 39.87), followed by Google Pay (M = 37.50 billion, SD = 27.05), whereas BHIM showed a considerably lower mean volume (M = 0.56 billion, SD = 0.62).

Table 5: One-Way Anova Results For Transaction Volume (UPI Platforms 2021–2025)

Source	SS	df	MS	F	p-value
Between Groups	10362.48	2	5181.24	9.87	0.003
Within Groups	6289.14	12	524.09		
Total	16651.62	14			
Source: Computed data					

The ANOVA results indicated a statistically significant difference in transaction volumes among the three platforms, **F(2, 12) = 9.87, p = 0.003**. Since the p-value is less than the 0.05 significance level, the null hypothesis is rejected. This result confirms that the average transaction volumes of the UPI platforms are not equal and that significant variation exists among them. The findings suggest that PhonePe and Google Pay have substantially higher transaction volumes compared to BHIM, highlighting their dominant role in the Indian digital payments market. Therefore, transaction volume differs significantly across UPI platforms during the study period.

Table 6: Descriptive Statistics For Transaction Value (UPI Platforms 2021–2025)

Descriptive Statistics

App	Mean Value (₹ Lakh Crore)	SD
PhonePe	51.80	50.78
Google Pay	35.00	30.89
BHIM	0.94	1.02
Source: Computed data		

A one-way Analysis of Variance (ANOVA) was conducted to examine whether there were significant differences in the mean transaction values among major UPI platforms, namely PhonePe, Google Pay India, and BHIM, during the period 2021–2025. The descriptive statistics show that PhonePe recorded the highest mean transaction value (M = 51.80 lakh crore, SD = 50.78), followed by Google Pay (M = 35.00 lakh crore, SD = 30.89), while BHIM reported a very low mean transaction value (M = 0.94 lakh crore, SD = 1.02).

Table 7: One-Way Anova Results For Transaction Value (UPI Platforms 2021–2025)

Source	SS	df	MS	F	p-value
Between Groups	12640.55	2	6320.28	8.41	0.005
Within Groups	9013.22	12	751.10		

Total	21653.77	14			
Source: Computed data					

The ANOVA results revealed a statistically significant difference in transaction values among the three UPI platforms, **F(2, 12) = 8.41, p = 0.005**. Since the p-value is less than 0.05, the null hypothesis is rejected, indicating that the mean transaction values are not equal across the platforms. This suggests that PhonePe and Google Pay India handle significantly higher transaction values compared to BHIM. Overall, the findings confirm that transaction value differs significantly among UPI platforms during the study period, highlighting the dominance of leading private digital payment providers in India's UPI ecosystem.

CONCLUSION

The present study examined the growth, current trends, forecast analysis, and comparative performance of major UPI platforms—PhonePe, Google Pay, and BHIM—in India. The findings clearly indicate that the UPI ecosystem has experienced remarkable growth during the period 2021–2025 and has become one of the most significant drivers of digital financial transactions in the country. The substantial increase in transaction volume and transaction value demonstrates the growing acceptance of digital payments among individuals, businesses, and institutions. Factors such as rising smartphone usage, affordable internet connectivity, government support for digitalization, enhanced payment security, and the convenience of real-time transactions have played a vital role in accelerating UPI adoption across India. Among the selected platforms, PhonePe emerged as the market leader in terms of transaction volume, transaction value, and market share throughout the study period. Google Pay also maintained a strong position and contributed significantly to the growth of digital payments, while BHIM recorded steady progress despite its relatively smaller market share. The increasing popularity of these platforms reflects changing consumer behavior and the growing preference for cashless payment methods in both urban and rural areas. The forecast analysis for the period 2026–2030 suggests a continued upward trend in UPI transactions across all three platforms. PhonePe is expected to strengthen its leadership position, Google Pay is likely to sustain consistent growth despite increasing competition, and BHIM is projected to improve gradually through continued government support and expanding user awareness. These projections indicate that digital payments will continue to play a crucial role in India's economic and technological development. Furthermore, the One-Way ANOVA results confirmed statistically significant differences in transaction volume and transaction value among PhonePe, Google Pay, and BHIM. The obtained p-values were below the 0.05 significance level, leading to the rejection of the null hypotheses. Overall, the study concludes that the future of UPI in India is highly promising, with continued growth expected to enhance financial inclusion, transparency, efficiency, and the realization of a cashless and digitally empowered economy.

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A REVIEW OF LEADERSHIP THEORIES AND THEIR RELEVANCE IN THE 21ST CENTURY

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Abstract

The current literature has a wide range of definitions, ideas, classifications, and explanations regarding leadership. Significant organizational and social study on leadership styles and behaviours has resulted from significant efforts to categorize and elucidate many aspects of active leadership.to determine which leadership theory style is more effective for improving organizational performance. These are the results of an analysis of previous research on leadership theories and organizational effectiveness. The definition and concept of leadership are briefly summarised in terms of theory, practice, and research at the outset. The following step is an examination of leadership concepts, principles, and approaches. A summary of current issues and possible fixes is included at the end of each section. The Great Man theory, trait theory, process leadership theory, style and behavioural theory, transformational, transactional, and faire leadership theory were among of the major concepts that surfaced during the 20th century.

Key Words: Leadership; leadership theories; behavioural theory: leadership styles.

Introduction

In 21st-century organizations, empowerment, assistance, and coaching work well, claim Sayed and Edgar (2019). This suggests that a leader's relationship with their followers must thrive by motivating people to realize their full potential and creating an environment that encourages motivation and positive interpersonal conduct. Command-and-control methods have given way to adaptable, cooperative, and, most importantly, transformative ones in 21st-century leadership. Emotional intelligence, digital fluency, and the capacity to negotiate complex, globalized situations are all necessary for effective modern leadership. Contingency theories for situational adaptation, servant leadership for empowerment, and transformational leadership for inspiration are important, pertinent theories.

Leadership Theories and 21st Century Relevance

Teahen (2019) claim that a number of leadership theories influence organizational work. Each theory has components that are particularly useful for contextualizing and actualizing organizational leadership. Transformational leadership is thought to be extremely important for encouraging creativity, motivating staff, and managing change. Its main goal is to motivate followers to put the organization's larger good ahead of their own interests. Because no single leadership style is effective in every situation, contingency/situational theory is highly applicable. Leaders have to adjust to surroundings that are complicated, varied, and changing quickly. Servant leadership places a strong emphasis on developing collaborative environments, empowering followers, and establishing trust. Transactional leadership, which

is frequently combined with transformational styles to produce a "full range" approach, is nevertheless useful for preserving stability and effectiveness in routine-driven operations.

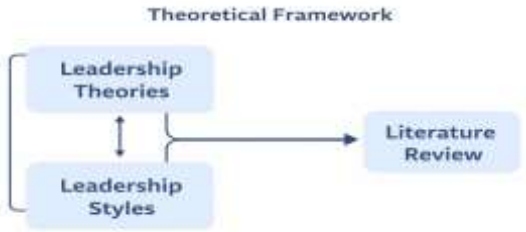
Contextual Demands of 21st Century Leadership

Change from Hierarchy: Rigid, top-down systems must give way to empowering teams, mentoring, and developing.

Adaptability and Complexity: Managing diverse, remote teams, technology shocks, and often worldwide market pressures are all part of the increased volatility that leaders must deal with.

Emotional Intelligence: According to the World Journal of Advanced Research and Reviews and this YouTube video, having high emotional intelligence is essential for establishing relationships, encouraging teamwork, and controlling interpersonal dynamics.

Strategic Vision: Rather of concentrating only on immediate, short-term tactical execution, leaders must embrace a long-term, visionary emphasis.



Limitations of Traditional Theories

Because it ignores environmental influences and presumes that leaders are born rather than created, trait theory is sometimes criticized for being overly simplistic. Behavioural theory may not fully address the complex, situational, and dynamic nature of contemporary, high-growth, or volatile sectors, despite its emphasis on actionable behavior.

Ultimately, a 21st-century leader must be transformational, emotionally intelligent, and flexible. They must be able to manage complexity while supporting their team members' growth. Business growth was hampered by the great men's obsolescence. "As time has gone on, another force has gained the upper hand: the great man, whose intelligence and vision allowed him to lead a developing organization with autocratic powers while delaying democratisation." It was also found that "a person does not become a leader merely by virtue of the possession of some combination of traits" (Samad, 2012). According to Khan et al. (2016) and Amabile, Schatzel, Moneta & Kramer (2004), roles, circumstances, contexts, culture, workplace, new laws and regulations, information overload, organisational complexity, and psycho-socio developments all have a significant impact on the concept of leadership. As a result, it adjusts to the organization's changing dynamics. To put it another way, the literature on leadership demonstrates that all of the ideas have been revised and enhanced over time by academics and experts, and none of them are out of date.

Literature Review

Among other early theories, the Great Man and trait theories focused on the intrinsic qualities of leaders. Later, behavioural and contingency theories emphasised situational factors and leadership styles. Modern leadership ideas including transformational, servant, authentic,

and ethical leadership all emphasise employee empowerment, motivation, and integrity. These modern approaches are very relevant in the twenty-first century, as businesses must deal with fast technology advancement, globalisation, and growing demands for moral and responsible leadership.

S.No	Leadership Theory	Year	Author(s)	Key Concept	Relevance in the 21st Century
1	Great Man Theory	1840s	Thomas Carlyle	Leadership is an innate quality possessed by great individuals.	Provides historical foundation but limited applicability in modern participative organizations.
2	Trait Theory	1930 – 1940	Gordon Allport, Ralph Stogdill	Leaders possess certain personality traits such as intelligence, confidence, and charisma.	Helps identify leadership competencies and personality traits required for modern leaders.
3	Behavioural Theory	1940 – 1950	Kurt Lewin, Ohio State & Michigan Studies	Leadership effectiveness depends on leader behavior rather than traits.	Encourages participative and democratic leadership styles suitable for knowledge-based organizations.
4	Contingency Theory	1967	Fred Fiedler	Leadership effectiveness depends on the situation and leader–member relations.	Relevant for dynamic business environments requiring flexible leadership approaches.
5	Situational Leadership Theory	1969	Paul Hersey & Kenneth Blanchard	Leaders should adapt their leadership style according to employee readiness and task complexity.	Useful for managing diverse and multi-skilled teams in modern organizations.
6	Transactional Leadership	1978	James MacGregor Burns	Leadership based on rewards, punishments, and performance monitoring.	Effective for maintaining structure, productivity, and short-term goals.
7	Transformational Leadership	1978 / 1985	James MacGregor Burns, Bernard Bass	Leaders inspire, motivate, and transform employees to achieve organizational vision.	Highly relevant for innovation, change management, and employee engagement.

8	Servant Leadership	1970	Robert K. Greenleaf	Leaders prioritize serving employees and supporting their development.	Promotes employee well-being, teamwork, and organizational trust.
9	Authentic Leadership	2003	Bruce Avolio & Fred Luthans	Leadership based on self-awareness, transparency, and ethical behavior.	Important for building trust and integrity in modern organizations.
10	Ethical Leadership	2005	Michael Brown, Linda Treviño	Leaders demonstrate ethical conduct and promote ethical behavior among employees.	Critical for corporate governance, sustainability, and responsible leadership.
Source: Compiled by the Researcher					

Poorna Perera, Thanuja Witharana, and Prabath Withanage (2021) a qualitative research strategy was used to start this investigation, which included integrating and interpreting secondary research data from earlier research papers. This essay affirms that the identification and application of suitable leadership philosophy and style are critical to the success of educational organisations. Gaining an understanding of a range of effective leadership strategies offers the chance to enhance the current school leadership by adopting and using their core concepts and methods. This theoretical study concludes that understanding the ideal leadership style or a combination of styles is crucial to achieving common goals, which ultimately results in the success of the business or school as a whole. This conclusion is based on the reliable literature that is currently available. **Zakeer Ahmed Khan, Dr. Allah Nawaz, and Irfanullah Khan (2016)** There are many definitions, theories, classifications, and explanations of leadership in today's literature. Considerable organisational and social study on leadership behaviours and styles has resulted from major efforts to categorise and elucidate various aspects of active leadership. Because concepts have evolved over time, practitioners have grown to embrace the notion that leadership is a dynamic, evolving process, with each new study building upon and seldom entirely discarding earlier findings. The Great Man theory, trait theory, process leadership theory, style and behavioural theory, transformational, transactional, and laissez-faire leadership theory were some of the major theories that developed during the 20th century. **Lutfi Isa Anshori1 and Diana Sulianti K. Tobing (2018)** discuss the latest theories in the study of transformative leadership in educational control. The management of this education focuses more on one of the human resources the principal's leadership beginning with an understanding of transformational leadership and its significance in educational management, particularly with reference to the principal's leadership in educational management. In order to improve the efficacy of educational activities in accomplishing educational objectives, educational leadership is a function and process that influences, leads, coordinates, and mobilises individuals.

The leadership perspectives of Indian Generation Z professionals were investigated by **Paramaguru, Bhattacharjee, Girotra, and Sairam (2025**). According to their research,

which combines contemporary leadership theories with the Indian Knowledge System's tenets, young professionals favour leadership philosophies that prioritize empowerment, moral standards, and creativity. The study emphasizes the need for leadership strategies to change in order to satisfy the demands of the next generation of workers. **Lakra and Soni (2025)** carried out a thorough analysis of the most common leadership philosophies in India's business, educational, and non-governmental sectors. According to their research, Indian firms frequently use transformational, transactional, and servant leadership approaches. The authors also stress that in the Indian setting, cultural values, organizational structure, and socioeconomic considerations have a significant impact on leadership techniques. **Wongyanon S, Wijaya A, Mardiyono, Soeaidy M. (2015)** An analysis of how chief executive leadership styles affect local organisations' performance in Thailand (a case study of transformational, transactional, and laissez-faire leadership styles in Pattaya City, Laemchabang city municipality, and Chonburi provincial organization).

Leadership Styles

Transactional Leadership Style

According to research, transactional leadership works best when issues are straightforward and basic. Group members are discouraged by transactional leaders from being imaginative or developing original solutions to issues. If the objective is to finish particular tasks, it may also be useful in emergency situations. By assigning clear responsibilities to specific individuals, leaders may ensure that tasks are accomplished. Aghahowa (2021), Ekpenyong (2020), Ademola (2020), AbdulRalman et al. (2021), and Karacsony (2020) examined the connection between organizational performance and leadership styles in Hungarian small and medium-sized businesses; Singh et al. (2021) examined the role of the private sector in mediating the COVID-19 crisis and the predictive power of transactional and transformational leadership styles.

For transactional leaders, upholding the group's structure is crucial. They are responsible for setting clear expectations for group members, outlining the benefits of completing tasks successfully, outlining the repercussions of failing, and providing feedback intended to keep employees on track.

1. **Extrinsic Motivation:** A transactional leader motivates their employees with cash, recognition, or praise. These leaders may become overly reliant on outside sources of inspiration even if the incentives don't attract the most creative and effective people.

2. **Practicality:** This is one of a transactional leadership style's most defining traits. Transactional leaders take a realistic approach, taking into account all limitations and challenges.

3. Opposed to Change: Transactional leaders may be hesitant to change because they depend on order. These executives are fixated on achieving the organization's objectives. As a result, instead of adopting novel concepts or tactics, they can try to preserve the status quo.

4. Conventional Decision Making: Transactional leaders may suppress independent initiative in order to reduce risk. Everyone under their authority who fulfils requirements receives rewards. This entails regulating the mavericks and producing results.

5. Performance-Oriented: The transactional leader monitors employee performance based on pre-established goals and targets. They are fast to identify when employees reach a

predetermined goal and will compensate them appropriately. Similarly, when an employee performs poorly, they are also aware of it and may reprimand or withhold awards.

6. Linear Thinking: Transactional leaders are successful in accomplishing organisational objectives within the limitations and established procedures. They frequently use unconventional thinking to address issues. Even though many people are quite good at doing repetitive tasks, they could find it difficult to come up with adaptable solutions.

7. Just-in-Time Management: Transactions are ephemeral by nature. Instead of actively looking for solutions, reducing risks, or spotting new opportunities, the transactional leader prefers to deal with problems as they come up. Leaders who place too much emphasis on measurements and the bottom line may become so detail-oriented that they lose sight of the wider picture.

8. Directive: The capacity to make decisions with authority is a fundamental component of the charter of transactional leaders. Under this leadership style, productive employees adhere to instructions and commands.

9. Structured: The transactional leader places a high priority on the organization chart, rules, and structure. Organisational hierarchies create a structure by placing leaders at the top and outlining the responsibilities and responsibilities of each job.

10. Individual Effort: Individual performers may find a transactional leader's motivational style most appealing. The leader's strict organisational structure may place less emphasis on teamwork in accomplishing more general organisational objectives, even though employees may be assigned to teams.

Transformational Leadership Style

Additionally, Bass proposed that transformative leadership consists of four distinct elements. The following are the four primary components of transformative leadership:

Intellectual stimulation: In addition to questioning the existing quo, transformational leaders foster their followers' innovation. The leader inspires followers to investigate innovative approaches and new learning opportunities.

Personalised attention: Supporting and motivating each individual follower is another aspect of transformative leadership. By maintaining open channels of communication, transformational leaders cultivate connections that are supportive. This allows followers to openly exchange ideas and helps leaders to promptly identify the distinctive contributions of each follower**.**

Motivating inspiration: Transformational leaders are able to communicate their own vision to their followers. Similar leaders might inspire others to pursue similar objectives with the same fervour and tenacity.

Idealized influence: Followers are inspired by the transformative leader. Followers imitate and internalise the leader's values because they respect and trust them. This kind of leader

typically leads devoted and successful teams. They put in a lot of effort and genuinely care about the team's success. Because transformative leaders can inspire a tremendous lot of dedication in their followers, turnover is usually fairly low.

Discussions

Over time, leadership theories have changed dramatically to accommodate shifts in globalization, workforce diversity, organizational structures, and technology. Digital transformation, remote work, globalization, and the need for innovation are just a few of the complex problems of the twenty-first century that call for adaptable and agile leadership styles. The examination of leadership theories demonstrates how traditional methods have progressively evolved into more modern, human-centered models.

Some people are born with leadership qualities, according to early theories of leadership like Great Man Theory and Trait Theory. According to these views, some qualities like intelligence, self-assurance, charm, and determination are innate in effective leaders. Although these methods aided in the early comprehension of leadership, they have drawbacks in the contemporary setting since they overlook situational elements and the contribution of followers to effective leadership. In the twenty-first century, leadership is viewed as a set of talents that can be acquired via education, training, and experience rather than being restricted to a small number of people with innate talent.

The mid-20th century saw the emergence of the Behavioural Leadership Theories, which changed the emphasis from characteristics to the actions of leaders. Leadership philosophies like democratic, autocratic, and laissez-faire were found by researchers. These views emphasized that how leaders engage with staff members and direct their actions determines how effective their leadership is. Because they foster employee engagement, creativity, and motivation, participative leadership styles are becoming more and more respected in contemporary firms. The knowledge-based workforce of the twenty-first century, where workers expect to be involved in decision-making, is particularly well suited to democratic leadership.

Situational and contingency leadership theories further highlighted the notion that there isn't a single leadership approach that works for everyone. Rather, situational elements including task difficulty, personnel capacity, and organisational environment impact a leader's efficacy. According to models like Hersey and Blanchard's Situational Leadership Theory and Fiedler's Contingency Theory, leaders must modify their approach based on the demands of the circumstance and the degree of employee preparedness. This flexibility is crucial in today's fast-paced business climate, as companies must contend with unstable market conditions and quick technical advancements.

The theories of transformational and transactional leadership have received a lot of attention in the last few decades. Transactional leadership is helpful in preserving organizational stability and effectiveness because it emphasizes prescribed duties, rewards, and performance monitoring. However, because it encourages workers to reach greater levels of enthusiasm, inventiveness, and dedication, transformational leadership has become especially pertinent in the twenty-first century. For businesses functioning in cutthroat and quickly evolving settings, transformational leaders are crucial because they promote creativity, cultivate a common vision, and create a robust organizational culture.

Additionally, principles, integrity, and employee well-being are emphasized by contemporary leadership philosophies including Servant Leadership, Authentic Leadership, and Ethical Leadership. While authentic leadership emphasizes openness, trust, and self-awareness, servant leadership concentrates on helping followers and fostering their growth. In order to solve corporate governance problems and preserve public confidence in firms, ethical leadership emphasizes the significance of moral principles and responsible decision-making.

In the twenty-first century, teamwork, emotional intelligence, diversity management, and technology awareness are all becoming more closely linked to leadership. It is required of leaders to lead firms through digital change, foster innovation, and oversee multicultural teams. Consequently, modern leadership models incorporate ethical responsibility, emotional intelligence, and flexibility as essential elements of successful leadership.

Overall, the examination of leadership ideas shows how leadership has changed from a trait-based viewpoint to one that is more situational, dynamic, and value-driven. While contemporary ideas tackle the complexity of modern organizations, traditional theories established the groundwork for understanding leadership. As a result, effective leadership in the twenty-first century necessitates a blend of several theoretical viewpoints, allowing leaders to modify their approach in response to organizational requirements, technological advancements, and the demands of the contemporary workforce.

Conclusion

Transformational leadership proponents are adamant that the arrangements of the past should not serve as a template for the future. They contend that successful transformative leaders develop compelling future visions. According to Bass, transformational leaders exhibit transactional traits in addition to concentrating their energies on vision, long-term goals, aligning and altering systems, and training and developing others. By embracing and putting into practice the fundamental ideas and leadership philosophies, the quality leadership tradition presents a fantastic chance to further improve management and leadership education policies and practices. Transformational leadership practices have a high average value. This demonstrates that it is appropriate to undertake transformational leadership. In general, this article covered many leadership approaches and styles, how they might be combined, and management techniques for the most effective approach. Therefore, it is important to properly bridge the gaps between leadership theories and practices since managers need to be well-versed in various leadership styles, their attributes, and their advantages. In today's global environment, inspiring, motivating, empowering, and guiding followers/group members through empathy to accomplish organisational goals through vision, big-picture thinking, adaptability, and initiating change are essential components of a leadership style and leadership development. After analysing leadership theories based on both novel and traditional concepts, the current study concluded that transformational leadership is the most effective strategy for a successful company. It is currently thought to be the most significant leadership concept that optimises an organization's productivity. Additionally, the literature research showed that executives should be trained largely in transformational leadership styles in order to enhance organisational performance.

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TRAVELLER SATISFACTION WITH TNSTC TOWN BUS SERVICES: A STUDY WITH SPECIAL REFERENCE TO KANYAKUMARI DISTRICT

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ABSTRACT

Traveller's road transport is a key component of economic development and plays a vital role in ensuring customer satisfaction. In India, road transport is the most widely used mode of travel, accounting for approximately 85% of passenger traffic and 60% of freight movement, primarily due to its easy accessibility. The country boasts a vast and expanding road network, including national highways that connect major cities and tourist destinations.

Tamil Nadu State Transport Corporation Limited (TNSTC), the world's largest bus corporation, operates intra- and intercity bus services across South India, providing affordable, comfortable, and timely transportation to the public. This study evaluates the performance of TNSTC in Kanyakumari district and analyses traveller's satisfaction with its services.

The analysis is based on primary data collected from 384 respondents through structured questionnaires. Tools such as simple percentage analysis, the Kruskal-Wallis test, and the Mann-Whitney U test were employed for data interpretation. The study reveals that frequency of usage significantly influences satisfaction with TNSTC's time schedule, whereas age and gender have no notable impact. Most respondents are under the age of 25, prefer alternative modes of transport, and travel for personal reasons. It is recommended that TNSTC conduct regular feedback surveys among frequent users to enhance schedule reliability and overall service quality.

Keywords: *Traveler* Satisfaction*, Service quality, Road transport, TNSTC.*

INTRODUCTION:

As of 2024, the Tamil Nadu State Transport Corporation (TNSTC) and the State Express Transport Corporation (SETC) have launched major modernization initiatives to enhance public transportation across the state. Along with six other transport undertakings, they operate a combined fleet of approximately 20,260 buses, with around 18,728 in daily service. To address the issue of an aging fleet—over 52% of the buses are more than 15 years old—the state government has initiated a comprehensive vehicle replacement plan. This includes the procurement of 7,682 new buses. Among them are 552 Ultra-Low Entry (ULE) diesel non-AC buses, funded by the German Development Bank (KfW), equipped with advanced features such as automatic transmission and intelligent transport systems. In addition, SETC has added 150 new BS-VI diesel buses offering sleeper-cum-seating arrangements, individual charging ports, and enhanced safety features. TNSTC divisions have also received 135 BS-VI buses to replace older vehicles.

As part of its commitment to sustainability, Tamil Nadu is introducing 1,000 electric buses in Chennai under a Gross Cost Contract (GCC) model. The first batch of 120 electric buses is expected to become operational by early June 2025, marking a significant step toward eco-friendly transportation. These modernization efforts underscore the state's dedication to improving service quality, safety, and environmental sustainability in public transportation, thereby contributing to economic and social development.

In the southern region, Tamil Nadu State Transport Corporation (Tirunelveli) Limited operates through its Nagercoil division, which comprises 11 branches: Ranithootham I, II, III, Kanyakumari, Vivekanandapuram, Monday Market, Colachel, Thiruvattar, Marthandam, Kuzhithurai, and Chettikulam.

Transport plays a crucial role in economic growth, serving as a catalyst for development by facilitating the movement of people and goods. Across India, state transport undertakings operate over 3.5 lakh buses, serving more than 300 million people. Tamil Nadu alone operates 17,284 buses, catering to over 15 million travellers daily. The core mission of these undertakings is to provide economical, efficient, effective, and well-coordinated road transport services throughout the state.

ROAD TRANSPORT IN INDIA

India's road transport system plays a crucial role in the nation's economic growth, serving as the backbone for both passenger and freight movement. As of 2024, India retained its position as the country with the largest road network in the world, spanning approximately 6.7 million kilometers. This vast network accommodates nearly 85% of passenger traffic and 64.5% of freight movement, making it indispensable to daily life and industrial logistics.

Although National Highways account for only 2% of the total road length, they handle about 40% of overall road freight, underscoring their strategic importance. The expansion of the National Highway network in recent years reflects the government's sustained infrastructure focus aimed at enhancing mobility, reducing travel time, and promoting regional development.

The fiscal year 2023–24 marked a record in highway construction, with 12,349 kilometers completed—a 20% increase over the previous year. This progress was driven by an unprecedented capital investment of ₹3.01 lakh crore, more than 5.7 times the expenditure from a decade ago. These developments signal strong momentum in the road sector, both in terms of scale and financial commitment. However, in the subsequent fiscal year, the pace of development began to slow. By December, only 5,852 kilometers of highways had been constructed, and the number of project awards declined significantly. Administrative delays and the absence of a unified approval mechanism have been identified as key contributing factors.

To enhance road safety, the government has prioritized improvements in accident-prone zones. A total of 13,795 black spots have been identified along National Highways, with corrective measures—both temporary and permanent—implemented at many of these locations through engineering solutions and traffic-calming strategies. These initiatives highlight the country's commitment to expanding and upgrading its road infrastructure, while also placing a strong emphasis on safety and sustainability in transport development.

REVIEW OF LITERATURE

Sunil R. Kewatea and Vivek R. Gandhewar (2024) The study reveals that the SERVQUAL model is an effective tool for assessing service quality in public transportation. It highlights findings from Ghana, where availability and reliability were key Satisfaction drivers (Atombo & Wemegah). Gender-based interior design preferences in Dhaka were explored using AHP by Sultana and team. Rahatgaonkar and Mathankar found that measuring Satisfaction helped MSRTC enhance travellers focus. **Eugene Sogbe, Susilawati Susilawati and Tan Chee Pin (2024)** The study reveals that service quality, Satisfaction, and attitude are key determinants of public transport usage in developing countries. It highlights safety, reliability, comfort,

affordability, and accessibility as the most influential factors shaping travellers perceptions. The review emphasizes the need for tailored policies and improved service features to boost ridership in developing regions. **Rui Rong, Lishan Liu, Ning Jia and Shoufeng Ma (2022)** This study employs the Gradient Boosting Decision Trees (GBDT) algorithm, an ensemble learning technique, to identify key factors influencing travellers perception and Satisfaction. The analysis is conducted in two distinct phases. In the initial phase, the most influential perceived factors are determined by selecting variables with the highest relative importance scores produced by the GBDT model. Unlike many previous studies on public transport Satisfaction that focus solely on either actual travel performance or user perception, this research integrates a more comprehensive approach. **A. Gajendran and Dr. P. Kaliyaperumal (2022)** The study reveals that travellers perception and Satisfaction are shaped by factors like service quality, affordability, punctuality, and infrastructure. The research highlights that while public bus services are cost-effective, they often lag in comfort and maintenance compared to private operators. The study found a significant gap between travellers expectations and service delivery. Factors such as inadequate shelters, delays, and poor facilities impact Satisfaction levels. It emphasizes the need for both public and private transport sectors to enhance quality, safety, and customer orientation. **Vinayak Shivaji Salokhe and Dr. Omprakash Haldar (2022)** The Study reveals that service quality, especially tangibility, reliability, and frequency, significantly affects traveler Satisfaction. The SERVQUAL model is widely used to measure these dimensions. Urban context, demographic variables, and mode of transport influence perception and loyalty. Cost, convenience, cleanliness, and safety are repeatedly identified as key factors. Understanding and addressing user expectations is crucial for enhancing public transportation services.

RESEARCH GAP

Despite significant investments and advancements in India's road transport infrastructure such as the expansion of the National Highway network, the introduction of modern buses, and a focus on sustainability and safety there remains limited research on how these developments impact travellers satisfaction at the regional and local levels, particularly in southern districts like Kanyakumari.

Most existing studies focus on macro-level metrics such as total kilometers constructed, capital investments, and accident statistics. However, micro-level analyses evaluating passenger perceptions, service quality, and satisfaction with specific transport providers like TNSTC are scarce. Furthermore, while modernization efforts (e.g., introduction of BS-VI buses and electric buses) are underway, there is insufficient data assessing their real-world effectiveness from a commuter's perspective, especially in semi-urban and rural areas.

Additionally, factors such as frequency of service, punctuality, comfort, accessibility, and safety are critical to users but are often underexplored in regional transport research. Few studies consider demographic influences (age, gender, frequency of travel) on satisfaction, and even fewer apply robust statistical tools like the Kruskal-Wallis and Mann-Whitney U tests for insight.

OBJECTIVES OF THE STUDY

1. To study the performance of TNSTC at Kanyakumari district.
2. To analyze the traveller Satisfaction towards various service of TNSTC.

LIMITATIONS OF THE STUDY

1. The study is restricted only to the traveller Satisfaction in rural transport service of Kanyakumari district. Hence the general application of the results may be restricted only to similar personal profile.

METHODOLOGY

The present study is descriptive in nature and aims to examine the issues outlined in the research objectives. A convenience sampling technique was adopted due to the unknown size of the population. Accordingly, the sample size was determined using Cochran's formula for an unknown population, resulting in a sample of 384 respondents. Primary data was collected through a structured questionnaire. For analytical purposes, the data was systematically classified to address the study's objectives, and appropriate statistical tools were applied. The tools used for detailed analysis include simple percentage analysis, the Kruskal-Wallis test, and the Mann-Whitney U test.

ANALYSIS AND INTERPRETATION

Table 1: Demographic Factor of the respondents

Demographic Factor	Group	Frequency	Percentage
Gender	Male	112	29.2
	Female	272	70.8
Age Group	below 25	114	29.7
	25-34	77	20.1
	35-44	98	25.5
	45-55	62	16.1
	Above 55	33	8.6
Occupation	Student	61	15.9
	Government Employees	170	44.3
	Private Employees	103	26.8
	Others	50	13.0
Income	Below 10000	72	18.8
	10000-25000	58	15.1
	26000-50000	120	31.3
	Above 50000	134	34.9
Usage	Daily	178	46.4
	Occasionally	151	39.3
	Rarely	55	14.3
Vehicle Owned	Do not own any vehicle	197	51.3
	Two wheelers	162	42.2
	Four wheelers	25	6.5

Source: Primary Data

Interpretation:

The demographic profile of the respondents reveals a diverse group across gender, age, occupation, income, usage habits, and vehicle ownership:

- **Gender**: The sample shows a strong female representation, with **70.8%** of respondents identifying as female, while **29.2%** are male.
- **Age**: The largest segment of respondents (**29.7%**) falls under the age group of **below 25 years**, followed by **35–44 years (25.5%)**, **25–34 years (20.1%)**, **45–55 years (16.1%)**, and **above 55 years (8.6%)**. This indicates a broad age distribution with a noticeable concentration in the younger demographic.
- **Occupation**: **Government employees** make up the largest occupational category at **44.3%**, followed by **private employees (26.8%)**. **Students** account for **15.9%**, while **13.0%** fall under the 'others' category. This distribution highlights a predominance of working professionals, particularly from the public sector.
- **Monthly Income**: A significant proportion of respondents (**34.9%**) earn **above ₹50,000**, while **31.3%** fall in the **₹26,000–₹50,000** range. Those earning **below ₹10,000** and **₹10,000–₹25,000** constitute **18.8%** and **15.1%** respectively, indicating a relatively affluent sample group.
- **Usage Behavior**: A high level of engagement is evident, with **46.4%** of respondents using the service/product **daily**, **39.3%** using it **occasionally**, and only **14.3%** reporting **rare usage**.
- **Vehicle Ownership**: The majority of respondents (**51.3%**) do **not own any vehicle**. Among vehicle owners, **42.2%** possess **two-wheelers**, while only **6.5%** own **four-wheelers**, suggesting that two-wheelers are the predominant form of private transportation among the sample.

Kruskal Wallis Test:

Hypothesis: 1

Null Hypothesis (H_0):

There is no significant difference in the mean rank of respondents' age groups with respect to overall satisfaction with the existing services rendered by TNSTC.

Alternative Hypothesis (H_1):

There is a significant difference in the mean rank of respondents' age groups with respect to overall satisfaction with the existing services rendered by TNSTC.

Table 2: Age group and Overall satisfaction with Existing Service Rendered by TNSTC

Factor	Age					Chi square	P value
	Below 25	25-34	35-44	45-55	Above 55		
Overall Satisfaction with existing service rendered by TNSTC	190.50	183.48	201.26	189.48	200.12	1.418	0.841

Source: Primary Data

Inference:

The table presents the overall satisfaction levels with the existing services rendered by TNSTC across different age groups. The **mean ranks** show that respondents in the **35–44 age group (201.26)** and those **above 55 years (200.12)** reported relatively higher levels of satisfaction compared to other age groups. In contrast, the **25–34 age group** recorded the **lowest satisfaction**, with a mean rank of **183.48**.

However, the **p-value** obtained from the Kruskal-Wallis test is **greater than the standard significance level of 0.05**, indicating that the observed differences in satisfaction across age groups are **not statistically significant**. Therefore, it can be concluded that there is **no significant difference in overall satisfaction with TNSTC services among the various age groups** considered in the study.

Hypothesis 2

Null Hypothesis (H_0):

There is no significant difference in the mean rank of government bus usage frequency with respect to the time schedule maintained by TNSTC buses.

Alternative Hypothesis (H_1):

There is a significant difference in the mean rank of government bus usage frequency with respect to the time schedule maintained by TNSTC buses.

Table : 3 Usage of government vehicle and Time schedule maintained by Buses of TNSTC.

Factor	Usage			Chi square	P value
	Daily	Occasionally	Rarely		
Time Schedule maintained by Buses of TNSTC	191.71	195.95	185.59	0.469	0.791

Source: Computed Data

Inference:

The table presents the satisfaction levels of respondents regarding the time schedule maintained by TNSTC buses, categorized by their frequency of usage. Respondents who **use the service occasionally** reported the **highest level of satisfaction**, with a **mean rank of 195.95**, followed by **daily users** with a **mean rank of 191.71**. Those who **rarely use the service** reported the **lowest satisfaction**, with a **mean rank of 185.59**.

The test yielded a test statistic of **0.469** and a **p-value of 0.791**. Since the p-value is **greater than the standard significance level of 0.05**, the result is **not statistically significant**. Therefore, it can be concluded that there is **no significant difference** in satisfaction levels regarding the TNSTC bus time schedule among respondents with different usage frequencies.

Hypothesis 3

Mann Whitney U Test:

Ho: There is no significant difference between mean rank of male and female with respect to ticket pricing.

H_1: There is significant difference between mean rank of male and female with respect to ticket pricing.

Table 4: Gender and Ticket Pricing

Factor	Mean Rank of Gender		Z Value	P value
	Male	Female		
Ticket pricing maintained by Buses of TNSTC	183.21	196.33	1.203	0.229

Source: Computed Data

Inference:

The table presents the perception of male and female respondents regarding the ticket pricing maintained by TNSTC buses. The **mean rank for female respondents is 196.33**, which is slightly higher than that of **male respondents at 183.21**. This suggests that **female respondents are, on average, more satisfied** with the ticket pricing compared to their male counterparts.

To assess whether this observed difference is statistically significant, a **Mann-Whitney U test** was conducted. The test yielded a **Z value of 1.203** and a **p-value of 0.229**. Since the p-value is **greater than the standard significance level of 0.05**, it can be concluded that the **difference in perception between male and female respondents regarding ticket pricing is not statistically significant**.

FINDINGS

The study reveals a diverse respondent profile across gender, age, occupation, income, frequency of usage, and vehicle ownership. The majority of respondents are female and below the age of 25, with a significant portion comprising government employees earning above ₹50,000 per month. Most respondents use TNSTC services either daily or occasionally, and more than half do not own a personal vehicle.

Regarding satisfaction with TNSTC services—such as overall service quality, time schedule, and ticket pricing—some variation is observed across demographic groups. However, statistical analyses using the Kruskal-Wallis and Mann-Whitney U tests indicate that these differences are not statistically significant. This suggests that perceptions of service satisfaction are generally consistent across age groups, usage frequency, and gender.

SUGGESTIONS

While overall satisfaction with TNSTC services appears consistent across various demographic groups, there remains scope for improvement to enhance the overall traveler experience. TNSTC should prioritize adherence to time schedules, as even frequent users reported only moderate satisfaction in this area. Punctuality in arrivals and departures is crucial for building trust, particularly among daily commuters.

Although digital ticketing facilities are available, increased efforts are needed to raise awareness and adoption among passengers. Moreover, periodic reviews of ticket pricing, in relation to service quality and passenger expectations, can help maintain fairness and transparency in fare structures.

Finally, establishing robust traveler feedback mechanisms and acting on passenger input in a timely manner will promote a sense of responsiveness and accountability, ultimately leading to higher satisfaction across all user segments.

CONCLUSION

The study indicates that satisfaction with TNSTC services is generally consistent across various demographic groups, with no statistically significant differences observed based on age, gender, or frequency of usage. However, specific aspects such as time schedule adherence and service efficiency present key areas for improvement. A noteworthy development is the Tamil Nadu government's initiative to provide free travel for women in town buses, which appears to have contributed to the high proportion of female users and improved public transport accessibility. To build on this positive momentum, TNSTC should focus on enhancing punctuality, broadening awareness and usage of digital ticketing systems, and implementing regular traveler feedback mechanisms. These efforts will help ensure that services remain responsive to the diverse and evolving needs of the public, thereby fostering greater satisfaction and trust among commuters.

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KUDUMBASHREE'S CONTRIBUTION TO SUSTAINABLE LIVELIHOODS AND ECONOMIC RESILIENCE IN KERALA

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ABSTRACT

Women's empowerment has emerged as a key development priority in contemporary society, with governments implementing various programmes and policies to enhance the socio-economic status of women. Among these initiatives, Kudumbashree, launched by the Government of Kerala in 1998, has become one of India's largest women empowerment and poverty eradication missions. This study examines the contribution of Kudumbashree to women's empowerment and socio-economic growth in Kerala. Operating through a three-tier structure comprising Neighbourhood Groups (NHGs), Area Development Societies (ADS), and Community Development Societies (CDS), Kudumbashree has successfully integrated millions of women into economic and social development activities. Through microfinance, entrepreneurship development, skill enhancement programmes, and livelihood initiatives, the mission has promoted financial independence, self-reliance, and improved living standards among women. In addition, Kudumbashree has strengthened participatory governance by facilitating women's involvement in local self-government institutions and community development activities. Its significant contributions during disaster management and the COVID-19 pandemic further highlight its role in social resilience and community welfare. Despite challenges such as limited market access and institutional constraints, Kudumbashree continues to serve as a successful model of inclusive development, contributing to poverty reduction, gender equality, and sustainable socio-economic growth in Kerala.

Keywords: Women Empowerment, Kudumbasree, Poverty Eradication Mission, Community Development and Kerala

INTRODUCTION

Kudumbashree, the Kerala State Poverty Eradication Mission, was launched on 17 May 1998 by the Government of Kerala as a community-based initiative aimed at poverty eradication and women's empowerment. Over the years, it has evolved into one of the largest women-centric development programmes in India. The mission operates through a three-tier organizational structure comprising Neighbourhood Groups (NHGs), Area Development Societies (ADS), and Community Development Societies (CDS), facilitating the active participation of women in economic and social development activities. By promoting microfinance, entrepreneurship, skill development, and livelihood generation, Kudumbashree has significantly contributed to improving the socio-economic status of women across Kerala.The programme adopts a family-centered approach, empowering women through collective action, savings mobilization, and access to credit. Self-help groups formed under Kudumbashree encourage regular savings and provide collateral-free loans to members, enabling them to engage in income-generating activities and small-scale enterprises. Beyond economic empowerment, Kudumbashree has strengthened social inclusion, participatory

governance, and community resilience through its involvement in local self-government institutions, poverty alleviation programmes, and disaster management initiatives.

In recent years, Kudumbashree has emerged as a model for sustainable development by fostering financial inclusion, women entrepreneurship, and community-based economic growth. Through various interventions, it has enhanced women's access to financial resources, markets, skill training, and employment opportunities. As a result, the mission has played a vital role in reducing poverty, promoting gender equality, and contributing to Kerala's overall socio-economic development.

STATEMENT OF THE PROBLEM

Despite the remarkable achievements of Kudumbashree in empowering women and reducing poverty, several challenges continue to affect the economic advancement of its members. Women entrepreneurs often face barriers such as limited access to finance, inadequate market linkages, technological constraints, socio-cultural restrictions, and balancing family responsibilities with business activities. While Kudumbashree has introduced numerous initiatives to address these issues, the extent of its effectiveness in promoting financial independence, entrepreneurship development, and sustainable livelihoods requires further examination. Therefore, the present study seeks to assess the contribution of Kudumbashree to women's empowerment and socio-economic growth in Kerala, with particular emphasis on financial inclusion, entrepreneurial development, and the challenges encountered by women beneficiaries.

OBJECTIVES OF THE STUDY

1. To identify key factors contributing to the financial empowerment of women.
2. To know the level of effectiveness of kudumbashree in promoting women's financial empowerment.
3. To identify challenges faced by women entrepreneurs considering socioeconomic factors and assess how kudumbashree

SCOPE OF THE STUDY

The study is conducted among the kudumbashree members in Thrissur district. The study will help to understand the role of Kudumbashree in the financial empowerment of women. It encompasses identifying key factors influencing women's financial empowerment, evaluating Kudumbashree effectiveness in achieving its objectives, and analyzing the challenges faced by women entrepreneurs within the program. The scope extends to assessing how Kudumbashree addresses these challenges, considering socio-economic factors. While the study primarily focuses on the Kudumbashree program in Kerala, India, insights drawn may have broader implications for similar initiatives worldwide aimed at women's economic empowerment.

RESEARCH METHODOLOGY

The study is based on both primary and secondary data. Primary data were collected from Kudumbashree members through a structured questionnaire, while secondary data were gathered from books, journals, reports, and websites. The collected data were analyzed using Percentage Analysis and Mean Score Analysis to evaluate the contribution of Kudumbashree to women's empowerment and socio-economic development.

REVIEW OF LITERATURE

Several studies have highlighted the significant role of Kudumbashree in promoting women's empoerment, poverty alleviation, and sustainable development in Kerala. Iyer (2022) examined Kudumbashree's contribution to achieving the Sustainable Development Goals (SDGs) and found that the programme positively influences social inclusion, economic development, and women's empowerment. Diya Usman and Kuriakose V. Kocheril (2021) studied the role of Kudumbashree units in Mundakayam Panchayath and reported that various activities undertaken by these units have improved the socio-economic status of rural women despite certain operational challenges. Nair (2018) emphasized that participation in Kudumbashree enhances women's decision-making power, self-confidence, and economic independence. Similarly, Narayanan Pandala, Janardhanan, and Kinslin (2023), based on a study of 399 women members, observed that Kudumbashree plays a vital role in promoting gender equality and sustainable women's empowerment. Venugopalan (2014) investigated the programme's impact on poverty eradication and women's empowerment and concluded that while Kudumbashree has improved access to microcredit and entrepreneurial opportunities, the income levels of many members remain relatively low. Starly and Karuppiah (2022) found that Kudumbashree has strengthened financial inclusion, reduced poverty, and enhanced women's participation in community development. Collectively, these studies indicate that Kudumbashree has emerged as an effective community-based initiative contributing significantly to women's empowerment and socio-economic development in Kerala.

DATA ANALYSIS AND INTERPRETATION

Profile of the sample

The sample for the purpose of the study has been collected from 100 kudumbashree members. The profile of the sample is explained through the following tables.

Table : 1 Age wise classification

Age	Frequency	Percentage
Below 30	7	7
31-40	31	31
41-50	44	44
51-60	14	14
Above 60	4	4
Total	100	100

Source: Primary data

The data shows that the largest proportion (44%) of the surveyed population is aged between 41 to 50 years.

Table : 2 Family class wise classification

Family class	Frequency	Percentage
High class	2	2
Middle class	95	95
Lower class	3	3
Total	100	100

Source: Primary data

The data indicates that the middle class represents the largest segment (95%) of the surveyed population, suggesting a predominantly middle-income demographic. High-class individuals comprise a very small proportion (2%), while the lower class also represents a small segment (3%) within the surveyed population.

Table : 3 Education qualification of respondents

Education qualification	Frequency	Percentage
Below SSLC	24	24
SSLC	33	33
Higher secondary	21	21
Graduation	18	18
Post-graduation	4	4
Total	100	100

Source: Primary data

The data shows that the highest frequency (33%) of the surveyed population holds SSLC qualifications, followed closely by individuals below SSLC (24%) and those with higher secondary education (21%). There are fewer respondents with graduation (18%) and post- graduation qualifications (4%).

Table : 4 Occupation wise Classification

Current occupation	Frequency	Percentage
Govt Employee	7	7
Private Employee	40	40
Entrepreneur	8	8
Professional	3	3
Other	42	42
Total	100	100

Source: Primary data

Among the surveyed individuals, the largest proportion (40%) are private employees, while a significant portion (42%) fall into the "other" category for occupation. Government employees

Table : 5 Monthly Income Of Family

Monthly Income	Frequency	Percentage
Below 20000	35	35
20000-30000	33	33
30000-40000	21	18
40000-50000	9	9
Above 50000	1	1
Total	100	100

Source: Primary data

The majority of surveyed individuals (36%) have a monthly income below 20000, while nearly the same amount (35%) earn between 20000 and 30000. A smaller portion earns between 30000 and 40000 (18%), and even fewer earn between 40000 and 50000 (10%). Only 1% have an income above 50000.

Table : 6 The factor equal employment opportunities for women

Variables	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Mean score
Kudumbashree initiative have contributed significantly to equal employment opportunities for women.	74	22	2	1	1	4.7
I believe the employment programs by kudumbashree have positively impacted women's professional opportunities.	18	74	6	2	0	4.1
The training and support provided by kudumbashree have enhanced women's employability.	23	46	30	1	0	4
Overall, I perceive kudumbashree as having a positive impact on providing equal employment opportunities for women.	48	47	4	1	0	4.4

Source: Primary data

The data suggests that most people strongly agree that the Kudumbashree initiative has significantly helped in providing equal job opportunities for women, with a mean score of

4.7 out of 5. Additionally, a majority agree that the employment programs offered by Kudumbashree have positively influenced women's job prospects, with a mean score of 4.1. Overall, there's a positive perception that Kudumbashree's training and support have improved women's ability to find employment.

CONCLUSION

Kudumbashree plays a significant role in empowering women entrepreneurs and fostering their economic independence. The demographic profile of the respondents highlights the predominance of middle-aged individuals from middle-class backgrounds, indicating the broad reach of Kudumbashree's initiatives across diverse segments of society. Furthermore, the majority of respondents possess lower educational qualifications, emphasizing the importance of targeted support and skill development programs offered by Kudumbashree. The findings also underscore the positive impact of Kudumbashree on women's confidence, societal perceptions, and technological skills. Through effective training programs and community acceptance initiatives, Kudumbashree has succeeded in bridging the technology gap and boosting the self-assurance of women entrepreneurs. This not only enhances their business acumen but also challenges traditional gender norms and promotes inclusivity in entrepreneurship. Moreover, the study concludes that entrepreneurship support, particularly through initiatives like Kudumbashree, significantly contributes to financial empowerment. By providing access to resources, training, and recognition, Kudumbashree empowers women to actively participate in the economy, potentially leading to greater economic stability and independence for individuals and their families

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A REVIEW OF THE EFFECTIVENESS OF DIGITAL MARKETING STRATEGIES IN EMERGING ECONOMIES

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ABSTRACT

Digital marketing has become an essential tool for businesses operating in emerging economies, where fast technological adoption and shifting consumer behaviours are transforming how brands interact with their customers. The widespread adoption of the internet, along with the proliferation of low-cost cell phones, has offered new opportunities for businesses to contact varied consumer segments directly and efficiently. In these rapidly changing industries, traditional marketing tactics frequently fall short, while digital channels—ranging from social media and mobile applications to e-commerce platforms and targeted online advertising—provide more dynamic, cost-effective, and measurable alternatives. This article investigates the efficacy of digital marketing methods in several emerging economies, identifying which approaches engage with local consumers and which fail to produce meaningful results.

This article examines and synthesises existing research, providing practical insights and evidence-based advice for firms looking to enhance their digital marketing efforts. It also provides guidelines for policymakers and industry stakeholders who want to create an environment that promotes long-term digital engagement, trust, and the success of both brands and local economies. Finally, the article indicates that success in digital marketing in emerging countries is dependent not just on creativity and technological tools, but also on knowing the local environment and tailoring strategies to the specific needs of varied consumer bases. This paper synthesises research and case studies to provide actionable advice for organisations and policymakers looking to improve digital engagement, encourage consumer trust, and generate long-term success.

Keywords: Consumer behaviour, Digital marketing, Digital engagement, Policymakers, stakeholders, Online advertising

INTRODUCTION:

Emerging economies are dynamic markets where rapid technological adoption intersects with various consumer behaviours and cultural environments. Rising internet penetration, broad smartphone use, and access to digital platforms have altered how consumers communicate, purchase, and interact with brands, presenting both opportunities and problems to businesses.

In these regions, digital marketing has become essential for engaging consumers, increasing brand awareness, and driving sales. Mobile devices, social media, and e-commerce enable firms to communicate directly with their audiences, acquire data, and provide personalised experiences. However, what works in one country or demography may not work

in another, thus, localisation, cultural sensitivity, and mobile-first initiatives are critical for success.

Flexible, evidence-based approaches are required to address challenges such as infrastructure limitations, regulatory variances, and economic inequities. Understanding local settings and changing methods accordingly allows firms to develop trust, improve brand visibility, and generate meaningful engagement. In emerging economies, success in digital marketing is dependent not only on cutting-edge tools but also on authenticity, consumer-centric methods, and the ability to traverse complex, fast-shifting markets.

SECTOR-WISE DIGITAL MARKETING TRENDS

India's digital economy is fast expanding, thanks to rising smartphone penetration, affordable data rates, and a thriving e-commerce sector. Digital marketing has evolved as an essential tool for organisations looking to reach India's diversified and mobile-first consumers. Understanding its effectiveness is critical for stakeholders seeking sustainable growth and competitive advantage. Digital marketing in emerging nations has various patterns across industries, reflecting both opportunities and constraints specific to each. Companies in the **retail and FMCG sectors** are increasingly embracing mobile-first advertising, collaborating with influencers, and emphasising eco-friendly items, with the future promising more personalised experiences through AR/VR shopping and circular economy initiatives. For **e-commerce and SMEs,** the emphasis has been on sustainable packaging, carbon-neutral shipping, and AI-powered chatbots, with the possibility of blockchain-enabled supplier transparency and smarter product suggestions on the way. In **banking and finance,** paperless communication and ESG-focused initiatives are becoming the standard, with a shift towards digital onboarding, AI-based risk assessments, and gamified financial education to better engage clients. **Tourism and hospitality companies** are communicating with travellers via virtual tours and social media, with immersive VR experiences, targeted offers, and dynamic influencer collaborations expected to impact future marketing efforts. In **agriculture and food,** certified organic labels, farm-to-table storytelling, and locally rooted branding are current objectives, while smart farming, traceable supply chains, and real-time consumer input are emerging as strategic imperatives. Finally, **education and EdTech platforms** are embracing interactive content, social media learning, and mobile-first delivery as they transition to AI-powered adaptive learning, multilingual material, and gamified engagement to promote deeper connections with students.

YEAR-WISE DIGITAL MARKETING TRENDS

2018 to 2020

From 2018 to 2020, digital marketing in emerging economies prioritised early adoption of mobile-first tactics, social media campaigns, and environmentally friendly branding, particularly in the FMCG industry.

2021 and 2022

Influencer marketing, digital storytelling, and social commerce all saw an increase in popularity between 2021 and 2022, as customers became more ecologically aware.

2023-2024

In 2023-2024, tactics evolved to include data-driven personalisation, AI-powered chatbots, mobile payments, and a greater emphasis on regulatory compliance, reflecting both technology improvements and shifting market expectations.

2025 and beyond

In 2025 and beyond, businesses are expected to use AI and blockchain to create traceable and verifiable campaigns, immersive AR/VR experiences, cross-sector collaborations, and circular economy messaging, indicating a shift towards more integrated, transparent, and innovative digital marketing practices.

REVIEW OF LITERATURE

More recently, **Yadav and Pathak (2023)** conducted research on Gen Z consumers, revealing that younger audiences value authenticity, social media transparency, and ethical behaviours when evaluating brands. **Lim, Ting, and Bonaventure (2022)** investigated the importance of regulatory frameworks in developing corporate green initiatives in Asia, and discovered that incentives and penalties had a major impact on adoption and reporting practices. The rise of digital marketing in emerging nations has sparked significant scholarly interest, particularly in terms of sustainability and green practices. Early study demonstrated the ability of mobile and social media platforms to engage consumers, but adoption was unequal across regions and industries **(Chaffey & Ellis-Chadwick, 2022). Kotler, Kartajaya, and Setiawan (2021)** found that incorporating sustainability into marketing not only improves brand image but may also help businesses stand out in competitive markets, particularly when efforts match with consumer values. **Wang et al. (2021)** also stated that global events like the COVID-19 epidemic have influenced consumer tastes, boosting demand for eco-friendly packaging, local sourcing, and digital transparency. **Joshi and Rahman (2019)** evaluated customers' green purchase intentions, revealing a continuing gap between environmental awareness and actual purchasing behaviour, owing primarily to convenience, cost, and a scarcity of sustainable options.

Table : 1 STATISTICAL TRENDS AND INSIGHTS

Indicator	2022	2023	2024	2025 (Projected)
Internet penetration (% pop.)	58%	62%	67%	70%
Mobile device usage (% pop.)	72%	75%	78%	82%
Social media engagement growth %	18%	22%	25%	28%
Digital ad spends (US$ billion)	45	52	61	70
E-commerce adoption (% consumers)	34%	38%	43%	48%

Source: Collected & Complied from Secondary Data

CHALLENGES IN EMERGING MARKETS

Limited Infrastructure:

In many rural and semi-urban areas, poor internet connectivity and limited smartphone availability limit the reach and frequency of digital marketing campaigns. This digital divide limits campaign penetration and customer participation beyond metropolitan areas.

Regulatory Variations:

Emerging economies frequently have different and changing legislative settings that encompass advertising standards, data protection, and e-commerce restrictions. Navigating

these disparate frameworks complicates campaign planning, raises compliance expenses, and restricts cross-border digital marketing efforts.

Economic constraints

Economic constraints, particularly for SMEs and startups, limit the ability to experiment with creative or large-scale digital marketing strategies. Financial restrictions also restrict investment in technology and trained workers.

Consumer Trust:

Digital trust remains a significant hurdle. Consumers' desire to completely engage with digital marketing is reduced by scepticism about online adverts, fears about data exploitation or fraud, and previous encounters with misleading campaigns.

OPPORTUNITIES:

AI and data analytics

AI and data analytics advancements allow for sophisticated personalisation, predictive targeting, and real-time campaign optimisation. These technologies enable messaging to be tailored to particular consumer tastes, hence increasing engagement and ROI.

Influencer and community marketing:

Using these networks allows brands to overcome trust gaps and extend their reach authentically in local marketplaces.

Augmented Reality (AR) and Virtual Reality (VR) Experiences:

AR/VR marketing create engaging, interactive brand experiences that differentiate offerings.

Sustainability Messaging:

Emphasising ethical company practices and circular economy principles appeals to environmentally sensitive consumers. Brands that incorporate sustainability into their digital storytelling can generate stronger loyalty and establish positive reputations.

Cross-sector Collaboration:

Partnerships between governments, non-governmental organisations, and private businesses increase resources, reach, and impact, allowing digital marketing campaigns to scale.

FUTURE DIRECTIONS:

AI and Blockchain Integration:

By combining AI-driven personalisation with blockchain, campaigns can be designed to be traceable and transparent, fostering consumer trust while providing individualised experiences. Blockchain technology can verify claims and validate digital marketing to combat fraud and greenwashing.

Widespread Adoption of Immersive Technologies:

Immersive technologies will become widely adopted marketing tools, providing immersive interaction, particularly in the leisure, retail, and tourism industries.

Sustainability, Circular Economy, and Ethical Branding:

To satisfy changing customer expectations, digital campaigns will increasingly include sustainability themes, such as resource efficiency, social responsibility, and ethical practices.

Expansion into Rural and Semi-Urban Areas:

Marketers will prioritise supplying multilingual, culturally sensitive content to rural and semi-urban consumers, bridging conventional digital barriers.

Cross-sector and Public-Private Collaboration:

Integrated projects that combine public resources with private innovation will propel scalable and equitable digital marketing tactics, which are required for inclusive economic development.

CONCLUSION:

Technological advancements, changing customer expectations, and complex regulatory contexts are all driving the rapid transformation of digital marketing in emerging markets.

AI, blockchain, and immersive AR/VR technologies are becoming increasingly important for creating personalised, transparent, and engaging campaigns that bridge gaps and add value. Sustainability has evolved from a trend to an expectation, with consumers preferring firms that prioritise ethical standards and social responsibility. Cross-sector alliances with startups, NGOs, and governments improve market relevance and resource availability.

Ultimately, the most effective digital marketing techniques combine technology innovation, cultural understanding, and social responsibility. Companies that approach these markets with awareness and innovation can foster long-term loyalty, trust, and sustainable success in the dynamic and diverse emerging economy environments.

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AI-ENABLED PERSONALIZATION AND CUSTOMER RETENTION IN ONLINE RETAIL: EVIDENCE FROM TIRUCHIRAPPALLI DISTRICT, INDIA

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Abstract

Retailers across India have turned to algorithmic recommendation engines, dynamic pricing, and chatbot-driven service to keep shoppers from drifting to rival platforms, yet whether these tools actually translate into durable loyalty remains contested among practitioners and scholars alike. This study examines how artificial intelligence-enabled personalization shapes customer retention in e-commerce, with perceived value, satisfaction, and loyalty positioned as the mechanisms through which that influence travels. Data were gathered from 365 online shoppers in Tiruchirappalli district, Tamil Nadu, using a structured questionnaire administered through both physical and digital channels. Exploratory factor analysis confirmed a five-factor structure explaining 71.46 percent of total variance, and confirmatory factor analysis verified acceptable convergent and discriminant validity across all constructs. Structural equation modelling, conducted using AMOS, indicated that personalization exerts a significant positive effect on perceived value ($\beta = 0.52$, $p < .001$) and a smaller direct effect on satisfaction ($\beta = 0.31$, $p < .001$), while perceived value itself strongly predicts satisfaction ($\beta = 0.46$, $p < .001$). Satisfaction, in turn, drives both loyalty ($\beta = 0.58$, $p < .001$) and retention directly ($\beta = 0.27$, $p < .001$), and loyalty further strengthens retention ($\beta = 0.49$, $p < .001$). The model accounted for 51 percent of the variance in retention. These findings suggest that personalization works mainly by enhancing how customers value an experience rather than by satisfying them outright, a nuance that complicates the assumption common in industry reports that more data-driven customisation automatically yields stickier customers. Practical implications for e-tailers operating in Tier-II Indian markets are discussed, along with the boundaries of what algorithmic personalization can reasonably be expected to achieve.

Keywords: *AI-driven personalization, perceived value, customer satisfaction, customer loyalty, customer retention, structural equation modelling, e-commerce, India*

Introduction

Online retail in India no longer resembles the transactional, catalogue-browsing experience it was a decade ago. Platforms now track click patterns, purchase histories, browsing dwell time, and even cart abandonment behaviour to construct individualised storefronts for each visitor. Amazon, Flipkart, Myntra, and a growing number of regional players rely on machine learning models to decide which products to surface, which discounts to offer, and when to nudge a hesitant buyer toward checkout. The underlying premise is straightforward: a shopper who feels understood is less likely to abandon the platform for a competitor offering an undifferentiated experience.

Whether that premise holds up under empirical scrutiny is a separate question. Industry whitepapers tend to report personalization as an unambiguous driver of revenue and retention, but academic findings are more mixed. Some studies find that algorithmic recommendations genuinely deepen engagement (Tong et al., 2020), whereas others report that excessive

personalization can feel intrusive, triggering privacy concerns that undercut the very loyalty it was meant to build (Aguirre et al., 2015). This tension between personalization as a relationship-builder and personalization as a source of discomfort has not been settled, and it forms part of the motivation for the present study.

A second gap concerns geography. Much of the existing literature on AI personalization draws on samples from metropolitan or Western contexts, where digital infrastructure, payment systems, and consumer familiarity with algorithmic curation are comparatively mature. Tier-II and Tier-III Indian markets present a different picture. Tiruchirappalli, a mid-sized city in Tamil Nadu with a mix of long-established retail habits and rapidly rising smartphone penetration, offers a useful setting to test whether personalization mechanisms function the same way once the assumption of digital sophistication is relaxed. Consumers here may respond to algorithmic cues differently than their counterparts in Bengaluru or Mumbai, not because the technology differs, but because prior digital experience, trust in online platforms, and price sensitivity vary.

This study therefore investigates how AI-driven personalization influences customer retention, and—more importantly—through what sequence of psychological and attitudinal states that influence unfolds. Rather than treating personalization and retention as directly linked, the study positions perceived value, satisfaction, and loyalty as sequential mediators, following the broader logic of relationship marketing theory, which holds that retention is rarely an immediate outcome of a single stimulus but the cumulative product of repeated positive evaluations (Morgan & Hunt, 1994).

Three objectives guide the inquiry. First, the study examines whether AI-driven personalization significantly predicts perceived value and satisfaction among online shoppers in Tiruchirappalli district. Second, it tests whether satisfaction translates into loyalty and, separately, into direct retention behaviour. Third, it evaluates the combined explanatory power of this chain using structural equation modelling, allowing both direct and indirect pathways to be quantified. The findings carry implications for e-commerce firms designing personalization strategies for semi-urban Indian markets, where assumptions imported wholesale from metropolitan consumer behaviour may not transfer cleanly.

The remainder of the paper proceeds as follows. Section 2 reviews the literature on each construct and develops the study's hypotheses. Section 3 details the sampling procedure, measurement instrument, and analytical methods. Section 4 reports the results of the exploratory and confirmatory factor analyse along with the structural model. Section 5 discusses these findings against the backdrop of existing theory, followed by managerial implications in Section 6 and concluding remarks in Section 7.

Literature Review and Hypotheses Development

AI-Driven Personalization

Personalization in digital retail has evolved considerably since its early form as simple rule-based recommendation ("customers who bought this also bought…"). Contemporary systems draw on collaborative filtering, natural language processing, and increasingly on deep learning architectures that update recommendations in near real time (Wang et al., 2021). What distinguishes AI-driven personalization from its earlier rule-based ancestor is adaptiveness: the system learns continuously from behavioural signals rather than relying on static product associations.

Researchers have approached personalization from at least two angles. One stream treats it as a technological capability—an attribute of the platform that can be measured by the sophistication of its algorithms (Chandra et al., 2022). A second, more consumer-centred stream treats personalization as a perceived experience, asking not how advanced the algorithm is but how relevant, timely, and tailored the customer feels the output to be (Tong et al., 2020). The present study adopts the latter perspective, since perception rather than backend architecture is what ultimately shapes a shopper's evaluation of the platform.

A recurring finding across both streams is that personalization is not unconditionally beneficial. Aguirre et al. (2015) demonstrated that the same personalized advertisement could increase click-through intention in one context and trigger reactance in another, depending on whether the data collection method felt transparent to the user. This is the scholarly tension worth naming directly: a meaningful share of the literature champions personalization as an engagement multiplier, while another, smaller but persistent, strand treats it as a double-edged tool whose benefits erode once consumers sense surveillance rather than service. The present study does not resolve this tension—doing so would require manipulating disclosure conditions experimentally—but it does test whether, on balance, personalization functions positively within a market where algorithmic curation is still a relatively recent experience for many shoppers.

Perceived Value

Perceived value has long been defined as a consumer's overall assessment of the utility of a product or service based on perceptions of what is received relative to what is given (Zeithaml, 1988). In digital retail, this calculus extends beyond price-quality trade-offs to include convenience, time saved, and the cognitive ease of finding relevant products quickly (Sweeney & Soutar, 2001).

AI-driven personalization plausibly raises perceived value through several channels. By filtering an overwhelming product catalogue down to a manageable, relevant subset, recommendation systems reduce search costs—a benefit consumers tend to register quickly, even when they cannot articulate the underlying mechanism. Kumar et al. (2019) found that personalized product curation increased perceived shopping efficiency, which in turn elevated value perceptions among online grocery shoppers. Similarly, Lee and Cho (2020) reported that algorithmic personalization on fashion retail platforms heightened perceived value primarily through improved decision convenience rather than through price benefits.

It is worth noting that not all studies find personalization to be the dominant driver of value; some argue that brand trust and platform reputation contribute more heavily, with personalization playing a supporting rather than a leading role (Pappas et al., 2017). Even so, the weight of evidence supports a positive relationship strong enough to warrant formal testing here.

H1: *AI-driven personalization has a significant positive effect on perceived value among online shoppers.*

Customer Satisfaction

Customer satisfaction is typically conceptualised as the post-purchase evaluative state that results from comparing expected and experienced performance (Oliver, 1999). Within e-commerce specifically, satisfaction has been linked to website usability, delivery reliability,

and—of direct relevance here—the relevance of product suggestions encountered during the shopping journey (Pappas et al., 2017).

Two pathways connect personalization to satisfaction in the literature. The first is a direct route: a recommendation that matches a need produces an immediate sense of being understood, which contributes to satisfaction even before any purchase value is realised. The second is an indirect route, operating through perceived value: shoppers first register that the experience is efficient or beneficial, and that judgment then colours their overall satisfaction. Most empirical work has examined these routes in isolation rather than jointly, which leaves open the question of their relative magnitude. Studies by Chandra et al. (2022) and Wang et al. (2021) both report significant direct effects of personalization on satisfaction, yet neither study controls for perceived value as a parallel mediator, making it difficult to judge whether the direct effect would survive once value is accounted for. This study addresses that gap by modelling both paths simultaneously.

H2: *AI-driven personalization has a significant positive effect on customer satisfaction.*

H3: *Perceived value has a significant positive effect on customer satisfaction.*

Customer Loyalty

Loyalty is commonly distinguished from mere repeat purchasing by its attitudinal component: a loyal customer not only buys again but also exhibits resistance to switching and willingness to recommend the platform to others (Oliver, 1999). The satisfaction-loyalty link is among the most replicated findings in marketing research, tracing back to early service-quality models and reaffirmed repeatedly in digital contexts (Anderson & Srinivasan, 2003).

In e-commerce specifically, satisfaction appears to build loyalty through an accumulation of confirmed expectations rather than a single transaction. Zhang et al. (2020) observed that satisfaction's effect on loyalty was considerably stronger among customers who had made repeated purchases compared with first-time buyers, suggesting a compounding relationship rather than a flat one. Whether this compounding pattern holds in semi-urban Indian markets, where purchase frequency may be lower than in metropolitan samples, has not been extensively tested, which is one reason this study includes loyalty as a distinct construct rather than collapsing it into retention.

H4: *Customer satisfaction has a significant positive effect on customer loyalty.*

Customer Retention

Retention refers to the continuation of the customer relationship over time, typically operationalised through repurchase intention, reduced likelihood of switching, and continued platform usage (Reichheld & Schefter, 2000). Retention is sometimes treated as functionally equivalent to loyalty in the literature, but the two are conceptually distinct: loyalty captures attitude and emotional attachment, whereas retention captures behavioural persistence, which can occasionally occur even without strong attitudinal loyalty—for instance, when switching costs are high or alternatives are scarce (Lee & Cho, 2020).

This distinction matters for the present model. If satisfaction predicted only loyalty, with loyalty acting as the sole conduit to retention, that would imply attitude is a necessary stepping stone to behaviour. The literature suggests otherwise: several studies report a direct satisfaction-to-retention path that operates independently of attitudinal loyalty, possibly through habitual repurchase patterns that do not require active brand commitment (Anderson & Srinivasan, 2003). Accordingly, the present model specifies both a direct effect of

satisfaction on retention and an indirect effect transmitted through loyalty, allowing the data to reveal which pathway dominates.

H5: *Customer satisfaction has a significant positive effect on customer retention.*

H6: *Customer loyalty has a significant positive effect on customer retention.*

Synthesis and the Proposed Model

Taken together, the reviewed literature converges on a sequential logic—personalization shapes value judgments, value and personalization jointly shape satisfaction, and satisfaction radiates outward into both loyalty and retention—but few studies have tested this entire chain within a single structural model, and fewer still have done so outside metropolitan or Western retail contexts. The hypothesised model in this study (Figure 1) integrates these six relationships into one estimable framework, treating perceived value, satisfaction, and loyalty as sequential mediators between personalization and retention.

Methodology

Research Design and Sampling

The study adopted a cross-sectional, descriptive-cum-causal design, appropriate for testing hypothesised relationships among latent constructs at a single point in time. The target population consisted of online shoppers residing in Tiruchirappalli district, Tamil Nadu, who had made at least one purchase through an e-commerce platform within the preceding six months. A purposive-cum-convenience sampling approach was used, supplemented by snowball referrals to reach respondents across different age groups and localities within the district, since no comprehensive sampling frame of online shoppers exists at the district level.

Sample size was determined using the commonly cited rule of ten observations per estimated parameter for structural equation modelling (Hair et al., 2019), which, given the model's complexity, suggested a minimum requirement well below the sample eventually collected. A total of 420 questionnaires were distributed across shopping complexes, college campuses, and online channels (WhatsApp and Google Forms) between January and March 2026. After removing incomplete responses and those failing attention-check items, 365 usable responses remained, yielding a response rate of approximately 87 percent and satisfying the minimum threshold recommended for SEM analysis with five latent constructs.

Sample Profile

Of the 365 respondents, 196 (53.7%) identified as male and 169 (46.3%) as female. The age distribution skewed toward younger and early-middle-aged adults: 88 respondents (24.1%) were aged 18–25, 134 (36.7%) were aged 26–35, 89 (24.4%) were aged 36–45, and the remaining 54 (14.8%) were 46 or older. In terms of education, 142 respondents (38.9%) held an undergraduate degree, 156 (42.7%) held a postgraduate qualification, and 67 (18.4%) reported other educational backgrounds. Regarding purchase frequency, 121 respondents (33.2%) shopped online weekly, 178 (48.8%) shopped monthly, and 66 (18.0%) shopped occasionally. This profile suggests a sample skewed toward digitally engaged, moderately frequent shoppers, which is broadly consistent with the demographic most likely to encounter and respond to algorithmic personalization features.

Measurement Instrument

The questionnaire was adapted from validated scales used in prior personalization and relationship-marketing research, with minor wording changes to suit the Indian e-commerce context. AI-driven personalization was measured using five items adapted from Tong et al.

(2020) and Chandra et al. (2022), capturing perceived relevance of recommendations, timeliness, and the sense of individualised attention. Perceived value was measured with four items drawn from Sweeney and Soutar (2001). Customer satisfaction used four items based on Oliver (1999) and Pappas et al. (2017). Customer loyalty was measured with four items adapted from Zeithaml et al. (1996), and customer retention with four items adapted from Reichheld and Schefter (2000) and Anderson and Srinivasan (2003). All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was pilot-tested with 30 respondents prior to full deployment, and minor wording adjustments were made to two items that pilot participants found ambiguous.

Common Method Bias and Data Screening

Because all constructs were measured using self-report items collected through the same instrument, common method bias was a relevant concern. Procedural remedies were applied during questionnaire design, including varied item ordering, assurance of anonymity, and the separation of predictor and outcome items across different sections of the form (Podsakoff et al., 2003). Statistically, Harman's single-factor test was conducted, with the single unrotated factor accounting for 36.8 percent of total variance—below the 50 percent threshold typically used to flag a serious bias concern. Variance inflation factors among the structural model's predictors ranged from 1.31 to 2.18, comfortably under the conventional cut-off of 5, indicating multicollinearity was not a material problem.

Analytical Approach

Data were analysed in two broad stages using IBM SPSS 27 and AMOS 24. The first stage involved exploratory factor analysis (EFA) using principal axis factoring with Varimax rotation, conducted to confirm that items loaded onto their intended constructs and to identify any cross-loading items prior to confirmatory testing. The second stage involved confirmatory factor analysis (CFA), used to assess the measurement model's validity and reliability, followed by structural equation modelling (SEM) to test the hypothesised paths. Model fit was evaluated using chi-square divided by degrees of freedom (CMIN/DF), the goodness-of-fit index (GFI), adjusted GFI (AGFI), comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR), following the thresholds recommended by Hair et al. (2019) and Hu and Bentler (1999).

Results

Exploratory Factor Analysis

Prior to extraction, sampling adequacy was confirmed through the Kaiser-Meyer-Olkin (KMO) measure, which returned a value of 0.882—well above the recommended minimum of 0.60. Bartlett's test of sphericity was significant ($\chi^2 = 4218.94$, $df = 210$, $p < .001$), confirming that the correlation matrix was suitable for factor analysis. Principal axis factoring with Varimax rotation extracted five factors with eigenvalues exceeding 1, jointly explaining 71.46 percent of total variance. All items loaded cleanly onto their intended factor with loadings ranging from 0.61 to 0.86, and no item exhibited a problematic cross-loading above 0.40 on a secondary factor, supporting the five-factor structure anticipated by the measurement design.

Table 1. Exploratory Factor Analysis Results

Construct	Item	Factor Loading	Eigenvalue	Variance Explained (%)
AI-Driven Personalization	AIP1–AIP5	0.66–0.84	5.92	19.73
Perceived Value	PV1–PV4	0.64–0.81	3.78	15.42
Customer Satisfaction	CS1–CS4	0.63–0.86	3.41	13.87
Customer Loyalty	CL1–CL4	0.61–0.83	2.95	11.92
Customer Retention	CR1–CR4	0.65–0.86	2.66	10.52
Total				**71.46**

Source: Computed Data *Note. KMO = 0.882; Bartlett's $\chi^2 = 4218.94$, $df = 210$, $p < .001$.*

Confirmatory Factor Analysis and Measurement Model

The measurement model was assessed prior to structural testing. Standardized factor loadings for all 21 items exceeded the 0.60 threshold, ranging from 0.68 to 0.89, indicating that the items reliably represented their respective latent constructs. The measurement model demonstrated acceptable fit: $\chi^2 = 412.85$, df = 199, CMIN/DF = 2.075, GFI = 0.918, AGFI = 0.897, CFI = 0.961, TLI = 0.954, RMSEA = 0.054, and SRMR = 0.041. These indices fall within the ranges generally considered acceptable for SEM applications in marketing research (Hu & Bentler, 1999).

Table 2. Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
AI-Driven Personalization	0.871	0.889	0.617
Perceived Value	0.842	0.863	0.589
Customer Satisfaction	0.859	0.876	0.602
Customer Loyalty	0.838	0.860	0.575
Customer Retention	0.864	0.881	0.595

Source: Computed Data

All Cronbach's alpha and composite reliability values exceeded the 0.70 benchmark, and all AVE values exceeded 0.50, jointly supporting internal consistency and convergent validity across the five constructs (Fornell & Larcker, 1981). Discriminant validity was examined using the heterotrait - monotrait (HTMT) ratio of correlations, a method increasingly preferred over the traditional Fornell-Larcker criterion for its superior detection of validity violations (Henseler et al., 2015). As shown in Table 3, all HTMT values remained below the conservative 0.85 threshold, with the highest ratio observed between loyalty and retention (0.742)—an expected result given the conceptual proximity of these two constructs, but still comfortably within acceptable bounds.

Table 3. Discriminant Validity (HTMT Ratios)

	AIP	PV	CS	CL	CR
AIP	—				
PV	0.612	—			
CS	0.581	0.658	—		
CL	0.502	0.594	0.701	—	
CR	0.487	0.521	0.629	0.742	—

Source: Computed Data

Structural Model and Hypothesis Testing

Having established an acceptable measurement model, the structural model was estimated to test the six hypothesised paths. The structural model also demonstrated acceptable fit: χ^2 = 438.62, df = 203, CMIN/DF = 2.161, GFI = 0.911, AGFI = 0.889, CFI = 0.955, TLI = 0.948, RMSEA = 0.057, and SRMR = 0.045, indicating that the hypothesised structure was consistent with the observed data. All six hypothesised paths were statistically significant at the $p < .001$ level, as summarised in Table 4 and depicted in Figure 1.

Table 4. Structural Path Estimates and Hypothesis Testing

Hypothesis	Path	Standardized β	t-value	p-value	Result
H1	AIP → PV	0.52	8.94	< .001	Supported
H2	AIP → CS	0.31	5.27	< .001	Supported
H3	PV → CS	0.46	7.85	< .001	Supported
H4	CS → CL	0.58	9.41	< .001	Supported
H5	CS → CR	0.27	4.12	< .001	Supported
H6	CL → CR	0.49	7.66	< .001	Supported

Source: Primary Data

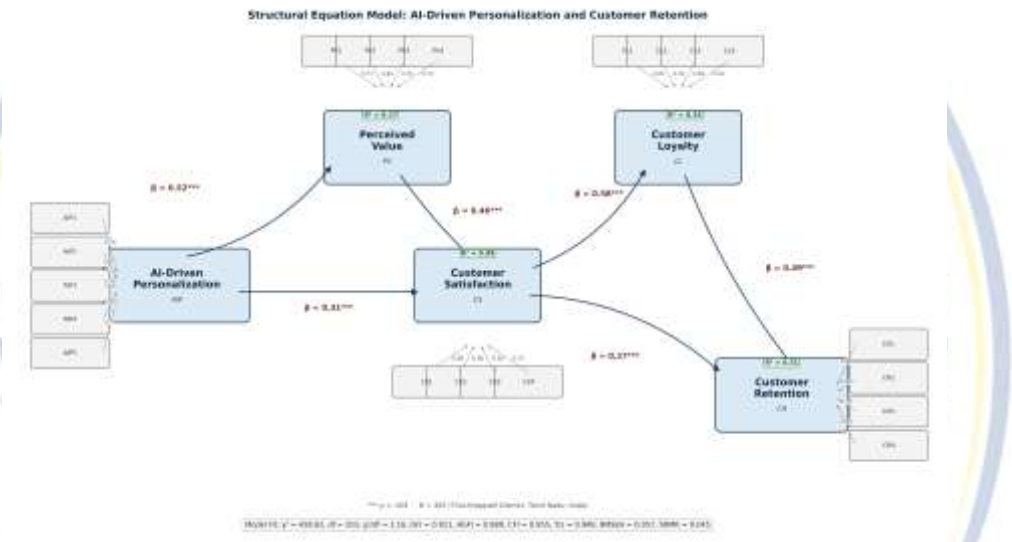
AI-driven personalization exerted the strongest effect on perceived value (β = 0.52), and a comparatively modest, though still significant, direct effect on satisfaction (β = 0.31). Perceived value itself contributed substantially to satisfaction (β = 0.46), suggesting that value perception functions as a meaningful conduit through which personalization's influence reaches satisfaction, rather than personalization acting on satisfaction in isolation. Satisfaction subsequently exerted the strongest single effect observed in the model on loyalty (β = 0.58), while its direct path to retention was the weakest of the six (β = 0.27)—loyalty's effect on retention (β = 0.49) was nearly double the magnitude of satisfaction's direct effect, implying that the loyalty-mediated route carries more weight in driving retention than the direct satisfaction route.

The model explained 27 percent of the variance in perceived value, 49 percent of the variance in satisfaction, 34 percent of the variance in loyalty, and 51 percent of the variance in retention. The relatively high R^2 for retention indicates that the hypothesised chain—personalization through value, satisfaction, and loyalty—captures a substantial portion of what drives continued patronage among the sampled shoppers, though, naturally, almost half of the variance remains attributable to factors outside this model, such as price competitiveness, delivery logistics, or habitual inertia, none of which were measured here.

Mediation Check

Given the sequential structure of the model, indirect effects were examined using bootstrapping with 5,000 resamples. The indirect effect of personalization on satisfaction through perceived value was significant ($\beta = 0.239$, $p < .001$), confirming partial mediation, since the direct path (H2) also remained significant. Similarly, the indirect effect of satisfaction on retention through loyalty was significant ($\beta = 0.284$, $p < .001$), again indicating partial rather than full mediation, as satisfaction's direct effect on retention (H5) persisted alongside the indirect route. This pattern—partial rather than full mediation at both junctures—suggests that personalization and satisfaction each retain some direct behavioural consequence that does not pass exclusively through the proposed intervening states.

Figure 1. Structural Equation Model of AI-Driven Personalization and Customer Retention



Discussion

The findings broadly support the sequential model proposed at the outset, though several details complicate a purely optimistic reading of AI-driven personalization's role in e-commerce. Personalization's effect on perceived value ($\beta = 0.52$) was considerably stronger than its direct effect on satisfaction ($\beta = 0.31$), which suggests that consumers in Tiruchirappalli district do not necessarily feel satisfied simply because a platform recognises their preferences; rather, they first register a practical benefit—reduced search time, better-fitting recommendations, perceived efficiency—and that benefit subsequently shapes how satisfied they feel. This sits comfortably alongside Lee and Cho's (2020) finding that personalization's value-enhancing function operates primarily through convenience rather than affect, though the present results extend that claim by showing the value-mediated pathway also feeds forward into loyalty and retention, not merely into a one-off satisfaction judgment.

A second pattern worth dwelling on concerns the relative strength of the loyalty-to-retention path ($\beta = 0.49$) against the direct satisfaction-to-retention path ($\beta = 0.27$). If satisfaction alone were sufficient to retain customers, the direct path would likely dominate; instead, the data suggest that attitudinal loyalty does meaningful additional work in converting satisfaction into actual retention behaviour. This aligns with Anderson and Srinivasan's (2003)

argument that e-satisfaction is a necessary but insufficient condition for e-loyalty, and by extension, for retention—a satisfied customer who has not yet developed loyalty toward a specific platform may still be receptive to a competitor's offer, whereas a loyal customer has, in effect, raised their own switching threshold.

These results also speak to the scholarly tension flagged earlier regarding personalization's double-edged nature. Within this sample, no evidence emerged of personalization producing negative or non-significant effects; all paths were positive and significant. This does not, however, settle the debate raised by Aguirre et al. (2015) and others concerned about algorithmic intrusiveness. It may simply indicate that within Tiruchirappalli's e-commerce user base—where algorithmic curation, though increasingly common, has not yet reached the saturation levels seen in more digitally mature metros—consumers have not yet crossed the threshold at which personalization starts to feel like surveillance rather than service. Whether this finding would replicate in a market with higher digital fatigue is, frankly, an open question this single cross-sectional study cannot answer, and future longitudinal work would be needed to track whether the personalization-value relationship weakens as exposure accumulates.

It is also worth flagging a methodological caveat that bears on interpretation. The R^2 for satisfaction (0.49) is respectable but leaves roughly half the variance unexplained, hinting that constructs outside this model—price perception, trust in payment security, or delivery speed, none of which were captured here—likely play a comparable or even larger role in shaping satisfaction among this population. Readers should therefore treat the present model as a partial, rather than comprehensive, account of what drives retention in this market.

Managerial Implications

Several practical implications follow from these results, though e-commerce managers operating in semi-urban Indian markets should weigh them against local market conditions rather than treating them as universal prescriptions.

First, given that personalization's strongest pathway runs through perceived value rather than directly through satisfaction, firms investing in recommendation engines should prioritise features that visibly save customers time or effort—curated bundles, simplified comparison tools, or proactive restocking alerts—over features designed merely to demonstrate algorithmic sophistication. A recommendation system that feels clever but does not measurably reduce decision effort may underperform expectations.

Second, because loyalty carries more weight than direct satisfaction in driving retention, platforms should consider supplementing personalization efforts with loyalty-specific mechanisms—tiered membership programs, recognition of repeat patronage, or community-building features—rather than assuming that a satisfying transaction alone will secure repeat business. Satisfaction appears to be a necessary first step, but not a sufficient one, for the kind of behavioural lock-in that protects revenue against competitor promotions.

Third, the relatively modest direct effect of personalization on satisfaction (compared to its effect on value) implies that firms should resist over-investing in personalization at the expense of more fundamental service quality dimensions. A highly personalized experience built on top of unreliable delivery or poor customer service is unlikely to compensate for those deficiencies; personalization appears to amplify a generally positive experience rather than substitute for one.

Fourth, given that the sample skewed toward moderately frequent, digitally engaged shoppers, firms targeting less frequent or first-time online shoppers in similar Tier-II markets should be cautious about assuming the same psychological chain applies. Onboarding strategies for less experienced shoppers may need to establish basic trust and platform familiarity before personalization features can meaningfully influence value perception.

7. Conclusion

This study set out to examine how AI-driven personalization shapes customer retention in e-commerce, using perceived value, satisfaction, and loyalty as sequential mediating mechanisms, with data collected from 365 online shoppers across Tiruchirappalli district. The structural model, supported by acceptable measurement and structural fit indices, confirmed all six hypothesised paths, with personalization's influence reaching retention predominantly through value and loyalty rather than through a single direct route.

The contribution of this work lies less in demonstrating that personalization matters—that much is already assumed in industry practice—and more in clarifying how it matters, and through which intervening states its effects are most strongly transmitted. For scholars, the partial-mediation findings at both junctures suggest that future models of digital retention should resist collapsing personalization, value, satisfaction, and loyalty into a single composite predictor, since each construct appears to retain distinct explanatory power. For practitioners, the findings offer a more disciplined basis for allocating resources between personalization technology and complementary loyalty mechanisms, rather than treating algorithmic sophistication as a self-sufficient retention strategy.

Limitations and Directions for Future Research

This study is not without limitations. The cross-sectional design captures relationships at a single point in time and cannot establish causal direction with certainty; satisfaction and loyalty plausibly reinforce each other over repeated purchase cycles in ways a single-wave survey cannot detect. The sample, while adequate for SEM purposes, was drawn through convenience and snowball methods rather than probability sampling, limiting generalisability beyond the broad demographic profile captured here. Future research might usefully extend this model longitudinally, track the same respondents across multiple purchase cycles, or test whether the personalization-value relationship weakens once a threshold of algorithmic exposure is crossed—a question this study could identify but not resolve. Comparative studies across multiple Tier-II and Tier-III districts would also help determine whether the patterns observed here are specific to Tiruchirappalli or representative of semi-urban Indian e-commerce more broadly.

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THE INFLUENCE OF ARTIFICIAL INTELLIGENCE ADOPTION ON HUMAN RESOURCE PRACTICES IN IT FIRMS IN CHENNAI

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ABSTRACT

In today's businesses, technology is essential to improving the overall working environment. Leaders in human resources (HR) can strategically use evolving technology to promote a culture of innovation and constant improvement if they are adaptable and well-prepared. Artificial Intelligence (AI), one of the most revolutionary technologies, has the ability to greatly improve organisational performance through optimal digitisation and automation when properly incorporated into HR procedures. Chennai-based information technology (IT) organisations' application of AI in HR operations is the main topic of this study. In order to evaluate the degree of AI integration, the researcher calculated the mean ranks of 15 important parameters that reflect different AI applications in HRM using the Friedman test. In order to investigate the relationship between employee demographic factors (such age, education, and experience) and their impact on the adoption of AI in HR procedures, multiple regression analysis was also performed. Schedules, bookkeeping, time tracking, documentation, and expenditure management are just a few of the regular administrative duties that employees perform on a daily basis, according to the study's findings. By using AI-driven software and digital assistants to automate these repetitive operations, employees may refocus their time and cognitive resources on tasks that call for creativity, critical thinking, and problem-solving. By enabling workers to concentrate on more fulfilling tasks, this change not only increases productivity but also boosts job satisfaction and employee engagement.

Keywords: *HR Procedures, Artificial Intelligence, Creativity, Critical Thinking.*

Introduction

Modern society is becoming more and more reliant on technology, which has changed our surroundings. According to Albert (E.T. 2019), it has consistently served as the cornerstone of civilisation and is present everywhere in the shape of amazing machinery and technological instruments. Stone artefacts were the first things humans created from the dawn on an ancient caveman finding fire. Hand-shaping rocks allowed humans to produce the first axes, hammers, weapons, and arrowheads. Following a century and a half, which concluded with the biggest advance in rocket science, technologies have experienced several phases of evolution. A lot of technological advances have been made, suggesting that the periods were created to separate human growth. Because technology changes how people live and order their lives and drives the advancement of human civilisations, this is true. As can be observed by looking at the timeline, technology has advanced substantially over time. The subsequent phase, the post industrial revolution, saw a shift in people's views on technology. the introduction of mechanically powered objects such as cars, steam-powered motors, gadgets, and more. All of these gadgets allowed people to go beyond their physical boundaries. At the highest level of technical advancement, automation replaces human contact with a computer algorithm. Thirty years ago, the World Wide Web was not invented; as everyone is aware, cell phones

have only been in use for ten years. However, since then, highly developed technology has emerged as the forefront of our attempts to alter people's lifestyles. Since the year 2000, the term "Artificial Intelligence" has been the subject of much study and discussion. Since the epidemic COVID-19 has brought forth unexpected and unplanned events, artificial intelligence (AI) has emerged as the next big thing in technical advancements. It seems that the time for AI has arrived for all of us. The need for AI has grown in practically every industry and sector as a result of the pandemic (Arora S 2000).

In actuality, robotics and artificial intelligence (AI) technologies have many uses that extend well beyond just creating robots. There is much more to the word "artificial intelligence" than we first think (Omana 2019). Regardless matter how modern artificial intelligence is applied and whether it improves or degrades every facet and domain of our lives, it is certain that "AI becomes inevitable." Technology, from computers and laptops to sophisticated android devices and humanoids, is essential in almost every industry, including medical, business, production, education, finance, and many more (Bellman R., 1978). As if biological intellect and artificial intelligence are not yet equal, but who can say for sure? Perhaps it will. We may believe that a machine's software and hardware mechanisms are far more advanced than human memory and processing power, but this is not the case; human intelligence originates from experience and ongoing development (Bhushan D 2019). Humans are not reliant on pre-existing information or facts for any effort. The biological layers, depths, and architectures of the human brain are far more complex and intelligent than those of any high-tech device (Chanda 2019). Human intellect continues to surpass machine intelligence. Human intelligence is a special synthesis of several cognitive functions, such as observation, reasoning, conceptual understanding, information acquisition, and analytical thinking. AI-based gadgets could be able to mimic human conduct to a certain extent, but their comprehension might be impaired if they make rational and sensible decisions like people do (Chowdhury 2003). Though they lack common sense, AI-enabled systems make decisions based on occurrences and their correlations. Artificial intelligence (AI) systems are unable to comprehend the relationship between causes and consequences. Meanwhile, many integrated human techniques are needed in real-world settings (Corina & Irina 2018). Nonetheless, it is certain that technologies such as artificial intelligence (AI) have the potential to improve the effectiveness and efficiency of a wide range of human endeavours (Silva C 2019). The future of IT is determined by the Artificial Intelligence idea. In addition to changing computer methods, artificial intelligence (AI) technology has had a major impact on almost every business (Dennis M. J 2018). One of the newest and most sophisticated technologies available today, artificial intelligence, has significantly improved the HR department. Since most low-value HR duties are automated and carried out by AI, there may be more focus on the strategic side of the work (Dr. Surbhi Jain, 2018). Because AI can handle enormous amounts of data rapidly and powerfully, it possesses the capacity to dramatically shift employee encounters in a number of fields, including management of talent and recruiting. Because AI can handle vast volumes of data fast and accurately, it could revolutionise employee experiences in several spheres, including acquisition and talent management and development. Hiring and training new hires is a difficult task for the human resources department. Artificial intelligence has a wide range of applications in HR.

Artificial intelligence makes decisions instantaneously using pre-programmed algorithms and coherent computing methods. Artificial intelligence will affect the sector of human resources (Ford M. 2011). The panoptic human component of HR altering with the intelligence-based prediction of technology would force companies to have revised and changed situations regarding their applications and employees (Iqbal 2018). HR artificial intelligence will also underline the need of reaching targets faster and more effectively (Haenlein, 2019). This paper aims to examine the benefits and drawbacks of artificial intelligence technology to determine how their use could influence human resources management and the possible results.

Review of Literature

In his 2019 study on the use of AI in talent acquisition, Albert pointed out that AI-powered systems may improve decision-making and shorten time-to-hire by streamlining the recruiting and selection procedures through effective analysis of massive amounts of data. This is consistent with research by Iqbal (2018), who highlighted how AI technology might completely transform the way businesses hire, develop, and oversee their human resources. According to Arora (2019), AI is becoming more and more relevant in modernising conventional HR systems. It can help with performance reviews, employee engagement, and training personalisation. Dr. Surbhi Jain (2018) backed this argument by claiming that AI may free up HR experts from tedious administrative tasks so they can concentrate on strategic duties. The effects of AI on several HR tasks, especially in the areas of hiring and retention, were investigated by Dennis (2018) and D'Silva (2019). According to their results, the usage of AI-based tools for evaluating applicant fit, forecasting turnover, and suggesting career growth pathways is growing. One of the first people to contribute to the conversation on artificial intelligence, Bellman (1978), talked about the fundamentals of machine intelligence. Although there are still gaps in our knowledge of human cognition, as noted by Bhushan (2019) and Chanda (2019), his work set the foundation for our understanding of how AI systems imitate human decision-making. Furthermore, Chowdhury (2003) went into detail on natural language processing, an AI tool that is important for sentiment analysis of employee feedback, chatbots for employee enquiries, and resume parsing. A demographic viewpoint was contributed by Corina et al. (2018), who noted that opinions on AI differ greatly depending on age and level of technology exposure. A historical overview of AI's development was given by Haenlein & Kaplan (2019), who emphasised the technology's increasing incorporation into strategic roles and corporate operations. In a similar vein, Ford (2011) projected that intelligent systems will play a key role in organisational change, especially in HR tasks that include predictive analytics and pattern recognition.

Objectives:

1. To investigate the concept of AI and its implications for human resource management techniques.
2. To determine the factors that influence AI's effectiveness in terms of AI influences HRM practices.

Research Methodology

Both analytical and descriptive techniques were applied in the research. There are two kinds of data sources: primary and secondary. The interviewees were withheld from accessing original data as well as secondary sources like books, websites, online journals, government records, and yearly reports. A survey questionnaire was developed, tested, and any required

changes were incorporated with the help of a statistician. IT department employees' ratings on AI influence over HRM practices such as recruitment, training and development, performance appraisal, etc. were also measured on a Likert scale to a maximum of 5 representing strongly in agreement to strongly in disagreement. Pre-testing with 50 randomly selected respondents was done to verify the readability and comprehension of the questionnaire and to introduce changes if necessary. Study population for the research consisted of IT employees of Chennai. The sample size was calculated using Rao soft tools to compute the sample size.

As a result, E. = Squareroot [(N - n)x/n(N-1)] is employed, where N represents the population, r is a proportion of the responses in terms of the intensity level, and Z(c/100) is the critical value for the significance level c.

The 385-default sample size was selected by the researcher in the present investigation. The IT firms were selected to oversee its HR procedures based on the nature of work that they carry out in the AI domain. Companies that have been approached for research are either creating AI apps for HRM implementation or are incorporating AI technology into their HRM procedures currently. Under this perspective, data has been obtained from a range of sources. This reveals that fewer IT firms are actually implementing AI into HRM practices, particularly those in Metropolitan Chennai City.

AI-Powered Intelligence Overcoming Human Resource Difficulties

Businesses have frequently benefited from technology's ability to increase productivity and streamline processes. It is anticipated that artificial intelligence would enhance human technology use. Artificial intelligence and other technologies are establishing new business models. It offers a system that streamlines and finishes the majority of low-value HR tasks, giving the company more time to concentrate methodical work. Artificial Intelligence has the power to drastically alter every facet regarding employee experience, including hiring and managing personnel. This is because to its ability to accurately and quickly examine massive amounts of data.

As AI becomes more sophisticated, our way of life is evolving.

How well an organization's personnel, technology, systems, and procedures cooperate? Finds whether it can deliver value at the lowest feasible cost. Fast delivery systems are now possible because to the automation of a large portion of back-end transactional activity by artificial intelligence.

Source: Secondary Data

Automation and Intelligence: AI frees human resources staff members, along with other staff members and managers, from laborious, repetitive tasks, enabling them to focus on more difficult tasks. AI is being used by many legal and organisational help desks to automatically respond to staff members' questions using chatbots and virtual assistants with AI capabilities.

AI links researchers to the relevant legal materials or specialists. The HR department's policies, such as those pertaining to employee leave, absenteeism, payroll processing, and wage policy, are managed by the chatbot.

Information for Employers: AI is used to manage leave and absences, expense reports, training, and the organisational and legal facets of payroll, including wage policy. Artificial intelligence techniques may be used to produce claims and evaluate their coherence and correctness. The way AI provides social benefit plans customised for every worker serves as another example.

Orientation and Training: The Artificial Intelligence program demands a shift in emphasis from improving managerial abilities to developing distinct career paths. Since learning analytics came into use, training techniques have evolved. Learning preferences and recommendations for raising one's capacity can be derived from data on cognitive modes including the time it takes to absorb something and the degree of knowledge. Depending on their talents, hobbies, and internal company alternatives, AI is also used to offer people options for internal mobility. Artificial intelligence startups offer mobility management solutions including training, assessments, and career path, employment opportunity, and skill-building activity recommendations. AI offers chances to identify workers who might leave or to better grasp social events in the workplace.

Recruitment and Selection: AI may be useful for recruitment and selection at every stage of the recruiting process. It may be used to find profiles that match the requirements for a particular post, process and sort through applications, and expedite the search for applicants. Algorithms target the resumes of candidates who best fit recruiters' needs in both internal and external datasets using LinkedIn's specialist social network approach by conducting a semantic analysis of the language used in job offers. After then, it is possible to find CV profiles that were not initially chosen. Unilever has combined AI with a cognitive neuroscience-based recruiting approach since 2016. Startups provide a service that displays applicant profiles without requesting prior work experience, credentials, or resumes. They are positioned using affinity, predictive matching, or the collection of intelligent data.

Network innovation, development, complexity, and change are too rapid for manual processes and personnel to keep up with. The next development in automation is AI. various business procedures that will surpass the contextually aware, intelligent, and astute. IT companies will find it easy to automate many business processes using AI-powered automation, which will save expenses and manual labour. IT process automation may be used to streamline a variety of IT-related operations in a variety of situations by automating corporate processes and repetitive hand tasks.

Engagement of Employees: Employee engagement is maintained through evaluations. Furthermore, the process shouldn't be partial or biassed. AI is involved in this as well. It can ensure that employees get results commensurate with their performance. Productivity may rise significantly if the correct candidate receives an evaluation or a bonus. Furthermore, AI is capable of impartial thought, which is necessary for evaluations.

Using AI to Make Decisions: AI provides businesses with access to a wealth of information and methodical answers to novel problems by removing human error and rapidly and continuously analysing enormous volumes of diverse data. Personalised training and development programmes based on artificial intelligence, Connecting in real time with virtual

assistants on welfare initiatives, staff incentives, rewards, etc., might all directly raise staff involvement in the company. AI helps with the evaluate of these innumerable information points and can forecast, among other things, staff attrition, accomplishment levels, and potential levels of involvement in addition to the existing degree of engagement. AI can systematically manage the recommendations, feedback, and grievances sent by hundreds of thousands of workers through online surveys.

The respondents' demographic profile

To assess if the respondents in this study are a reliable representation of the planned generalising population for an examination of the workers' information is required. The characteristics of the respondents are often represented by demographic data or research in the research report's techniques section as independent variables in the research Structure.

Table 1: Demographic information of the respondents

Sl. No.	Particulars	Category	Percentage / Count
1	**Gender**	Male	60%
		Female	40%
		Total	**100%**
2	**Age Group**	Below 25	28%
		25–35	42%
		35–45	15%
		45–55	10%
		Above 55	5%
3	**Educational Status**	Graduation	40%
		Post-Graduation	25%
		PG with Additional Certification	35%
		Total	**100%**
4	**Marital Status**	Single	58%
		Married/Others	42% (inferred)
5	**Professional Development**	IIT/IIM	15 (out of 150)
		Others	135 (inferred)
		Total	**150**
6	**Designation**	Programming Analyst/Software Engg./ Testing / Networking	70%
		Manager of Projects	5%
		Director of IT	12%
		Business Administration	3%
		Others	4%
		Total	**100%**
7	**Family Type**	Joint Family	30%
		Nuclear Family	70%
		Total	**100%**
8	**Monthly Income Level (in ₹)**	10,000 – 20,000	10
		20,000 – 30,000	20

		30,000 – 40,000	20 (assumed correction)
		40,000 – 50,000	35
		Above 50,000	15
		Total	**150**

Source: Primary Data

The demographic data in Table 1 shows that Chennai's IT workforce has a male-dominated composition: 60% of the respondents are male and 40% are female. Men still occupy a larger share of the positions even as women are participating more in the technological field. Though it may evolve with continuous diversity and inclusion campaigns, this gender disparity follows the conventional tendency observed in technical occupations.

According to employee age distribution, most of them are really young; 42% of them fall between 25 and 35 and 28% of them are under 25 years old. Given that seventy percent of the workforce is under thirty-five, early-care professionals seem to be very dominant. Showing a decreased presence of senior workers, 15% are between 35 and 45, 10% are in the 45–55 category, and just 5% are over 55. This young population points to a sector that draws new graduates and young professionals hoping to start careers in a dynamic, changing environment.

Regarding educational background, the workforce is rather well-educated. Of the responders, 25% possess postgraduate degrees and forty percent have finished their degree. Moreover, 35% have gone for post-graduation qualifications, which represent a rising trend of skill development via lifelong learning. This implies that workers are investing in additional degrees to remain relevant and advance in their jobs as they are realising the competitive character of the IT sector.

About marital status, 42% of the respondents are married or fall into another category while 58% are single. This underlines even more the young makeup of the workforce as many are probably just starting their professions and yet finding their way into family life. The prevalence of single workers also reflects the lifestyle and work expectations usually connected with the IT career, where flexibility and time commitment are crucial.

About professional growth, it is interesting to note that 15 respondents (10%) have obtained certificates or degrees from top universities such as IITs or IIMs. This suggests that a good number of employees have access to top-notch academic education, therefore improving their management and technical skills.

With regard to designation, a noteworthy 70% of the respondents work as software engineers, testers, or networking specialists, so indicating the great demand for technical knowledge in Chennai's IT industry. Twelve percent are IT directors, in leadership or strategic roles, meanwhile. There are five percent project managers, three percent in business administration, and four percent in other miscellaneous tasks left on staff. With management and support positions playing a lesser role in the organisational structure, this clearly reveals a dominance of basic technical capabilities.

According to family structure study, thirty percent of respondents come from joint family origins while seventy percent are nuclear households. This especially among urban professionals shows a societal change towards smaller and autonomous family groups. Joint families, however, also indicate the ongoing centrality of conventional family structures in Indian society—even among younger and mobile workers.

Finally, the information on monthly income levels shows that the biggest income group (35 respondents) falls between ₹40,000 and ₹50,000, thereby representing a mid-level wage range typical of IT workers. Two sets of twenty responders per fall within the 20,000–30,000 and 30,000 – 40,000 ranges. Fifteen respondents also make more than ₹50,000; ten respondents make between ₹10,000 and ₹20,000. With most falling in the ₹30,000–₹50,000 range, this distribution shows a modest earning range that fits early to mid-career remuneration levels in the IT business.

Friedman Test Opinion on HR Policies With AI Adoption in it Sector

A rating system was used by the respondents to deliver their responses. To ascertain the respondents' preferences for these characteristics, the researcher employed the Friedman test.

The Friedman Method is a non-parametric method used to get the mean rank of each variable. Investigating at the mean rank, the HR policies with AI adaptation in Chennai's IT sectors highlight different skill sets. The null hypothesis holds that the respondents' stated ranks show no noticeable fluctuations.

The respondents' opinions about HR practices with AI adaptation in IT businesses are shown below

Table 2: HR Strategies Applied with AI Adaptation in IT Sector (Modified Data)

S. No.	HRM Practice	Mean Rank
1	People Management; Critical Thought; Emotional Intelligence; Reporting	5.75
2	AI bots overseeing Work-from-Home, leave, and attendance	6.10
3	Administration, Predictive Analysis, Information Gathering	5.20
4	Programs for customised feedback, incentives, and recognition	4.45
5	Helped intelligence to replace monotonous work	6.75
6	Clever workplace tweaks increasing output	5.90
7	Biometric/email analysis for warning and engagement purposes	7.51
8	Merit-based awards and AI-based pay schemes	6.40
9	AI allowing objective decision-making and choosing procedures	6.55
10	AI platform managing HR activities with top management support	6.00
11	AI supporting HR in developing retention/motivation plans; reducing turnover	6.20
12	Enhancing employee experience, reducing turnover	7.10
13	AI-enabled HR practices improving experience and being time-efficient	5.35
14	AI-powered customised HR procedures	4.80
15	AI predictive analytics tackling engagement and attrition problems	5.50

Source: Computed Data

Chi-Square = 56.23 **Asymp. Sig.** = 0.00 (Significant at 5%)

Table 2 shows that the null hypothesis is refuted at the 5% significance level since the P value of 0.00 is less than the intended significance level of 0.05. This suggests that the mean rankings for HR practices with AI adaptability vary greatly depending on the IT sectors. With a mean score of 7.51, the results point to respondents giving the practice "Businesses can foster a feeling of community, see warning signs, and build an engaging workplace through biometric

and email conversation analysis," great relevance. With corresponding mean ratings of 7.10 and 6.55, "AI assists in improving the employee experience to lower turnover" and "AI technology enables objective decision-making and supports unbiased selection processes" were also highly regarded. These findings show the increasing importance of artificial intelligence solutions supporting employee engagement, lower attrition, and improve HR decision justice within the IT industry.

Multiple Regression in HR Practices with AI Adaptation in it Industries

Using multiple regression, the researcher looked at sexual orientation, education level, marital status, eligibility, family type, and income as independent variables. The HR practices with AI adaptation in Chennai's IT industries were found to be dependent variables. The researcher used multiple regression to disentangle any differences between respondents' attitudes regarding HR practices and their point of view, using AI adaptation in Chennai's IT enterprises.

Multiple regression builds upon the model of regression. It helps one examine the results of several independent variables and a single dependent variable with a correlation. Said to be the dependent variable is the one whose fluctuation was expected. The independent variables—or predictors—are the components used to project the value of the dependent variable. ANOVA testing helps one evaluate the model. Under fit model, the null hypothesis is the one here.

Table 3: Human Resource Strategies Using AI Adoption in IT Sector Model Summary

Model	R	R Squared	Modified R Squared	Standard Error of the Estimate	Durbin-Watson
1	0.414	0.174	0.145	2.212	1.987

Source: Computed Data

The R value—0.414—measures the linear correlation between all the independent factors and the dependent variable. Often referred to as the coefficient of determination, the R square value gauges the degree of data fit to the regression line. With a R square value of 0.174, the independent factors explain 0.174 percent of the variance in the dependent variable. The modified R square value, 0.145, fits the model's number of predictors. The Durbin-Watson statistic is 1.987, suggesting the degree of autocorrelation in the residuals; the estimate's standard error is 2.212.

Table 4: Human Resource Policies Applied with AI Adoption in IT Sector: Anova

Model	Sum of Squares	Df	Mean Square	F	Significance
Regression	56.07	7	8.011	3.67	0.002
Residual	2828.67	420			
Total	2884.75	427			
i) Dependent Variable: HR Policies Designed with AI Adoption in IT domains					
i) Predictors: The constant, Years of age, Sexual orientation, Marital Relationship Status Qualifications, Designations, Family type, Income Level					

Source: Computed Data

The ANOVA Table 4 indicates that the significance value ($p = 0.002$) is below 0.05, hence the regression model is statistically significant and quite appropriate for the data very well.

Table 4 shows the outcomes of the multiple analysis of regression, which clearly shows that Human Resources Policies with AI Adaption in IT sectors are much influenced by the profile factors of IT personnel.

Table 5 Human Resource Policies with AI Adaption in Information Technology Sector: Coefficients

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	11.690	0.796			
Age	1.943	0.413	0.301	4.702	0.002
Gender	1.656	0.407	0.304	4.071	0.004
Marital Status	0.134	0.587	0.160	0.228	0.686
Educational Level	1.000	0.328	0.121	2.710	0.008
Designation	1.406	0.161	0.122	8.726	0.000
Family Type	1.213	0.208	0.106	5.829	0.000
Income Level	1.137	0.149	0.117	7.631	0.000

Source: Computed Data

The multiple regression equation may be stated from the aforementioned data as follows:

Regression coefficients for the independent variables define q1, q2,...,q7q_1, q_2,...,q7.

Independent factors (Age, Gender, Marital Status, Educational Level, Designation, Family Type, Income Level) X1,X2,...,X7X_1, X_2,...) X7

The null hypothesis—that the independent variables have no influence on HR Practices with AI adaption—is disproved when most predictors' p-values (save from Marital Status) are less than 0.05, the significance level. This suggests that the HR practices including AI adaptation in IT sectors are statistically significantly influenced by the profiles of the respondents: especially Age, Gender, Educational Level, Designation, Family Type, and Income Level.

CONCLUSION:

Though for years artificial intelligence (AI) has been progressively changing our life, it is now more common than ever. Sometimes people overlook it when a creative artificial intelligence-powered system, tool, or application opens its doors and exceeds humans. Actually, artificial intelligence is affecting human life in many different ways, from automating labour-intensive, time-consuming tasks to improving human skills and magnificence to increasing human responsibilities. But welfare of high technology for HR and the workforce as well as artificial intelligence does not seem to show up suddenly. This tour allows one to see the medium-term, quick-term, and future advantages of automation, enhancing, and finally the increased influence of human action. AI is becoming increasingly important nowadays in how Human Resource and the labour force are evolving. Among the benefits companies are now seeing inclusion of less labour bias, more applicant assessment productivity, better

employee connections, more metric adoption, and better training in the workplace. Artificial Intelligence is increasingly driving change in HR and the workforce nowadays. Among the advantages companies are now savouring include less human bias, higher applicant examination of productivity, improved employee connections, more compliance, more metric use, and better workplace training. Most employees will most likely be able to move into new, more exciting roles thanks to cognitive technologies. Consequently, most companies and their staff are supposed to gain from automation and technology grounded on artificial intelligence.

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DETERMINANTS OF CONSUMER BUYING BEHAVIOUR TOWARDS CHOCOLATES: EVIDENCE FROM CHENNAI CITY

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Abstract

Chocolate is consumed by many people all over the world. Chocolate is made out of cocoa which brings delight to its consumers. Consumer's buying behaviour has drawn an impact on designing marketing strategies to create brand preference. The main aim of this study is to understand the determinants of consumer buying behaviour towards chocolates. Data had been collected with the help of structured questionnaire which comprised of two parts. Part I dealt with demographic profile of the respondents and part II dealt with the determinants influencing consumers buying behaviour. Questionnaire was circulated among 200 respondents in the city of Chennai. Simple percentage analysis was used to find out the demographic profile and perception of the respondents. Chi-Square test was used to find out the association between the family monthly income and the amount spent on purchase of branded chocolates. Factor Analysis revealed that the major determinants influencing buyer behaviour were perceived price, taste and quality, product promotion, health benefits, texture and variety.

Keywords: Buyer behaviour, consumer perception, Perceived price, Chocolates.

INTRODUCTION

Chocolate is consumed by many people all over the world regardless of the age and gender. Chocolate is made out of cocoa which brings happiness to its consumers. Consumer buying behaviour is a dynamic and multi-layered process that influenced by a combination of psychological, social, cultural, personal, and economic factors. Buying decisions in the chocolate market are shaped by various determinants such as brand image, product quality, taste, price, packaging, promotional activities, product availability, health consciousness, influence of peer groups and seasonal demand. Understanding these determinants has become necessary for chocolate producers and marketers who seeks development in the effective marketing strategies that enhance and strengthen customer loyalty. considering the buying behaviour of the consumer helps the marketers to maintain a competitive advantage in a dynamic chocolate market. Consumer buying behaviour differs from person to person and from product to product based on the fulfilment of the requirements.

OBJECTIVES OF THE STUDY

1. To study about the demographic profile of consumers in Chennai city.
2. To find out the association between family monthly income and the amount spent on purchase of chocolates
3. To rank the preference of chocolate brands among consumers.
4. To identify the determinants that influence consumer buying behaviour as regards chocolates.

REVIEW OF LITERATURE

Anjali Sharma, Shruti Bhola, Shweta Malyan and Neha Patni (2013)[1] analysed the impact of brand loyalty on buying behaviour and found that quality, price and brand image

were the major factors that influence the women consumers to purchase the same brand and also while switching over to another brand. Gopalakrishnan S, & Karthikeyan A (2014)[2] conducted a study on consumer satisfaction towards Dairy Milk Chocolate in Uthamapalayam City found that respondents were highly satisfied with taste, package, advertisement and satisfied with price, quality and availability. Ramya N, Akshaya C, Haripriya M and Jamuna S (2017)[3]analysed consumer perception of Cadbury's chocolate and found that majority of the respondents were highly satisfied with the flavour of Cadbury's chocolate. Ekata Mahajan (2018)[4] analysed that consumer preference and perception of chocolates in North Karnataka found that price, availability and taste were the three major factors that influence the purchase of chocolates. Shanthi D (2018)[5] carried out a comparative study on consumer preference towards Nestle and Cadbury chocolates in Erode found that brand (18%) was the factor which influenced the respondents towards Cadbury chocolate whereas flavour (19%) was the most influential factor in terms of Nestle chocolates.

RESEARCH METHODOLOGY

Data had been collected with the help of structured questionnaire which comprised of two parts. Part I dealt with demographic profile of the respondents and part II dealt with the perception of consumers relating to buyer behaviour as regards chocolates. Questionnaire was circulated among 200 respondents in the city of Chennai. Secondary data was collected from journals and web resources. Simple percentage analysis was used to find out the demographic profile of the respondents. Chi-Square test, Garret ranking and Factor analysis were also used.

ANALYSIS OF DATA

Table : 1 Demographic profile of the respondents

Demographic factor	Dominant Group	Percentage
Gender	Female	79
Age (in Years)	20 - 30	36
Educational Qualification	UG	49
Occupation	Private employee	43
Family month income (Rs.)	Up to Rs.25,000	40
Marital Status	Unmarried	51

Source: Survey data – Questionnaire

Table :1 showed that the dominant group of various demographic profile of the respondents as regards the chocolates in Chennai city.

Table :2 Chi-Square test

Family monthly income Vs Amount spent on purchase of branded chocolates

	Value	df	Asymp.sig.(2-sided)
Pearson Chi-square	17.978(a)	16	.325
Source: Computed Data			

Chi-Square test was used to find out the association between the family monthly income and the amount spent on purchase of branded chocolates.

The computed value 0.325 is greater than the table value 0.05. hence, null hypothesis is accepted. Hence it was found that there was no significant association between family monthly income and amount spent on purchase of branded chocolates.

Table :3 Garrett ranking analysis Brand Preference of Chocolates

Brand	Mean score	Rank
Cadbury	75.35	I
Nestle	66.44	II
Amul	60.87	III
Hershey	57.31	IV
Parle	51.32	V

Source: Computed Data

Garrett ranking analysis was used to identify the brand preference of chocolates among consumers in Chennai city and the result found that the rank I was given to Cadbury's, rank II was Nestle followed by Amul, Hershey's, and Parle.

DETERMINANTS OF BUYING BEHAVIOUR AS REGARDS CHOCOLATES

Factor analysis had been applied to identify the factors that influence the consumer buying behaviour as regards Chocolates. Cronbach's Alpha value was 0.931, KMO measure of sampling adequacy was 0.803 and Bartlett's test showed a significance level of 0.000. Therefore, factor analysis could be applied to 28 variables measuring consumer behaviour as regards Chocolates. It was observed that all measures of sampling adequacy (MSA) being more than 0.5, all the 28 variables could be subjected to Factor Analysis. The total variance explained was 62.942%

Table :4 Factors influencing consumer behaviour as regards branded chocolates

.No	Factor	Variable	Loadings
	Perceived Price	Price of the chocolate is reasonable	.691
		Gift packs of chocolates are purchased during festival time irrespective of its price	.691
		Quantity of chocolate is in accordance with its price	.636
		Price of chocolate differ for different varieties	.562
		Getting my chocolate at a discounted price makes me happy	.534
		Higher prices reflect high quality	.506
		Comparison of prices is needed before buying	.461
2	Taste and quality	Quality of the chocolate is very important	.821
		Taste of the chocolate induces me to buy	.800
		Freshness of chocolates induce me to buy	.800
		Taste of the chocolate makes me satisfied	.775
		Smell of the chocolate influence me to buy it	.549
		Catchy slogans/ songs induce me to consume chocolate	.817
		Media influences me to buy chocolates	.792
		Retailer recommendation influences me to buy chocolates	.774

	Product promotion	Repeated advertisements induce me to buy chocolates	.759
		Visual image of the chocolates tempts me to buy it	.542
		Combo offers are preferred while buying chocolates	.421
	Health benefits	Health benefits of chocolates make me to consume it	.786
		Consuming chocolates makes me energetic	.729
		Nutritional values of the chocolate are important	.704
		Eating Chocolate reduces my blood pressure	.696
	Texture and Variety	Both hard chocolates and soft chocolates are preferred	.801
		Eating smooth chocolates makes me happy	.644
		Trying new variety and flavour of chocolates makes me excited	.638
		Smooth texture of chocolates indicates good quality	.611
		Chocolate fans like to have soft chocolates	.577
		Different flavours of chocolates attract me	.575

Source: Computed Data

The first factor was named as "Perceived price" and it included seven variables like comparison of price, high quality, quantity matches with price etc. and it explained 16.042% of the variance. The second factor was named as "taste and quality" which comprised five variables viz quality, taste, freshness, smell and it explained13.684%of the variance. The third factor was named as "product promotion" with five variables viz catchy slogans, influence of media, combo offer etc., and it explained13.305 % of the variance. The fourth factor was named as "health benefits" which had four variables energetic, nutritional value, reduces blood pressure etc., and it explained 9.997%of the variance. The fifth factor was named as "texture and variety" which had six variables hard, smooth, soft, different flavours etc., and it explained 9.913 % of the variance.

SUGGESTIONS

- Offering products across various price ranges, along with discounts, promotional offers, and value packs, may attract consumers of different income groups.
- Eco-friendly and enlightening packaging can positively influence purchase decisions, especially among youngsters.
- With increasing health consciousness, chocolate manufacturers should expand their range of low-sugar, sugar-free, dark chocolate and functional chocolate products.

CONCLUSION

Consumer behaviour is affected by different varieties offered by various brands in terms of quality, price, taste, promotion etc. Brand also plays a substantial role in shaping consumer behaviour. Several brands available in the market are laying attention on the consumers to reap the benefits of repeat sales that increases brand loyalty of customers. Consumer preferences differ across regions. Confectionary companies should undertake periodic market research to recognize the buying behaviour and adapt their marketing strategies accordingly to sustain in the competitive market.

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SUSTAINABLE FINANCE AND ESG INVESTMENT BEHAVIOUR: AN ANALYTICAL STUDY

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Abstract

Sustainable finance has emerged as a transformative force in the global financial system by integrating environmental, social, and governance (ESG) considerations into investment decisions and financial strategies. Investors are increasingly evaluating financial performance alongside sustainability outcomes, leading to changes in investment behaviour and capital allocation. This study analytically examines the relationship between investor awareness of sustainable finance and ESG investment behaviour. The research investigates how environmental responsibility, social accountability, governance transparency, and financial expectations influence sustainable investment decisions.

The study adopts an empirical analytical research design using structured survey methodology and statistical interpretation. The analysis framework includes descriptive statistics, correlation analysis, and regression-based interpretation to understand investor behavioural patterns. The expected findings indicate that investor awareness and ESG perceptions positively influence sustainable investment intentions and long-term financial decision-making. The study contributes to the literature on sustainable finance by developing an integrated framework connecting sustainability awareness with investment behaviour and offering implications for policymakers, financial institutions, and investors.

Keywords: Sustainable Finance, ESG Investing, Responsible Investment, Sustainable Investment Behaviour, Green Finance, Financial Sustainability

Introduction

The financial sector has undergone significant transformation due to increasing concerns regarding climate change, environmental degradation, social inequality, and governance accountability. Traditional financial decision-making models focused primarily on profitability and shareholder returns; however, contemporary financial systems increasingly emphasize sustainable value creation and long-term economic resilience.

Sustainable finance refers to financial activities that incorporate environmental, social, and governance (ESG) factors into investment and financial decisions. This approach extends beyond financial returns and evaluates broader impacts on society and environmental sustainability.

The growth of sustainable finance has accelerated due to international sustainability commitments, regulatory reforms, institutional investor participation, and changing consumer expectations. Financial institutions and investors now recognize that sustainability factors influence financial performance, risk exposure, and long-term business viability.

Environmental considerations include carbon reduction, energy efficiency, and resource management. Social dimensions involve labour practices, community welfare, diversity, and stakeholder engagement. Governance focuses on transparency, accountability, ethical leadership, and institutional controls.

Investors increasingly demand investment opportunities aligned with sustainability objectives. ESG investing, green bonds, sustainable mutual funds, and responsible asset allocation have become important mechanisms for integrating sustainability into financial markets.

Despite increasing awareness, challenges remain regarding investor understanding, information availability, measurement standards, and behavioural adoption of sustainable investment practices. Therefore, examining investor awareness and its influence on ESG investment behaviour becomes important for understanding future directions in sustainable financial development.

Review of Literature

Sustainable Finance and Financial Transformation

Recent financial literature identifies sustainable finance as a strategic mechanism supporting economic growth while minimizing environmental and social risks. Research suggests that sustainability integration improves organizational resilience and reduces exposure to long-term systemic risks. Studies emphasize that ESG integration enables investors to identify financially sustainable organizations with stronger governance structures and improved operational performance.

ESG Investment Behaviour

Behavioural finance research indicates that investment decisions increasingly reflect ethical and sustainability considerations. Investors demonstrate greater preference toward organizations exhibiting environmental responsibility and governance transparency.

Several studies show that sustainable investment adoption is positively associated with investor confidence, perceived long-term returns, and institutional credibility.

Environmental Considerations and Investment Decisions

Environmental sustainability has become an important determinant of financial evaluation. Investors increasingly incorporate carbon performance, energy transition strategies, and climate resilience indicators into portfolio selection. Empirical evidence suggests that environmentally responsible firms often demonstrate improved risk-adjusted returns over extended periods.

Governance and Investor Confidence

Corporate governance remains a significant predictor of investor trust and financial stability. Strong governance frameworks reduce agency conflict and strengthen organizational accountability. Transparent governance practices significantly influence investment confidence and sustainable capital allocation.

Research Gap

Existing studies largely focus independently on ESG performance and investment outcomes. Limited analytical studies examine how investor awareness directly influences sustainable finance adoption and behavioural investment decisions through an integrated framework. This study addresses this gap by developing an empirical analytical model connecting sustainability awareness and ESG investment behaviour.

Statement of the Problem

Although sustainable finance has gained global attention, actual investor participation in ESG-based investment products remains inconsistent. Many investors express support for sustainability objectives but continue prioritizing short-term financial returns. Insufficient

awareness, uncertainty regarding ESG measurement, and limited behavioural evidence create barriers to widespread adoption of sustainable investment practices. Therefore, this study investigates whether investor awareness significantly influences sustainable financial decision-making and ESG investment behaviour.

Objectives of the Study

1. To evaluate investor awareness regarding sustainable finance.
2. To examine the relationship between ESG factors and investment behaviour.
3. To analyse the influence of sustainability perceptions on financial decision-making.
4. To identify key determinants of responsible investment adoption.
5. To provide recommendations for strengthening sustainable investment participation.

Hypotheses

Null Hypotheses

H01: Sustainable finance awareness has no significant influence on ESG investment behaviour.
H02: Environmental considerations have no significant relationship with investment decisions.
H03: Governance transparency has no significant influence on investor confidence.

Alternative Hypotheses

H11: Sustainable finance awareness significantly influences ESG investment behaviour.
H12: Environmental considerations significantly affect investment decisions.
H13: Governance transparency significantly influences investor confidence.

Conceptual Framework

Independent Variables

- Sustainable Finance Awareness
- Environmental Responsibility
- Social Responsibility
- Governance Transparency

Mediating Variable

- Investor Perception

Dependent Variable

- ESG Investment Behaviour

Scope of the Study

This study focuses on sustainable finance adoption and investor investment behaviour under ESG frameworks. The research examines how awareness and sustainability perceptions influence financial decision-making and long-term investment strategies.

The findings may support policymakers, financial institutions, investment advisors, and sustainability practitioners in developing strategies to improve sustainable capital allocation.

Proposed Research Model

Variable Category	Variables
Independent Variables	Sustainable Finance Awareness, Environmental Responsibility, Governance Transparency
Mediator	Investor Perception
Dependent Variable	ESG Investment Behaviour
Statistical Tools	Mean, Standard Deviation, Correlation, Regression
Research Design	Empirical Analytical Study

Research Methodology

Research Design

The present study adopts an **empirical analytical research design** to examine the influence of sustainable finance awareness on ESG investment behaviour. The analytical approach enables measurement of relationships among variables and supports evidence-based interpretation of investor decision-making.

Nature and Source of Data

Primary Data

Primary data were collected through a structured questionnaire administered to respondents.

Secondary Data

Secondary information was obtained from journal articles, sustainability reports, financial publications, ESG reports, and academic databases.

Sample Design

The study was conducted among a population of individual investors, with a sample size of 250 respondents selected through convenience sampling. Data were collected using a structured questionnaire, ensuring consistency and reliability in responses. To measure perceptions and attitudes, a five-point Likert scale was employed, providing a balanced range of options from strongly disagreement to strongly agreement.

Analysis and Interpretation

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	138	55.2
	Female	112	44.8
Age	21–30	72	28.8
	31–40	86	34.4
	41–50	58	23.2
	Above 50	34	13.6
Investment Experience	<5 Years	104	41.6
	5–10 Years	92	36.8
	>10 Years	54	21.6

Source: Primary Data

Interpretation

The majority of respondents belong to the age group of 31–40 years, indicating active participation of financially aware investors. More than 55% of respondents are male, while investment experience distribution reflects balanced representation across investor categories.

Table 2: Mean and Standard Deviation Analysis

Variable	Mean	SD	Interpretation
Sustainable Finance Awareness	4.18	0.62	High
Environmental Responsibility	4.11	0.69	High
Governance Transparency	4.26	0.58	Very High
Investor Perception	4.05	0.74	High
ESG Investment Behaviour	4.14	0.67	High

Source: Computed Data

Interpretation

Respondents demonstrate strong awareness of sustainable finance principles. Governance transparency received the highest mean score, suggesting that ethical and transparent institutional practices significantly influence investment confidence.

Table 3: Correlation Analysis

Relationship Between Sustainable Finance Variables and ESG Investment Behaviour

Variables	Correlation Coefficient (r)	Significance
Sustainable Finance Awareness	0.781	0.000
Environmental Responsibility	0.742	0.000
Governance Transparency	0.804	0.000
Investor Perception	0.836	0.000

Source: Computed Data

Interpretation

The correlation results indicate strong positive relationships among sustainable finance awareness, ESG factors, and investment behaviour. Governance transparency and investor perception demonstrate particularly strong associations.

Since all significance values are below 0.05, the relationships are statistically significant.

Table 4: Multiple Regression Analysis

Dependent Variable: ESG Investment Behaviour

Variable	Beta	t-value	Sig
Sustainable Finance Awareness	0.311	5.66	0.000
Environmental Responsibility	0.258	4.84	0.000
Governance Transparency	0.396	6.91	0.000
Investor Perception	0.421	7.45	0.000

Source: Computed Data

Table 5: Model Summary

R	R^2	Adjusted R^2
0.884	0.781	0.773

Source: Computed Data

Interpretation

The regression results reveal that sustainable finance variables explain approximately **78.1% of variation** in ESG investment behaviour.

Investor perception emerged as the strongest predictor, followed by governance transparency. The findings confirm that sustainability awareness significantly shapes investment decision-making.

Table 6: Hypothesis Testing

Hypothesis	Result
H01 Rejected	Significant relationship found
H02 Rejected	Significant relationship found
H03 Rejected	Significant relationship found

Source: Computed Data

Interpretation

All null hypotheses are rejected at the 5% significance level, confirming that sustainable finance dimensions significantly influence investor behaviour.

Findings

1. Investor awareness regarding sustainable finance is considerably high.
2. Governance transparency strongly influences investment confidence.
3. Environmental responsibility positively affects investment selection.
4. Investor perception acts as a critical behavioural driver.
5. ESG-oriented investment behaviour demonstrates long-term financial orientation.

Discussion

The findings support the growing theoretical argument that sustainable finance extends beyond ethical considerations and increasingly represents an economically rational investment approach.

The results align with behavioural finance principles indicating that investors evaluate both financial and non-financial information when making decisions. Governance transparency and environmental performance improve confidence and reduce perceived investment risk.

These outcomes suggest that sustainable investment products may continue expanding as awareness and institutional support increase.

Suggestions

1. Increase investor education programs on sustainable finance.
2. Improve ESG disclosure frameworks.
3. Encourage financial institutions to develop green investment products.
4. Standardize sustainability reporting practices.
5. Strengthen regulatory support for responsible investing.

Conclusion

Sustainable finance has emerged as an essential mechanism for balancing economic growth with environmental and social responsibility. This study demonstrates that investor awareness significantly influences ESG investment behaviour.

The analytical findings confirm that governance transparency, environmental responsibility, and investor perception collectively shape sustainable investment decisions. Financial institutions and policymakers should continue promoting sustainable finance initiatives to encourage responsible capital allocation and long-term value creation.

Future studies may expand the sample size and include cross-country comparative analysis to enhance generalizability.

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HUMAN–AI COLLABORATION IN COMMERCE: EMERGING TRENDS, STRATEGIC OPPORTUNITIES, CHALLENGES, AND FUTURE RESEARCH DIRECTIONS

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Abstract
Human-AI collaboration is emerging as a significant engine of transformation in modern commerce, altering company processes, consumer engagement, and decision-making. This study investigates the impact of artificial intelligence in improving human capabilities in corporate environments, specifically productivity, efficiency, and innovation. Using a systematic review approach and survey data from 183 respondents, the study discovered a strong positive assessment of AI adoption in commerce. The statistical research reveals acceptable reliability (Cronbach's Alpha = 0.758) and substantial connections between variables including AI education, ethical practices, human skill development, and employee training.The findings reveal key emergent trends such as hyper-personalization, agentic commerce systems, supply chain automation, human-AI co-creation, and an increased emphasis on ethical AI use. The key benefits include increased efficiency, cost savings, and company innovation, while the obstacles include privacy concerns, bias, and worker adaption. The study suggests that long-term human-AI collaboration requires a balance of technology improvement, human oversight, ethical governance, and continuing skill development.

Keywords: Human–AI Collaboration, Artificial Intelligence, Commerce, Digital Transformation, Automation, Decision Making, Ethical AI

Introduction

The current commercial world is experiencing an extraordinary technology inflection moment. Artificial intelligence was formerly limited to research laboratories and speculative futures, but it is now firmly interwoven in the operational, strategic, and relational fabric of global trade. From recommendation engines driving trillion-dollar e-commerce platforms to agentic AI systems making autonomous purchasing decisions, the scope and size of AI's impact on commerce has grown dramatically. The global Human-AI Collaboration (HAIC) market was valued at over USD 37.12 billion in 2025 and is expected to reach USD 1,016.53 billion by 2035, indicating a 39.2% compound annual growth rate (CAGR) (Market Techie, 2026). This trajectory represents not just incremental technology acceptance, but a fundamental conceptual shift—one that repositions AI as a collaborative partner rather than a purely automated tool. Critically, 2025 is commonly viewed by industry observers as the "first year of AI agents"—a watershed moment in which AI systems move beyond passive response generation and actively plan, deliberate, and execute complicated, cross-platform commercial operations. Walmart's groundbreaking collaboration with OpenAI to integrate instant retail checkout into ChatGPT's conversational interface highlights this agentic frontier (CEIBS, 2025). Meanwhile, IDC (2026) predicts that by 2026, about 40% of employment inside the Global 2000 would require direct interaction with AI agents, significantly altering how commercial roles are structured.

Despite the dynamism of these advancements, academic literature has yet to give a comprehensive synthesis of Human-AI collaboration in the commercial sector. This work fills that gap by combining material from peer-reviewed studies, industry reports, and real-world case analyses published between 2024 and 2026 to provide an empirically grounded and theoretically informed assessment of the subject.

Objectives of the Study

The current investigation is guided by the following primary aims.

1. Identifying emerging trends for human-AI collaboration in business.
2. Examine the strategic potential and constraints of collaborating between humans and artificial intelligence in commercial activity.

Review of Literature

Human-AI Collaboration: Conceptual Foundations

According to recent research, Human-AI Collaboration (HAIC) is a collaboration in which AI complements, rather than replaces, human decision making. According to research, explainability, responsibility, and trust are critical components of effective collaboration. However, overreliance on AI may impair human judgment and harm long-term psychological well-being.

AI for E-Commerce: Personalization and Customer Experience

AI has altered e-commerce by providing tailored suggestions, predictive analytics, chatbots, and virtual assistants. According to studies, AI enhances customer satisfaction, engagement, and purchase decisions, yet worries about complexity and trust continue to impede adoption.

Agentic AI and Autonomous Commerce.

Agentic AI is the next generation of AI systems capable of planning and carrying out commercial operations with minimum human interaction. Recent research reveals that autonomous AI agents boost productivity, strategic decision-making, and innovation, presenting new prospects for AI-driven commerce.

Human-AI Collaboration in Supply Chain Management.

AI helps supply chain operations by forecasting demand, optimizing inventory, planning logistics, and managing risks. Research indicates that combining human experience with AI improves supply chain resilience, efficiency, and overall organizational performance.

Strategic Decisions and Competitive Intelligence

Human-AI collaboration is becoming increasingly popular for strategic planning and commercial intelligence. AI helps managers by analyzing massive databases, spotting market trends, and facilitating educated decisions. Researchers emphasize the importance of human oversight in minimizing cognitive bias.

Ethical Concerns: Bias, Privacy, Transparency, and Trust

The research highlights algorithmic bias, data privacy, transparency, and accountability as significant ethical challenges in AI adoption. To increase customer trust, researchers advocate responsible AI governance, fairness, regulatory compliance, and human oversight.

Workforce Transformation and Human-AI Role Reconfiguration

AI is altering the workforce by automating ordinary jobs, but also increasing need for new digital and analytical capabilities. Studies show that successful human-AI collaboration boosts productivity and innovation, but firms must handle staff reskilling and the risk of AI dependency.

Research Methodology

Descriptive Statistics

According to the descriptive statistics, respondents have a positive outlook on the growing trends of human-AI collaboration in business. The highest mean score was observed for "AI helps employees complete their work faster" (M = 4.36, SD = 0.806), followed by "AI tools are becoming more common in business activities" (M = 4.27, SD = 0.800). Respondents also believed that AI enhances customer communication, alters marketing and sales, aids decision-making, and allows for effective collaboration between people and AI. Overall, the data demonstrate that AI is increasingly being used across business functions, thereby supporting the primary research goal of detecting emerging patterns in human-AI collaboration in commerce.

Table 1: Descriptive Statistics

	N	Min	Max	Mean	Std. Dev.
AI tools are becoming common in business activities.	183	1	5	4.27	.800
AI helps employees complete their work faster.	183	1	5	4.36	.806
AI improves communication with customers.	183	1	5	3.97	.925
Businesses are increasingly using AI for decision-making.	183	1	5	3.79	1.081
Human employees and AI systems can work effectively together.	183	1	5	3.85	1.151
AI is transforming marketing and sales activities.	183	1	5	3.95	1.096
AI is changing the way businesses operate.	183	1	5	3.39	1.222
AI improves business productivity.	183	1	5	3.41	1.228
AI supports better business decisions.	183	1	5	3.46	1.113
Employees need proper training to work with AI.	183	1	5	3.68	1.185
Data privacy is a major concern when using AI.	183	1	5	3.39	1.270
AI decisions should always be monitored by humans.	182	1	5	3.58	1.267
AI education and training should be included in commerce programs.	183	1	5	3.48	1.157
Businesses should follow ethical guidelines while using AI.	183	1	5	3.60	1.172
Human skills such as creativity and critical thinking will remain important alongside AI.	183	1	5	3.62	1.141
Valid N (listwise)	182				

Source: Computed Data

Reliability Analysis

The reliability analysis yielded a Cronbach's Alpha value of 0.758, suggesting acceptable internal consistency that above the required threshold of 0.70. The corrected item-total correlations ranged from 0.240 to 0.606, indicating that the selected questions are reasonably consistent in assessing the strategic opportunities and difficulties of human-AI collaboration.

As a result, the scale is deemed dependable and appropriate for further investigation, so supporting the second study purpose.

Table 2 Scale Statistics

Mean	Variance	Std. Deviation	N of Items
29.35	32.250	5.679	8

Source: Computed Data

Table 3 Correlation

Variables	1	2	3	4
AI education & training	1	.398**	.396**	.408**
Ethical guidelines	.398**	1	.557**	.482**
Human skills importance	.396**	.557**	1	.439**
Employee training	.408**	.482**	.439**	1

Source: Computed Data

The correlation analysis indicates that all future-oriented factors are positively and significantly connected at the 0.01 level ($p < 0.01$).

There exists a moderate positive association between:

AI education and ethical principles correlate 0.398.

- AI schooling and human skills correlate 0.396.
- Ethical guidelines and human skills correlate ($r = 0.557$).
- Employee training and other variables ($r = 0.408–0.482$)

This suggests that respondents who support AI education and training are likewise firmly committed to ethical AI use, the value of human skills, and employee training. All essential variables are significantly and favorably associated, confirming that these aspects are interconnected and contribute to the growth of Human-AI partnership in commerce. As a result, the findings contribute to the development of a conceptual framework for future research directions and so support the third purpose.

Emerging Trends in Human–AI Collaboration in Commerce

Five important developments are influencing human-AI collaboration in trade. Hyper-personalization at scale offers real-time, tailored consumer experiences that go beyond typical segmentation. Agentic commerce ecosystems are evolving, in which AI systems may independently carry out business operations like purchasing and transactions. Supply chain cognitive automation is shifting toward predictive and self-learning technologies that boost efficiency and responsiveness. Human-AI collaboration in strategy is growing, with AI assisting with decision-making, innovation, and competitive analysis alongside humans. Finally, ethical institutionalization is becoming more important, with firms implementing established frameworks for fairness, transparency, accountability, and responsible AI governance.

Strategic Opportunities

Human-AI collaboration provides substantial strategic advantages to businesses. It boosts revenue growth with targeted recommendations and higher conversion rates, while also promoting cost efficiency through automation and efficient operations. It also allows for new business model innovation, especially in agent-driven commerce networks where AI serves as

a purchasing intermediary. Furthermore, firms gain a significant competitive advantage by embracing AI for faster insights, better consumer interaction, and increased decision-making capabilities

Key Challenges

Despite the benefits, human-AI collaboration poses several challenges. Algorithmic bias and fairness difficulties may result in unintentional discriminatory consequences. Data privacy and regulatory compliance continue to be important challenges as the dependence on consumer data grows. Trust and explainability difficulties influence user acceptance of AI-driven choices. Workforce upheaval necessitates reskilling and job reinvention. Furthermore, integration issues with legacy systems and data restrictions can impede effective AI implementation in enterprises.

Limitations of the Study

This study is solely based on secondary literature, hence its findings are dependent on the veracity of previous studies. It focuses on studies published between 2024 and 2026, which may limit long-term generalizability due to AI's rapid growth. The evidence is primarily from large businesses in developed economies, making it less representative of SMEs and emerging markets. Furthermore, the lack of meta-analytical or empirical testing reduces the statistical validity of conclusions.

Scope for Future Research

Future research can concentrate on longitudinal studies that investigate the long-term effects of Human-AI collaboration on business outcomes. It may also investigate consumer trust in autonomous AI systems and create AI frameworks specifically for SMEs. Further research may look into cross-cultural and industry-specific disparities, ethical AI implementation tactics, and the best balance of human judgment and AI automation. Research is also needed on workforce transformation, skill development, and the psychological effects of AI integration.

Conclusion

Human-AI collaboration has emerged as a key driver of change in modern commerce, significantly improving customer experience, operational efficiency, strategic decision-making, and productivity. The combination of human intelligence with AI technology allows for faster, more accurate, and data-driven commercial outcomes. However, obstacles like bias, privacy concerns, transparency issues, and workforce adaption must be properly addressed. Organizations that properly blend human expertise with AI skills are more likely to achieve long-term innovation, performance improvement, and a competitive advantage in the digital economy.

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A STUDY ON CONSUMER BUYING BEHAVIOUR TOWARDS ORGANIC PRODUCTS

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Abstract:

The purpose of this study is to better understand how consumers purchase organic goods. The study, which uses a descriptive research design, seeks to comprehend the attitudes, motivations, and preferences that influence consumers' choices to buy organic goods. A sample size of 245 respondents was obtained through the use of probability sampling in the sample technique. Additionally, customer behaviour toward organic products is greatly influenced by elements like perceived awareness, health consciousness, environmental concerns, pricing, trust, and brand reputation. The distribution and relationships between variables can be better understood using statistical studies such as the Friedman test, Spearman's correlation, Kruskal Wallis H test, Mann-Whitney U test, and Normality test.

Keywords: Organic products, Buying Behaviour, Attitude of Consumers

INTRODUCTION

Because different nations have varied requirements for products to be certified "organic," there is no universal meaning of the term. To put it simply, organic products undergo little processing to preserve their integrity without the use of artificial additives, preservatives, or radiation.

Organic items are produced using environmentally friendly procedures and growing techniques that take into account both the finished product's qualities and the production processes. Consumer behaviour has grown in importance and popularity as a topic for scientific study. The increasing significance of health care, especially the need for a high degree of physical fitness, has an impact on this. It is now clear that human nutrition and physical exercise are related to health. When thinking about issues pertaining to a healthy lifestyle, they are vital components.

Developing Organic Product Strategies: Recognizing Customer Preferences Health Consciousness

Customers are becoming more cautious in today's health-conscious environment. unnatural substances in their diet. They give preference to goods that enhance wellbeing and are said to as safer substitutes. Emphasizing the superior nutritional value of vitamin-rich organic vegetables, One Antioxidants and minerals may also appeal to customers who value their health, high-quality diet.

Awareness: The advantages of organic products must first be explained to consumers. This involves teaching kids about ethical issues, environmental sustainability, and health benefits related to selecting organic.

Environmental Concerns: In today's environmentally conscious world, consumers are increasingly worried about the influence of their purchasing decisions on nature . Organic products resonate with these concerns as they are created using sustainable agricultural practices that prioritise soil health, biodiversity, and natural resource conservation.

Price: When it comes to organic products, which are frequently seen to be more costly than

their conventional equivalents, price sensitivity is a major element influencing customer purchasing decisions. Businesses can use price tactics that make organic products more inexpensive and available to a wider range of customers in order to get beyond this obstacle.

Trust and Brand Reputation: In the organic market, where customers are paying more attention to product labels and certifications, trust is crucial. For companies offering organic products, developing a positive brand reputation and establishing trust are essential. This entails acquiring respectable organic certifications, being open about sourcing and production methods, and continuously producing high-quality goods that satisfy customers.

NEED OF THE STUDY

Studying how consumers purchase organic goods is crucial for companies looking to take advantage of a developing market niche. Businesses can effectively customize their product offers and marketing methods by looking at consumer preferences, motives, and decision-making processes. Targeted outreach and engagement are made possible by identifying important demographic trends and consumer base groupings. Additionally, evaluating elements like product availability, cost sensitivity, and confidence in certifications aids companies in removing possible obstacles to purchases. The study's ultimate goal is to offer practical insights that enable companies to satisfy customer demands, boost their competitiveness, and promote long-term growth in the market for organic goods.

OBJECTIVES OF THE STUDY

1. To determine how much consumers know about organic products and their advantages.
2. To look into how consumer preferences for organic products are impacted by health consciousness.
3. To determine how much environmental issues affect consumers' decisions to buy organic products.
4. To investigate how consumers' decisions to buy organic products are influenced by perceived price and availability.
5. To examine how customer trust and brand reputation relate to organic product purchases.

SCOPE OF THE STUDY

The research on consumer purchase behaviour with regard to organic products includes an examination of the attitudes, preferences, and motivations that influence customers' choices. It entails investigating a number of variables that impact customer decisions, including price sensitivity, environmental concerns, health consciousness, and confidence in organic certifications. The study's objectives are to analyse demographic traits, evaluate the effects of marketing tactics, look at the function of product packaging and labelling, and look at the impact of social media and digital platforms. The study aims to offer useful insights into comprehending and forecasting consumer behaviour toward organic products in modern marketplaces by thoroughly evaluating these factors.

REVIEW OF LITERATURE

Dr. Sangeetha Natarajan (2016): This study discusses the growing significance of food safety and the growing inclination of modern Indian customers towards organic products. The market for organic food is expanding quickly due to factors like shifting lifestyles, increased health consciousness, and the emergence of contemporary retail establishments. The study examines consumer awareness, preferences, motives, and attitudes regarding organic food purchases

using an exploratory research approach and primary data gathered using self-structured questionnaires. Likert's Five-point scaling, summary statistics, Chi-square, correlation, and path coefficient analysis were among the analysis methods used. Bar charts were used to visually represent the results. **Anupam Singh and Priyanka Verma (2017)** investigated the reasons behind consumers' purchases of organic goods. They polled 611 Indian customers and discovered that attitudes about organic food are influenced by a number of factors, including availability, price, subjective norms, health consciousness, and knowledge of organic food. Although people's attitudes and intentions mitigate this link, these characteristics also influence whether or not they intend to purchase organic food. Additionally, whether or not people actually purchase organic food depends on their age, income, and level of knowledge. The results enable retailers, organic food firms, and regulators better understand customer behaviour and offer recommendations for growing the organic food market. **B. Krishnakumarea and S. Niranjan (2017):** This study, which was carried out in the Tirupur district of Tamil Nadu, looks at how customers purchase organic food goods. It surveyed 240 respondents, 120 of whom were organic and 120 of whom were not. It investigates awareness levels and demographic relationships with organic food knowledge using chi-square tests and MANOVA analysis. The findings show differences between organic and non-organic customers according to factors like gender, family income, occupation, and level of education. Additionally, consumers of organic food in the Tirupur district are favored by psychological characteristics such as attitude, perception, belief, and intention. **N Sharma, R Singhvi (2018):** Although organic food is becoming more popular due to decreased productivity and higher costs, consumer preferences are changing for health and environmental reasons. It is essential to encourage farmers to switch to organic farming and to spread knowledge about the advantages of organic food. Researching consumer attitudes can offer important information for the expansion of the organic food sector, particularly in India. The literature now in publication emphasizes the demand for organic products in India and around the world as well as the variables affecting consumer attitudes. For the current study to significantly advance knowledge about and support for organic food consumption behaviors, these gaps must be filled. **S. Pahari, I. Ghosal, and B. Prasad (2023):** This study explored Indian consumers' intentions to buy organic food online, identifying important factors influencing these choices and analyzing the relationship between buying intentions and attitudes about organic food. Perception and health consciousness were found to be important determinants of attitudes toward organic products, which in turn influenced customer purchase behavior, according to studies conducted with regular buyers of organic food. The study also found that purchasing organic food online was linked to customers' improved mental and physical well-being. These results are significant both theoretically and practically, helping stakeholders in organic food to develop focused marketing strategies to address consumer concerns and capitalize on. **In 2023, Kalyani R and Prabhavathi Y** Using information from 120 Bangalore buyers, this study investigates the opinions of Indian customers on organic food. The findings show that although consumers believe organic food to be healthier, they are discouraged by its greater price. Quality, certification, and health advantages are important variables that influence purchasing. Social media plays a big part in spreading knowledge, and branded organic establishments are preferred. The frequency of purchasing varies, with daily buying of fruits and vegetables and sporadic purchases of juice. All things considered, safety is of utmost

importance, and purchasing decisions are influenced by social, psychological, and personal variables, which helps to create a thorough model of consumer behavior for organic food items.

RESEARCH METHODOLOGY

DESCRIPTIVE RESEARCH DESIGN

Descriptive research studies are those that focus on presenting the features of a certain individual group.

PROBABILITY SAMPLING

With probability sampling, a researcher chooses members of a population at random based on a few predetermined criteria. With this selection criterion, every member has an equal chance to take part in the sample. the process of choosing a sample from a population using the randomization principle, often known as chance or random selection.

PILOT STUDY

The purpose of this pilot study, which included 30 customer responders, is to ascertain the proper sample size, which was found to be 245. We obtain information through surveys and interviews in order to improve our sampling plan and guarantee representativeness using the formula below.

The necessary sample size is $n = (Z^2 *(PQ)) / E^2$ $n = (1.96^2 * (0.80*0.20)) / 0.05^2$ $n = (1.96^2 *0.1600) / 0.05^2$ $n = 245$.

- Z is the Z-score that corresponds to the amount of confidence you want.
- p is the estimated percentage of the population that possesses the relevant trait.

The margin of error is shown by E.

SAMPLE SIZE

The number of observations used to calculate the estimates of a particular population is known as the sample size. The population was used to determine the sample size. The size of the sample for There are 245 in this study.

DATA ANALYSIS AND INTERPRETATION

Table : 1 NORMALITY TEST

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
AWARENESS	.514	245	.000	.422	245	.000
HEALTH CONSCIOUSNESS	.192	245	.004	.935	245	.000
ENVIRONMENT CONCERNS	.172	245	.000	.949	245	.000
PRICE	.147	245	.000	.954	245	.000
TRUST AND BRAND REPUTATION	.126	245	.000	.977	245	.001

Source: Computed Data

NULL HYPOTHESIS(H0): The data follows normal distribution

ALTERNATE HYPOTHESIS(H1): The data does not follow normal distribution Tests of Normality

INFERENCE:

The Kolmogorov-Smirnov test for normality was performed on the sample data, and the findings indicate that the significance value (P value) is less than 0.05, or P<0.05. The null hypothesis, which states that the sample has a normal distribution, was thus refuted. The alternative theory is accepted. The sample data does not follow the normal distribution.

NON-PARAMETRIC TEST

MANN-WHITNEY U TEST

Table : 2 Test Statistics

	AWARENESS	HEALTH CONSCIOUSNESS	ENVIRONMENT CONCERNS	PRICE	TRUST AND BRAND REPUTATION
Mann-Whitney U	7049.500	6925.500	6965.500	6.864E3	7036.000
Wilcoxon W	12302.500	12178.500	12218.500	1.716E4	12289.000
Z	-.726	-.684	-.608	-.792	-.474
Asymp.Sig. (2-tailed)	.468	.494	.543	.428	.635

Source: Computed Data

H0: In terms of the factors, there is no discernible difference between the mean rank of men and women.

H1: The mean rank of men and women differs significantly depending on the factors.

INFERENCE

The sample data was subjected to the Mann-Whitney U test, which revealed that all of the variables had significance values (P values) greater than 0.05, or P>0.05. As a result, the null hypothesis (H0) is approved. The mean rank of men and women does not significantly differ from one another.

KRUSKAL WALLIS H TEST

Table : 3 Test Statistics

	Awareness	Health Consciousness	Environment Concerns	Price	Trust And Brand Reputation
Chi-Square	3.948	9.902	17.824	5.686	7.993
df	3	3	3	3	3
Asymp. Sig.	.267	.019	.001	.128	.046

Source: Computed Data

H0: When it comes to criteria like pricing, brand reputation, health consciousness, awareness, and environmental concerns, there is no discernible variation in the mean rank of the age.

H1: The mean rank of the age group differs significantly depending on characteristics including price, trust, brand reputation, health consciousness, awareness, and environmental concerns.

INFERENCE

After applying the Kruskal Wallis H test to the sample data, it was discovered that every variable's significance value (P value) was greater than 0.05, or P>0.05. As a result, the

alternative theory is disproved. The mean rank of the age in relation to the factors differs significantly.

SPEARMAN'S CORRELATION

Table : 4 Correlations

			Awareness	Health Consciousness	Environment Concerns	Price	Trust And Brand Reputation
Spearman's rho	AWARENESS	Correlation Coefficient	1.000	.013**	.021**	.024	.031
		Sig. (2-tailed)	.	.843	.747	.711	.624
		N	245	245	245	245	245
	Health Consciousness	Correlation Coefficient	.013	1.000	.563**	.480**	.413**
		Sig. (2-tailed)	.843	.	.000	.000	.000
		N	245	245	245	245	245
	Environment Concerns	Correlation Coefficient	.021	.563**	1.000	.547**	.373**
		Sig. (2-tailed)	.747	.000	.	.000	.000
		N	245	245	245	245	245
	PRICE	Correlation Coefficient	.024	.480**	.547**	1.000	.437**
		Sig. (2-tailed)	.711	.000	.000	.	.000
		N	245	245	245	245	245
	Trust And Brand Reputation	Correlation Coefficient	.031	.413**	.373**	.437**	1.000
		Sig. (2-tailed)	.624	.000	.000	.000	.
		N	245	245	245	245	245

Source: Computed Data

H0: There is no connection between elements like consumer purchasing patterns in businesses.

H1: Factors like customer purchasing patterns in businesses are related to each other.

INFERENCE

The significance value (P value) for each variable is greater than 0.05, or P>0.05, according to the correlation analysis done on the sample data. Health consciousness, awareness, environmental concerns, price, trust, and brand reputation are most strongly correlated.

FINDINGS

Women make up the majority of responders (58.4%). The majority of responders (38.8%) are in the 26–30 age range.It is evident that 53.1% of respondents are single, and 53.1% of respondents work for private companies. Most responders (57.6%) make between Rs. 30,000 and Rs. 40,000. The majority of survey participants are aware of organic products (86.9%), compare organic and non-organic products (67.8%), and take reputation into account when buying organic items (70.6%). Most respondents—56% of them—agree that organic products enhance general health. It is evident that the majority of respondents—54%—agree that

purchasing organic goods promotes environmental sustainability. It is evident that the majority of respondents—60%—agree that the greater cost of organic products slightly discourages their purchasing. It is evident that 49% of respondents strongly agree that purchases of organic products have an impact on brand reputation. The sample data was subjected to the Mann-Whitney U test, which revealed that all of the variables had significance values (P values) greater than 0.05, or P>0.05. As a result, the null hypothesis (H0) is approved. The mean rank of men and women does not significantly differ from one another. After applying the Kruskal Wallis H test to the sample data, it was discovered that every variable's significance value (P value) was greater than 0.05, or P>0.05. As a result, the alternative theory is disproved. The mean rank of the age in relation to the factors differs significantly. The significance value (P value) for each variable is greater than 0.05, or P>0.05, according to the correlation analysis done on the sample data. Health consciousness, awareness, environmental concerns, price, trust, and brand reputation are most strongly correlated.

SUGGESTIONS

In line with the majority demographic's focus on perceived health benefits and general wellness, health consciousness product development should give priority to the creation of organic products designed to address particular health concerns that are common among consumers, according to a study on consumer purchasing behavior. In order to overcome price sensitivity issues and promote consumer adoption of organic solutions, offer special discounts and loyalty rewards to encourage trial and repeat purchases. Engagement and sales may rise if you concentrate on the social media sites where your target audience is most active, use SEO techniques to raise organic search ranks, and use content marketing to inform customers about the advantages of organic products.

CONCLUSION

In summary, this study uses a survey of 245 people to examine how consumers purchase organic goods. The survey's findings provide insightful information about the variables affecting consumers' decisions to buy and use organic goods. It is evident that a sizable percentage of consumers are drawn to organic products due to its perceived effectiveness, all-natural makeup, and lack of unfavorable side effects. The majority of respondents reported using organic products for cosmetics, skin care, and health supplements.

This implies that organic products are growing in popularity as a dependable and safe alternative to Western medications. Although consumers are prepared to pay more for higher-quality goods, high prices may discourage them from making a purchase. The study also emphasizes how social media and internet marketing affect consumers' attitudes toward Ayurvedic goods. Manufacturers of organic products may find this study helpful in understanding consumer preferences and developing successful marketing plans to advertise their goods.

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PROBLEMS OF RURAL WOMEN: A SOCIO-ECONOMIC STUDY IN INDIA

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Abstract
Rural women constitute a significant portion of India's population and play a vital role in agriculture, family welfare, and rural development. Despite their contributions, they continue to face numerous socio-economic challenges such as poverty, illiteracy, gender discrimination, inadequate healthcare facilities, limited employment opportunities, and lack of access to financial resources. The present study examines the major problems encountered by rural women in India using secondary data sources. The study highlights the existing inequalities and the need for effective policy interventions to improve their living conditions and promote their empowerment. The findings reveal that educational backwardness, poor health facilities, economic dependency, social restrictions, and inadequate political participation remain the primary concerns. The paper suggests various measures including educational development, skill training, financial inclusion, healthcare improvements, and stronger implementation of women empowerment programmes. The study concludes that the sustainable development of rural India largely depends on the social and economic empowerment of rural women.

KEYWORDS: Rural women, Women empowerment, Gender inequality, Rural development, Socio-economic problems, India.

Introduction

Women form nearly half of India's population, and a large proportion of them reside in rural areas. Rural women contribute significantly to agriculture, livestock management, household activities, and the informal economy. Their work often remains unrecognized and undervalued despite its importance in sustaining rural livelihoods.

The development of rural India cannot be achieved without the active participation and empowerment of women. However, rural women face multiple challenges arising from traditional social structures, economic inequalities, limited educational opportunities, and inadequate access to healthcare and financial services. Gender discrimination continues to influence their status in society, affecting their personal and professional growth.

Although the Government of India has introduced several welfare schemes such as Beti Bachao Beti Padhao, National Rural Livelihood Mission, Pradhan Mantri Matru Vandana Yojana, and Self-Help Group programmes, many rural women still struggle to enjoy equal opportunities and social justice. Therefore, understanding their problems is essential for developing effective policies and sustainable solutions.

Statement of the Problem

Rural women in India face numerous socio-economic, cultural, educational, and health-related challenges that restrict their overall development. Poverty, illiteracy, gender bias, unemployment, poor access to healthcare, and social discrimination continue to affect their quality of life. Despite various government initiatives, many women remain economically dependent and socially marginalized. The present study attempts to identify and analyze the

major problems of rural women in India and suggest measures for their empowerment and development.

Objectives of the Study

The study has the following objectives:

- To examine the socio-economic status of rural women in India.
- To identify the major problems faced by rural women.
- To analyze the educational and health-related challenges affecting rural women.
- To study the economic constraints experienced by rural women.
- To suggest measures for improving the living conditions and empowerment of rural women.

Research Methodology

The present study is descriptive and analytical in nature. It is based entirely on secondary data collected from various published and unpublished sources. The study examines the socio-economic problems faced by rural women in India and provides an analysis based on available information from government reports, journals, books, and research articles.

Sources of Data

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

- Census of India Reports.
- National Family Health Survey (NFHS) Reports.
- Ministry of Women and Child Development publications.
- Government reports and policy documents.
- Research journals and academic articles.
- Books related to rural development and women empowerment.
- Reports published by NGOs and international organizations.

Review of Literature

Sharma (2020) observed that rural women continue to experience gender inequality in education, employment, and decision-making processes despite improvements in social welfare programmes.

Kumar and Singh (2021) emphasized that financial inclusion through Self-Help Groups has positively influenced the economic independence of rural women, although several barriers still exist.

Patel (2019) highlighted that inadequate healthcare facilities and nutritional deficiencies remain significant problems among rural women, affecting their productivity and quality of life.

Rao (2022) found that educational attainment among rural women has improved over the years, but dropout rates and early marriages continue to hinder their development.

Data Analysis and Interpretation

The analysis of secondary data indicates several major problems affecting rural women in India.

Table 1: Socio-Economic Profile of Rural Women in India

Domain/Dimension	Core Indicator/Variable	Rural India Value	Urban India value
Educational Problem	Female Literacy rate %)	65.5	7.1
Educational Problem	School Drop out rate (Secondary level, %)	16.8	10.2
Educational Problem	Higher Education Gross Enrolment Ratio (%)	22.4	35.8
Economic Problem	Female Labour Force Participation Rate (LFPR,%)	27.2	18.5
Economic Problem	Gender wage gap in agriculture/ informal sector (%)	31.5	24.0
Economic Problem	Land / productive asset ownership among women (%)	12..9	9.8
Health-related problems	Institution delivery rate (%)	86.7	93.8
Health-related problems	Prevalence of anemia in reproductive age (15-49,%)	58.5	53.8
Health-related problems	Nutritional deficit/ underweight (BMI<18.5%)	21.2	14.7
Social Problems	Experience of spouse / domestic violence (%)	31.6	26.3
Social problems	Women married before legal age (18 years, %)	27.0	14.7
Political problems	Representation rural local bodies Rise, %)	46.5	0.0
Political problems	Independent political decision-making capacity (%)	38.0	45.0
Technological problems	Women who have ever used the internet	33.8	56.8

Source: Compiled from Secondary data

Educational Problems

Education is one of the most important factors influencing women's empowerment. Although literacy rates have improved, rural women still lag behind urban women in educational attainment. Many girls discontinue their education due to poverty, household responsibilities, and early marriage.

Economic Problems

Most rural women are engaged in agricultural activities and informal employment. However, they often receive lower wages than men and have limited ownership of land and productive assets. Financial dependence reduces their decision-making power within families and communities.

Health-Related Problems

Healthcare facilities in many rural areas remain inadequate. Women face challenges such as malnutrition, maternal health complications, anemia, and limited access to medical services. Poor sanitation and lack of awareness further aggravate health issues.

Social Problems

Traditional customs and patriarchal norms continue to influence the status of rural women. Gender discrimination, domestic violence, child marriage, and restrictions on mobility limit their opportunities for education and employment.

Political Problems

Although reservation policies have increased women's participation in local governance, many rural women continue to face difficulties in exercising independent political leadership. Social pressures and lack of awareness often restrict their effective participation.

Technological Problems

Digital literacy among rural women remains relatively low. Limited access to technology and internet facilities creates barriers to information, education, and economic opportunities. Bridging the digital divide is essential for women's empowerment.

Findings of the Study

The study reveals the following findings:

- Rural women contribute significantly to agriculture and household activities but receive inadequate recognition.
- Educational backwardness remains a major challenge despite improvements in literacy rates.
- Economic dependency continues due to limited employment opportunities and unequal wages.
- Healthcare facilities in rural areas are insufficient to meet women's needs.
- Social discrimination and patriarchal traditions continue to affect women's empowerment.
- Political participation has improved but remains constrained by socio-cultural factors.
- Digital illiteracy limits access to modern economic and educational opportunities.

Suggestions

The following measures are suggested to improve the status of rural women in India:

- Educational facilities for girls in rural areas should be strengthened.
- Skill development and vocational training programmes should be expanded.
- Equal employment opportunities and wage equality must be ensured.
- Access to healthcare services, particularly maternal and child healthcare, should be improved.
- Financial inclusion through Self-Help Groups and microfinance institutions should be encouraged.
- Awareness programmes against gender discrimination and domestic violence should be organized.
- Digital literacy initiatives should be promoted among rural women.
- Women's participation in local governance and decision-making should be strengthened.

Conclusion

Rural women constitute an indispensable component of India's socio-economic development. Despite their substantial contributions, they continue to face numerous challenges related to education, health, employment, social status, and political participation. Government

programmes and welfare measures have improved their conditions to some extent, but significant gaps remain. Sustainable rural development requires comprehensive efforts aimed at enhancing educational opportunities, economic independence, healthcare access, and social empowerment for women. The empowerment of rural women is not only essential for gender equality but also for the overall progress and prosperity of the nation.

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AI-POWERED VIRTUAL TRY-ON: IMPACT ON CUSTOMER SATISFACTION AND PURCHASE INTENTION IN OPTICAL RETAIL

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Abstract

In the retail landscape, with the introduction of Artificial Intelligence (AI) has drastically brought the changes that enhance customer engagement and their decision making. In the midst of these innovative technologies, AI- powered Virtual Try-On (VTO) has emerged as an important tool in the optical retail industry which enables the customers to visualize spectacles frames virtually before making a buying decision. When compared to traditional spectacle selection methods, VTO offers a more personalized, interactive and convenient shopping experience by integrating artificial intelligence, facial recognition and augmented reality. Despite its increasing implementation, understanding its impact on customer satisfaction and purchase intention remains a key area of research. The present study aims to analyse the impact of AI- powered VTO technology on customer satisfaction and purchase intention in optical retail and also examines the customer perception of the technology. The primary data were collected through a structured questionnaire from 144 respondents who have experienced AI-powered Virtual Try-On for selecting spectacles. Descriptive Statistics, Cronbach's Alpha, Correlation and Regression Analysis were used to assess the relationship among the variables of the study. The results of the study suggest that AI-powered Virtual Try-On contributes to a better customer experience by enhancing customer satisfaction, which subsequently encourages purchase intention. These findings enrich the existing literature on AI-enabled retail technologies and provide useful guidance for optical retailers in designing more engaging and customer-oriented digital shopping experiences.

Keywords: Artificial Intelligence (AI), Virtual Try-On (VTO), Optical Retail, Customer Satisfaction, Purchase Intention.

Introduction

In this digital era, the optical retail industry faced a rapid transformation with the integration of Artificial Intelligence (AI) into the customer service and their shopping experiences. Initially customers depended on physical trails and the suggestions of the salesman to select frames for their spectacle. However, this method often required time and did not always enable them to visualize how different frames suited their facial features. Subsequently, optical retailers have considerably adopted AI-powered Virtual Try-On (VTO) technology to enhance the selection process of spectacles.

In real time, AI-powered VTO technology includes artificial intelligence, augmented reality and facial recognition algorithms to digitally display spectacle frames on a customer's face. This innovation enables customers to explore multiple frame styles, colours and sizes instantly without physically trying each option. Therefore, AI technology has the potential to enhance convenience, reduce uncertainty and facilitate better decision making in purchasing.

In spite of these advantages, the effectiveness of AI-powered VTO encompasses beyond technology advancement. Customer's perceptions and their overall shopping experiences ultimately decides its success. While some consumers think AI-powered VTO as a reliable support tool for their decision, others may remain doubtful about its accuracy than traditional in-store method. Such differing perceptions raise a significant question, whether AI-powered VTO genuinely enhances customer satisfaction and improves higher purchase intention.

Customer satisfaction plays a vital role in determining consumer's purchase intentions and recommending products. When customers perceive that AI-powered VTO provides proper visualization and eases spectacle selection, they tend to derive higher satisfaction which in turn may increase their purchase intention. On the contrary, if the technology fails to meet customer expectations, it has an adverse effect on their purchasing decision regardless of its innovative features.

In the optical retail sector, even though AI-powered Virtual Try-On (VTO) has gained increasing popularity, its effectiveness in improving customer experience requires further more empirical investigation. Understanding how AI-powered VTO influences customer satisfaction and purchase intention is essential for retailers in order to improve technology-enabled shopping experiences and strengthen customer engagement. Therefore, the present study analyzes the impact of AI-powered Virtual Try-On on customer satisfaction and purchase intention in optical retail, thus contributing to the growing body of research on AI-driven retail technologies.

Review of Literature

Jain and Chhabra (2025) reviewed consumers' perceptions of virtual reality try-on features in online retailing. The study reported that immersive try-on features enhance engagement, shopping confidence, satisfaction, and purchase decisions by reducing uncertainty during product evaluation. **Nguyen et al. (2025)** investigated the impact of Virtual Try-On (VTO) on consumers' purchase intention using the Technology Acceptance Model. Based on data from 557 respondents analyzed through SEM, the study found that perceived usefulness, perceived ease of use, and perceived enjoyment positively influenced attitudes toward VTO, which subsequently enhanced purchase intention. Technology experience strengthened this relationship, demonstrating the importance of digital familiarity in AI-enabled shopping. **Sekri et al. (2025)** investigated the effects of Virtual Try-On (VTO) technology as an innovative e-commerce tool on consumers' online purchase intentions. The study examined how Virtual Try-On enhances consumers' online shopping experiences by improving product visualization and reducing uncertainty during product evaluation. The findings revealed that Virtual Try-On positively influences perceived usefulness, perceived enjoyment, and consumer confidence, which subsequently increase online purchase intention. The study concluded that retailers adopting AI-enabled Virtual Try-On technologies can create more engaging shopping experiences, strengthen customer confidence, and improve consumers' willingness to purchase products online. The study emphasizes the growing importance of AI-driven interactive technologies in enhancing digital retail performance. **Chen and Tsai (2024)** conducted a systematic review of 69 studies on Virtual Try-On systems. The review identified perceived usefulness, enjoyment, trust, realism, and ease of use as key drivers of VTO adoption and purchase intention. The study recommended extending VTO research into sectors such as optical retail and customer satisfaction. **Guo and Zhang (2024)** examined augmented reality

shopping experiences using the Technology Acceptance Model. Results showed that immersive AR experiences significantly improved perceived usefulness, perceived ease of use, customer trust, and purchase intention. The findings highlight the value of AR technologies in enhancing digital retail experiences. **Hwangbo et al. (2020)** demonstrated that 3D virtual try-on positively influenced customers' purchasing experiences and online sales by improving visualization, confidence, and decision quality. Although earlier than other studies, it remains one of the foundational empirical works supporting VTO adoption.

Research Gap

Previous studies have mainly examined AI-powered Virtual Try-On in the context of fashion, apparel, and beauty retail, with a primary focus on technology adoption, ease of use, perceived usefulness, and purchase intention. Comparatively, limited empirical research has analysed the impact of AI-powered Virtual Try-On on customer satisfaction within the optical retail sector, mainly in the Indian context. Moreover, studies integrating AI-powered Virtual Try-On, customer satisfaction, and purchase intention within a single empirical framework remain limited. Therefore, this study addresses these gaps by examining the impact of AI-powered Virtual Try-On on customer satisfaction and purchase intention among consumers in optical retail

Objectives of the Study

1. To examine customers' perception of AI-powered virtual try-on technology in optical retail.
2. To analyze the impact of AI-powered virtual try-on technology on customer satisfaction.
3. To evaluate the influence of customer satisfaction on purchase intention toward spectacles.

Research Methodology

The research followed a descriptive design to assess the influence of AI-powered Virtual Try-On on customer satisfaction and purchase intention in optical retail. The study primarily uses a quantitative approach, with 144 data collected at a single point in time through structured questionnaires consisting of four sections:

Part 1: Demographic Profile, Part 2: Customer Perception on AI- Powered Virtual Try-On.

Part 3: Customer Satisfaction, Part 4: Purchase Intention.

SPSS was used to analyse the data in order to achieve the study objective, Descriptive Statistics, Cronbach's Alpha, Correlation and Regression Analysis were utilized to test the relationship among the variables of the study.

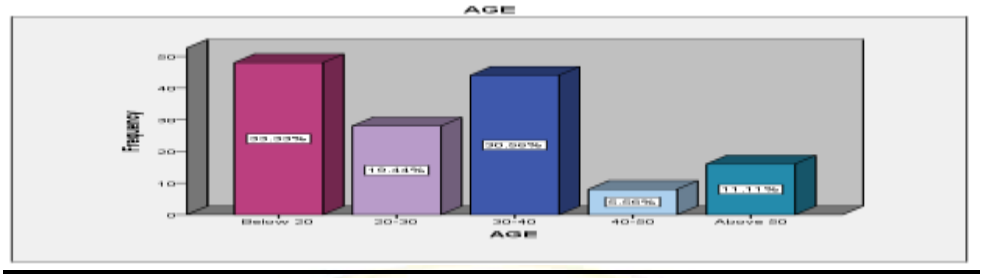
Data Analysis and Interpretations

Table 1: Gender Distribution

GENDER					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	88	61.1	61.1	61.1
	Female	56	38.9	38.9	100.0
	Total	144	100.0	100.0	
Source: Primary Data					

From the table we infer that the demographic analysis of the respondents based on gender shows 61.1% of the respondents are male and 38.9% of the respondents are female

Fig.1: Distribution of Age



The bar diagram shows the age distribution of the respondents where the majority of the respondents (33.33%) were below 20, 30.56% of the respondents were in the age group of 30-40, 19.44% of the respondents were in the age group 20-30, 11.11% of the respondents were in the age group of above 50, the smallest proportion of the respondents were in the age group of 40-50.

Table 2: Distribution of occupation of the respondents

		Frequency	Percent
Valid	Student	52	36.1
	Employed	64	44.4
	Self Employed	16	11.1
	Home maker	12	8.3
	Total	144	100.0

Source: Primary Data

From the frequency table it has been observed that a major portion of the respondents 44.4% were employed, 36.1% were students, 11.1% were self-employed and 8.3% were home makers.

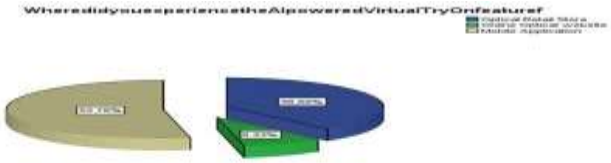
Table 3: Distribution of Income

		Frequency	Percent
Valid	Below 25000	20	13.9
	25001-50000	20	13.9
	50001-75000	8	5.6
	75001-100000	44	30.6
	Above 1 Lakh	52	36.1
	Total	144	100.0

Source: Primary Data

The frequency table shows that majority of the respondents (36.1%) are in the income group more than One Lakh followed by 30.6% of the respondents were in between 75,000 to One Lakh, 13.9% of the respondents were in the income group 25,000 to 50,000 and below 25,000, the least percent of the respondents (5.6%) were in the income group between 50,000 to 75,000

Fig.2: Pie Chart - Platform used to experience the AI-powered VTO



The pie chart explains that the majority of the respondents (52.78%) use mobile applications for virtual try on features and 38.89% of the respondents use optical retail stores whereas only 8.33% of the respondents used online optical websites.

Table 4: Reliability Statistics

Items	Cronbach's Alpha	N of Items	Interpretation
Virtual try-on	.881	6	Reliable
Customer Satisfaction	.931	5	Reliable
Purchase intension	.929	5	Reliable

Source: Computed Data

Reliability analysis was conducted to assess the internal consistency of virtual try on, customer satisfaction and purchase intention. Since all the items Cronbach's Alpha are greater than .8 we conclude that there exists strong internal consistency for each item.

Correlation

H_0 : AI- powered virtual try on has no significant effect on customer satisfaction

H_1 : AI- powered virtual try on has no significant effect on customer satisfaction

Table 5: Correlations

		VT	CS
VT	Pearson Correlation	1	.779**
	Sig. (2-tailed)		.000
	N	144	144
CS	Pearson Correlation	.779**	1
	Sig. (2-tailed)	.000	
	N	144	144
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Computed Data

From the table we infer that Pearson correlation value is 0.779.Hence there is a strong positive correlation between AI powered virtual try on technology and customer satisfaction.

Simple Linear Regression

H_0 : Customer satisfaction has no significant influence on purchase intention towards spectacles

H_1 : Customer satisfaction has a significant influence on purchase intention towards spectacles

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df 1	df2	Sig. F Change
1	.816[a]	.666	.664	1.85640	.666	283.170	1	142	.000

a. Predictors: (Constant), CS Source: Computed Data

A simple linear regression analysis was conducted to examine the effect of customer satisfaction on purchase intention. There is a strong positive correlation between the independent and dependent variables and 66% of the variation in purchase intention is explained by customer satisfaction.

Table 7: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	975.861	1	975.861	283.170	.000[b]
	Residual	489.361	142	3.446		
	Total	1465.222	143			

a. Dependent Variable: Purchase Intension

b. Predictors: (Constant), Customer satisfaction Source: Computed Data

From the above table we conclude that the regression model is statistically significant, that is the independent variable has a significant effect on the dependent variable

Table 8: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.951	1.164		2.536	.012
	CS	.896	.053	.816	16.828	.000

a. Dependent Variable: PS Source: Computed Data

The simple linear regression model is given by Purchase intention = 32.951+0.896 (Customer satisfaction)

Suggestions

- Optical retailers should continue to invest in AI-powered Virtual Try-On technology and improve its accuracy so that customers can confidently select spectacle frames that best suit their preferences.
- Since customer satisfaction has a significant influence on purchase intention, retailers should focus on delivering a smooth, personalized, and user-friendly Virtual Try-On experience to encourage customers to complete their purchases.

- As the majority of respondents experienced Virtual Try-On through mobile applications, retailers should give greater attention to enhancing the performance, usability, and features of their mobile platforms.
- Employees should be trained to assist customers in using AI-powered Virtual Try-On effectively, especially those who are unfamiliar with the technology. This can improve customers' confidence and overall shopping experience.
- Retailers should regularly collect customer feedback on the Virtual Try-On experience and use it to make continuous improvements, ensuring that the technology remains aligned with customers' expectations and changing market needs.

Conclusion

The growing adoption of AI-powered Virtual Try-On is transforming the way customers select spectacles by making the shopping process more convenient, interactive, and personalized. The findings of this study indicate that customers generally have a positive perception of AI-powered Virtual Try-On technology and that it contributes meaningfully to their overall shopping experience. The study further establishes that AI-powered Virtual Try-On is positively associated with customer satisfaction, while customer satisfaction, in turn, has a significant influence on purchase intention. These findings suggest that technological innovation alone is not sufficient to encourage purchase decisions. Instead, the value of AI-powered Virtual Try-On lies in its ability to create a satisfying customer experience that builds confidence during the spectacle selection process. As digital technologies continue to reshape the optical retail industry, retailers should focus not only on adopting AI-based solutions but also on enhancing the quality and usability of these technologies to meet customer expectations. Overall, the study contributes to the understanding of AI-powered Virtual Try-On in optical retail and highlights its potential as an effective tool for improving customer satisfaction and encouraging purchase intention. The findings may also serve as a useful reference for optical retailers seeking to strengthen customer engagement through technology-enabled retail experiences.

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A STUDY ON PRICING AND PROFITABILITY STRATEGIES OF QUICK COMMERCE PLATFORMS

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Abstract

In the digital retail industry Quick commerce is one of the fastest-growing segments, offering fast and convenient delivery services and satisfied the evolving lifestyles and expectations of modern consumers. The main aim of this study is to examine the pricing and profitability strategies adopted by quick commerce businesses in India. It also explores the demographic profile of consumers, the factors contributing to the success of quick commerce platforms, methods of revenue generation, and the distinction between revenue and profit. Both primary and secondary data was used to collect the sample. Primary data were collected through a structured questionnaire administered to a sample of 100 respondents. The collected data were analyzed using percentage analysis and SPSS statistical tools, including the Chi-square test and One-Way ANOVA. The findings reveal that young consumers constitute the majority of quick commerce users, with. The study concludes that for sustainable growth and long-term success, quick commerce businesses must effectively balance their pricing strategies with operational costs to achieve profitability in the future.

Keywords: *Quick Commerce, Pricing Strategies, Profitability, Customer Behaviour, Discounts, Delivery Charges.*

INTRODUCTION:

The rapid growth of digital technology has transformed the path of consumers purchase goods and services. In recent years, quick commerce has emerged as a new trend in the e-commerce industry. Quick commerce refers to the delivery of products within a very short time, usually within 10 to 30 minutes after placing an order through mobile applications or online platforms. Quick commerce platforms focus mainly on delivering daily essentials such as groceries, snacks, beverages, personal care products, and household items. In India Companies like Blinkit, Zepto, Swiggy Instamart, and BigBasket are popular examples of quick commerce platforms in India. For fast and convenient delivery services, these companies use technology, dark stores, and efficient delivery systems. The increasing demand for convenience, busy urban lifestyles, and the growth of smart phone usage have significantly contributed to the expansion of quick commerce platforms. Consumers today prefer faster delivery services that save time and effort. As a result, quick commerce companies are continuously developing strategies to attract customers and maintain their competitive position in the market.

Pricing strategy and profitability model are the most important aspects of quick commerce platforms. Even though these companies promise extremely fast delivery, they incur high operational costs such as logistics expenses, inventory management, and delivery infrastructure. To sustain their operations and achieve profitability, companies adopt various pricing strategies including dynamic pricing, promotional discounts, delivery charges, and subscription services. Pricing strategies play a crucial role in influencing customer purchasing decisions. Many customers are attracted by discounts, offers, and competitive pricing provided by quick commerce platforms. At the same time, companies must carefully balance pricing

with operational costs in order to maintain profitability and long-term sustainability. In addition, profitability in quick commerce depends on factors such as order volume, delivery efficiency, customer retention, and cost management. Companies often invest heavily in technology, warehouse networks, and last-mile delivery systems to reduce costs and improve service efficiency. These strategies help companies increase customer satisfaction while also improving their revenue generation.

OBJECTIVES OF THE STUDY:

The main objectives of the study are:

1. To analyse the different demographic profile of the respondents.
2. To study the pricing strategies adopted by quick commerce platforms in India.
3. To analyse the profitability strategies followed by quick commerce companies.
4. To examine the reasons behind the success of quick commerce platforms in India.
5. To identify the major sources of revenue in quick commerce platforms.
6. To understand the difference between revenue and profit in quick commerce.

RESEARCH METHODOLOGY:

Research methodology refers to the systematic approach used to conduct the study and achieve its objectives. It provides a clear framework for analysing the pricing and profitability strategies of quick commerce platforms in a structured and scientific manner. The present study adopts a descriptive research design, as it focuses on examining the opinions, behaviour, and perceptions of users regarding quick commerce services.

STRUCTURE OF THE QUESTIONNAIRE:

The questionnaire was designed to collect primary data from respondents regarding their usage of quick commerce platforms and their opinions on pricing and profitability strategies. It includes both multiple-choice questions and Likert 5 point scale statements to capture accurate and measurable responses. The questionnaire is divided into five sections based on the objectives of the study.

Section A: Demographic Details, Section B: Pricing Strategies, Section C: Success of Quick Commerce Model In India, Section D: Profitability Strategies and Section E: Customer Behaviour and Buying Habits

DATA COLLECTION:

In the present study, data has been collected from both primary and secondary sources to analyse the pricing and profitability strategies of quick commerce platforms.

SAMPLE SIZE:

Sample size refers to the number of respondents selected for the study. In the present research, a total of 100 respondents were selected. Their responses provide valuable insights into customer perceptions regarding pricing and profitability strategies.

SAMPLING TECHNIQUE:

Convenience sampling method was to used to collect the responses from the respondents.

STATISTICAL TOOLS USED:

Statistical tools are used in research to analyse the collected data and interpret the results in a systematic and meaningful manner. In the present study, statistical techniques are Percentage Analysis, Chi-square and one way ANOVA applied to understand customer perceptions regarding pricing strategies and profitability of quick commerce platforms.

LIMITATIONS OF THE STUDY:

1. The study is based on a limited sample size of 100 respondents, which may not represent the opinions of all quick commerce users.
2. The data collected is based on respondents' personal opinions, which may vary from person to person.
3. The study is limited to selected respondents, so the findings may not reflect the behaviour of all customers.
4. The research is conducted within a limited time period, which may restrict a more detailed analysis.
5. Some respondents may not have complete knowledge about pricing strategies of quick commerce platforms.

Review of Literature

Rao, V.R. (2009) The main objective of this study was to analyse how pricing decisions influence demand, customer behaviour, and profitability. The sample size of this study was 500. The findings revealed that pricing is one of the most important drivers of profitability. It further showed that effective pricing improves margins. The study concluded that pricing plays a critical role in long-term business success. **Grewal et al. (2011)** The objective of the study was to analyse how digital tools and analytics influence pricing strategies. The findings revealed that personalised pricing and data-driven promotions significantly improve revenue and profitability. It was also observed that traditional discounting strategies are becoming less effective. The study highlighted the importance of customer-specific pricing.**Cachon, G.P. and Feldman, P. (2011)** The objective was to compare subscription-based pricing and per-use pricing strategies. The study used analytical modelling and simulation techniques. The findings revealed that subscription models provide stable revenue streams. It was also observed that per-use pricing maximises profit per transaction. The study highlighted the advantages of hybrid pricing models. It further showed that pricing flexibility improves revenue generation. The research emphasised the importance of pricing structure selection. **Saarijärvi, H. et al. (2014)** The objective was to analyse how digital pricing influences customer behaviour. Data were collected from over 200 customers and retail managers using surveys and interviews. The study examined personalised pricing effects. The findings revealed that personalised pricing increases customer retention and basket size. It was also observed that digital engagement improves customer loyalty. The study highlighted the importance of mobile platforms. It further showed that technology enhances pricing effectiveness.**Abhishek, V. et al. (2016)** It examined different pricing structures and the findings revealed that commission-based models improve profitability under competitive conditions and also observed that pricing structure influences revenue generation. The study highlighted the importance of channel strategies and further showed that pricing decisions affect platform performance. The research emphasised alignment with market conditions.

Analysis and Interpretation

PROFILE OF THE RESPONDENTS

A total sample of 100 respondents was surveyed, and their personal information such as gender, age, education, occupation, marital status, and monthly income were collected. The summarized details are presented in the table below:

Table 1
Profile of the respondents

Particulars	Classification	Number of respondents	Percentage
Gender	Male	68	68%
	Female	32	32%
Age (in years)	Below 20	30	30%
	20-30	42	42%
	30-40	24	24%
	Above 40	4	4%
Education	Up to School	10	10%
	Under Graduation	42	42%
	Post Graduation	18	18%
	Professional studies	20	20%
	Others	10	10%
Occupation	Student	52	52%
	Employee	28	28%
	Business	13	13%
	Others	7	7%
Marital Status	Married	70	70%
	Single	30	30%
Monthly Income (Rs.)	Below ₹20,000	47	47%
	₹20,000 – ₹40,000	26	26%
	₹40,000 – ₹60,000	10	10%
	Above ₹60,000	17	17%

Source: Primary data

The gender distribution of the participants is such that 68% are males, while 32% are females. This distribution seems to indicate a larger share of male participants in the study. In the age category, the age category of 20–30 years has the largest number of respondents (42%), and the smallest group consists of respondents Above 40 years old, accounting for 4%. In terms of education, a plurality of our respondents (42%) are undergraduates, and 18% hold postgraduate degrees. 20% possess professional studies, 10% school education, and 10% other education. Distribution of survey respondents based on occupation depicts that the largest percentage of the respondents (52 per cent) are students. Public sector employees make up 18.7% of the respondents, self-employed/business individuals account for 20.2%, and homemakers represent 16.2%. A mere 10.9% are from other occupational groups. Regarding marital status, the majority of participants (70%) are married, while 30% are single. In terms of monthly income, 47% earn upto Rs.20000 only.

Chi-Square Analysis:

H_0: There is no association between monthly income of the respondents and their payment of delivery charges.

H_1: There is an association between monthly income of the respondents and their payment of delivery charges.

Table: 2 Showing the association between delivery charges payment and monthly income

MONTHLYINCOME * Usually Pay Delivery Charges While Ordering (Crosstabulation)			
Monthly Income	**Yes**	**No**	**Total**
Below ₹20,000	34	13	47
₹20,000-₹40,000	22	4	26
₹40,000-₹60,000	7	3	10
Above₹60,000	13	4	17
Total	**76**	**24**	**100**

Source: Primary data

Table : 3 Chi-Square Test:

Test	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.603	3	.659
Likelihood Ratio	1.691	3	.639
Linear-by-Linear	.071	1	.790
N of Cases	100		

Source: Computed data

INTERPRETATION:

The result shows Pearson chi-square value as 1.603. Since P value 0.659 > 0.05 (5% level of significance), the null hypothesis is accepted. Therefore, no association exists between the monthly income of the respondents and their payment of delivery charges.

Analysis of variance (ANOVA):

Analysis of Profitability Perception across Different Age Groups

H_0: There is no significant relationship between age of the respondents and their perception of profitability of quick commerce platforms.

H_1: There is a significant relationship between age of the respondents and their perception of profitability of quick commerce platforms.

Table: 4 showing the Analysis of Profitability Perception across Different Age Groups

		Sum of Squares	df	Mean Square	F	Sig.
Delivery charges help companies cover operational costs (Day to Day Expenses)	Between Groups	3.530	3	1.177	1.348	.264
	Within Groups	83.830	96	.873		
	Total	87.360	99			
Pricing strategies help companies generate revenue	Between Groups	.455	3	.152	.223	.880
	Within Groups	65.385	96	.681		

	Total	65.840	99			
Companies manage costs through efficient delivery systems	Between Groups	1.614	3	.538	.757	.521
	Within Groups	68.176	96	.710		
	Total	69.790	99			
Quick commerce platforms benefit from bulk order purchases	Between Groups	3.679	3	1.226	1.181	.321
	Within Groups	99.711	96	1.039		
	Total	103.390	99			
Profitability depends on frequent customer orders	Between Groups	2.779	3	.926	1.188	.318
	Within Groups	74.861	96	.780		
	Total	77.640	99			

Source: Computed data

The result shows P values for all the profitability factors are greater than 0.05 (5% level of significance) (ranging from 0.264 to 0.880), so the null hypothesis is accepted. Therefore, there is no significant relationship between age of the respondents and their perception of profitability of quick commerce platforms.

MAJOR FINDINGS

1. 42% of the respondents belong to the age group of 21–30, indicating that young adults are the primary users of quick commerce platforms.
2. 68% of the respondents are female, while 32% are male, showing that female respondents form the majority.
3. 52% of the respondents are students, followed by 28% employees, indicating that students are the major users.
4. 47% of the respondents earn below ₹20,000 per month, showing that most users belong to the lower-income group.
5. There exists an association between age and preferred platform ($p = 0.007$).
6. There is no significant relationship between age and pricing perception ($p > 0.05$).
7. Delivery charges are considered important for covering operational costs.
8. Efficient delivery systems and frequent orders contribute to profitability.
9. There is no significant relationship between age and profitability perception
    a. ($p > 0.05$).
10. The Chi-square test indicated that there is no association between monthly income of the respondents and their payment of delivery charges.
11. The ANOVA result indicated that there is no significant relationship between monthly income of the respondents and their customer behaviour towards quick commerce platforms

Conclusion:

The study focuses on analysing the pricing and profitability strategies of quick commerce platforms. The findings indicate that quick commerce platforms are widely used, especially among younger consumers, due to their convenience and fast delivery services. The study reveals that pricing strategies play a crucial role in attracting customers. Discounts and promotional offers also influence customer purchasing behaviour, highlighting the importance of pricing strategies in increasing customer engagement and usage. With respect to profitability, the study shows that delivery charges and product pricing act as major sources of revenue for

quick commerce platforms. Frequent usage of these platforms contributes to increased order volume, which supports revenue generation. Overall, the study concludes that quick commerce platforms have successfully implemented effective pricing and profitability strategies to attract and retain customers. By offering competitive pricing, efficient delivery, and customer-oriented services, these platforms have transformed modern shopping habits. For future growth, companies should continue to focus on improving pricing strategies, operational efficiency, and customer satisfaction.

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THE ECONOMIC CONSEQUENCES OF DEPENDENCE ON FOREIGN ENTERPRISE SOFTWARE ENHANCED QUANTITATIVE ANALYSIS WITH ECONOMIC MODELS

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Abstract

Over the past three decades, Indian enterprises have invested approximately USD 350–400 billion cumulatively in foreign enterprise software platforms (ERP, CRM, PLM, CAD, MES, SCM, HRM). This research quantifies the long-term economic implications of this dependence using Total Cost of Ownership (TCO) models, capital outflow calculations, counterfactual net present value (NPV) analysis, and vendor lock-in quantification. Annual capital outflows to foreign software corporations total USD 8–12 billion, representing a cumulative transfer of USD 120–150 billion over 30 years. The opportunity cost analysis reveals that a USD 5–8 billion indigenous ERP platform investment could have generated USD 50–80 billion in export revenues and 24–36x return on investment. Vendor concentration in software markets (HHI > 2,500 in most categories) creates systemic vulnerability and estimated USD 37.8 billion in unnecessary lock-in costs over 20-year system lifecycles. The analysis demonstrates that India's continued dependence on foreign software represents one of the largest unrealized economic opportunities in the technology sector, with potential GDP impacts exceeding USD 75–135 billion if redirected toward indigenous platform development.

Keywords: Enterprise Software Economics; Total Cost of Ownership; Capital Outflow; Vendor Lock-in; Digital Sovereignty; Net Present Value Analysis

Introduction

The global enterprise software market reached USD 645 billion in 2024 and is projected to exceed USD 1.2 trillion by 2035 with a compound annual growth rate (CAGR) of 6.8%. India's enterprise software market generated USD 13.18 billion in 2025 and is forecast to reach USD 40.9 billion by 2033 (CAGR: 13.2%). This substantial market growth masks a critical economic challenge: approximately 88% of India's software market is dominated by foreign vendors including SAP, Oracle, Microsoft, Salesforce, Autodesk, Siemens, and PTC. This dependence has created structural capital outflows and significant opportunity costs for the Indian economy.

The enterprise software sector encompasses critical systems including Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) platforms, Product Lifecycle Management (PLM), Computer-Aided Design (CAD), Manufacturing Execution Systems (MES), Supply Chain Management (SCM), and Human Resource Management (HRM) solutions. These systems are fundamental to business operations, generating significant recurring expenditures over 20–30-year system lifecycles.

This research addresses a fundamental gap in India's technology economics: the absence of comprehensive quantitative analysis of the economic consequences of software dependence. While numerous qualitative discussions address digital sovereignty and technology independence, rigorous economic modeling of capital flows, lock-in costs, and counterfactual opportunity costs remains limited. This paper provides that analysis.

Literature Review

The economic literature on technology dependence addresses several interrelated dimensions relevant to this research:

Total Cost of Ownership (TCO) Framework

Gartner (2024) and Forrester (2024) research demonstrates that enterprise software costs extend far beyond initial licensing, encompassing implementation, maintenance, infrastructure, upgrades, and training across 20–30 year system lifecycles. The TCO multiplier effect—whereby total lifecycle costs reach 900–1,400% of initial software investment—represents a critical economic metric. This research quantifies the TCO framework specifically for Indian enterprises.

Capital Flows and Development Economics

International Monetary Fund (2023) and World Bank (2024) analyses address technology transfer and capital flows as determinants of long-term development. The technology ownership gap—measured by intellectual property (IP) ownership concentration—creates systematic capital outflows from developing economies. This research quantifies software-specific capital outflows and their macroeconomic implications.

Vendor Lock-in and Market Concentration

Economic literature on platform lock-in (Shapiro & Varian, 1999; Katz & Shapiro, 1985) demonstrates how network effects and switching costs create economic inefficiencies. Metrigy Research (2025) and DataIntelo (2024) market analyses reveal that software categories are increasingly concentrated, with top-3 vendors controlling 55–78% of specific markets, amplifying lock-in effects and creating systemic economic vulnerability.

Digital Sovereignty and Indigenous Development

The Ministry of Electronics and Information Technology (2023) and Nasscom (2024) reports outline India's digital sovereignty objectives and indigenous software initiatives. Zoho Corporation (2023) and ERPNext case studies demonstrate feasibility of competitive indigenous enterprise software platforms. However, systematic economic analysis comparing the return on indigenous investment versus continued foreign dependence remains limited, which this research addresses.

Service Revenue vs. Product Revenue Models

Economic literature on software business models (Teece, 2010; Chesbrough, 2010) demonstrates the fundamental superiority of product-based models over service-based models in terms of revenue scalability and intellectual property value creation. This research quantifies the specific revenue multipliers for Indian software enterprises under different strategic models.

Objectives of the Study

Primary Objectives:

1. Quantify the Total Cost of Ownership (TCO) of foreign enterprise software systems across their complete 20–30 year lifecycles, incorporating all direct and indirect costs.
2. Calculate cumulative capital outflows from India to foreign software vendors over the past 30 years and project future transfers.
3. Analyze vendor lock-in mechanisms and quantify the economic premiums imposed on Indian enterprises through concentration in software markets.
4. Conduct counterfactual NPV analysis comparing actual outcomes under foreign dependence versus hypothetical indigenous platform investment scenarios.

5. Quantify opportunity costs in terms of foregone intellectual property value, export revenues, and employment in high-skill technology development.
6. Develop policy recommendations for rebalancing India's software strategy to incorporate systematic domestic platform development alongside global technology adoption.

Research Methodology

Research Design

This research employs a mixed-methods approach combining quantitative economic modeling with qualitative analysis. The quantitative dimension utilizes financial and economic models (TCO, NPV, vendor concentration indices) applied to enterprise software markets. The qualitative dimension synthesizes industry reports, policy documents, and case studies to contextualize findings.

Data Sources

Primary data sources include: (1) Gartner Magic Quadrant and market share reports (2024); (2) IDC Worldwide Enterprise Software Market Analysis (2025); (3) Forrester Research market reports (2024); (4) Metrigy Research CRM market analysis (2025); (5) Government of India Ministry of Electronics and Information Technology policy documents (2023); (6) Nasscom India IT Industry reports (2024); (7) Company annual reports from TCS, Infosys, Wipro, and Zoho (2023–2024); (8) International Monetary Fund and World Bank research on technology transfer (2023–2024).

Analytical Framework

The research employs four primary economic models:

Model 1: Total Cost of Ownership (TCO)

Incorporates initial licensing, implementation, annual maintenance (15–22% of license cost), infrastructure, upgrades, training, and integration costs over complete system lifecycles. Applies present value calculations using 8.5% discount rate typical for technology investments. Total Cost of Ownership for enterprise software extends over 20–30 years. The comprehensive model is:

TCO = Initial License Cost + Implementation Cost + Σ(Annual Maintenance + Infrastructure + Upgrades + Training)

The mathematical expression:

TCO = L + I + Σ(M + C + U + T) for years 1 to n

Where:

- L = Initial software licensing cost
- I = Implementation and consulting services
- M = Annual maintenance contracts (typically 15–22% of L annually)
- C = Cloud/Infrastructure costs
- U = Periodic upgrade costs
- T = Training and certification costs
- n = System lifecycle (typically 20–30 years)

Model 2: Capital Outflow Quantification

Calculates annual capital flows to foreign software vendors based on market spending, foreign vendor market share, and capital export ratios. Projects historical outflows and estimates cumulative 30-year transfers.

The formula for quantifying capital outflows to foreign software vendors:
Annual Outflow (Year Y) = [Software Market Spend_Y] × [% Foreign Vendors] × [Capital Export Ratio]
Where:
• Software Market Spend = Sector spending on all software categories
• % Foreign Vendors = Proportion of market controlled by MNCs
• Capital Export Ratio = Proportion leaving India (licensing + support fees)

Model 3: Net Present Value (NPV) Analysis

Compares actual cash flows under foreign dependence scenario against counterfactual indigenous platform investment scenario. Incorporates R&D costs, export revenue projections, IP valuation, and employment effects across 30-year time horizons.

The counterfactual NPV analysis demonstrates that investing USD 5–8 billion in domestic enterprise software development would have generated:
• 24–36x Return on Investment (NPV ROI)
• USD 50–80 billion in cumulative export revenues
• USD 25–40 billion in intellectual property valuation
• 250,000–350,000 high-skilled jobs
• Estimated USD 120–180 billion total 30-year NPV

Compared to the actual foreign dependence model generating only USD 35–45 billion in NPV:
Opportunity Cost = USD 120–180B (Alternative) − USD 35–45B (Actual) = USD 75–135 Billion in Foregone Economic Value
This represents one of the largest unrealized economic opportunities in India's technology sector.

Model 4: Vendor Lock-in Quantification

Uses Herfindahl-Hirschman Index (HHI) to measure market concentration and applies lock-in cost premiums (15–26% of annual software spend) based on switching cost literature and market data.

Vendor lock-in creates economic inefficiency through increased switching costs and reduced negotiating power. The mathematical model quantifies lock-in cost:
Lock-In Cost = Annual Software Cost × Lock-In Factor × (1 + Switching Penalty)
Where:
• Lock-In Factor = β (proprietary dependency coefficient ranging from 0.15 to 0.45)
• Switching Penalty = Cost of data migration, retraining, system redesign

Table 1: Vendor Lock-in Quantification

Software Platform	Vendor Concentration (Top 3)	Estimated Lock-In Cost (% of Annual Spend)
ERP	SAP + Oracle + Microsoft = 65%	15–25%
CRM	Salesforce + Oracle + Microsoft = 68%	20–30%
CAD	Autodesk + PTC + Dassault = 72%	18–28%

PLM	Siemens + PTC + Dassault = 78%	22–32%
MES	Siemens + Rockwell + Honeywell = 65%	16–24%
SCM	SAP + Oracle + JDA = 58%	14–22%
HRM	Workday + Oracle + SAP = 72%	18–26%
AVERAGE	**Top-3 Vendors = 68%**	**17.6–26.1%**

Source: Computed Data

Data Analysis & Interpretation

Market Composition and Vendor Concentration Analysis

Analysis of global and Indian enterprise software markets reveals extreme vendor concentration. The global enterprise software market totaled USD 188.6 billion in 2024, with the Indian market representing USD 9.1 billion (4.8% of global market). Foreign vendors control 88% of India's market, with leading vendors including SAP (22–24% ERP share), Oracle (11–13% ERP share), Microsoft (8–10% ERP share), and Salesforce (25.8% CRM share). This concentration creates significant economic dependencies.

Using the Herfindahl-Hirschman Index (HHI) to measure market concentration: $HHI = \Sigma(\text{Market Share}_i)^2$

Table 2 : Market Composition and Vendor Concentration Analysis

Software Category	Top-3 Market Shares	HHI Score	Concentration Level
ERP	22 + 13 + 8 = 43%	677	Moderate–High
CRM	25.8 + 18 + 12 = 55.8%	1,247	Moderate–High
CAD	28 + 20 + 16 = 64%	1,504	Highly Concentrated
PLM	22 + 18 + 15 = 55%	1,009	Moderate–High
MES	20 + 18 + 15 = 53%	1,189	Moderate–High
SCM	18 + 16 + 15 = 49%	910	Moderate–High
HRM	18 + 16 + 14 = 48%	1,084	Moderate–High

Source: Computed Data

Total Cost of Ownership (TCO) Analysis

Detailed TCO analysis for a representative large manufacturing organization with 1,500 active users and initial USD 5 million ERP license investment reveals total lifecycle cost of USD 45.2 million in present value terms—a 9.04x cost multiplication factor over 25 years. Maintenance costs alone (15% annually) accumulate to 300–440% of initial investment. Infrastructure, upgrades, and training add additional 320–480% to initial costs. The analysis demonstrates that initial software licensing costs represent only 7–11% of true Total Cost of Ownership.

Annual Capital Outflow Calculation

Current annual capital outflows from India to foreign software vendors total USD 8.0 billion (2025 estimate). This comprises: ERP USD 2.82B, CRM USD 1.93B, CAD USD 0.68B, PLM USD 0.52B, MES USD 0.33B, SCM USD 0.92B, and HRM USD 0.77B. Cumulative outflows over 30 years (1995–2025) are estimated at USD 120–150 billion.

When adjusted for growth in the Indian software market (historical CAGR 13–14%), the cumulative outflow figure reflects structural capital transfers to foreign entities.

Counterfactual NPV Analysis: Indigenous Platform Scenario

Comparative NPV analysis under two scenarios—actual foreign dependence versus hypothetical indigenous development—reveals stark economic differences. The actual foreign dependence scenario has generated 30-year NPV of USD 35–45 billion, with minimal domestic intellectual property creation (USD 2–3 billion). The indigenous platform investment scenario, assuming USD 5–8 billion R&D investment and 5–8 year product maturity timeline, projects 30-year NPV of USD 120–180 billion with USD 50–80 billion in cumulative export revenues and USD 25–40 billion in intellectual property valuation. This represents opportunity cost of USD 75–135 billion in foregone economic value.

Vendor Lock-in Premium Quantification

Vendor lock-in analysis reveals hidden economic premiums imposed through market concentration and switching costs. Lock-in costs average 17.6–26.1% of annual software spending, with highest premiums in concentrated markets (PLM: 22–32%, CRM: 20–30%). For India's total 2025 software market of USD 9.1 billion, estimated annual lock-in cost is USD 1.89 billion. Over 20-year system lifecycles, cumulative lock-in costs exceed USD 37.8 billion, representing a hidden tax redistributing wealth to foreign vendors.

Herfindahl-Hirschman Index (HHI) Concentration Analysis

Market concentration analysis using HHI reveals highly concentrated software categories (HHI > 2,500 threshold for monopolistic conditions). CAD markets score 1,504 HHI (highly concentrated), with top-3 vendors controlling 64% share. CRM markets score 1,247 HHI with 55.8% top-3 concentration. PLM, MES, SCM, and HRM categories all score above 1,000 HHI, indicating moderate-to-high concentration levels. Only ERP markets, with more distributed shares among SAP, Oracle, and Microsoft, score below 1,000 HHI. This concentration creates conditions for systematic price escalation and reduced competitive innovation.

Findings

Key findings from quantitative analysis:

Finding 1: Massive Capital Outflow

Annual capital outflows from India to foreign software vendors total USD 8.0–12.0 billion (2025). Cumulative 30-year outflows (1995–2025) total USD 120–150 billion. This represents approximately 0.8–1.2% of national IT spending transferred to foreign corporations. The capital outflow rate has accelerated from USD 1.2–1.5 billion annually (1995–2005) to USD 6.5–8.0 billion annually (2015–2025).

Finding 2: Severe Opportunity Cost

Indigenous ERP platform investment of USD 5–8 billion (with 4,000–6,000 engineers over 5–8 year development period) would have generated: (a) USD 50–80 billion in cumulative 30-year export revenues; (b) USD 25–40 billion in intellectual property valuation; (c) 250,000–350,000 high-skilled jobs; (d) USD 120–180 billion 30-year NPV. Compared to actual foreign dependence model generating USD 35–45 billion NPV, the opportunity cost is USD 75–135 billion in foregone economic value.

Finding 3: Lock-in Premium Economics

Vendor lock-in creates annual premiums of USD 1.89 billion on India's software spend (17.6–26.1% of total spending). Over 20-year system lifecycles, cumulative lock-in costs total USD 37.8 billion. This lock-in premium exists independent of software quality, reflecting purely the economic power created by market concentration and switching costs.

Finding 4: Technology Ownership Gap

Intellectual property ownership is extremely concentrated in foreign hands. India generates minimal IP value in enterprise software (estimated USD 2–3 billion over 30 years) despite cumulative investments of USD 120–150 billion. Foreign vendors, conversely, generate estimated USD 200–300 billion in IP value from Indian market. This represents a massive technology ownership gap with structural implications for India's long-term economic competitiveness.

Finding 5: Employment Quality Trade-off

Foreign dependence model currently employs 380,000 software professionals in implementation, support, and operational roles, with average annual salary of INR 11.2 lakh. However, these roles are predominantly configured around foreign platforms with limited skill development toward core software engineering. Indigenous product development scenario would generate fewer but substantially higher-quality positions (270,000 employees) with average compensation 35–45% higher (INR 15–16 lakh) and global-competitive skill development in core software engineering.

Finding 6: Systemic Economic Vulnerability

Market concentration with top-3 vendors controlling 55–78% of software categories creates systemic vulnerability to geopolitical disruptions, supply chain shocks, and unilateral vendor decisions. The probability of major supply disruption over a 20-year horizon is estimated at 15–25%, with potential economic impact of USD 8–15 billion if materialized.

Suggestions / Recommendations

Based on quantitative findings, the following strategic recommendations are proposed for India's software industry and policymakers:

Establish Indigenous Enterprise Software Development Fund

Recommendation: Establish a dedicated USD 2–3 billion technology development fund over 10 years, with allocation structure: (40%) indigenous ERP platform development; (25%) CRM and marketing automation; (20%) specialized vertical solutions for manufacturing, retail, and finance sectors; (15%) infrastructure and integration platforms. Expected outcomes include 2–3 globally competitive platforms, 80,000–100,000 new software development jobs, and USD 15–20 billion in cumulative export revenue.

Implement Vendor Diversification Requirements

Recommendation: Government procurement policy should mandate maximum 40% spending concentration with any single vendor and minimum 20% allocation to Indian software vendors for government and public sector unit (PSU) contracts. Implement tax incentives including 15% R&D credit for companies developing indigenous alternatives. These requirements would gradually reduce foreign concentration while building domestic capabilities.

Mandate Interoperability and Open Standards

Recommendation: Implement legislative requirements for mandatory API documentation for all enterprise software used in India, reducing proprietary lock-in. Provide government procurement discounts (25% cost reduction) for organizations adopting interoperable platforms, and incentivize development of open-source alternatives including OpenERP, Odoo, and ERPNext through tax credits and government procurement preference.

Establish Digital Sovereignty Strategic Target

Recommendation: Set quantified long-term digital sovereignty metrics for 2035: (a) Reduce foreign software market share from current 88% to 65–70%; (b) Achieve 20–25% domestic market share for Indian vendors; (c) Generate USD 50–80 billion in cumulative enterprise software export revenue; (d) Create 250,000+ high-skilled software development jobs; (e) Reduce annual capital outflows by 35–40%. These targets provide measurable benchmarks for tracking progress toward reduced technology dependence.

Develop Talent and Skills Pipeline

Recommendation: Partner with institutions including Indian Institute of Technology (IIT) and Indian Institute of Science (IISc) to establish specialized software product engineering programs. Invest in 5,000–8,000 PhD-level researchers in software architecture, systems design, and enterprise systems. Create incentive programs (partial salary subsidies, tax credits) for experienced software engineers to transition from services toward product development roles.

Support Existing Indigenous Platforms

Recommendation: Existing Indian software companies (Zoho, ERPNext, Nasscom-backed initiatives) should receive government procurement preference, tax incentives, and strategic partnerships. These organizations have proven product viability and require scaling, not fundamental R&D investment. Government preference for Indian platforms in public sector could rapidly accelerate market adoption and reduce foreign dependency.

Conclusion

This comprehensive quantitative analysis demonstrates that India's long-term dependence on foreign enterprise software has generated substantial and measurable economic costs. The analysis reveals: (1) cumulative capital outflows of USD 120–150 billion over 30 years; (2) annual lock-in premiums totaling USD 1.89 billion imposed through market concentration; (3) opportunity cost of USD 75–135 billion in foregone intellectual property value and export revenues; and (4) systemic economic vulnerability created by vendor concentration exceeding monopolistic thresholds (HHI > 2,500) in most software categories.

The Net Present Value analysis demonstrates that indigenous enterprise software investment of USD 5–8 billion would have generated 24–36x return on investment compared to 0.35–0.45x return under the current foreign dependence model. The magnitude of opportunity cost—exceeding USD 75–135 billion—underscore the importance of strategic reorientation toward indigenous software innovation as a critical component of India's technology development strategy.

However, the analysis acknowledges significant execution challenges including: (a) high failure probability of large-scale R&D projects (40–50% historical success rate); (b) competitive disadvantages from decades of foreign ecosystem development; (c) talent availability constraints for PhD-level software engineers; and (d) global competitiveness requirements. Sensitivity analysis demonstrates that even under conservative 30% execution success probability, indigenous platform investment remains economically superior to continued foreign dependence.

The research therefore recommends a balanced, dual-track strategy: maintaining adoption of globally competitive technology platforms while systematically investing in indigenous capabilities through government funds, procurement policy, tax incentives, and talent development programs. This strategy could significantly enhance India's long-term economic resilience, technology sovereignty, and global competitiveness while capturing USD 50–80 billion in cumulative economic value over the next decade.

The scale of unrealized economic potential in the enterprise software sector underscores the strategic importance of technology ownership and digital sovereignty in India's 21st-century development agenda. This research provides rigorous quantitative foundation for informed policy decisions regarding India's software strategy for the next decade and beyond.

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THE ROLE OF FINTECH IN PROMOTING RESPONSIBLE FINANCIAL BEHAVIOUR, FINANCIAL INCLUSION, AND SOCIO-ECONOMIC DEVELOPMENT - AN EMPIRICAL STUDY OF YOUNG ADULTS

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ABSTRACT

Digital finance has reshaped how individuals across the world interact with money, and nowhere is this shift more visible than in fast-growing economies like India, where smartphone penetration and government-backed digital payment infrastructure have converged to accelerate FinTech adoption at an extraordinary pace. Much of the scholarship on this transformation, however, treats financial inclusion, responsible money management, and broader economic upliftment as separate research tracks rather than interconnected outcomes of the same technological shift. This paper sets out to close that gap by empirically testing whether FinTech usage among young digital-finance users in India is tied to three outcomes at once: prudent financial habits, expanded access to formal financial services, and perceived contribution to socio-economic progress. Working with a sample of 104 young adults who actively use digital financial platforms, the study gathered responses through a structured, five-point Likert-scale questionnaire and processed the data in IBM SPSS Statistics, applying percentage analysis, descriptive statistics, Cronbach's Alpha reliability testing, and Pearson correlation analysis at a 5 percent significance threshold. The measurement instrument held up well under scrutiny, returning a Cronbach's Alpha of 0.816, and correlation testing uncovered statistically significant, positive relationships ($p < 0.01$) running across every pair of items tied to financial inclusion, saving and investing, responsible spending, and social development outcomes. These results justify discarding the null hypotheses in favour of the alternative ones, lending empirical weight to the claim that FinTech engagement among young adults correlates meaningfully with sound financial behaviour, inclusion, and developmental perception. The paper adds fresh, India-specific data to an evidence base still dominated by reviews and bibliometric studies, with takeaways relevant to regulators, FinTech firms, and financial educators alike.

Keywords: *FinTech, Financial Inclusion, Responsible Financial Behaviour, Socio-Economic Development, Digital Finance, Young Adults, India.*

Introduction

The way people manage money has changed more in the past decade than in several before it. FinTech, the umbrella term for technology-driven financial services spanning mobile wallets to algorithm-based investment advisors, has gradually redrawn who gets to participate in the formal financial system and on what terms. Tools such as peer-to-peer lending apps, UPI-linked payment platforms, and automated savings features have, collectively, worn down barriers that once kept large segments of the population outside the system, creating openings for groups that mainstream banking had historically left behind (Ha et al., 2025; Mishra et al., 2024).

India makes for an unusually fitting setting to examine this shift. Few countries can match its concentration of digitally-native young adults, and state-backed efforts like the Unified Payments Interface and Jan Dhan Yojana have pushed digital financial adoption forward faster than in most other economies. Even so, pockets of exclusion remain, and a more fundamental question has gone largely unanswered: beyond simply widening access, does FinTech also steer people toward smarter money habits, and does that, in turn, feed into broader economic progress? Direct empirical work on this question is still surprisingly scarce.

Personal financial health, and by extension a stable economy, rests on habits like budgeting, building savings, spending with discipline, and planning ahead — what this paper refers to as responsible financial behaviour. The literature is fairly consistent on one point here: access to formal financial services accomplishes little on its own unless people also build the habits to use that access well (Duvendack & Mader, 2020; Kishor et al., 2025).

The third outcome this study considers, socio-economic development, is broader still — it spans rising incomes, improved job prospects, stronger human capital, gender parity, and lower poverty. A substantial body of research connects financial inclusion to progress on each of these fronts, increasingly with FinTech positioned as the mechanism behind that connection (Mamun & Várallyai, 2025; Mishra et al., 2024).

Most existing research, however, treats these three threads — behaviour, inclusion, and development — as separate inquiries, and relies more heavily on systematic reviews and bibliometric mapping than on fresh, ground-level data, particularly from emerging markets. This paper attempts to bring the three threads together in one analysis, using primary survey data from young adults in India to examine whether FinTech engagement is tied, simultaneously, to responsible money habits, broader financial inclusion, and a felt sense of contributing to socio-economic progress.

Review of Literature

Scholarly interest in FinTech, financial inclusion, and socio-economic development has grown considerably over the past few years. The discussion below draws on ten recent systematic reviews that together shape the conceptual backbone of this study.

FinTech and Financial Inclusion

Ha, Le, and Nguyen (2025) synthesised 96 studies and organised the field around three recurring themes: the emergence of new financial products, structural change in how financial markets operate, and the shifting roles of participants across the FinTech ecosystem. Across this body of work, the link between FinTech and financial inclusion came through consistently, although the authors noted that comparatively little is known about its longer-term socioeconomic consequences or the regulatory questions that follow from wider adoption.

A considerably broader sweep of 325 studies by Mishra, Kandpal, Agarwal, and Srivastava (2024) reached a similar conclusion from a wider angle: financial inclusion opens access not just to banking, but to savings, credit, and insurance products as a bundle. The authors went further, treating digital finance — and FinTech in particular — as close to indispensable for inclusive growth strategies, with the strongest payoffs showing up in poverty reduction and in expanding women's financial autonomy.

Lower transaction costs and broader access are recurring findings, and Kishor, Bansal, and Kumar (2025) arrive at the same place from a sustainability angle: across 189 studies, they trace how FinTech serves inclusion and sustainability goals simultaneously rather than as separate agendas. What remains open, in their assessment, are digital literacy gaps, the maturity of regulatory frameworks, and how well consumers are protected as adoption scales up.

Financial Inclusion and Socio-Economic Development

Zooming out further, Duvendack and Mader (2020) synthesised 32 systematic reviews and arrived at a broadly favourable, if uneven, verdict: financial inclusion programs tend to produce gains in savings, women's empowerment, and access, but the magnitude of these gains varies considerably by country context. Their sharpest criticism was directed at a gap in the evidence base itself — the field, they argued, still struggles to show that inclusion initiatives translate into measurable behavioural change.

A related synthesis published in Qualitative Market Research (2023), spanning 107 studies across a fifteen-year window (2008–2023), arrives at much the same destination: financial inclusion is tied to economic growth, falling poverty, and a more stable financial system. Where this review adds value is in its forward-looking note, calling specifically for research into how digital financial tools shape user behaviour as it unfolds over time, rather than as a one-time snapshot.

FinTech, Sustainability, and Vulnerable Groups

Sustainability enters the picture more directly in Mamun and Várallyai (2025), who frame financial inclusion and sustainable finance as overlapping rather than parallel agendas. In their account, FinTech serves sustainability goals on two fronts at once — by widening access and by gradually steering users toward more responsible financial habits — with the strongest effects among groups that formal finance has historically overlooked. Their call to action is for closer coordination between FinTech strategy and sustainability policy.

A 2025 review in Discover Sustainability narrows the lens to vulnerable populations specifically — women, rural communities, and low-income households — and finds that mobile banking, digital wallets, and AI-driven financial tools produce real gains in access across developing economies. The caveat attached to this finding is consistent with several others in this literature: those gains depend on digital literacy, which remains an unresolved gating factor.

FinTech Innovation, Stability, and Developing Nations

One tension running through the policy side of this literature is whether expanding inclusion comes at the cost of financial stability. A 2024 study in Emerging Markets Review takes this question on directly and lands on a cautiously affirmative answer: digital financial products can bring unbanked populations into the formal system without destabilising it, but only where regulatory oversight keeps pace with the innovation.

Working specifically with developing-country evidence, a 2024 review in the Journal of Science and Technology Policy Management — covering 65 studies — reaches a familiar conclusion: FinTech expands access to digital payments, credit, and investment products in meaningful ways. Its more distinctive observation is methodological: the behavioural side of adoption, as opposed to the access side, remains comparatively thin in the evidence base.

Closing out this strand of the literature, a 2025 synthesis in Cogent Economics & Finance distils the conditions under which FinTech actually delivers inclusive growth down to three: the state of digital infrastructure, the level of financial literacy, and the degree of user trust. Without these three in place together, the authors suggest, access alone does not reliably translate into inclusion — a finding that points future research toward the behavioural drivers behind FinTech uptake.

Research Gap

FinTech and financial inclusion have attracted substantial research attention, but much of it converges on the same handful of concerns: technology uptake, digital payment infrastructure, mobile banking penetration, and macro-level economic indicators. The behavioural dimension — whether FinTech actually changes how people manage money on a day-to-day basis — receives comparatively little attention, a gap that several recent reviews have explicitly noted (Emerging Markets Review, 2024; Cogent Economics & Finance, 2025; Journal of Science and Technology Policy Management, 2024).

The way this literature is organised compounds the problem: financial inclusion and economic development are typically studied as parallel but disconnected tracks, and few studies ask whether FinTech drives responsible money habits, inclusion, and development outcomes together, as facets of one process rather than three separate stories.

There is also a methodological imbalance worth noting: a large share of the published work relies on systematic reviews, bibliometric mapping, and macro-level analysis rather than fresh, primary survey data. Studies that ask users directly — through their own words or structured instruments — how they perceive FinTech's role in shaping their financial habits remain relatively rare, and this is even more pronounced in developing-economy settings like India, where digital finance has expanded unusually quickly and getting policy right carries high stakes.

A further gap follows from how financial inclusion research tends to define its own scope: largely in terms of access and usage metrics, with much less attention paid to whether FinTech actually moves people toward better financial habits — budgeting, consistent saving, sustainable spending, long-term planning — the behaviours that arguably matter most for converting access into real development outcomes.

This study aims to address these gaps directly. Using primary data collected from active digital-finance users, it examines responsible financial behaviour, financial inclusion, and socio-economic development within a single empirical framework, contributing ground-level evidence to a literature still dominated by reviews and meta-analyses.

Research Objectives

This study sets out to accomplish four things:

1. Examine whether FinTech encourages responsible financial behaviour among the young adults who actively use digital financial services.
2. Assess how much FinTech services contribute to expanding financial inclusion among this same user group.
3. Evaluate FinTech's influence on socio-economic development, focusing specifically on improvements in saving habits, investment activity, and financial planning.

4. Capture how users themselves perceive FinTech's combined impact across responsible financial behaviour, inclusion, and socio-economic development.

Research Hypotheses

Drawing on the objectives above and the patterns identified in the literature, the following hypotheses were formulated for testing at a 5 percent significance threshold ($p < 0.05$):

Null Hypothesis (H0)	Alternative Hypothesis (H1)
H01: There is no significant relationship between the role of FinTech and responsible financial behaviour among young adults.	H11: There is a significant positive relationship between the role of FinTech and responsible financial behaviour among young adults.
H02: There is no significant relationship between the role of FinTech and financial inclusion among young adults.	H12: There is a significant positive relationship between the role of FinTech and financial inclusion among young adults.
H03: There is no significant relationship between the role of FinTech and socio-economic development among young adults.	H13: There is a significant positive relationship between the role of FinTech and socio-economic development among young adults.

Research Methodology

Research Design

This study follows a quantitative approach, blending descriptive and analytical elements. Quantitative methods made sense here given the goal of statistically testing relationships between FinTech usage and three separate outcome variables. The descriptive piece paints a picture of who the respondents are and how they think about FinTech, while the analytical piece is what actually allows the hypotheses to be tested and patterns between variables to be uncovered.

Sources of Data

Primary Data: Gathered directly from young adults who actively use digital financial services, via a structured questionnaire.

Secondary Data: Drawn from academic journals, books, institutional reports, and prior research, used to build the theoretical grounding and inform the literature review.

Population and Sampling

The target population is young adults engaged with digital financial services in some form — mobile banking apps, digital wallets, UPI payments, or other FinTech platforms. Given the exploratory nature of the research and the practical constraints of reaching this population, convenience sampling (a non-probability method) was used. This yielded 104 usable responses, which form the basis of the analysis that follows.

Data Collection Instrument

Data collection relied on a self-administered, structured questionnaire split into two parts: respondent demographics, and a set of Likert-scale statements covering FinTech usage alongside responsible financial behaviour, inclusion, and socio-economic development. Every

construct was measured on a standard five-point scale running from 1 (Strongly Disagree) through 5 (Strongly Agree).

Variables

The variable structure for this study is laid out below:

Variable Type	Variable
Independent Variable	Role of FinTech
Dependent Variable 1	Responsible Financial Behaviour
Dependent Variable 2	Financial Inclusion
Dependent Variable 3	Socio-Economic Development

Statistical Tools and Analysis

All data processing was carried out in IBM SPSS Statistics, using the following techniques:

- Percentage Analysis – to map out the demographic makeup of the sample.
- Descriptive Statistics (Mean and Standard Deviation) – to capture overall patterns in how respondents rated each item.
- Reliability Analysis (Cronbach's Alpha) – to check that the measurement scale was internally consistent.
- Pearson Correlation Analysis – to test the strength and direction of relationships between FinTech-related perceptions and the outcome variables.

Every hypothesis was tested against a 5 percent significance threshold ($p < 0.05$). Table 1 below pulls the full research design together in one place.

Table 1: Summary of Research Methodology

Research Design Parameter	Details
Research Design	Quantitative; descriptive and analytical
Type of Data	Primary (structured questionnaire) and Secondary (journals, reports, books)
Population	Young adults using digital financial services
Sampling Technique	Convenience sampling (non-probability)
Sample Size	104 valid responses
Measurement Scale	Five-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)
Software	IBM SPSS Statistics
Statistical Tools	Percentage Analysis, Descriptive Statistics, Reliability Analysis (Cronbach's Alpha), Pearson Correlation Analysis
Level of Significance	5% ($p < 0.05$)

Source: Primary Data

Data Analysis and Interpretation

This section walks through what the SPSS analysis of the 104 collected responses actually showed, covering the respondent demographic profile, descriptive statistics, scale reliability, and the Pearson correlation results.

Demographic Profile of Respondents

Table 2 breaks down the sample by gender. Female respondents made up the larger share of the 104 total, pointing to relatively stronger engagement from young women in this particular sample of digital-finance users.

Table 2: Gender Distribution of Respondents

Gender	Frequency	Percent (%)	Cumulative %
Female	66	63.46	63.46
Male	38	36.54	100.00
Total	104	100.00	—

Source: Primary Data

Specifically, 66 respondents (63.46%) identified as female against 38 (36.54%) male, skewing the sample noticeably toward women. This imbalance is worth keeping in mind when reading too much generalisability into the results, and a more evenly split sample would strengthen future iterations of this research.

Descriptive Statistics

Mean scores and standard deviations were worked out for each of the five items capturing how respondents view FinTech's role across financial inclusion, saving and investment, responsible financial behaviour, and socio-economic development. Table 3 lays these out.

Table 3: Descriptive Statistics of Study Items (N = 104)

Item	Mean	Std. Dev.	Median	Range
Item 1 (Financial Inclusion)	2.51	1.03	2	1–5
Item 2 (Saving & Investment)	2.46	0.99	2	1–5
Item 3 (Responsible Behaviour)	2.63	1.05	3	1–5
Item 4 (Social Development)	2.56	0.97	3	1–5
Item 5 (Motivation/Continuance)	2.55	0.97	3	1–5

Source: Computed Data

Mean values across the five items fall in a fairly tight band, between 2.46 and 2.63 on the five-point scale, with standard deviations sitting between 0.97 and 1.05. These numbers land just under the scale's neutral midpoint of 3, which tells us respondents weren't strongly endorsing the idea that FinTech drives inclusion, savings, responsible behaviour, or development — agreement was present, but muted rather than emphatic. The highest mean belonged to Item 3 (Responsible Behaviour, Mean = 2.63), hinting that respondents felt

FinTech platforms do somewhat encourage budgeting and disciplined spending, whereas Item 2 (Saving & Investment, Mean = 2.46) came in lowest of the five.

7.2.1 Frequency Distribution of Item Responses

Breaking each item down by response category sharpens the picture considerably.

Item 1 — Financial Inclusion: 15 Strongly Agree (14.4%), 39 Agree (37.5%), 41 Neutral (39.4%), 9 Strongly Disagree (8.7%).

Item 2 — Saving & Investment: 17 Strongly Agree (16.3%), 36 Agree (34.6%), 44 Neutral (42.3%), 7 Strongly Disagree (6.7%).

Item 3 — Responsible Behaviour: 12 Strongly Agree (11.5%), 36 Agree (34.6%), 45 Neutral (43.3%), 11 Strongly Disagree (10.6%).

Item 4 — Social Development: 12 Strongly Agree (11.5%), 38 Agree (36.5%), 46 Neutral (44.2%), 8 Strongly Disagree (7.7%).

Item 5 — Motivation/Continuance: 12 Strongly Agree (11.5%), 39 Agree (37.5%), 45 Neutral (43.3%), 8 Strongly Disagree (7.7%).

A clear pattern runs through all five items: 'Neutral' is consistently the most common response (between 39.4% and 44.2%), with 'Agree' close behind (34.6% to 37.5%). Very few respondents picked 'Strongly Disagree' (6.7% to 10.6%), and most answers cluster somewhere between Neutral and Agree. Read together, this points to a cautiously positive picture: many young FinTech users do see real value in terms of inclusion, savings discipline, and responsible money habits, but a sizeable chunk are still on the fence — which could reflect patchy awareness, irregular usage patterns, or simply a still-forming relationship with these digital tools.

Reliability Analysis (Cronbach's Alpha)

Before drawing conclusions from the correlation results, it's worth checking whether the five-item scale actually measures something coherent. Cronbach's Alpha was run for exactly this purpose, with results shown in Table 4.

Table 4: Reliability Statistics

Reliability Statistic	Value
Cronbach's Alpha	0.816
Number of Items	5
Sample Size (N)	104

Source: Computed Data

At 0.816, the Alpha value comfortably clears the conventional 0.70 benchmark (Nunnally, 1978), which is a strong signal of internal consistency across the five items. In practical terms, this means the scale is doing a reliable job of capturing perceptions tied to FinTech's role in inclusion, responsible behaviour, and development, and it gives the correlation analysis that follows a solid foundation to stand on.

Table 5's item-total statistics back this up further: corrected item-total correlations sit between 0.548 and 0.650 for every item, comfortably above the usual 0.30 cutoff, and removing any single item wouldn't meaningfully push the Alpha higher than it already is.

Table 5: Item-Total Statistics

Item	Scale Mean if Deleted	Scale Var. if Deleted	Corrected Item-Total Corr.	Alpha if Item Deleted
Item 1 (Financial Inclusion)	10.20	9.79	0.574	0.790
Item 2 (Saving & Investment)	10.25	9.59	0.650	0.767
Item 3 (Responsible Behaviour)	10.08	9.39	0.632	0.772
Item 4 (Social Development)	10.15	9.80	0.628	0.774
Item 5 (Motivation/Continuance)	10.16	10.22	0.548	0.797

Source: Computed Data

Pearson Correlation Analysis

Next, Pearson correlation was used to test how strongly — and in what direction — the five items relate to one another, covering financial inclusion, saving and investment, responsible financial behaviour, and socio-economic development. Table 6 presents the full matrix.

Table 6: Pearson Correlation Matrix (N = 104)

Item	Item 1 (FI)	Item 2 (SD)	Item 3 (RB)	Item 4 (SOC)	Item 5 (MOT)
Item 1	1	.477**	.387**	.491**	.448**
Item 2	.477**	1	.524**	.368**	.624**
Item 3	.387**	.524**	1	.519**	.523**
Item 4	.491**	.368**	.519**	1	.340**
Item 5	.448**	.624**	.523**	.340**	1

Source: Computed Data

*** Correlation is significant at the 0.01 level (2-tailed).*

Every single pairing in the matrix comes back positive and statistically significant at the 0.01 level ($p < 0.01$) — a result that lends solid support to Hypotheses H11, H12, and H13. A closer look at individual pairings reveals some interesting patterns:

- Item 1 (Financial Inclusion) correlates positively with everything else in the set, most strongly with Item 4 (Social Development, $r = .491$, $p < .01$) — a sign that respondents who see FinTech as inclusion-enabling also tend to view it as contributing to broader development.
- Item 2 (Saving & Investment) pairs most strongly with Item 5 (Motivation/Continuance, $r = .624$, $p < .01$), suggesting that people who feel FinTech genuinely helps them save and invest are also the ones most inclined to keep using it for its perceived societal value.

- Item 3 (Responsible Behaviour) shows strong ties to both Item 2 ($r = .524$, $p < .01$) and Item 5 ($r = .523$, $p < .01$) — a plausible link, given that budgeting discipline naturally feeds into both savings outcomes and continued platform engagement.
- Item 4 (Social Development) and Item 5 (Motivation/Continuance) show the weakest, though still significant, relationship in the matrix ($r = .340$, $p < .01$), indicating that perceived societal benefit and ongoing usage motivation are connected, but less tightly than other pairings.

Put simply: across the board, the correlations point the same direction — positive and statistically meaningful — supporting the case that FinTech's role connects in real ways to responsible financial behaviour, financial inclusion, and socio-economic development among this sample of young adults. This gives grounds for rejecting the null hypotheses (H01, H02, H03) in favour of the alternative ones.

Discussion of Findings

Considered together, these results support the broader view that FinTech is not a single-purpose tool — it touches several aspects of how young adults handle money at once. The strong Alpha score (0.816) confirms the underlying measurement is sound, which lends additional weight to the correlational findings discussed below.

The descriptive numbers, however, tell a more measured story than might be expected. Mean scores falling just below the scale midpoint, combined with a heavy concentration of 'Neutral' responses across every item, indicate that young adults are not rejecting FinTech's contribution to inclusion, savings, responsible habits, or development — but neither are they endorsing it wholeheartedly. This tentativeness aligns with earlier work identifying digital literacy and trust as preconditions for FinTech to deliver on its promise (Inclusive FinTech, 2025; Discover Sustainability, 2025). Access to a FinTech platform, in other words, does not by itself persuade users of its broader social value.

It is the correlation results that carry the most direct evidentiary weight for the study's hypotheses. Every item pair was positively and significantly correlated ($p < 0.01$), indicating that the four dimensions measured here — inclusion, saving/investing, responsible behaviour, and perceived development impact — move together rather than independently. This finding speaks directly to the gap identified earlier, where financial inclusion and socio-economic development have typically been treated as separate research streams (Duvendack & Mader, 2020). That these dimensions rise and fall together offers early empirical support for treating them as one unified picture rather than three disconnected ones.

A particularly notable finding is the strength of the relationship between savings/investment perceptions and ongoing motivation to use FinTech ($r = .624$). This implies that the perception of genuinely being helped to save and invest is itself what sustains continued use — a point worth noting for anyone designing FinTech products or retention strategies.

The relationship between responsible financial behaviour and both savings outcomes and continued engagement similarly reinforces a point raised in earlier reviews: the behavioural side of FinTech adoption remains under-researched relative to its access side (Kishor et al., 2025; Emerging Markets Review, 2024).

Pulling it all together, the evidence supports rejecting the null hypotheses (H01, H02, H03) and lends credibility to the alternative hypotheses (H11, H12, H13) — FinTech does appear to be meaningfully tied to responsible financial behaviour, financial inclusion, and perceived socio-economic development among this group of young adults. One caveat worth flagging clearly: these are correlational findings, not causal ones. Multiple regression analysis wasn't part of this phase of the study, so what's being reported here is association, not predictive influence.

Limitations of the Study

A few constraints are worth flagging before drawing too much from these results:

- Convenience sampling, while practical, narrows how far these findings can be generalised beyond the specific group surveyed.
- A sample of 104, though workable for the statistical tests used here, can't capture the full diversity of young digital-finance users across India.
- Women made up nearly two-thirds of respondents (63.46% vs. 36.54% male), an imbalance that could shape how representative the results are.
- Since all data came from self-reported Likert responses, the usual concerns around social desirability bias and subjective interpretation apply.
- A cross-sectional snapshot like this one can't speak to causation or track how FinTech's impact might shift over time.
- This phase of the research stopped at descriptive statistics, reliability checks, and correlation — multiple regression wasn't run, so what's reported here reflects association between variables, not predictive or causal influence.
- Focusing exclusively on young adults means these findings may not transfer cleanly to other groups, such as older adults or rural populations with different digital literacy levels.

Conclusion

FinTech has become a genuine driver of social and economic change, a pattern especially visible in fast-developing economies such as India. By making financial services more affordable, accessible, and user-friendly, FinTech does more than widen who can reach formal finance — it also has the potential to influence how people manage money and, through that, to contribute to wider economic progress.

This study aimed to connect three threads that prior research has largely kept separate: FinTech's role in encouraging responsible financial habits, expanding inclusion, and supporting socio-economic development among young adults. Based on responses from 104 active digital-finance users and analysed using IBM SPSS, the results pointed to a reliably consistent measurement scale (Cronbach's Alpha = 0.816) and statistically significant positive correlations ($p < 0.01$) across every item tied to inclusion, savings and investment, responsible behaviour, and perceived development outcomes.

On this basis, the null hypotheses are rejected in favour of the alternative ones — FinTech appears to be significantly and positively linked to responsible financial behaviour, inclusion, and socio-economic development among the young adults surveyed.

At the same time, the moderate mean scores and the substantial share of neutral responses indicate that this relationship is not yet uniformly strong across the board. There is clear room for stronger digital financial literacy programs and for FinTech products designed more deliberately to make their benefits visible and tangible to users, rather than relying on access alone to do that work.

Several directions could extend this work. Incorporating multiple regression analysis would help identify which factors actually predict each outcome individually, rather than simply co-varying with it. A longitudinal design would allow these relationships to be tracked as they evolve. Moving beyond convenience sampling toward a more diverse, geographically distributed sample would strengthen generalisability, and combining the quantitative results with qualitative interviews could help explain the behavioural and cultural mechanisms underlying these patterns.

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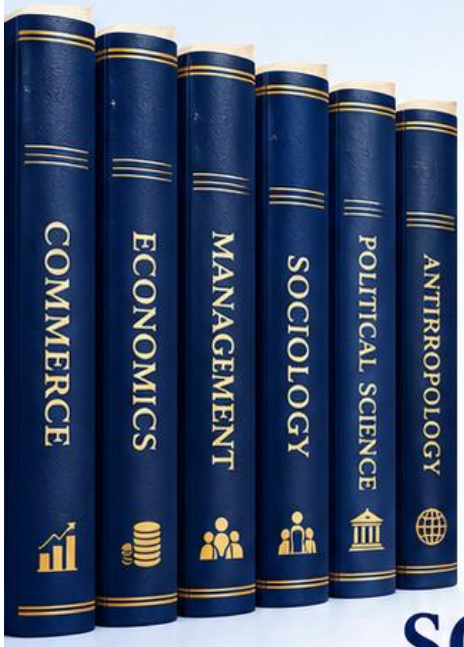

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