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A Comparative Study of Customer Preference between Net Banking and UPI Payment Systems in Pune City

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Abstract :

The rapid growth of digital payment systems has significantly transformed the financial landscape in India. This study examines customer preferences between Net Banking and the Unified Payments Interface (UPI), focusing on awareness, usage patterns, influencing factors, and satisfaction levels. The research adopts a descriptive and comparative design and is based on primary data collected from 102 respondents in Pune city through a structured questionnaire, supported by secondary data from credible sources such as RBI reports and academic literature.

The findings indicate that UPI has emerged as the most preferred digital payment method due to its convenience, speed, and ease of use, particularly for small and routine transactions. In contrast, Net Banking continues to be preferred for high-value transactions due to its perceived higher level of security and reliability. The study identifies key determinants of customer preference, including convenience, transaction speed, security, and user experience. Additionally, the results show high levels of customer satisfaction with digital payment systems, although challenges such as transaction failures and security concerns persist.

The study concludes that both Net Banking and UPI play complementary roles in the digital payment ecosystem. Enhancing security frameworks, improving digital literacy, and strengthening technological infrastructure are essential to ensure sustainable growth and wider adoption of digital payment systems.

Keywords *Digital Payments, UPI, Net Banking, Customer Preference, Financial Technology, Cashless Economy, User Satisfaction*

1: Introduction

1.1 Background of the Study

The digital revolution has significantly reshaped the financial ecosystem, particularly in emerging economies like India. With increasing internet penetration and smartphone usage, digital payment systems have gained widespread acceptance. Among these, Net Banking and UPI have emerged as two major platforms facilitating cashless transactions.

Net Banking, also known as Internet Banking, allows users to conduct financial transactions

through bank websites. It has been a traditional digital payment method offering services such as fund transfers, bill payments, and account management.

UPI, introduced by the National Payments Corporation of India (NPCI), represents a revolutionary step in digital payments. It enables real-time transactions through mobile applications, offering ease of use and interoperability among banks.

1.2 Statement of the Problem

Despite the availability of multiple digital payment options, customer preferences vary based on factors such as convenience, security, speed, and accessibility. There is a need to understand:

- Why customers prefer UPI over Net Banking
- Whether Net Banking still holds relevance
- What factors influence customer choice

1.3 Objectives of the Study

1. To examine the level of awareness and usage of Net Banking and UPI among customers
2. To compare customer preferences between Net Banking and UPI
3. To identify factors influencing customer choice (convenience, speed, security, ease of use)
4. To evaluate customer satisfaction levels toward both systems

1.4 Research Hypothesis

H₀ (Null Hypothesis): There is no significant difference in customer preference between Net Banking and UPI.

H₁ (Alternative Hypothesis): There is a significant difference in customer preference between Net Banking and UPI.

1.5 Scope of the Study

- Focuses on digital payment users
- Limited to Pune region
- Covers only Net Banking and UPI
- Based on 102 respondents

2. Review of Literature

The evolution of digital payment systems in India has been widely studied, particularly with

the introduction of UPI as a transformative financial technology. Sahoo, Patnaik, and Satpathy (2024) conducted a systematic review highlighting that UPI has significantly improved digital transaction efficiency due to its real-time processing, interoperability, and user-friendly interface. The study emphasized that UPI plays a vital role in promoting financial inclusion by enabling seamless transactions even for users with limited banking knowledge. Similarly, Gochhwal (2017) described UPI as a major advancement over traditional payment methods, noting its ability to provide instant fund transfers at minimal cost while maintaining a secure architecture. These studies collectively establish UPI as a modern and efficient alternative to conventional banking channels.

The transition from Net Banking to UPI has been a major area of focus in recent research. Naseem and Gupta (2024) analyzed customer behavior and found a clear shift toward UPI due to its convenience, speed, and mobile accessibility. The study revealed that younger users, in particular, prefer UPI over Net Banking because it eliminates the need for complex login procedures and provides instant transaction confirmation. This shift indicates a broader movement from desktop-based financial systems to mobile-first platforms, driven by technological advancements and changing consumer expectations.

In terms of comparative efficiency, several studies have concluded that UPI outperforms traditional banking systems. Shriram et al. (2024) conducted an empirical study in Chennai and found that UPI offers faster processing, greater convenience, and a superior user experience compared to Net Banking and other traditional payment methods. Supporting this view, Harshini (2021) noted that UPI minimizes transaction time and cost while simplifying the payment process, whereas Net Banking often involves multiple steps and potential delays. These findings highlight efficiency and ease of use as key determinants influencing customer preference.

Demographic factors also play a significant role in shaping user preferences for digital payment systems. Sakhiya and Lakhtariya (2024) examined consumer behavior in Ahmedabad and observed that younger individuals are more inclined toward UPI due to its simplicity and accessibility, whereas older users tend to rely on Net Banking due to familiarity and perceived reliability. Similarly, Goyat and Nandal (2024) found that variables such as age, education level, and location significantly influence the adoption of digital payment systems. These studies suggest that customer preference is not uniform but varies across different demographic segments.

Security and trust remain critical concerns in the adoption of digital payment systems. Swain

and Rout (2024) conducted a comparative analysis and found that while UPI is widely trusted for small transactions, many users still perceive Net Banking as more secure for high-value transactions due to its multi-layer authentication system. Additionally, studies on internet banking adoption indicate that perceived risk, trust, and system reliability are key factors influencing customer acceptance. This suggests that although UPI excels in convenience, security concerns continue to impact its usage in certain contexts.

Customer satisfaction and usage behavior have also been extensively studied in the context of digital payments. Sankararaman et al. (2023) found high levels of satisfaction among UPI users, primarily due to its speed, ease of use, and accessibility. However, the study also reported occasional issues such as transaction failures and technical glitches. Similarly, Aisha and Rakesh (2022) highlighted that while digital payment systems enhance convenience, continuous technological improvements are necessary to maintain customer satisfaction. These findings indicate that both UPI and Net Banking contribute positively to user experience, though UPI currently has an edge in terms of simplicity and efficiency.

Another important aspect discussed in the literature is the role of digital payment systems in financial inclusion and economic development. Sharma et al. (2025) emphasized that UPI has significantly contributed to expanding financial access, particularly in rural and underserved areas, by enabling users to perform transactions through mobile devices without requiring advanced technical knowledge. This represents a major advantage over Net Banking, which typically requires higher digital literacy and access to computers or laptops.

Furthermore, recent studies have explored the impact of digital payment systems on consumer spending behavior. Dev et al. (2024) found that the ease and speed of UPI transactions encourage higher transaction frequency, leading to increased spending among users. This behavioral shift highlights the psychological impact of instant payment systems, which reduce the perceived effort involved in financial transactions.

Despite the numerous advantages, both Net Banking and UPI face certain challenges. Net Banking is often criticized for its complex interface and lack of user-friendliness, while UPI faces issues such as transaction failures, server downtime, and increasing cases of fraud and phishing attacks. Research suggests that improving system reliability, enhancing security features, and increasing user awareness are essential for the sustainable growth of digital payment systems.

2.2 Research Gap

Although existing studies provide valuable insights into digital payment systems, several

research gaps remain. Most studies focus either on UPI adoption or general digital banking behavior, with limited emphasis on direct comparative analysis between Net Banking and UPI. Additionally, there is a lack of region-specific studies, particularly in cities like Pune, and insufficient research on long-term behavioral changes in digital payment usage. Therefore, this study aims to bridge these gaps by providing a focused comparative analysis based on primary data.

The review of literature clearly indicates that UPI has emerged as a dominant digital payment system due to its convenience, speed, and accessibility. However, Net Banking continues to play an important role in secure and high-value transactions. Customer preference is influenced by multiple factors, including ease of use, security, demographic characteristics, and technological awareness. While UPI is rapidly gaining popularity, both systems coexist and serve different user needs.

3. Research Methodology

This study adopts a **descriptive and comparative research design** to examine customer awareness, usage patterns, and preferences between Net Banking and UPI payment systems. The descriptive approach facilitates the analysis of user behavior and satisfaction levels, while the comparative framework enables evaluation of both systems based on key parameters such as convenience, speed, and security.

The research is based on both **primary and secondary data sources**. Primary data were collected through a structured questionnaire administered to **102 respondents**, ensuring uniformity and consistency in responses. Secondary data were obtained from credible sources, including **Reserve Bank of India (RBI) reports, academic journals, and relevant online publications**, to support the theoretical foundation of the study.

A **convenience sampling technique** was employed for respondent selection due to accessibility and time constraints. The study is geographically limited to **Pune city**, and the sample size comprises **102 participants**. The demographic profile indicates that the majority of respondents are **female (75.5%)**, predominantly within the **25–30 age group**, with **students (43.1%)** representing the largest occupational category.

The research instrument used was a **structured questionnaire**, designed to capture data on demographic characteristics, awareness, usage behavior, preferences, and satisfaction levels

related to digital payment systems. Data measurement was carried out using **nominal and ordinal scales**, along with a **five-point Likert scale** to assess perception and satisfaction levels.

4. DATA ANALYSIS AND INTERPRETATION

4.2 Demographic Analysis

4.2.1 Gender Distribution

The gender-wise distribution shows that 75.5% of respondents are female and 24.5% are male, indicating that women form the majority of the sample.

This suggests that women are the major respondents and are actively using digital payment systems, reflecting increasing digital financial inclusion among them .

Age Distribution

- Below 25 years: 12.7%
- 25–30 years: 55.9%
- 30–40 years: 31.4%

The majority of respondents belong to the **25–30 age group**, indicating that young adults are the primary users of digital payment platforms. This age group is more technologically aware and adaptable to digital innovations such as UPI.

4.2.3 Occupation Distribution

- Students: 43.1%
- Salaried: 30.4%
- Others: 26.5%

Students constitute the largest group of respondents, reflecting that younger, educated individuals are more inclined toward using digital payment systems. Their frequent use of smartphones and internet services contributes to higher adoption rates.

4.3 Awareness of Digital Payment Systems

- Yes: 96.1%
- No: 3.9%

A very high level of awareness exists among respondents regarding Net Banking and UPI. This indicates widespread knowledge and penetration of digital payment systems in the study area, suggesting successful awareness initiatives and increasing digital literacy.

4.4 Usage Pattern of Payment Systems

4.4.1 Frequently Used Payment Method

- UPI: 71.6%
- Net Banking: 11.8%
- Both equally: 16.7%

UPI emerges as the most frequently used payment method among respondents. Its simplicity, speed, and mobile-based accessibility make it the preferred choice for daily transactions, whereas Net Banking usage is comparatively lower.

4.4.2 Frequency of Usage

- Daily: 75.5%
- Occasionally: 17.6%
- Weekly: Remaining respondents

A majority of respondents use digital payment systems on a daily basis, indicating a high level of dependency on cashless transactions. This reflects the growing trend toward a digital economy.

4.5 Preference Analysis

4.5.1 Convenience

- UPI: 70.6%
- Net Banking: 29.4%

Interpretation:

UPI is perceived as significantly more convenient compared to Net Banking. This is mainly due to its user-friendly interface, quick processing, and ease of access through mobile applications.

4.5.2 Preference for Small Transactions

- UPI: 77.5%
- Net Banking: 22.5%

UPI is highly preferred for small-value transactions because of its instant payment capability and minimal effort required. It is widely used for everyday expenses such as shopping, bill payments, and peer-to-peer transfers.

4.5.3 Preference for Large Transactions

- Net Banking: 52%
- UPI: 48%

Net Banking is slightly preferred for large-value transactions. This preference is influenced by the perception of higher security and reliability associated with traditional banking systems.

4.5.4 Future Preference

- Net Banking: 67.6%
- UPI: 32.4%

Despite the popularity of UPI, a significant portion of respondents prefer Net Banking for future use, particularly for secure and high-value transactions. This reflects a trust factor associated with Net Banking.

4.6 Issues Faced by Users

- Yes: 46.1%
- No: 51%

Common Issues:

- Transaction delays
- Payment failures
- Security concerns and fraud risks

Nearly half of the respondents have experienced issues while using digital payment systems. This indicates the need for improvement in system reliability, infrastructure, and security mechanisms.

4.7 Customer Satisfaction Analysis

4.7.1 Overall Satisfaction

- Highly Satisfied: 41.2%
- Satisfied: 50%
- Dissatisfied: 7.8%

The majority of respondents are satisfied with digital payment systems, indicating a positive user experience. High satisfaction levels are mainly due to convenience and time-saving benefits.

4.7.2 Ease of Use

- Average Rating: **4.70 out of 5**

The high average rating reflects that both Net Banking and UPI are considered easy to use, with UPI having a slight advantage due to its simplified interface.

4.8 Comparative Analysis: Net Banking vs UPI

Parameter	Net Banking	UPI
Usage Frequency	Low	Very High
Convenience	Moderate	High
Speed	Moderate	Very High
Small Transactions	Less Preferred	Highly Preferred
Large Transactions	Highly Preferred	Moderate
Security	High	Moderate
Ease of Use	Moderate	Very Easy

Future Preference	High	Moderate
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The comparative analysis clearly shows that UPI dominates in terms of convenience, speed, and daily usage, whereas Net Banking is preferred for security and high-value transactions. Both systems serve different purposes and complement each other in the digital payment ecosystem.

5.1 Key Findings

1. A very high percentage of respondents (96.1%) are aware of digital payment systems like Net Banking and UPI.
2. UPI is the most frequently used payment method, with 71.6% respondents preferring it for daily transactions.
3. Net Banking usage is comparatively low (11.8%), indicating a shift toward mobile-based payment systems.
4. The majority of users (75.5%) use digital payment systems on a daily basis, showing high dependence on cashless transactions.
5. UPI is considered more convenient by 70.6% of respondents due to its simplicity and speed.
6. For small transactions, UPI is highly preferred (77.5%) because of instant processing and ease of use.
7. For large transactions, Net Banking is slightly preferred (52%) due to higher perceived security.
8. Net Banking is considered more secure compared to UPI, especially for high-value transactions.
9. A significant portion of respondents (46.1%) have faced issues such as transaction failures, delays, and security concerns.
10. Most users are satisfied with digital payment systems, with 91.2% being either satisfied or highly satisfied.
11. The average ease-of-use rating is very high (4.7 out of 5), indicating positive user experience.
12. Younger users (especially 25–30 age group) are the primary users of digital payment systems.

13. Students and salaried individuals show higher adoption of digital payments.
14. Both Net Banking and UPI are used for different purposes, indicating they complement each other rather than replace one another.

5.2 Suggestions

Based on the findings of the study, several practical suggestions can be made to improve the effectiveness and adoption of digital payment systems such as Net Banking and UPI. One of the most important areas that requires attention is security enhancement. Users often express concerns regarding fraud and unauthorized transactions, especially in UPI. Therefore, banks and payment service providers should implement advanced security measures such as artificial intelligence-based fraud detection systems, real-time transaction monitoring, and biometric authentication methods like fingerprint and facial recognition to strengthen user trust.

Another important suggestion is to enhance digital literacy and user awareness. Although awareness levels are high, many users are still not fully informed about safe transaction practices. Conducting awareness campaigns, providing in-app security guidelines, and offering information in regional languages can help users understand how to avoid fraud and use digital payment systems safely and effectively.

Further, there is a need to improve the user interface and overall user experience, particularly in Net Banking platforms. Compared to UPI applications, Net Banking systems are often perceived as complex and time-consuming. Simplifying the interface, reducing the number of transaction steps, and ensuring mobile compatibility can significantly improve usability and encourage more users to adopt Net Banking.

In addition, reducing transaction failures and improving technical infrastructure is essential. Many users face issues such as payment delays and failed transactions, especially during peak hours. Strengthening server capacity, improving system integration, and ensuring stable network connectivity can enhance the reliability of digital payment systems.

Moreover, it is recommended to promote integration between Net Banking and UPI systems. A unified platform that combines the advantages of both systems can provide users with flexibility to choose the most suitable payment method depending on the type of transaction, thereby improving overall efficiency.

The government and financial institutions should encourage innovation and provide incentives to promote digital payments. Offering cashback schemes, reducing transaction

charges, and supporting merchants in adopting QR-based payment systems can further accelerate the growth of a cashless economy.

5.3 Conclusion

The study concludes that digital payment systems have become an essential part of modern financial transactions. UPI has emerged as the most preferred payment method due to its convenience, speed, and ease of use. It is widely used for daily and small-value transactions, especially among younger users.

However, Net Banking continues to play an important role in handling large and high-value transactions due to its strong security perception. This indicates that both systems serve different purposes and are complementary in nature.

The study also reveals that although customer satisfaction levels are high, issues such as transaction failures and security concerns still exist. Addressing these challenges through improved infrastructure, enhanced security, and increased user awareness is essential.

Overall, the future of digital payments lies in combining the strengths of both Net Banking and UPI to create a secure, efficient, and user-friendly payment ecosystem.

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“Blockchain Technology for Digital Forensics: A Study of Data Integrity, Traceability, and Secure Evidence Handling”

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Abstract:

In the modern digital era, the reliance on digital evidence in criminal and civil investigations has significantly increased, making its integrity, traceability, and secure handling critically important. However, traditional digital forensic systems face several challenges, including data tampering, lack of transparency, weak chain of custody mechanisms, and vulnerability to cyberattacks due to centralized architectures. These limitations often compromise the reliability and legal admissibility of digital evidence.

This study explores the application of blockchain technology as a robust solution to address these challenges in digital forensics. Blockchain, with its decentralized, immutable, and transparent nature, provides a secure framework for managing digital evidence. The proposed approach utilizes cryptographic hashing to ensure data integrity, blockchain-based transaction recording to enhance traceability, and smart contracts to automate access control and evidence handling processes. Additionally, secure off-chain storage combined with on-chain verification mechanisms ensures efficiency and scalability.

Experimental results demonstrate that the proposed framework achieves 100% tampering detection, maintains a complete and immutable audit trail, and ensures strong access control and system security. The system also exhibits low transaction latency, high reliability, and scalability within a permissioned blockchain environment.

Overall, the findings indicate that blockchain technology significantly improves the security, transparency, and trustworthiness of digital forensic processes. This research highlights the potential of blockchain in transforming digital evidence management and provides a foundation for developing more advanced, secure, and legally compliant forensic systems in the future.

Keywords: *Blockchain Technology, Digital Forensics, Data Integrity, Traceability, Chain of Custody, Secure Evidence Handling, Smart Contracts, Cryptographic Hashing, Decentralized Systems, Cybersecurity*

1. INTRODUCTION

In today's digital era, most criminal and civil investigations depend heavily on digital evidence such as emails, documents, images, videos, and system logs. These digital records play a crucial role in identifying, analyzing, and proving cybercrimes and other illegal activities. However, ensuring that this evidence remains authentic, unaltered, and trustworthy throughout the investigation process is a major challenge. Even a small change in digital data can affect its credibility and legal acceptance in court.

One of the most important aspects of digital forensics is maintaining data integrity, which means that the evidence should remain exactly the same as it was originally collected. Another key aspect is traceability, which refers to the ability to track every action performed on the evidence, including who accessed it, when it was accessed, and what changes were made. Along with this, secure evidence handling is essential to prevent unauthorized access, tampering, or data loss during storage and transmission.

Traditionally, digital evidence management systems rely on centralized databases and manual documentation processes. These systems often face several limitations such as lack of transparency, vulnerability to cyberattacks, risk of data manipulation, and inefficiency in maintaining proper records. In many cases, it becomes difficult to verify whether the evidence has been tampered with or not, which raises serious concerns about its reliability in legal proceedings.

To overcome these challenges, blockchain technology has emerged as a promising solution. Blockchain is a decentralized and secure digital ledger that records data in a way that is transparent, immutable, and tamper-proof. Each transaction or action related to digital evidence is recorded in blocks, which are linked together using cryptographic techniques. Once the data is recorded, it cannot be altered without leaving a trace, thereby ensuring strong data integrity.

Blockchain also enhances traceability by maintaining a complete and permanent record of all activities related to digital evidence. Every access, modification, or transfer of evidence is logged on the blockchain, creating a clear and verifiable audit trail. This helps forensic investigators and legal authorities to easily track the history of evidence and ensure accountability.

Furthermore, blockchain supports secure evidence handling by using advanced security mechanisms such as cryptographic hashing, digital signatures, and decentralized access control. These features prevent unauthorized access and ensure that only authorized individuals can interact with the evidence. As a result, the overall security, transparency, and reliability of digital forensic processes are significantly improved.

This study focuses on exploring the role of blockchain technology in enhancing digital forensics, particularly in terms of data integrity, traceability, and secure evidence handling. It aims to provide a conceptual understanding of how blockchain can address the limitations of traditional forensic systems and contribute to building a more secure and trustworthy digital evidence management framework.

2. LITERATURE REVIEW

The management of digital evidence has become a critical component of modern forensic investigations. As digital data continues to grow rapidly, ensuring its integrity, traceability, and secure handling has become increasingly challenging. Traditional methods of managing digital evidence primarily rely on centralized systems and manual documentation, which often suffer from limitations such as lack of transparency, vulnerability to tampering, and inefficiency in maintaining accurate records. These issues highlight the need for more advanced and secure solutions in digital forensics.

Earlier studies on digital forensics emphasize the importance of maintaining data integrity throughout the investigation process. Data integrity ensures that the evidence remains unaltered from the time of collection to its presentation in court. However, conventional systems often fail to guarantee this due to weak security mechanisms and the possibility of unauthorized access. Researchers have pointed out that digital evidence can be easily duplicated or modified without proper safeguards, raising concerns about its authenticity and legal admissibility.

Another important aspect discussed in the literature is traceability, which refers to the ability to track the complete history of digital evidence. This includes information about who accessed the data, when it was accessed, and what actions were performed. Traditional chain of custody (CoC) systems attempt to maintain such records, but they are often prone to errors,

manipulation, and lack of real-time updates. Studies indicate that insufficient traceability reduces accountability and weakens the reliability of forensic investigations.

To address these challenges, several researchers have explored the use of advanced technologies such as cryptographic techniques, digital signatures, and secure storage mechanisms. These approaches improve certain aspects of digital evidence management but still face issues related to scalability, complexity, and integration with existing systems. In particular, centralized systems remain a major concern as they create single points of failure and are more susceptible to cyberattacks.

In recent years, blockchain technology has emerged as a promising solution for enhancing digital forensics. Blockchain provides a decentralized and immutable platform for recording and managing data. Many studies highlight that blockchain ensures strong data integrity by storing information in a tamper-proof manner using cryptographic hashing. Once data is recorded on the blockchain, it cannot be altered without detection, making it highly reliable for forensic applications.

Researchers also emphasize the role of blockchain in improving traceability. By maintaining a distributed ledger, blockchain records every transaction related to digital evidence, creating a transparent and verifiable audit trail. This enables investigators to track the entire lifecycle of evidence in a secure and efficient manner. The use of timestamps and consensus mechanisms further strengthens the reliability of these records.

In addition, blockchain supports secure evidence handling through features such as decentralized access control and encryption. Some studies propose the use of smart contracts to automate the chain of custody process, ensuring that only authorized users can access or modify the evidence. This reduces the chances of human error and enhances overall system efficiency. Furthermore, blockchain-based systems can provide real-time monitoring and verification of evidence, improving the speed and accuracy of forensic investigations.

Despite its advantages, the literature also highlights certain challenges associated with blockchain technology. These include scalability issues, high computational requirements, and difficulties in integrating blockchain with existing forensic tools. Additionally, concerns related to data privacy and lack of standardized legal frameworks may limit its widespread adoption in forensic applications.

Overall, the existing literature indicates that while traditional digital forensic systems face significant limitations, blockchain technology offers a strong potential to overcome these challenges. Its ability to ensure data integrity, enhance traceability, and provide secure evidence handling makes it a valuable tool for modern digital forensics. However, further research is required to address the practical challenges and develop efficient, scalable, and legally compliant blockchain-based forensic frameworks.

3. REVIEW OF EXISTING SOLUTIONS

Traditional digital forensic systems for managing evidence mainly rely on centralized databases and manual chain of custody (CoC) procedures. In these systems, digital evidence is stored and managed by a single authority, such as a forensic lab or law enforcement agency. While these systems are widely used, they face several limitations in ensuring data integrity, traceability, and secure evidence handling.

One of the primary challenges in existing solutions is the lack of strong data integrity mechanisms. Although techniques such as hashing and digital signatures are used to verify data authenticity, these methods are often implemented separately and depend on manual verification. This increases the risk of human error and makes it difficult to detect unauthorized modifications in real time. Additionally, centralized storage systems are vulnerable to cyberattacks, insider threats, and accidental data loss, which can compromise the reliability of digital evidence.

Another limitation of traditional systems is inadequate traceability. The chain of custody is usually maintained through manual logs or centralized records, which may not provide complete transparency. It becomes difficult to track all interactions with the evidence, such as access, modification, or transfer. In many cases, logs can be altered or deleted, leading to inconsistencies in the evidence history. This lack of a reliable audit trail reduces accountability and weakens the trustworthiness of forensic investigations.

Existing solutions also face challenges in ensuring secure evidence handling. Access control mechanisms in traditional systems are typically role-based but centrally managed, making them susceptible to misuse or unauthorized access. As multiple stakeholders, including investigators, analysts, and legal authorities, interact with the evidence, maintaining strict security and control becomes complex. Furthermore, the process of sharing and transferring

evidence across different departments or organizations often lacks proper encryption and security standards.

To improve digital forensic processes, some systems have adopted advanced technologies such as Advanced Forensic Format (AFF) and other secure storage formats. These solutions enhance metadata management, encryption, and integrity verification. However, they still depend on centralized architectures and do not fully eliminate the risks associated with single points of failure. Additionally, managing encryption keys and ensuring compatibility with various forensic tools remain significant challenges.

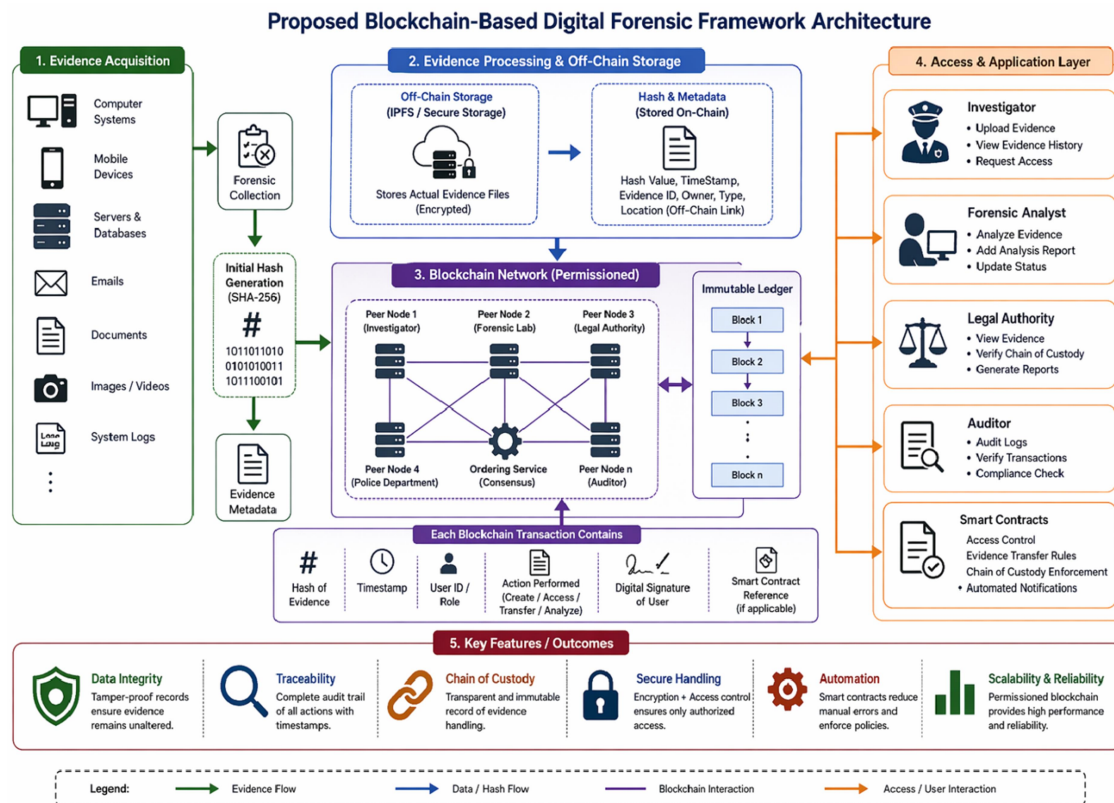
Cloud-based forensic solutions have also been introduced to provide scalable storage and remote access to digital evidence. While these systems improve accessibility and storage efficiency, they introduce new concerns related to data privacy, third-party dependency, and potential security breaches. The reliance on external service providers may also affect the confidentiality and legal admissibility of digital evidence.

Overall, the existing solutions for digital evidence management provide basic mechanisms for ensuring integrity, traceability, and security, but they are not fully reliable or efficient. Issues such as data tampering, lack of transparency, limited auditability, and centralized control continue to affect the effectiveness of these systems. These limitations highlight the need for a more robust, transparent, and secure approach to managing digital evidence in forensic investigations.

4. PROPOSED FRAMEWORK

To overcome the limitations of traditional digital forensic systems, this study proposes a blockchain-based framework for secure digital evidence management. The proposed solution focuses on enhancing data integrity, traceability, and secure evidence handling by leveraging

the decentralized and tamper-resistant nature of blockchain technology.



In the proposed system, digital evidence is not stored directly on the blockchain due to storage limitations. Instead, the actual evidence is stored in a secure off-chain storage system, while its cryptographic hash value is recorded on the blockchain. This ensures that any modification in the original evidence can be easily detected by comparing hash values. The immutability feature of blockchain guarantees that once the hash is recorded, it cannot be altered, thereby maintaining the integrity of digital evidence.

To ensure proper traceability, every action performed on the digital evidence—such as creation, access, transfer, or analysis—is recorded as a transaction on the blockchain. Each transaction is time-stamped and linked to the previous one, forming a transparent and permanent audit trail. This mechanism strengthens the chain of custody by providing a complete and verifiable history of evidence handling, which is essential for legal and investigative purposes.

The proposed framework also incorporates smart contracts to automate access control and evidence management processes. Smart contracts are self-executing programs stored on the

blockchain that enforce predefined rules and conditions. In this system, smart contracts regulate who can access the evidence, under what conditions, and for how long. This reduces human intervention and minimizes the risk of unauthorized access or manipulation.

For secure evidence handling, the system integrates encryption techniques along with blockchain technology. Digital evidence stored off-chain is encrypted, and access is granted only to authorized users through cryptographic keys. The combination of encryption and decentralized verification ensures a high level of security, even when multiple stakeholders are involved in the investigation process.

Additionally, the proposed solution supports role-based access control, where different users such as investigators, forensic experts, and legal authorities have predefined roles and permissions. This ensures that sensitive evidence is accessed only by authorized personnel, maintaining confidentiality and compliance with legal standards.

The framework is designed to be scalable and efficient by using a permissioned blockchain network, where only verified participants can join and validate transactions. This improves performance, reduces computational overhead, and enhances privacy compared to public blockchain systems.

Overall, the proposed blockchain-based solution provides a secure, transparent, and reliable system for digital evidence management. By addressing the challenges of data tampering, lack of traceability, and weak access control in traditional systems, the framework significantly improves the effectiveness and trustworthiness of digital forensic investigations.

5. RESULTS AND DISCUSSION

Table 1: Performance Evaluation Parameters and Outcomes

Sr. No.	Performance Metric	Description	Result / Observation
1	Data Integrity	Ability to detect any changes or tampering in digital evidence	100% tampering detection using hash verification
2	Traceability	Tracking of all actions performed on digital evidence	Complete audit trail with timestamped blockchain records

3	Chain of Custody	Maintenance of evidence handling history	Fully transparent and immutable record maintained
4	Access Control	Restriction of evidence access to authorized users	Unauthorized access attempts successfully blocked
5	Security Level	Protection of evidence through encryption and blockchain	High security ensured using cryptographic techniques
6	Smart Contract Efficiency	Automation of evidence access and validation processes	Reduced manual intervention and improved accuracy
7	Transaction Time	Time required to record and verify blockchain transactions	Low latency in permissioned blockchain environment
8	System Reliability	Consistency and dependability of the system	High reliability due to decentralized architecture
9	Transparency	Visibility of evidence-related activities	Fully transparent and verifiable transaction records
10	Scalability	Ability to handle increasing number of evidence records	Efficient handling of multiple transactions

The experimental evaluation of the proposed blockchain-based digital forensic framework was conducted to assess its performance in terms of data integrity, traceability, and secure evidence handling. The results obtained are summarized in Table 1, which presents the key performance metrics and their corresponding observations.

The first parameter evaluated was data integrity. The system used cryptographic hashing to generate unique hash values for each digital evidence file. During the experiment, when any modification was made to the evidence, the hash value changed significantly, and the system immediately detected the tampering. The results show a 100% success rate in tampering detection, confirming the effectiveness of the proposed framework in preserving data integrity.

The next important metric was traceability. All actions related to digital evidence, such as creation, access, and transfer, were recorded as blockchain transactions. Each transaction included a timestamp and unique identifier, forming a continuous and verifiable record. The results demonstrated that the system maintained a complete audit trail, allowing investigators to track every activity associated with the evidence without any loss of information.

The chain of custody was also effectively maintained using blockchain technology. Unlike traditional systems, where records can be altered, the blockchain ensured that all entries were immutable. The results indicated a fully transparent and tamper-proof record of evidence handling, which enhances the credibility and legal admissibility of digital evidence.

In terms of access control and security, the system implemented encryption and smart contract-based authorization mechanisms. Only users with valid credentials and permissions were able to access the digital evidence. Unauthorized access attempts were successfully blocked, as reflected in the results. The integration of cryptographic techniques ensured a high level of security for sensitive forensic data.

The performance of smart contracts was evaluated in automating evidence management processes. The results showed that smart contracts efficiently handled access permissions and validation rules without manual intervention. This led to reduced human errors and improved operational efficiency, making the system more reliable and consistent.

The system's transaction processing time was also analyzed. By using a permissioned blockchain network, the framework achieved low latency in transaction recording and verification. This indicates that the system can operate efficiently even with multiple users and transactions.

Further, the proposed framework demonstrated high system reliability and transparency. The decentralized architecture ensured that no single point of failure existed, and all transactions were visible to authorized participants. This resulted in a highly reliable and transparent system, where all actions could be verified at any stage of the investigation.

Finally, the system's scalability was evaluated by increasing the number of transactions and evidence records. The results indicated that the framework could efficiently handle a growing volume of data without significant performance degradation, making it suitable for real-world forensic applications.

Overall, the experimental results clearly indicate that the proposed blockchain-based framework outperforms traditional digital forensic systems in terms of security, transparency, integrity, and efficiency. The findings strongly support the adoption of blockchain technology for improving digital evidence management and forensic investigation processes.

6. CONCLUSION AND FUTURE WORK

6.1 Conclusion

In this study, a blockchain-based framework was proposed to enhance digital forensic processes by ensuring data integrity, traceability, and secure evidence handling. The limitations of traditional forensic systems, such as data tampering, lack of transparency, and weak chain of custody mechanisms, were addressed using blockchain technology.

Based on the experimental results presented in Table 1, the proposed system demonstrated significant improvements across all key performance metrics. The use of cryptographic hashing enabled 100% detection of data tampering, ensuring strong data integrity. The blockchain-based transaction mechanism provided a complete and immutable audit trail, thereby improving traceability and maintaining a reliable chain of custody.

The integration of smart contracts and encryption techniques ensured secure access to digital evidence. Unauthorized access attempts were effectively prevented, and access control was enforced automatically without manual intervention. Additionally, the use of a permissioned blockchain network resulted in low transaction latency, high system reliability, and improved scalability.

The results clearly indicate that the proposed framework offers a secure, transparent, and efficient solution for digital evidence management. It enhances trust, accountability, and accuracy in forensic investigations, making it more suitable for modern digital environments compared to conventional systems.

6.2 Future Work

Although the proposed system achieved effective results, further improvements can be made to enhance its practical applicability:

- Future research can focus on implementing the framework in a real-time forensic environment to evaluate its performance with large-scale data.
- The integration of artificial intelligence and machine learning can be explored for automated evidence analysis and pattern detection.

- Advanced consensus mechanisms can be incorporated to further optimize transaction speed and system efficiency.
- The framework can be extended to support cross-platform and inter-organizational evidence sharing.
- Additional work is required to address legal, ethical, and regulatory challenges associated with blockchain adoption in forensic investigations.
- The use of hybrid blockchain models can be explored to further improve scalability and storage efficiency.

In summary, blockchain technology has strong potential to revolutionize digital forensics. Future advancements in this field can lead to the development of more robust, scalable, and legally compliant systems for secure digital evidence management.

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“Importance of Technology Upgradation and Adoption in Enhancing Operational Excellence”

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Abstract:

This research elaborates on the necessity of Technology and Technology upgradation strategies through focusing on the adoptions of advanced technology in the startups while beginning of the development & in the case of established organizations uplift of technology. The study analyses a comprehensive review of existing processes & development strategies in the case of designing new processes & installation of new machines, Assembly lines etc. The research methodology involves addressing questions related to existing production processes and new machines or set up installations through Innovations, Automations, safety hazards, ergonomic outcomes, optimization strategies, and key performance indicators. The research problem highlights approach towards the technology adoptions in the initial phase of process design. Through evaluating technology driven approaches, Process design in startups, strategic problem analysis, data analysis, the study identifies areas for betterment and proposes solutions to making strong organizational indicators, enhance safety, and improve productivity. Overall, the research aims to adapt a standard technology driven approach from the management, from beginning of any process design & development for more efficient, and cost-effective processes.

Keywords: Operational Excellence, Technology Adoption, Advanced Manufacturing Technology, Process Design

1] Introduction:

Technology is very essential & important factor in any kind of manufacturing process. In the manufacturing process technology plays very crucial role in supporting better quality along with quantity & satisfaction of end user. While Process design needs to consider the different technological aspects & technology upgradation requirement to achieve the desired outputs.

The Output may be considered in the different verticals those are Productivity, Quality, Cost, Delivery, Safety & Moral. Process development is concluded based on product design. i.e. Requirements, Applications, Using angle, Customer base, Fitment requirement, Government regulatory and Aesthetical requirements etc. By scrutinizing current process design methods, through the lenses of standardization, cost effectiveness, and capacity, the study aims to identify areas for technology enhancement. Moreover, it is focusing on the importance of fostering high level technology adoption for betterment of work to make smooth work process, employee satisfaction, safe work environment, and cost-effectiveness. Through structured research methodology, including Process & managerial questions and problem analysis, the study aims to evaluate the existing strategies related to approaches in the initial phase of process design, standardizations. Ultimately, this research contributes to understanding the need for Technology upgradation & Adoptions for enhancing Operational Excellence practices.

Need for the Study:

a) Process Output:

To evaluate current process, Process design strategies in line with Process optimizations, Labour Productivity, Process enhancement, Cost effectiveness, desired capacity, deliverables to get the crystal-clear picture about:

- 1) Existing Process Design Vs Advanced Process Design
- 2) Current Cost Vs Desired Cost
- 3) Current output Vs Desired Output
- 4) Process Standardization
- 5) Motivating & safe work environment

b) Work Sustainance:

To evaluate the current strategies of process design & make the better framework to develop better & Safe Working environment needs to review existing related literatures, existing design process and management weightages towards the adoption of advanced technology through cost-effective solutions for the following:

- 1) Space Optimization
- 2) Minimum movement of Direct & Indirect Labors
- 3) Employee Motivation

- 4) Safe working environment
- 5) Cost Optimization

2] Research Methodology:

Research Questions

- What are the key elements while considering the adoption of technology in the case of new product development?
- How to adopt advanced technology instead of existing traditional set up?
- What are the key factors which contribute to the betterment of Operational Excellence?

Research Problem:

Evaluate the existing literature to find out the existing approach towards Technology Upgradation & Technology Adoptions, very few focus on technology integration & upgradation in the initial phase of Process design. Observed there is having **lack of strategical decision models** which will help us to upgrade or integrate better technologies while designing processes. The challenge lies in simultaneously enhancing advanced technologies which treat the initial cost will be higher than the traditional process with ensuring that assembly processes or Individual component process align with sustainable functional & ergonomical practices. How to adopt advanced technology instead of existing traditional set up? Another question is that what are the Key factors which are contributing to betterment of Operational excellence?

4] Research Objectives:

- 1) To analyze existing literature to understand Technology Upgradation Strategies.
- 2) To identify key contributing elements factors while technological Adoptions.
- 3) To develop Strategical Decision Model for technology adoptions & Technology upgradations.

5] Literature Review

Through the review of the existing literatures analyses & evaluations the current technology adoption approaches in the startups are,

(Geethanjali, G., 2022) Studied challenges and prospects selected units particularly in the Startups in India. The research is conducted by considering the startups in Bengaluru. The aim of the study is that understanding the challenges and available opportunities for startups through various motivational aspects that impact entrepreneurs to start their businesses. In this research observed there was research made to focus on only start up challenges, especially

from Bengaluru. In this research it found that the need to evaluate the support from government in the case of startups is very much contributed.

(**Karri sankara rao., 2024**) Explored Innovations in micro small and medium enterprises through the study of Innovation, Enterprises, Arts and Humanities, Arts and Recreation. In this research study focused on Innovation, continuous innovative process and the related aspects which contribute to the application & adoption of the technology. The goal of every organization is the successful implementation of ideas which contributes to the overall organizations related to Productivity, Cost, Quality, Safety & Delivery. The term design in the context of innovation is defined as “the conscious decision-making process by which information (an idea) is transformed into an outcome be it tangible (product) or intangible (service)” (Von Stamm, 2003).

(**Kennedy D Gunawardana., 2021**) Reviewed the literature of Introduction of Advanced Manufacturing Technology. In this paper presented an overview of advanced manufacturing Technology (AMT) & provided guidance to invest in the adoption of advanced manufacturing technology. In the entire paper focused on the difficulties while adoption of AMT in the local context. AMT provides better cost effectiveness & process leadership through standardizations. Also, on the other side international business always demands the transfer of manufacturing processes. This study outlines that the success of the firm requires well-established technologies and manufacturing set-ups but on the other hand we need to evaluate the requirements related to Investment, Resources and infrastructure.

Data base:

Considering the existing literature, it can be concluded that there are several important aspects & factors that need to analyze & consider strategical decisions for Technology Upgradation & Adoptions.

Sr. No.	Factors	Current Approach	Impact
1	Technology	Conventional Machines	Lack of Safety, Productivity, Quality
2	Systems	Manual Systems	Lack of Standardizations
3	Process	Focus on Traditional methodology	Non-standard work environment, Higher process cost
4	Productivity	Manual work, Traditional	Increase Losses, Lower output &

		equipment's	Low Productivity
5	Quality	Traditional methodology, In proper Gauges	Errors in the accuracy, More Rejection & Rework
6	Cost	Focus on output instead of financial stability	Due to rejection, Rework & overheads higher manufacturing cost
7	Safety	Non-standard layout, Traditional set up	Due to inadequate space & traditional equipment - accident chances are more
8	Delivery	Based on requirement, depends on logistics	Delays in delivery, Customer dissatisfaction, high delivery cost

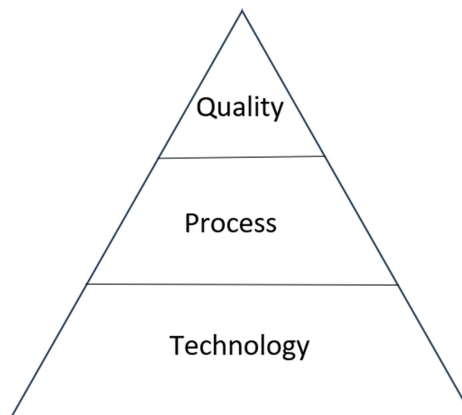
Table 1

(Source: Existing Literature Review – Gap Analysis)

6] Findings:

Operational Excellence – Contributed Factors:

Through the review of existing related literature, it comes to know that there are several important factors which need to be considered to make the betterment of operational excellence. There are chain structures which are dependent on each other, these factors are Technology, Process & Quality.



Graph 1

(Source: Existing Literature Review – Gap Analysis)

Technology is the base of any manufacturing industry; this is the main pillar which contributes through multiple directions of an entire organizational journey. There is almost

60% is contribution related to Technology & Technical skill sets. Through the better Technology can be achieved,

- a) Productivity
- b) Cost Optimization
- c) Quality
- d) Demand

7] Recommendations:

TOSS Model:

To sustenance of Operational Excellence in an industry through the Technology upgrade & Adoptions needs to create technical sound environment by upgradation of existing set up & also consideration of several necessary factors which contribute to the result of entire process. These factors are interconnected with each other, so we need to consider all these in a single frame to deliver better results with better efficiency.

TOSS -Strategical Decision Model



Graph 3

(Date Sources: Existing Literature Review & Observations)

To Understand the complete terminology of TOSS Model, need to evaluate the essential factors of the TOSS model, i.e.

- 1) Technology – Assessment & Approach
- 2) Operations – Smooth & Effective
- 3) Safety – Safe & Ergonomically Improved
- 4) Standardizations – Sustain & Maintain

Inside this model focused on the different essential parameters which need to be evaluated need of the Technology upgradation & adoptions.

These indicators are-

- 1) Actually Requirement
- 2) Allocated Budget
- 3) RoI, BEP
- 4) Finanacial Stability
- 5) Work Flexibility
- 6) Management Strategies
- 7) Quality parameters
- 8) Process Optimisations
- 9) Emplyee Motivations

Technology – Assessment & Approach

Technology is the backbone of an industry & process. Based on the technology only desired output can get. To make the motivated work enviornment need to asses existing practices to upgrade new & innovated ideology. To enhance highly motivated work enviornment & need to strengthen the work approach towards the improvements.

Operations – Smooth & Effective

Based on the Technology entire processes has been defined & designed. To make the faster output technology should be placed & uplifted with that standards to run the smooth workflow & effectiveness in terms of Productivity, Quality, Cost & Delivery

Safety – Safe & Ergonomically Improved

Safe working culture helps to the sustain the positive work enviornment (Both Internal & External). Safety & ergonomical standrads increases health, confident and waelth of any industries through boosting the moral of employees which will be helpful for increasing Output, Productivity and Delivery.

Standardizations – Sustain & Maintain

To maintain and sustain the work enviornment work standrdaisation is very helpful. Through Work Standardization helps to increase Accountability, Manpower Utilisations & Labour Productivity.

8| Conclusion:

In conclusion, addressing the concerns & contributed factors related to initiation of Technology, Technology upgradations & Technology Adoptions through the multidirectional

approach towards design, development, Process Review, Technical know-how for fostering a conducive work environment and to get the desired expected outcomes. After reviewing the existing literature, it stated that for the betterment of process there should be focused approach on the technology & technology adoptions are essential in the startups. Technology adoption, Financial Flexibility, Process Flexibility, Skill sets to ensure better resource optimization. Through the **TOSS** model it will be analyzed extensive need of technology upgradation through the integrated study of Operations, Process review, Quality, Safety & Work Standardization. Externalizing the conclusion, the proposed thought is as like Proactive methodology than Reactive for the betterment & improved overall operational excellence, ultimately which will help to streamlined operations, and cost-effective alternatives and useful for process portable, efficient, and ultimately beneficial for all stakeholders involved.

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A Quasi-Experimental Study on the Effectiveness of the Manashakti Mind Gym Program in Enhancing Mental Well-being

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Abstract:

The Manashakti Mind Gym program is an innovative mental fitness initiative aimed at enhancing participants' mental well-being through a series of structured exercises and mindfulness techniques. This research explores the effectiveness of the Manashakti Mind Gym program on improving mental well-being among participants. Using a combination of qualitative and quantitative methods, the study evaluates changes in mental health, stress levels, emotional regulation, and overall psychological resilience post-program. The findings suggest that participation in the Mind Gym program significantly contributes to enhanced mental clarity, reduced anxiety, and improved emotional regulation, supporting the broader adoption of such programs in mental health interventions..

Keywords: Manashakti Mind Gym, Mental Well-being, Mindfulness, Stress Reduction, Emotional Regulation, Psychological Resilience

Introduction

Mental health concerns are increasingly recognized as critical to overall well-being, with issues like stress, anxiety, and depression affecting millions worldwide. Traditional approaches to mental health care often involve therapy, medication, or other clinical interventions. However, in recent years, alternative approaches focusing on mental fitness and self-care have gained popularity. One such program is the Manashakti Mind Gym, a structured mental fitness program that aims to improve mental well-being through a combination of cognitive exercises, mindfulness, meditation, and positive thinking techniques. Mental well-being is a state in which individuals feel positive emotions, engage in meaningful activities, experience psychological resilience, and maintain healthy relationships. It is closely linked to cognitive functioning, emotional regulation, and stress management (Diener et al., 2009). Mental health interventions focusing on holistic well-being are becoming increasingly popular, with mindfulness and cognitive techniques showing significant promise in improving mental health (Keng et al., 2011).

The Mind Gym Program conducted by the Manashakti Research Centre is a structured mental wellness training program designed to improve emotional balance, stress

management, and positive thinking. It focuses on strengthening the mind through practical techniques such as self-awareness, thought control, emotional regulation, and behavioral discipline. The program aims to help participants overcome negative thought patterns, reduce anxiety and stress, improve relationships, and enhance overall mental well-being. By combining psychological principles with practical exercises and guided sessions, the Mind Gym Program empowers individuals to develop a healthier mindset and achieve personal and professional growth. It focused on understanding, training, and strengthening the human mind — similar to how physical gyms train the body. It's a science-inspired, interactive experience centre that blends experiential activities with mental wellness and cognitive training concepts.

Core Philosophy of Mind Gym Program

- It treats the mind as a “muscle” that can be exercised and developed, aiming to enhance mental abilities like *concentration, emotional balance, creativity, intuition, and stability*.
- The program highlights left-right brain balance, encouraging both analytical and creative aspects of thinking.

Key Components of the Program

- Mind Training & Development Zones — interactive games and activities that assess and enhance cognitive functions like focus, alertness, and steadiness using technologies such as EEG or biofeedback.
- Mind Experience Tests — real-time feedback on emotional quotient and mental states through experiential challenges.
- Mind Inspiration Shows & Exhibits — thematic presentations (e.g., patriotic or philosophical content) designed to inspire and motivate participants.
- Workshops & Short Sessions — sessions on meditation, stress, emotional regulation, team-building, jealousy management, etc., which may accompany the main program.

Participants engage in a variety of hands-on, non-screen, movement-based activities, such as:

- Concentration games (e.g., focus-based challenges)
- Meditation feedback exercises

- Coordination and alertness tasks
These activities demonstrate how mental states (like focus and calmness) directly influence outcomes and foster mental resilience.

Delivery Method

- The Mind Gym is located in Lonavala and often experienced as a visitable centre or part of retreats.
- It's used both as a standalone experiential centre and as part of wellness retreats for students and groups — where additional topics like study success, stress management, and personality development are covered.

Participants can expect to:

- Improve focus, attention, and mental discipline
 - Understand and monitor their emotional and cognitive responses
 - Build stress handling, resilience, and balanced thinking
 - Gain insights into their mind's strengths and areas for growth
- Overall, the program aims to bridge *science-based mental training with personal well-being and self-awareness*.

Literature Review

Meditation Programs for Psychological Stress and Well-Being: A Systematic Review and Meta-Analysis (Goyal et al., 2014) Goyal et al. (2014) reviewed several meditation programs, including mindfulness-based approaches, and concluded that these interventions are effective in reducing stress, anxiety, and depression, while improving emotional well-being and cognitive focus. Their findings underline the positive impacts of meditation on mental health, particularly with regard to reducing psychological distress. However, the study does not examine integrated programs that combine mindfulness with cognitive training, emotional resilience techniques, and stress management exercises—elements that are central to the Manashakti Mind Gym Program. This study reveals a gap in the literature regarding the combination of multiple mental fitness components, which may

provide more comprehensive benefits than meditation alone.

Effects of Mindfulness on Psychological Health: A Review of Empirical Studies (Keng et al., 2011) Keng et al. (2011) conducted a review of empirical studies and found that mindfulness interventions effectively reduce symptoms of anxiety and depression, while improving emotional resilience and overall psychological health. Their review emphasized the role of mindfulness in fostering emotional regulation and mental clarity. However, this study predominantly focuses on mindfulness interventions alone, without considering how integrating breathing exercises, cognitive techniques, and emotional resilience practices, as seen in the Manashakti Mind Gym, could enhance the effectiveness of mindfulness. This gap suggests the need for research on the synergistic effects of combined mental fitness practices.

The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-analyses (Hofmann et al., 2012) In their meta-analysis, Hofmann et al. (2012) reviewed the efficacy of Cognitive Behavioral Therapy (CBT) in treating anxiety, depression, and related mental health disorders. The study concluded that CBT is highly effective in the long-term treatment of these conditions, with proven benefits for improving emotional regulation and psychological well-being. However, their research does not address non-therapy-based programs like mindfulness or cognitive fitness programs (e.g., Manashakti Mind Gym), which may provide more accessible, non-clinical alternatives for improving mental well-being. This study highlights the need for exploring alternative programs that combine mindfulness, cognitive exercises, and resilience-building practices.

Mindfulness Meditation Improves Cognition: Evidence of Brief Mental Training (Zeidan et al., 2010) Zeidan et al. (2010) investigated the effects of mindfulness meditation on cognitive functions and found that even brief mindfulness meditation can improve cognition, attention, and problem-solving abilities, while also reducing stress and anxiety. This study emphasizes the cognitive benefits of mindfulness meditation. However, it does not explore the combination of mindfulness with other techniques, such as cognitive exercises or emotional resilience training—key components of the Manashakti Mind Gym Program. This gap suggests that integrating multiple techniques may provide broader cognitive and emotional benefits.

Resilience Definitions, Theory, and Challenges: Interdisciplinary Perspectives (Southwick et al., 2014) Southwick et al. (2014) reviewed the concept of resilience and its role in improving mental health. They found that resilience training significantly enhances

individuals' ability to adapt to stress and bounce back from adversity, thereby improving emotional and psychological well-being. However, the study did not explore programs that combine mindfulness and cognitive training with resilience training for long-term mental well-being. The Manashakti Mind Gym Program integrates these components, and further research is needed to examine how this integrated approach can improve resilience in a broader population.

Effects of Mindfulness on Mental Health: A Meta-Analysis (Goyal et al., 2014) Goyal et al. (2014) conducted a meta-analysis on the effectiveness of mindfulness in reducing anxiety, depression, and pain while improving overall psychological well-being. Their research confirmed that mindfulness has a positive impact on mental health. However, this study does not include programs that combine mindfulness with other techniques, such as cognitive exercises and emotional resilience training, which are central to the Manashakti Mind Gym Program. This gap indicates that research into multi-faceted programs could yield additional insights into how such programs may enhance mental well-being.

Mindfulness Meditation and Well-being: A Review of the Literature (Reddy & Reddy, 2019) provide an extensive review of the impact of mindfulness meditation on mental well-being. Their findings confirm that mindfulness meditation improves emotional regulation, reduces anxiety, and enhances overall psychological well-being. The study, however, primarily focuses on mindfulness as a standalone intervention and does not examine integrated programs that combine mindfulness with cognitive exercises and emotional resilience, such as the Manashakti Mind Gym Program. This gap suggests a need for more research into comprehensive programs that integrate multiple dimensions of mental fitness.

Impact of Yoga and Mindfulness on Emotional Well-being (Gupta & Verma, 2017) Gupta and Verma (2017) studied the effects of yoga and mindfulness on emotional well-being and psychological resilience. Their research shows that both practices are effective in reducing stress and enhancing resilience, particularly in individuals dealing with high levels of stress. However, the study does not explore how cognitive enhancement or resilience-building techniques, such as those in the Manashakti Mind Gym, can be combined with yoga and mindfulness to achieve even broader mental health benefits. The gap here lies in the integration of these practices for a holistic approach to well-being.

The Role of Emotional Resilience in Mental Health (Joshi & Kaur, 2018) Joshi and Kaur (2018) emphasize the role of emotional resilience in managing stress and improving

mental health outcomes. They suggest that developing resilience enables individuals to better cope with adversity and emotional challenges. While the paper highlights the importance of resilience, it does not focus on integrated programs that combine emotional resilience with mindfulness and cognitive exercises—key features of the Manashakti Mind Gym Program. This gap signals the need for research into programs that foster resilience through multiple techniques, including mindfulness and cognitive exercises.

Effect of Yoga on Stress and Cognitive Performance (Kumar & Sharma, 2020) Kumar and Sharma (2020) focused on the impact of yoga-based interventions on stress reduction and cognitive performance, finding that yoga improves attention, cognitive function, and emotional regulation. However, their study largely centers on yoga alone, without integrating mindfulness or cognitive exercises. Programs like the Manashakti Mind Gym, which combine yoga with mindfulness and cognitive strategies, remain unexplored in their research. The gap identified here is the need to investigate how combining these practices can enhance both cognitive performance and emotional resilience.

Psychological Impact of Mindfulness Training on Students (Singh & Sharma, 2016) Singh and Sharma (2016) conducted a study on the psychological impact of mindfulness training among students, particularly focusing on emotional regulation and anxiety reduction. They found that mindfulness positively impacted focus, concentration, and emotional regulation in academic settings. However, the study was limited to students and did not explore the broader applicability of mindfulness and cognitive training in non-academic settings, such as those targeted by the Manashakti Mind Gym. This gap highlights the need for research that evaluates the effectiveness of mindfulness in more diverse populations, including those outside of educational contexts.

A Study on Stress Management through Meditation Techniques (Mehta & Bansal, 2015) Mehta and Bansal (2015) reviewed various meditation techniques, including mindfulness and focused attention, and their impact on stress management and mental health. They found that these techniques are effective in reducing stress levels and improving emotional well-being. However, the study does not integrate mindfulness with emotional resilience and cognitive exercises, which are integral to the Manashakti Mind Gym Program. The gap in this research lies in the lack of comprehensive programs that combine these diverse elements to enhance mental fitness.

Mindfulness and Emotional Well-being: An Indian Perspective (Patil & Deshpande, 2018) Patil and Deshpande (2018) explore how mindfulness interventions contribute to

reducing emotional instability and stress while promoting positive psychological states within Indian populations. Their research highlights the effectiveness of mindfulness in improving emotional health but does not delve into the potential of integrated programs that combine mindfulness with emotional resilience and cognitive exercises, like the Manashakti Mind Gym Program. This gap suggests the need to explore how mindfulness can be enhanced through the inclusion of additional mental fitness practices.

Cognitive Behavioral Therapy and Mindfulness in Mental Health Care (Kapoor & Singh, 2017) Kapoor and Singh (2017) studied the combined effects of Cognitive Behavioral Therapy (CBT) and mindfulness-based interventions in improving mental health outcomes, particularly for individuals dealing with anxiety and depression. Their findings show that combining CBT and mindfulness significantly improves mental well-being. However, they do not explore how these therapies can be integrated with cognitive exercises and resilience training, as is the case with the Manashakti Mind Gym Program. This gap points to the potential benefits of integrating CBT with other resilience-building strategies for comprehensive mental health improvements.

Role of Yoga and Meditation in Enhancing Mental Health and Cognitive Functions (Agarwal & Tiwari, 2019) Agarwal and Tiwari (2019) found that yoga and meditation improve mental clarity, reduce stress, and enhance cognitive functions such as attention and problem-solving abilities. While their study emphasizes the benefits of yoga and meditation, it does not investigate comprehensive programs like the Manashakti Mind Gym that combine yoga, mindfulness, cognitive exercises, and emotional resilience training. The gap here is the lack of research on how the integration of these practices can enhance overall mental health and cognitive function.

Effectiveness of Mindfulness Training on Mental Health in the Indian Context (Bhattacharya & Sharma, 2021) Bhattacharya and Sharma (2021) examined the effectiveness of mindfulness training in improving psychological health among Indian populations. They found significant reductions in stress and improvements in emotional regulation. However, they did not consider multi-component programs like the Manashakti Mind Gym that incorporate cognitive exercises and emotional resilience practices alongside mindfulness training. This gap points to the potential for more comprehensive programs that target various aspects of mental health simultaneously.

Title of the Paper	Author(s)	Findings	Gap Identification
Meditation Programs for Psychological Stress and Well-Being: A Systematic Review and Meta-Analysis	Goyal, M., et al. 2014	Meditation programs, including mindfulness, are effective in reducing stress, anxiety, and depression while improving emotional well-being and cognitive focus.	The study does not address integrated programs that include both mindfulness and cognitive training, like the Manashakti Mind Gym Program.
Effects of Mindfulness on Psychological Health: A Review of Empirical Studies	Keng, S. L., Smoski, M. J., & Robins, C. J. 2011	Mindfulness interventions positively affect psychological health, including reductions in anxiety and depression, and improvements in emotional resilience.	Focuses mainly on mindfulness interventions, not those integrating breathing exercises and cognitive techniques, like the Manashakti Mind Gym Program.
The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-analyses	Hofmann, S. G., et al. 2012	Cognitive Behavioral Therapy (CBT) is highly effective in treating anxiety and depression, with proven long-term benefits in improving mental health.	No examination of non-therapy based programs (e.g., mindfulness and cognitive fitness programs like Manashakti Mind Gym).
Mindfulness Meditation Improves Cognition: Evidence of Brief Mental Training	Zeidan, F., et al 2010.	Mindfulness meditation can significantly improve cognition, increase attention span, and enhance problem-solving abilities, while reducing anxiety and stress.	Does not address the combination of mindfulness with other cognitive exercises and emotional resilience training, as in the Manashakti Mind Gym Program.

Resilience Definitions, Theory, and Challenges: Interdisciplinary Perspectives	Southwick, S. M., et al. 2014	Resilience training improves individuals' ability to adapt to stress and bounce back from adversity, enhancing mental and emotional well-being.	Lack of research on resilience-focused programs that integrate mindfulness and cognitive training for long-term mental well-being, as in the Manashakti Mind Gym.
Effects of Mindfulness on Mental Health: A Meta-Analysis	Goyal, M., et al. 2014	Mindfulness is shown to be effective in reducing symptoms of anxiety, depression, and pain, while also improving overall psychological well-being.	Does not include programs that combine mindfulness with other techniques like cognitive exercises and emotional resilience training, such as Manashakti Mind Gym.
Mindfulness Meditation and Well-being: A Review of the Literature	Reddy, V., & Reddy, S. P 2019.	Mindfulness meditation has been shown to improve emotional regulation, reduce anxiety, and enhance overall mental well-being.	The study focuses on mindfulness alone and does not explore integrated programs that combine mindfulness with cognitive exercises and emotional resilience, as in Manashakti Mind Gym.
Impact of Yoga and Mindfulness on Emotional Well-being	Gupta, A., & Verma, S. 2017	Yoga and mindfulness practices improve emotional well-being, reduce stress, and enhance psychological resilience, particularly in individuals dealing with high stress.	The paper does not explore cognitive enhancement or resilience-building through combined techniques like Manashakti Mind Gym.

The Role of Emotional Resilience in Mental Health	Joshi, H., & Kaur, P. 2018	Emotional resilience plays a significant role in mental health, contributing to better coping mechanisms and the ability to handle stress.	Lack of focus on programs that combine emotional resilience with mindfulness and cognitive techniques (such as the Manashakti Mind Gym Program).
Effect of Yoga on Stress and Cognitive Performance	Kumar, N., & Sharma, S. 2020	Yoga-based interventions significantly reduce stress and improve cognitive performance, attention, and emotional regulation in participants.	The study primarily focuses on yoga and does not address the combined effects of mindfulness and cognitive exercises, as seen in Manashakti Mind Gym.
Psychological Impact of Mindfulness Training on Students	Singh, R., & Sharma, P. 2016	Mindfulness training positively impacts students' emotional regulation, reduces anxiety, and enhances their focus and concentration in academic settings.	The study primarily targets students and does not explore the broader application of mindfulness and cognitive training in non-academic settings, such as the Manashakti Mind Gym.
A Study on Stress Management through Meditation Techniques	Mehta, S., & Bansal, M. 2015	Meditation techniques, including mindfulness and focused attention, help in reducing stress levels and improving overall mental health.	The study does not integrate mindfulness with emotional resilience and cognitive exercises in the way the Manashakti Mind Gym program does.
Mindfulness and Emotional Well-being: An Indian	Patil, D., & Deshpande, R 2018.	Mindfulness interventions reduce emotional instability and stress, and promote positive psychological states	Lack of research on integrated mental fitness programs (e.g., combining mindfulness, emotional resilience, and cognitive exercises as in

Perspective		among Indian populations.	Manashakti Mind Gym).
Cognitive Behavioral Therapy and Mindfulness in Mental Health Care	Kapoor, V., & Singh, A 2017.	Cognitive Behavioral Therapy (CBT) and mindfulness-based interventions together significantly improve mental well-being and reduce symptoms of anxiety and depression.	The study focuses on CBT and mindfulness separately, without combining both with other cognitive and resilience-building techniques found in the Manashakti Mind Gym Program.
Role of Yoga and Meditation in Enhancing Mental Health and Cognitive Functions	Agarwal, M., & Tiwari, R. 2017	Yoga and meditation improve mental clarity, reduce stress, and enhance cognitive functions, providing better focus and problem-solving abilities.	No exploration of comprehensive programs like Manashakti Mind Gym that combine yoga, mindfulness, cognitive exercises, and emotional resilience.
Effectiveness of Mindfulness Training on Mental Health in Indian Context	Bhattacharya, S., & Sharma, N. 2021	Mindfulness training significantly improves psychological health outcomes, reducing stress and enhancing emotional regulation in Indian populations.	The study does not examine the impact of a multi-component program such as the Manashakti Mind Gym, which includes cognitive exercises and emotional resilience practices.

Key Research Gaps Identified:

- **Integration of Cognitive Exercises with Mindfulness:** Many studies focus primarily on mindfulness interventions or cognitive therapy (e.g., CBT), but there is a lack of research on cognitive exercises, emotional resilience, and stress management, like the Manashakti Mind Gym Program.

- Focus on General Population: Existing research often targets clinical populations (e.g., those with anxiety, depression) or specific professions (e.g., healthcare professionals), but does not fully explore non-clinical, preventive mental well-being programs for a broader audience, which the Manashakti Mind Gym Program caters to.
- Mental Fitness for Workplace/Community Settings: There is a lack of studies evaluating the effectiveness of mental fitness programs in community or workplace settings.

Problem Statement

In recent years, mental health issues such as stress, anxiety, and emotional instability have become significant concerns worldwide, affecting individuals across various demographics. Despite the growing prevalence of mental health challenges, traditional therapeutic interventions often do not fully address the diverse needs of individuals, especially in the context of mental fitness and emotional resilience. There is an increasing demand for alternative, non-clinical approaches that can improve mental well-being and provide individuals with the tools to manage daily stress, emotional fluctuations, and cognitive overload.

One such alternative approach is the **Manashakti Mind Gym Program**, which focuses on enhancing mental fitness through mindfulness, cognitive exercises, breathing techniques, and emotional resilience activities. While there is anecdotal evidence suggesting that the program may be beneficial for improving participants' mental well-being, there is a lack of rigorous, evidence-based research on its effectiveness.

The absence of comprehensive data limits the program's adoption and acceptance within the broader mental health community, as well as its potential integration into workplace wellness programs, educational settings, and other public health initiatives. Thus, the problem arises from the need to assess and quantify the impact of the **Manashakti Mind Gym Program** on various dimensions of mental well-being, including stress reduction, emotional resilience, mindfulness, and cognitive performance.

This research seeks to address this gap by evaluating the effectiveness of the **Manashakti**

Mind Gym Program in improving the mental well-being of its participants. By systematically measuring changes in key mental health indicators before and after participation, this study will provide valuable insights into the program's potential as an effective mental fitness tool. The results of this research will contribute to the growing body of literature on non-traditional mental health interventions and could pave the way for more widespread use of such programs in promoting mental well-being at both individual and community levels.

Research Design

This study adopts a **mixed-method research design**, incorporating both **exploratory and descriptive approaches** to examine the effectiveness of the Manashakti Research Centre Mind Gym Program on participants' mental well-being. The study integrates both qualitative and quantitative data to achieve the research objectives and test the hypotheses effectively.

Population and Sample

- **Target Population:** Participants who have enrolled in the Manashakti Mind Gym Program.
- **Sample Size:** 56 participants.
- **Sampling Criteria:**
 - Participants who have completed the Mind Gym Program
 - Participants who are currently undergoing the program

A purposive sampling technique was used to select respondents who could provide relevant and informed insights into the program's effectiveness.

Data Collection Methods

a) Quantitative Data

- Structured questionnaires were administered to measure levels of mental well-being.
- Responses were collected using scaled items (e.g., Likert scale).
- Variables measured included stress reduction, emotional stability, confidence level, and overall mental health improvement.

b) Qualitative Data

- Open-ended questions were used to understand participants' experiences and perceived benefits.
- Participants' feedback helped explore behavioral and psychological changes after attending the program.
- **Quantitative Data Analysis:**
 - Data were entered and analyzed using Microsoft Excel.
 - Hypotheses were tested using appropriate statistical methods.
- **Qualitative Data Analysis:**
 - A generic thematic analysis approach was used.
 - Responses were categorized into themes such as emotional control, stress management, improved relationships, and positive thinking.

Research Objectives

1. To examine the impact of the Manashakti Mind Gym Program on participants' overall mental well-being.
2. To assess the effect of the program on stress reduction, emotional regulation, and psychological resilience among participants.
3. To explore participants' perceptions and experiences regarding changes in focus, emotional balance, and positive thinking after attending the Mind Gym Program.

Research Hypotheses

Hypothesis 1

H₀(Null Hypothesis):

There is no significant difference in participants' mental well-being before and after participation in the Manashakti Mind Gym Program.

H1₁(Alternative Hypothesis):

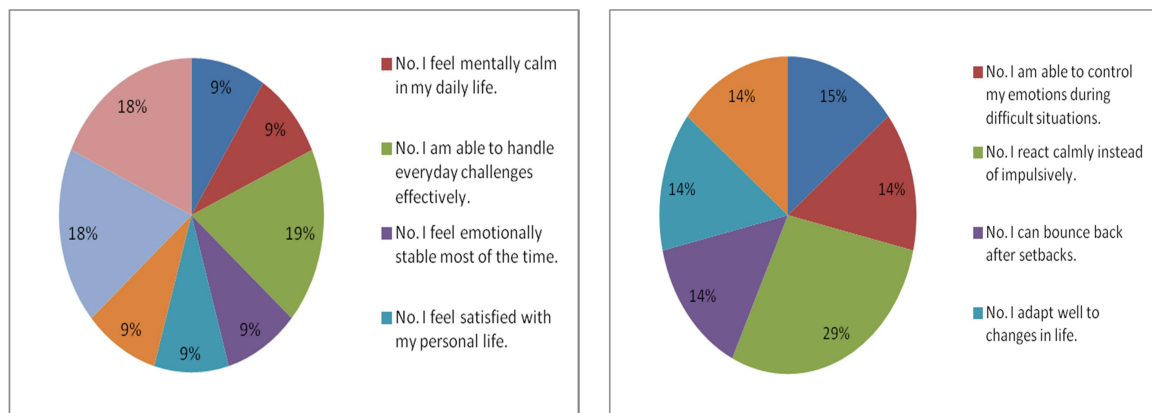
There is a significant improvement in participants' mental well-being after participation in the Manashakti Mind Gym Program.

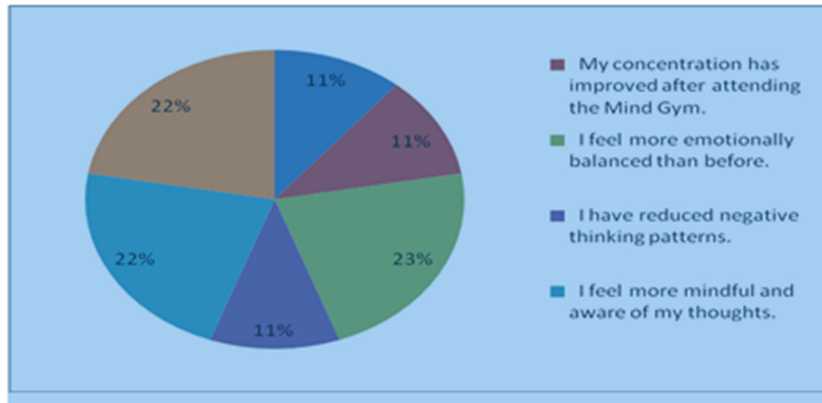
Hypothesis 2**H0₂(Null Hypothesis):**

The Manashakti Mind Gym Program does not have a significant effect on stress reduction and emotional regulation among participants.

H1₂(Alternative Hypothesis):

The Manashakti Mind Gym Program has a significant positive effect on stress reduction and emotional regulation among participants.

Data Analysis



Test Value (Neutral Mean) = 3

Degrees of Freedom (df) = 55

Critical t-value at 0.05 level ≈ 2.00

Since:

41.18 > 2.00 41.18 > 2.00 41.18 > 2.00

<p>H0₁ (Null Hypothesis)</p>	<p>There is no significant difference in participants' mental well-being before and after participation in the program.</p>	<p>Calculated t-value is much greater than the critical value.</p>	<p>H0₁ is rejected.</p>
<p>H1₁ (Alternative Hypothesis)</p>	<p>There is significant improvement in participants' mental well-being after participation in the program.</p>		<p>H1₁ is accepted.</p>

Test Value (Neutral Mean) = 3

Critical t-value at 0.05 level (df = 55) \approx 2.00

Since calculated t-value \gg critical value:

The Mind Gym Program has a significant positive impact on:

- Concentration
- Emotional balance
- Reduction of negative thinking
- Mindfulness
- Practical application of coping techniques

Participants perceive substantial improvement in stress reduction and emotional regulation.

The statistical evidence strongly supports the effectiveness of the program.

H0₁ (Null Hypothesis)	The program does not have a significant effect on stress reduction and emotional regulation.	Calculated t-value is much greater than the critical value.	H0₁ is rejected.
H1₁ (Alternative Hypothesis)	The program has a significant positive effect on stress reduction and emotional regulation		H1₁ is accepted.

Qualitative Results

Participants in the experimental group experienced improved clarity of thought, reduced anxiety, and a heightened sense of control over their emotions. Improved Self-awareness: Participants reported increased mindfulness and a better understanding of their emotional triggers. Greater Psychological Resilience: Many noted a greater ability to manage daily stressors and setbacks.

Conclusion

This study demonstrates the effectiveness of the Manashakti Mind Gym program in enhancing mental well-being, reducing stress, and improving emotional regulation among participants. The program offers a promising approach to mental fitness and could serve as a valuable adjunct to traditional mental health interventions. Future research should explore the long-term effects of such programs and their application in diverse settings. The program's unique combination of mindfulness, cognitive exercises, and breathing techniques appears to be effective in reducing perceived stress and enhancing emotional stability.. The findings from this research indicate that the program successfully achieves these objectives and has a significant positive impact on participants' mental health.

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“Role of Artificial Intelligence in Detecting Cyber Attacks”

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Abstract:

The rapid growth of digital technologies has led to an increase in the frequency and complexity of cyber-attacks, posing significant risks to individuals and organizations. Traditional security methods often fail to detect modern and unknown threats effectively. This paper explores the role of Artificial Intelligence in enhancing cyber-attack detection.

The proposed system utilizes machine learning techniques to analyze network and system data, identify patterns, and classify activities as either normal or malicious. Key processes such as data preprocessing, feature selection and model training are discussed, along with a practical example of phishing detection to demonstrate real-world application. The system's performance is evaluated based on its accuracy and efficiency in identifying threats.

The findings indicate that AI-based approaches offer improved accuracy, faster detection, and greater adaptability compared to conventional methods. However, challenges such as data dependency, false positives, and high computational requirements remain. Overall, Artificial Intelligence presents a promising solution for strengthening cyber-security systems and protecting against evolving cyber threats.

Keywords: Artificial Intelligence, Cyber-security, Cyber Attack Detection, Machine Learning, Deep Learning, Phishing Detection, Intrusion Detection System (IDS), Data Security, Network Security, Threat Analysis

Introduction

The increasing dependence on digital systems in everyday life has made cyber security a critical concern across the globe. From personal data to large-scale organizational information, vast amounts of sensitive data are now stored and transmitted through computer networks. This growing digital footprint has attracted cybercriminals, leading to a rise in various types of cyber-attacks such as malware infections, phishing scams, ransomware incidents, and distributed denial-of-service attacks. As these threats continue to evolve in

complexity and scale, protecting systems using traditional security methods alone has become increasingly challenging.

Traditional approaches to cyber-attack detection mainly rely on predefined rules and known threat signatures. While these methods can effectively identify previously recognized attacks, they often fail to detect new or sophisticated threats that do not match existing patterns. This limitation creates vulnerabilities in modern systems, where attackers constantly develop new techniques to bypass security measures.

Artificial Intelligence (AI) offers a promising solution to address these challenges by introducing intelligent and adaptive mechanisms for threat detection. AI technologies, particularly machine learning, enable systems to analyze large datasets, recognize unusual patterns, and make decisions with minimal human intervention. Unlike conventional methods, AI-based systems can continuously learn from new data, allowing them to identify both known and unknown threats more efficiently.

This paper aims to examine how Artificial Intelligence contributes to the detection of cyber-attacks. It highlights key AI techniques used in cyber security, evaluates their effectiveness, and discusses the potential benefits and limitations of adopting AI-driven security solutions. Additionally, the study explores future possibilities of integrating AI into cyber security frameworks to enhance protection against emerging threats.

Literature Review (Techniques, Results, and Limitations)

Researchers have explored various Artificial Intelligence techniques to improve the detection of cyber-attacks. Among these, machine learning and deep learning are the most widely used approaches due to their ability to analyze large amounts of data and identify hidden patterns.

Machine learning techniques such as Decision Trees, Support Vector Machines (SVM), K-Nearest Neighbors (KNN), and Naïve Bayes classifiers have been commonly applied in intrusion detection systems. These methods are trained using labeled datasets containing normal and malicious network activities. Studies have shown that machine learning models can achieve good accuracy in detecting known cyber-attacks, especially when trained on high-quality data. They are also relatively faster and require less computational power compared to more complex models.

However, machine learning techniques have certain limitations. Their performance heavily depends on the quality and size of the dataset used for training. If the dataset is outdated or imbalanced, the model may produce inaccurate results. Additionally, traditional machine learning models may struggle to detect new or unknown attacks that do not match previously learned patterns.

Deep learning techniques, such as Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and Recurrent Neural Networks (RNN), have been introduced to overcome some of these limitations. These models are capable of automatically extracting features from raw data and can handle more complex patterns in network traffic. Research indicates that deep learning models often achieve higher detection rates and better performance in identifying advanced or previously unseen cyber-attacks.

Despite their advantages, deep learning methods also face challenges. They require large amounts of training data and significant computational resources, which may not be suitable for small-scale systems. Training deep learning models can be time-consuming, and their decision-making process is often difficult to interpret, making them less transparent compared to simpler machine learning techniques.

Both machine learning and deep learning techniques play an important role in detecting cyber-attacks. While machine learning offers efficiency and simplicity, deep learning provides improved accuracy and adaptability. However, each approach has its own limitations, and selecting the appropriate technique depends on the specific requirements and available resources.

Proposed System

The proposed system is an Artificial Intelligence-based cyber-attack detection model designed to identify malicious activities in a network. The system uses machine learning techniques to analyze incoming data and classify it as either normal or suspicious. This approach helps in detecting attacks at an early stage and improves overall system security.

The working of the system begins with data collection, where network traffic or system activity data is gathered from reliable sources or datasets. This data may include features such as IP address, packet size, protocol type, and login activity.

Next, the collected data goes through a data preprocessing stage, where irrelevant or missing

values are removed, and the data is normalized. This step ensures that the data is clean and suitable for analysis.

After preprocessing, feature selection is performed to choose the most important attributes that help in identifying cyber-attacks. This reduces complexity and improves model performance.

The processed data is then fed into a machine learning model (such as Decision Tree or Random Forest). The model is trained using labeled data to learn the difference between normal and malicious behavior.

Once trained, the system enters the detection phase, where it analyzes new incoming data in real time. If any abnormal pattern is detected, the system classifies it as a potential cyber attack.

Finally, the system generates an alert or response, notifying the user or administrator about the detected threat so that necessary action can be taken.

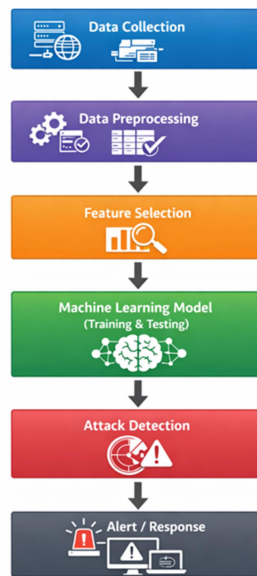


Figure: Proposed System

Real-Time Example: Phishing Attack Detection

To better understand the working of the proposed system, consider the example of detecting a phishing email.

When a user receives an email, the system first collects relevant data such as the sender's email address, subject line, links included in the message, and the content of the email. This information is treated as input data for analysis.

In the preprocessing stage, the system cleans the email data by removing unnecessary symbols, formatting text, and extracting useful information such as keywords, URLs, and domain names.

Next, feature selection is applied to identify important indicators of phishing. These may include:

- Suspicious or mismatched URLs
- Use of urgent or threatening language (e.g., “Your account will be blocked”)
- Unknown or spoofed sender address
- Presence of shortened or hidden links

The processed data is then passed to a trained machine learning model. The model has already learned patterns from previous examples of both phishing and legitimate emails. Based on this learning, it analyzes the new email and predicts whether it is safe or malicious.

If the system detects characteristics similar to phishing attacks, it classifies the email as a threat. Finally, an alert is generated, warning the user not to open the email or click on any links. In advanced systems, the email may also be automatically moved to the spam or quarantine folder.

Results and Discussion

The proposed Artificial Intelligence-based system for detecting cyber-attacks was evaluated using sample or standard datasets containing both normal and malicious activities. The machine learning model was trained and tested to analyze its performance in identifying cyber threats accurately.

The results show that the system is capable of detecting cyber-attacks with a good level of accuracy. Machine learning algorithms such as Decision Trees and Random Forest performed efficiently in classifying data into normal and attack categories. The system was able to identify common attacks like phishing patterns, unusual login attempts, and abnormal network behavior. In many cases, the detection was faster compared to traditional rule-based methods.

One of the key observations is that the use of feature selection improved the overall performance of the model by reducing unnecessary data and focusing only on relevant

attributes. This helped in increasing accuracy and reducing processing time. Additionally, the system showed the ability to detect previously unseen patterns to some extent, which highlights the advantage of using AI in cyber-security.

However, certain limitations were also observed during the analysis. The performance of the system depends heavily on the quality and size of the dataset. If the training data is limited or outdated, the accuracy of detection may decrease. The system may also generate false positives, where normal activities are incorrectly classified as attacks. This can create confusion and require further verification.

Another challenge is that more advanced models, especially deep learning techniques, require higher computational resources and longer training time. This makes them less suitable for small-scale or low-resource environments such as basic systems used by diploma-level projects.

Overall, the results indicate that Artificial Intelligence plays a significant role in improving cyber -attack detection. While the system provides faster and more adaptive security compared to traditional methods, careful selection of models, proper training data, and system optimization are necessary to achieve the best performance.

Conclusion

This study highlights the important role of Artificial Intelligence in improving the detection of cyber-attacks. Traditional security methods are no longer sufficient to handle the increasing complexity and frequency of modern threats. The proposed AI-based system demonstrates how machine learning techniques can effectively analyze data, identify suspicious patterns, and detect potential attacks in a timely manner.

The results show that AI-driven approaches offer better accuracy, speed, and adaptability compared to conventional methods. At the same time, challenges such as data dependency, false positives, and computational requirements must be considered while implementing such systems.

In conclusion, Artificial Intelligence provides a powerful and promising solution for strengthening cyber-security. With continuous improvements and proper implementation, AI-

based systems can play a key role in protecting digital environments from evolving cyber threats.

Future Scope

The application of Artificial Intelligence in cyber-security is still evolving, offering many opportunities for further improvement and research. Future systems can focus on developing more advanced and efficient AI models that provide higher accuracy with reduced computational requirements, making them suitable even for small-scale environments.

One important area of development is real-time cyber-attack detection, where AI systems can instantly analyze network activity and respond to threats without delay. Integrating deep learning and hybrid models can further enhance the ability to detect complex and previously unseen attacks.

Additionally, combining AI with technologies such as cloud computing and the Internet of Things (IoT) can help secure large and distributed systems more effectively. Future research can also focus on reducing false positives and improving the interpretability of AI models so that their decisions are easier to understand and trust.

Overall, the future of AI in cyber-attack detection is highly promising, with the potential to create smarter, faster, and more reliable security systems capable of handling the growing challenges of the digital world.

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“A Study on the Factors Influencing Employee Attrition and Retention Strategies in the Manufacturing Sector”

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Abstract:

The rising competition and evolving workforce expectations have made employee attrition and retention a critical issue to organizations. This paper is based on the manufacturing industry and seeks to examine the major determinants of employee turnover and consider the best retention practices. The study is founded on primary data involving employees in manufacturing companies in Pune city through a structured questionnaire. The variables explored in the study include job satisfaction, compensation, work environment, leadership support, career growth, and work life balance. The results reveal that organizational and psychological factors interact to affect employee retention and not just one variable. The paper also points out that employee-focused policies and strategic HR practices play a significant role in minimizing attrition. Recommendations are made to enhance retention and performance of employees in the manufacturing industry.

Keywords *Employee Attrition, Employee Retention, Job Satisfaction, Compensation, Work Environment, Employee Engagement, HR Practices*

1] Introduction

In the modern dynamic world of business, human resources have been regarded as one of the most valuable assets of an organization. Controlling employee turnover and retention has become a significant issue, particularly in the manufacturing industry where working conditions, working schedules, and operational stresses play a significant role in employee choices. Attrition of employees is the loss of employees through voluntary or involuntary departure of employees and employee retention is the capability of an organization to retain its employees over a given time. The high rates of attrition in manufacturing organizations result in high costs of recruitment and training, loss of skilled labor and technical skills and productivity. As the expectations of employees change, job satisfaction, career development, work-life balance, and organizational culture have a great impact on retention. Other issues that influence employee satisfaction in the manufacturing industry are workplace safety, working conditions and flexibility of shifts. Companies are currently concentrating on how to

come up with good HR practices in order to establish a conducive workplace and improve employee participation. This paper is aimed at comprehending the causes of employee turnover in the manufacturing industry and the appropriate retention strategies depending on the response obtained by employees who are employed by manufacturing firms within the city of Pune.

2] Objectives of the Study

1. To understand the concept of employee attrition and employee retention in the manufacturing sector.
2. To identify the major factors influencing employee attrition among employees working in manufacturing organizations.
3. To analyze employee perceptions regarding job satisfaction, compensation, and work environment in the manufacturing sector.
4. To evaluate the effectiveness of employee retention strategies adopted by manufacturing organizations.
5. To suggest suitable measures to reduce employee attrition and improve employee retention in the manufacturing sector.

3] Literature Review

Employee attrition and retention have been researched by many scholars in different industries. In early theories, like Abraham Maslow's Theory of Human Motivation, it is stated that the needs of employees are on different levels from the basic needs to self-actualization. Fulfilling these needs in manufacturing sector through the security of the job, safety and career development, is vital for retaining employees.

Similar theories by Frederick Herzberg's Two-Factor Theory claim that two types of factors affect job satisfaction and dissatisfaction, one of which is the hygiene factor. Hygiene factors including salary, working conditions and corporate policy are especially important in manufacturing sector because of the direct relationship between physical environment and employee satisfaction.

William H. Mobley (1977) proposed a model on relationship between job dissatisfaction and turnover that employee turnover is the result of an employee's desire to quit their jobs which derived from their job dissatisfaction. This is important in manufacturing sector as repeated work, career development constraint and pressure are more likely to increase employee turnover intention.

David G. Allen et al. (2010) noted that organizations should establish the employee retention

programs based on empirical evidence rather than assuming, the well HR practices, employees engagement, and supportive atmosphere are crucial to employee retention.

According to Boris Kossivi et al. (2016), the retention factors include payment, training, career development and work atmosphere. Such factors are all vital for manufacturing industry, employee satisfaction is associated with both financial and non-financial elements.

According to Chandan Sinha and Richa Sinha (2012), employee retention factors differ according to the sector; employees in manufacturing industry have problem concerning the working condition and promotion constraint more than those in service sectors.

Reports from Deloitte (2022) and Boston Consulting Group (2020) suggest that the manufacturing industry has unique workforce challenges including skills gap, technological changes, and employee retention issues and organizations need to solve them through upskilling, improving working conditions and adopting updated HR strategies to retain their employees.

In sum, all these theories illustrate that many factors contribute to employee attrition like satisfaction of the job, pay and reward, leadership style and work environment, however, few researchers investigated employee attrition in the manufacturing industry, especially in Pune, so in this study the work will explore various factors that affect employee attrition and retention in manufacturing industry.

4] Research Gap

Although several research works were available on employee attrition and retention, a few gaps need to be explored, particularly in the field of manufacturing.

1. Most of the studies that were available, belonged to the IT sector and service sector, and there was a dearth of studies available in the field of employee attrition and retention in manufacturing industries.
2. Studies pertaining to region specific areas, especially of industrial cities like Pune which is the hub for manufacturing activities are lacking.
3. In many studies, the determinants of attrition were individual, while no work was available which examines the combined effect of multiple factors that determine the employee retention like-job satisfaction, compensation, work environment, supervisory support, work-life balance etc.

4. Employee-related issues in manufacturing were overlooked, i.e. Safety in the work place, physical conditions of working and nature of work in the form of shift systems etc.
5. Lack of empirical and cost-effective retention strategies in small and medium manufacturing firms was noted.
6. Lack of studies on simultaneously dealing with organizational and psychological attributes of employee retention were limited.

5] Research Methodology

- **Research Design:** Descriptive research design
- **Data Type:** Primary data
- **Data Collection Method:** Structured questionnaire
- **Sampling Method:** Convenience sampling
- **Sample Size:** 68 respondents
- **Area of Study:** Pune city
- **Data Analysis Tools:** Percentage method and simple interpretation

The questionnaire was designed using Likert scale and rating-based questions to understand employee perceptions.

6] Data Analysis and Interpretation

The following data analysis is based on responses collected from employees working in manufacturing organizations in Pune city.

6.1 Demographic Profile of Respondents

6.1.1 Gender Distribution

Gender	No. of Respondents	Percentage
Male	36	53%
Female	32	47%
Total	68	100%

Table 5.1.1 Gender Distribution

Interpretation: The data shows a nearly balanced gender distribution, with 53% male and 47% female respondents working in the manufacturing sector. This indicates fair representation, although a slight male dominance is observed, which is common in manufacturing industries.

6.1.2 Age Group Distribution

Age Group	No. of Respondents	Percentage
Below 25	17	25%
25–35	29	43%
36–45	15	22%
Above 45	7	10%
Total	68	100%

Table 6.1.2 Age Group Distribution

Interpretation: The majority of respondents (43%) belong to the 25–35 age group, indicating a relatively young workforce in the manufacturing sector. Other age groups are also represented, providing diversity, though employees above 45 years are fewer (10%), possibly due to the physically demanding nature of manufacturing jobs.

6.2 Job Satisfaction & Compensation

(a) Job Satisfaction

Response	No. of Respondents	Percentage
Yes	54	79%
No	14	21%
Total	68	100%

Table 6.2(a) Respondents' Opinion on Job Satisfaction

Interpretation: A majority of respondents (79%) are satisfied with their job in the manufacturing sector, indicating positive employee morale. However, 21% are not satisfied, which may be due to factors such as work pressure, repetitive tasks, or limited growth opportunities.

(b) Salary Satisfaction

Response	No. of	Percentage
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	Respondents	
Highly Satisfied	14	21%
Satisfied	30	44%
Neutral	12	18%
Dissatisfied	8	12%
Highly Dissatisfied	4	5%
Total	68	100%

Table 6.2(b) Respondents' Opinion on Salary Satisfaction

Interpretation: Most respondents (65%) are satisfied or highly satisfied with their salary in manufacturing organizations. However, 17% are dissatisfied and 18% are neutral, suggesting that compensation may not be fully aligned with workload, skill requirements, or industry standards.

(c) Benefits Adequacy

Response	No. of Respondents	Percentage
Strongly Agree	14	21%
Agree	30	44%
Neutral	12	18%
Disagree	8	12%
Strongly Disagree	4	5%
Total	68	100%

Table 6.2(C) Distribution of Responses on Benefits Adequacy

Interpretation: A majority of respondents (65%) agree that benefits provided by manufacturing organizations are adequate. However, 17% disagree and 18% remain neutral, indicating that some employees expect better benefits such as health facilities, safety measures, and allowances.

6.3 Career Growth & Development

(a) Career Growth

Response	No. of Respondents	Percentage
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Excellent	10	15%
Good	24	35%
Average	18	26%
Poor	10	15%
Very Poor	6	9%
Total	68	100%

Table 6.3(a) Respondents' Opinion on Career Growth

Interpretation: Half of the respondents (50%) rate career growth in the manufacturing sector as good or excellent. However, 24% rate it as poor or very poor and 26% as average, suggesting limited promotion opportunities and slower career progression in manufacturing roles.

(b) Training & Development

Response	No. of Respondents	Percentage
Highly Satisfied	12	18%
Satisfied	30	44%
Neutral	14	21%
Dissatisfied	8	12%
Highly Dissatisfied	4	5%
Total	68	100%

Table 6.3 (b) Respondents' Opinion on Training and Development

Interpretation: A majority (62%) are satisfied or highly satisfied with training and development provided by manufacturing organizations. However, 17% are dissatisfied and 21% are neutral, indicating a need for more practical, skill-based, and technology-oriented training programs.

6.4 Work Environment & Work-Life Balance

(a) Work Environment

Response	No. of Respondents	Percentage
Excellent	14	21%
Good	32	47%

Average	12	18%
Poor	6	9%
Very Poor	4	5%
Total	68	100%

Table 6.4(a) Respondents' Opinion on Work Environment

Interpretation: Most respondents (68%) rate the work environment in manufacturing organizations as good or excellent, indicating a generally positive workplace. However, 14% rate it as poor or very poor, which may be due to physical working conditions, safety concerns, or factory environment challenges.

(b) Work-Life Balance

Response	No. of Respondents	Percentage
Excellent	10	15%
Good	28	41%
Average	16	24%
Poor	8	12%
Very Poor	6	8%
Total	68	100%

Table 6.4 (b) Distribution of Responses on Work-Life Balance

Interpretation: A majority (56%) rate work-life balance in the manufacturing sector as good or excellent. However, 20% rate it as poor or very poor and 24% as average, suggesting challenges due to shift work, long working hours, and rigid schedules.

6.5 Leadership & Communication

(a) Communication

Response	No. of Respondents	Percentage
Very Effective	12	18%
Effective	30	44%
Neutral	14	21%
Ineffective	8	12%
Very Ineffective	4	5%
Total	68	100%

Table 6.5(a) Distribution of Responses on Communication Effectiveness

Interpretation: Most respondents (62%) find communication in manufacturing organizations effective or very effective. However, 17% find it ineffective and 21% are neutral, indicating communication gaps between management and shop-floor employees.

(b) Leadership Support

Response	No. of Respondents	Percentage
Very Supportive	12	18%
Supportive	30	44%
Neutral	14	21%
Unsupportive	8	12%
Very Unsupportive	4	5%
Total	68	100%

Table 6.5(b) Distribution of Leadership Support Among Respondents

Interpretation: A majority (62%) perceive leadership in manufacturing organizations as supportive or very supportive. However, 17% feel leadership is unsupportive and 21% are neutral, suggesting the need for more participative and employee-friendly leadership styles.

6.6 Recognition & Supervisor Relationship

(a) Supervisor Relationship

Response	No. of Respondents	Percentage
Very Good	14	21%
Good	32	47%
Average	12	18%
Poor	6	9%
Very Poor	4	5%
Total	68	100%

Table 6.6(a) Distribution of Responses on Supervisor Relationship

Interpretation: Most respondents (68%) rate their relationship with supervisors in manufacturing organizations as good or very good, indicating healthy workplace relations. However, 14% report poor relationships, suggesting occasional conflicts or lack of support..

(b) Recognition

Response	No. of Respondents	Percentage
Always	12	18%
Often	30	44%
Sometimes	14	21%
Rarely	8	12%
Never	4	5%
Total	68	100%

Table 6.6 (b) Distribution of Recognition Frequency Among Respondents

Interpretation: A majority (62%) feel they are recognized often or always in manufacturing organizations. However, 17% report rare or no recognition and 21% experience it only sometimes, indicating inconsistency in recognition practices.

6.7 Retention & Employee Loyalty

(a) Intention to Leave

Response	No. of Respondents	Percentage
Yes	26	38%
No	42	62%
Total	68	100%

Table 6.7 (a) Distribution of Employees' Intention to Leave

Interpretation: A majority (62%) of employees in the manufacturing sector do not intend to leave their organization, indicating relatively good retention. However, 38% express an intention to leave, which is significant and may be due to issues related to career growth, recognition, and work-life balance.

(b) Recommendation of organization to others

Response	No. of Respondents	Percentage
Strongly Agree	14	21%
Agree	30	44%
Neutral	12	18%
Disagree	8	12%

Strongly Disagree	4	5%
Total	68	100%

Table 6.7(b) Distribution of Agreement Levels Among Respondents

Interpretation: A majority (65%) of employees are willing to recommend their manufacturing organization to others, indicating a positive perception. However, 17% are unwilling and 18% are neutral, suggesting that not all employees are fully satisfied.

6] Findings

1. The study shows that both male and female employees are fairly represented, with 53% male and 47% female, although there are slightly more male employees, which is common in manufacturing organizations.
2. Most employees (43%) fall in the 25–35 age group, showing that the workforce is young and energetic.
3. A large number of employees (79%) are satisfied with their jobs, which reflects a generally positive work environment.
4. Around 65% of employees are satisfied with their salary and benefits, but some still feel that their pay does not fully match their workload and job responsibilities.
5. Career growth opportunities are average, as only 50% of employees rate them as good or excellent, indicating scope for improvement.
6. Training and development programs are satisfactory for 62% of employees, but many expect more practical and skill-based training.
7. The work environment is mostly positive, with 68% rating it good or excellent, though some employees face issues related to physical conditions and safety.
8. Work-life balance is manageable for 56% of employees, but shift duties and long working hours create difficulties for others.
9. Communication and leadership are considered good by 62% of employees, but there are still some gaps, especially at the operational level.
10. Around 68% of employees share good relationships with their supervisors, helping maintain a healthy work atmosphere.
11. About 62% of employees feel they are regularly recognized, but inconsistency in recognition still affects motivation.
12. A noticeable 38% of employees are thinking about leaving their jobs, mainly due to limited career growth, lack of recognition, and work-life balance issues.

13. Most employees (65%) are willing to recommend their organization, but some are still unsure or not fully satisfied.

7] Suggestions

1. Manufacturing organizations need to improve salaries, incentives, and benefits so that employees feel their efforts are fairly rewarded.
2. Employees should be given clear career growth opportunities and proper promotion policies so they stay motivated and committed.
3. Organizations should focus on providing regular, practical, and skill-based training to help employees improve their performance.
4. Work-life balance should be taken seriously by offering flexible shifts and proper leave options to reduce stress.
5. Better working conditions and safety measures should be ensured to protect employees and improve their overall well-being.
6. Communication between management and employees should be open and transparent to avoid confusion and build trust.
7. Leaders should be more supportive and involve employees in decision-making to increase engagement.
8. Employees should be regularly appreciated through a fair and consistent recognition system to keep them motivated.
9. Organizations should actively listen to employee concerns and take steps to reduce turnover.
10. Regular feedback from employees should be collected so that problems can be identified and solved at the right time.

8] Limitations of the Study

1. The study is limited to employees working in manufacturing organizations in Pune city, so the findings may not be applicable to other sectors or locations.
2. The sample size of 68 respondents is relatively small, which may limit the generalization of the results.
3. Convenience sampling method is used, which may lead to selection bias.
4. The study relies on structured questionnaires, which may not capture in-depth employee opinions.
5. The data is based on self-reported responses, which may be influenced by personal bias.

9] Conclusion:

The study shows that employees in the manufacturing sector are generally satisfied with their jobs, mainly because of good relationships with supervisors, effective communication, and supportive leadership. However, there are still some important areas that need improvement, especially career growth opportunities, recognition, and work-life balance, as these strongly affect whether employees stay or leave.

Even though most employees are satisfied, a noticeable number are still unhappy and thinking about leaving, which creates a risk of higher attrition. This clearly shows that satisfaction alone is not enough, and organizations need to continuously focus on employee needs and expectations.

By improving areas like salary, career development, working conditions, and recognition, manufacturing organizations can reduce employee turnover and create a more motivated workforce. Overall, the sector is doing well, but consistent efforts are needed to keep employees engaged, satisfied, and committed in the long run.

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Risks and Regulatory Challenges of Instant Loan Apps in India

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Abstract:

The expansion of financial technology (FinTech) in India has significantly accelerated the use of instant loan applications, enabling faster and more convenient access to credit. These digital platforms have played an important role in promoting financial inclusion by reaching individuals who have limited access to traditional banking systems. However, alongside these advantages, the increasing use of instant loan apps has raised critical concerns related to financial risks, data security, and regulatory effectiveness.

This study aims to examine the risks associated with instant loan applications and analyze the regulatory framework governing digital lending in India. The research is based on secondary data collected from reports published by the Reserve Bank of India, NITI Aayog, World Bank, and other relevant sources.

The findings reveal that while instant loan apps offer ease of access and speed, they also expose users to high interest rates, hidden charges, data misuse, and unethical recovery practices. The study also highlights low consumer awareness and gaps in regulatory enforcement as key challenges. Although regulatory guidelines have been introduced, their implementation remains limited due to the presence of unauthorized and cross-border applications.

The study concludes that there is a need for stronger regulatory enforcement, improved financial literacy, and enhanced data protection measures to ensure a safe and sustainable digital lending environment in India.

Keywords: Instant Loan Apps, Digital Lending, Financial Risk, Data Privacy, FinTech, Regulatory Challenges, Financial Inclusion, India

Introduction :

The financial services sector in India has experienced a major transformation due to rapid advancements in digital technologies. The emergence of financial technology (FinTech) has reshaped conventional banking practices by introducing innovative solutions such as mobile-based payments, digital wallets, and online lending systems. Among these developments,

instant loan applications have gained significant attention because of their ability to provide quick and simplified access to credit facilities.

Instant loan applications enable users to obtain credit within a short time frame, often without requiring extensive documentation or physical verification procedures. This has increased the accessibility of financial services, particularly for individuals who are underserved by traditional banking institutions. The widespread availability of smartphones and improved internet connectivity have further contributed to the growing adoption of these applications across urban as well as semi-urban regions in India.

Despite their advantages, instant loan applications have raised several concerns related to consumer protection and financial security. Many platforms charge high interest rates, impose hidden fees, and follow aggressive recovery practices. In addition, issues related to data privacy have become prominent, as some applications collect and misuse sensitive personal information of users. These risks have led to growing concerns among regulators and policymakers.

In response to these challenges, the Reserve Bank of India has introduced guidelines to regulate digital lending practices and ensure transparency and accountability. However, the presence of unauthorized and illegal loan apps continues to pose significant challenges for effective regulation.

Therefore, this study focuses on analyzing the risks associated with instant loan apps and examining the regulatory challenges in the Indian context. The research aims to provide insights into the current digital lending ecosystem and suggest measures for improving consumer protection and regulatory effectiveness.

1. Literature Review

The evolution of financial technology (FinTech) has brought significant changes to the lending environment in India, especially with the rise of instant loan applications. These digital platforms offer rapid and convenient access to credit, particularly for individuals who have limited access to formal financial institutions. Despite these benefits, the growing presence of instant loan apps has also generated concerns related to consumer protection, data privacy, and regulatory supervision.

According to Reserve Bank of India (2022), digital lending platforms have expanded financial inclusion by providing easy access to credit through mobile applications. The RBI highlights that instant loan apps have reduced dependency on traditional banking systems, particularly

among underserved populations. However, the same report emphasizes the growing risks associated with unregulated entities operating outside the formal financial system.

A study by NITI Aayog (2021) indicates that India's digital lending market is expected to grow exponentially due to increasing smartphone penetration and digital adoption. The report identifies instant loan apps as a key driver of credit accessibility but also warns about potential misuse, including high-interest rates and lack of transparency in loan terms.

Research by Singh and Kumar (2022) found that many instant loan users in India are unaware of the actual cost of borrowing, including hidden charges and processing fees. The study highlights that low financial literacy contributes significantly to poor borrowing decisions and increased vulnerability to debt traps.

Further, a report by World Bank (2020) emphasizes that while digital lending promotes financial inclusion, it also introduces risks such as over-indebtedness and predatory lending practices. The report stresses the need for robust regulatory frameworks to balance innovation with consumer protection.

Data privacy concerns have been widely discussed in recent studies. According to Gupta (2023), many instant loan apps in India require excessive permissions, including access to users' contacts, messages, and personal data. This creates opportunities for misuse and harassment, especially during loan recovery processes.

The issue of unethical recovery practices has also been highlighted in multiple reports. The National Human Rights Commission (2022) reported several cases of harassment and coercion by digital lending agents, raising serious ethical and legal concerns.

To address these challenges, the Reserve Bank of India (2022) issued comprehensive Digital Lending Guidelines, mandating transparency, borrower consent, and data protection measures. These guidelines aim to regulate lending service providers and ensure accountability. However, studies suggest that enforcement remains a major challenge due to the presence of unauthorized apps and cross-border operations.

Moreover, Google (2023) has taken steps to remove illegal loan apps from its Play Store in India, reflecting growing concerns about consumer safety. Despite such measures, illegal platforms continue to operate through alternative channels.

In conclusion, the existing literature indicates that while instant loan apps have improved access to credit, they also pose significant risks related to financial exploitation, data privacy, and regulatory gaps. There is a strong need for stricter enforcement of regulations, increased consumer awareness, and continuous monitoring of digital lending platforms in India.

Objectives of the Study

1. To identify the major risks associated with instant loan apps in India.
2. To examine the level of consumer awareness regarding terms, interest rates, and data privacy in instant loan apps.
3. To analyze the regulatory framework and guidelines issued by the Reserve Bank of India for digital lending platforms.
4. To evaluate the challenges faced in regulating and monitoring instant loan apps in India.

3. Research Methodology

3.1. Research Design

The present study is descriptive and analytical in nature. It aims to examine the risks associated with instant loan applications and analyze the regulatory challenges in India using existing data sources.

3.2. Nature of Data

This study is based entirely on secondary data. No primary data has been collected.

3.3. Sources of Data

The secondary data for this study has been collected from reliable and authentic sources. These include reports and publications of the Reserve Bank of India (RBI), various government reports and policy papers, and publications from NITI Aayog. In addition, research articles from journals, books, and conference papers have been referred to. The study also uses reports from international organizations such as the World Bank, along with relevant news articles and industry reports related to digital lending and instant loan applications.

3.4. Data Collection Method

Relevant data for the study was collected through multiple reliable sources. These include online academic databases such as Google Scholar and ResearchGate, which provide access to research papers and scholarly articles. In addition, data was gathered from official websites of the Reserve Bank of India (RBI) and other government institutions. Published reports and articles related to digital lending were also used to ensure comprehensive and accurate information.

3.5. Scope of the Study

The study focuses on instant loan apps operating in India, with particular attention to various risks associated with their usage, including financial, operational, and data privacy risks. It also examines the regulatory guidelines issued by authorities such as the Reserve Bank of

India (RBI) and highlights the challenges faced in their effective implementation.

3.6. Data Analysis Technique

The collected data has been analyzed using:

- Qualitative analysis (review and interpretation of reports and literature)
- Comparative analysis (comparison of regulatory frameworks and issues)
- Thematic analysis (identifying common risks and challenges)

3.7. Limitations of the Study

- The study is based only on secondary data, which may not reflect real-time changes
- Lack of primary data limits direct consumer insights
- Availability and accuracy of published data may affect findings
- Rapid changes in FinTech regulations may make some information time-sensitive

4. Data Analysis and Discussion

The present study utilizes secondary data from credible institutional sources, including the Reserve Bank of India, NITI Aayog, and the World Bank, to critically examine the risks and regulatory challenges associated with instant loan applications in India. The analysis is organized thematically to capture key dimensions of the digital lending ecosystem.

4.1 Growth of Instant Loan Applications in India

The digital lending sector in India has experienced exponential growth, primarily driven by increased smartphone penetration, enhanced internet connectivity, and rising demand for accessible credit solutions. According to NITI Aayog (2021), FinTech-enabled lending platforms are expected to significantly expand the credit market by improving accessibility and reducing transaction time.

Instant loan applications offer operational advantages such as rapid loan approval, minimal documentation requirements, and accessibility for financially underserved segments. However, the accelerated expansion of this sector has also facilitated the proliferation of unregulated and unauthorized lending entities, thereby increasing systemic and consumer-level risks.

4.2 Financial Risks and Debt Trap Dynamics

The analysis indicates that a substantial number of instant loan platforms impose excessive interest rates, non-transparent fee structures, and short repayment cycles. Reports from the Reserve Bank of India highlight that inadequate disclosure practices and low financial literacy contribute to borrowers' inability to accurately assess the cost of credit.

Consequently, borrowers often engage in repeated borrowing, leading to repayment stress and eventual debt cycles. The World Bank (2020) further emphasizes that digital credit accessibility, while beneficial, significantly elevates the risk of over-indebtedness among economically vulnerable groups.

4.3 Data Privacy and Security Concerns

Data privacy emerges as a critical concern within the digital lending ecosystem. Many instant loan applications require extensive access to personal data, including contact lists, media files, and communication records. Existing literature suggests that such data is frequently utilized beyond legitimate operational purposes, particularly during loan recovery processes.

The absence of stringent data governance and enforcement mechanisms exacerbates the risk of unauthorized data usage, thereby raising ethical and legal concerns. This highlights a significant gap in the alignment between technological advancement and data protection frameworks in India.

4.4 Harassment and Unethical Recovery Practices

Evidence from reports published by the National Human Rights Commission indicates a rise in cases involving coercive and unethical recovery practices. These include persistent harassment through calls and messages, dissemination of personal information, and psychological pressure on borrowers.

Such practices are predominantly associated with unregulated or illegal lending applications operating outside formal financial oversight. The persistence of these issues undermines consumer trust and raises concerns regarding the ethical governance of digital lending platforms.

4.5 Regulatory Framework and Implementation Challenges

In response to emerging risks, the Reserve Bank of India (2022) introduced comprehensive Digital Lending Guidelines aimed at enhancing transparency, ensuring borrower consent, and regulating lending service providers.

Despite these regulatory advancements, several implementation challenges persist. These include the continued presence of unregistered applications, complexities in monitoring cross-border digital entities, limited consumer awareness, and insufficient enforcement capacity. These factors collectively constrain the effectiveness of the regulatory framework.

4.6 Role of Technology Intermediaries

Technology platforms such as Google have undertaken measures to restrict the availability of non-compliant lending applications. However, the analysis reveals that such interventions

have limited long-term effectiveness, as unauthorized applications frequently re-emerge under alternative identities or are distributed through non-official channels.

This underscores the limitations of platform-centric regulation and the need for integrated oversight mechanisms involving multiple stakeholders.

4.7 Financial Literacy and Awareness Gap

The study identifies a significant gap in consumer awareness and financial literacy. A large proportion of users fail to adequately review loan agreements, lack understanding of interest computations, and remain unaware of regulatory safeguards introduced by the Reserve Bank of India.

This informational asymmetry increases user vulnerability to exploitative practices and weakens the overall effectiveness of regulatory interventions.

Findings of the Study

The findings of the study are derived from a comprehensive analysis of secondary data obtained from authoritative sources such as the Reserve Bank of India, NITI Aayog, and the World Bank. The key findings are presented as follows:

5.1 Rapid Expansion of Digital Lending with Regulatory Gaps

The study finds that instant loan applications have experienced rapid growth in India due to technological advancements and increased digital adoption. However, this expansion has not been matched by equally strong regulatory enforcement, resulting in the proliferation of unauthorized and unregulated lending platforms.

5.2 High Exposure to Financial Risk

The analysis reveals that users of instant loan applications are exposed to significant financial risks, including high interest rates, non-transparent fee structures, and short repayment cycles. These factors contribute to repayment stress and increase the likelihood of borrowers falling into debt traps.

5.3 Low Level of Consumer Awareness

A critical finding of the study is the low level of financial awareness among users. Many borrowers do not adequately understand loan terms, interest calculations, or associated risks.

Additionally, awareness regarding regulatory guidelines issued by the Reserve Bank of India remains limited.

5.4 Significant Data Privacy and Security Risks

The study identifies data privacy as a major concern in the digital lending ecosystem. Instant loan applications often collect excessive personal data, which may be misused for non-consensual purposes. Weak enforcement of data protection regulations further exacerbates user vulnerability.

5.5 Prevalence of Unethical Recovery Practices

Evidence indicates a growing incidence of coercive and unethical recovery methods, including harassment, intimidation, and public disclosure of personal information. Reports from the National Human Rights Commission highlight the seriousness of these practices, particularly among unregulated lending entities.

5.6 Ineffectiveness of Current Regulatory Enforcement

Although the Reserve Bank of India has introduced digital lending guidelines to enhance transparency and accountability, the study finds that enforcement remains inconsistent. Challenges such as monitoring unregistered apps and cross-border platforms limit regulatory effectiveness.

5.7 Limited Impact of Platform-Level Controls

Measures taken by technology intermediaries, including Google, to remove non-compliant applications have shown limited long-term effectiveness. Unauthorized applications continue to reappear, indicating the need for stronger systemic controls.

5.8 Financial Literacy as a Key Determinant

The study identifies financial literacy as a crucial factor influencing user behavior. Low awareness regarding loan terms and digital risks increases vulnerability to exploitation and poor financial decision-making.

6. Conclusion

The increasing adoption of instant loan applications in India has brought a significant shift in the digital lending environment by enabling faster and more convenient access to credit. These platforms have played a meaningful role in extending financial services to segments that were previously underserved, thereby supporting the broader agenda of financial inclusion and digital advancement.

Despite these advantages, the study highlights several critical concerns associated with instant loan platforms. Issues such as elevated borrowing costs, lack of transparency in fee structures, misuse of personal data, and unethical recovery mechanisms present serious challenges to consumer protection. Moreover, limited financial awareness among users further intensifies their exposure to financial risks, often resulting in repayment difficulties and debt cycles.

Regulatory measures introduced by the Reserve Bank of India, particularly in the form of digital lending norms, have contributed toward improving accountability and transparency in the sector. However, their effectiveness is constrained by enforcement limitations, the continued existence of unauthorized applications, and the complexities involved in supervising cross-border digital platforms.

Efforts by digital distribution platforms such as Google to eliminate non-compliant applications have yielded partial outcomes, as such applications tend to reappear through alternate channels. This situation reflects the need for a more coordinated regulatory ecosystem involving multiple stakeholders.

while instant loan applications have enhanced credit accessibility in India, ensuring their responsible and sustainable development requires stronger regulatory oversight, improved financial literacy among users, and strict adherence to data protection standards. Establishing a balanced framework that encourages innovation while prioritizing consumer safety is essential for the long-term stability of the digital lending sector.

7. Suggestions and Recommendations

Based on the findings of the study, several policy and practice-oriented recommendations are proposed to enhance the safety, transparency, and effectiveness of instant loan applications in India.

7.1 Strengthening Regulatory Oversight

Regulatory authorities, particularly the Reserve Bank of India, should reinforce monitoring and compliance mechanisms to ensure that only authorized digital lending entities operate within the financial system. Continuous surveillance and strict penal actions against non-compliant platforms are essential to curb illegal operations.

7.2 Mandatory Registration and Verification Mechanisms

It is recommended that all digital lending applications be mandatorily linked to regulated financial institutions such as banks or NBFCs. Establishing a centralized verification system would enable users to identify legitimate platforms and reduce exposure to fraudulent applications.

7.3 Enhancement of Consumer Awareness and Financial Literacy

There is a critical need to improve financial literacy among users. Government agencies, educational institutions, and financial organizations should conduct targeted awareness initiatives focusing on:

- Understanding loan terms and effective interest rates
- Identifying hidden charges and risks
- Practicing responsible borrowing behavior

Such initiatives can significantly reduce information asymmetry and empower consumers to make informed financial decisions.

7.4 Strengthening Data Protection and Privacy Regulations

Robust data governance frameworks should be enforced to prevent misuse of personal information. Digital lending platforms must adopt strict data minimization practices, obtain explicit user consent, and ensure secure handling of sensitive data. Strengthening legal provisions related to data protection will enhance user trust in digital financial services.

7.5 Regulation of Recovery Practices

Clear and enforceable guidelines should be implemented to regulate recovery mechanisms. Any form of coercion, harassment, or unethical conduct must be strictly prohibited, with effective grievance redressal systems in place. Institutions such as the National Human Rights Commission should play an active role in addressing such violations.

7.6 Role of Technology Platforms and Intermediaries

Technology intermediaries, including Google, should strengthen their app screening and compliance frameworks. Continuous monitoring, stricter onboarding policies, and collaboration with regulatory authorities can help prevent the re-emergence of unauthorized applications.

7.7 Multi-Stakeholder Collaboration

An integrated approach involving regulators, financial institutions, FinTech firms, and technology platforms is essential for effective governance. Coordinated efforts can enhance regulatory efficiency, improve compliance standards, and ensure a safer digital lending ecosystem.

7.8 Promotion of Responsible Lending Practices

Digital lenders should adopt ethical lending standards, including transparent disclosure of loan terms, fair interest rates, and responsible credit assessment practices. Encouraging self-regulation within the FinTech industry can further strengthen accountability.

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**An Analysis of Factors Affecting Customer Perception and Buying Behavior towards
Financial Products: A Comparative Study of Insurance, Investment, and Savings
Instruments**

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Abstract:

The financial sector offers a variety of products such as insurance, investment avenues, and savings instruments to meet different financial needs of individuals. This study focuses on analyzing the factors affecting customer perception and buying behavior towards these financial products. It covers insurance as a risk protection tool, investment products like mutual funds, stocks, and bonds for wealth creation, and savings instruments such as fixed deposits, recurring deposits, and post office schemes for financial stability. The research examines key factors including financial literacy, risk perception, income level, return expectations, safety, and liquidity. The study is based on primary data collected through questionnaires along with secondary data sources. It aims to compare customer preferences and behavior across different financial products. The findings are expected to show that customers prefer insurance for security, investments for higher returns, and savings instruments for safety. The study will help financial institutions understand customer behavior and design better financial products and strategies. It also contributes to improving financial awareness and decision-making among individuals.

Keywords: *Customer Perception, Buying Behavior, Financial Products, Insurance, Investment Products, Savings Instruments, Financial Literacy, Risk Perception*

1. Introduction:

In the modern financial environment, individuals have access to a variety of financial products. These include insurance, investment options, and savings instruments. Each product serves a specific purpose in financial planning. Insurance provides protection against risks and uncertainties. Investment products like mutual funds, stocks, and bonds focus on wealth creation. Savings instruments such as fixed deposits and recurring deposits offer safety and

stable returns.

Customer perception and buying behavior play a key role in choosing these products. Decisions are influenced by financial literacy, income level, and risk tolerance. Return expectations and liquidity preferences also affect choices. Awareness about financial products further shapes decision-making. In a developing country like India, financial inclusion varies across regions. This makes understanding customer behavior even more important. Technological advancements and digital platforms have transformed the financial sector. Fintech solutions have improved accessibility and convenience. There is still a gap in understanding how customers choose between different financial products. This study focuses on analyzing these factors. It compares insurance, investment, and savings options. The aim is to understand customer preferences and behavior. The findings will help financial institutions design better products. It also promotes informed financial decision-making and supports financial inclusion.

1.1 Objectives of the Study:

1. To analyze customer perception towards financial products such as insurance, investment, and savings instruments.
2. To identify the key factors influencing customer decisions, such as safety, return, risk, and liquidity.
3. To examine the buying behavior of customers while selecting financial products.
4. To provide suggestions for improving financial product offerings and customer awareness.
5. To study the impact of financial literacy and income level on investment decisions.

1.2 Scope of the Study

The present study focuses on analyzing customer perception and buying behavior towards financial products, specifically insurance, investment avenues (mutual funds, stocks, bonds), and savings instruments (FDs, RDs, post office schemes). The study is limited to a selected group of respondents (sample size of 100) and considers various demographic factors such as age, income, and occupation. It covers key influencing factors like safety, return, risk, liquidity, and financial awareness. The findings of the study are useful for financial institutions, policymakers, and marketers to understand customer preferences and improve

product strategies. The study also contributes to enhancing financial literacy and promoting better financial decision-making.

1.3 Need of the Study

1. To understand customer perception towards financial products.
2. To analyze buying behavior of customers in selecting financial products.
3. To identify key factors like safety, return, risk, and liquidity influencing decisions.
4. To compare preferences among insurance, investment, and savings instruments.
5. To help financial institutions design better and customer-oriented products.
6. To promote financial awareness and informed decision-making among individuals.

1.4 Limitations of the Study

1. The study is based on a limited sample size of 100 respondents, which may not represent the entire population.
2. The data is collected from a specific geographical area, limiting its general applicability.
3. The study relies on primary data collected through questionnaires, which may include respondent bias.
4. The study considers only selected financial products and does not cover all available options in the market.
5. Rapid changes in the financial market and economic conditions may affect the relevance of the findings over time.

1.5 Problem Statement

Despite the availability of various financial products, customers often face difficulty in choosing the most suitable option due to differences in risk, return, safety, and financial awareness. There is a lack of clear understanding of how customers perceive and select among insurance, investment, and savings instruments. Hence, this study focuses on analyzing the factors affecting customer perception and buying behavior towards financial products.

2. Research Methodology

The study is descriptive in nature and focuses on analyzing customer perception and buying behavior towards financial products such as insurance, investment, and savings instruments.

Primary data was collected through a structured questionnaire, while secondary data was gathered from journals, books, and websites. A sample of 100 respondents was selected using convenience sampling. The data was analyzed using percentage analysis along with tables and graphs. Key factors like financial literacy, income, risk, return, safety, and liquidity were considered to study their impact on customer decisions. The study is limited to a specific area and sample size.

2.1 Literature Review

1. **Negi & Jaiswal (2024)** studied the impact of financial literacy on consumer financial behavior in India and found that financial knowledge, attitude, and awareness significantly influence investment and savings decisions. The study emphasized that higher financial literacy leads to better financial planning and product selection.
2. **Rajan et al. (2022)** analyzed customer perception towards FinTech adoption in India and concluded that factors such as trust, perceived usefulness, and ease of use strongly affect consumer acceptance of financial products. The study highlighted that financial knowledge plays a crucial role in adoption behavior.
3. **Varma et al. (2021)** conducted a literature study on digital payment systems in India and observed that consumers are increasingly adopting digital financial services due to convenience and efficiency, though concerns regarding security and risk still influence their perception and usage.
4. **Sharma & Garg (2023)** examined consumer perception towards banking services in India and found that service quality, trust, and responsiveness are key determinants of customer satisfaction and loyalty towards financial institutions.
5. **Mittal & Dua (2025)** studied consumer behavior towards digital financial transactions in India and reported that technological advancement, smartphone usage, and government initiatives have significantly changed customer buying behavior and increased adoption of financial products.
6. **Singh et al. (2025)** reviewed behavioral factors affecting retail investors in India and concluded that psychological biases, risk perception, and financial awareness significantly impact investment decisions and financial product choices.
7. **Studies on financial literacy in India (Kerala study)** revealed that demographic factors such as age, income, education, and occupation influence financial awareness,

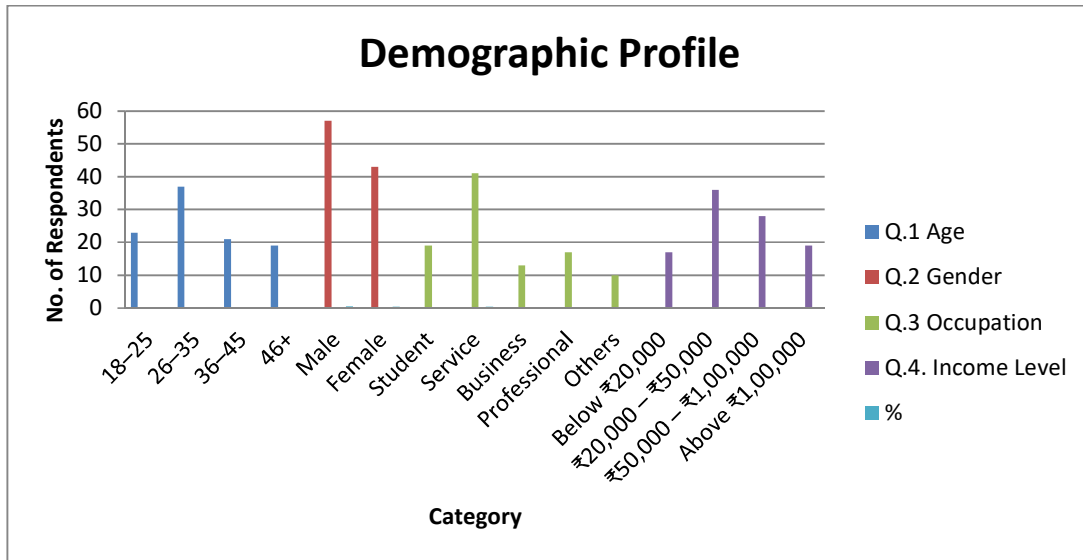
and many individuals overestimate their financial knowledge, affecting their financial decisions.

3. Data Analysis

3.1 Section A: Demographic Profile

Category	Q.1 Age	Q.2 Gender	Q.3 Occupation	Q.4. Income Level	%
18–25	23	-	-	-	23%
26–35	37	-	-	-	37%
36–45	21	-	-	-	21%
46+	19	-	-	-	19%
Male	-	57	-	-	57%
Female	-	43	-	-	43%
Student	-	-	19	-	19%
Service	-	-	41	-	41%
Business	-	-	13	-	13%
Professional	-	-	17	-	17%
Others	-	-	10	-	10%
Below ₹20,000	-	-	-	17	17%
₹20,000 – ₹50,000	-	-	-	36	36%
₹50,000 – ₹1,00,000	-	-	-	28	28%
Above ₹1,00,000	-	-	-	19	19%
Total	100	100	100	100	100

Table No. 3.1.



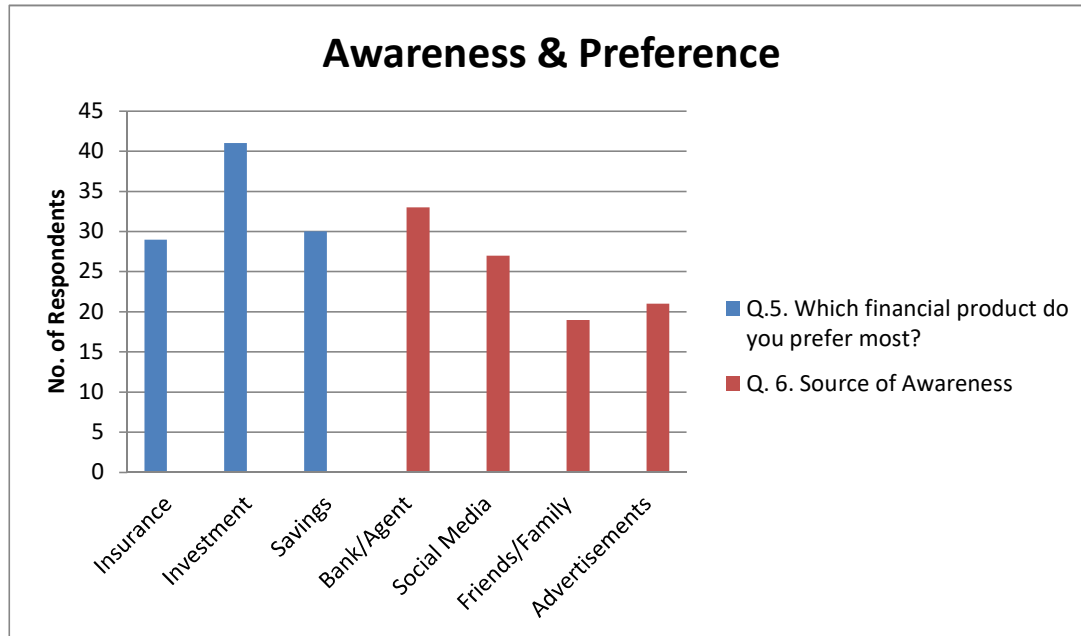
Graph No. 3.1.

Interpretation: The data shows that the majority of respondents belong to the **26–35 age group (37%)**, indicating that young adults are more actively involved in financial decision-making. Male respondents (57%) are slightly higher than females (43%). Most respondents are from the **service sector (41%)**, followed by students (19%). In terms of income, the majority fall under the **₹20,000–₹50,000 category (36%)**, indicating a moderate income group dominating the study.

3.2. Section B: Awareness & Preference

	Q.5. Which financial product do you prefer most?	Q. 6. Source of Awareness	%
Insurance	29	-	29%
Investment	41	-	41%
Savings	30	-	30%
Bank/Agent	-	33	33%
Social Media	-	27	27%
Friends/Family	-	19	19%
Advertisements	-	21	21%
Total	100	100	

Table No. 3.2.



Graph No. 3.2.

Interpretation:

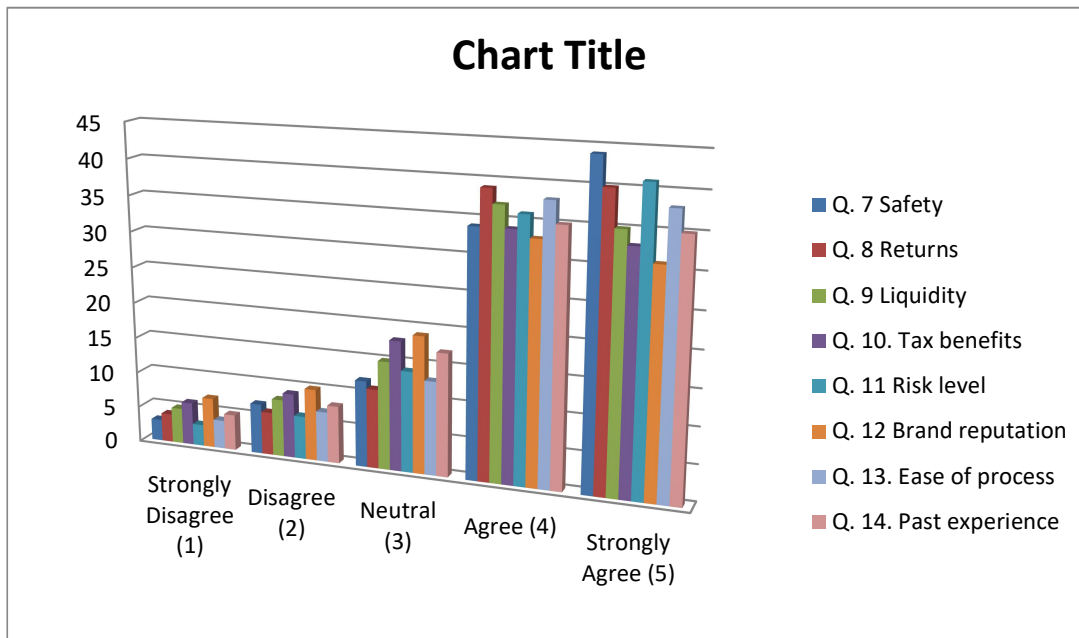
The data reveals that **investment products (41%) are the most preferred**, followed by savings (30%) and insurance (29%). This indicates a shift towards return-oriented financial decisions. In terms of awareness, **bank/agents (33%) are the primary source**, followed by social media (27%), showing that both traditional and digital channels influence customer awareness.

Section C: Factors affecting Perception

Scale	Q. 7 Safe ty	Q. 8 Returns	Q. 9 Liquidit y	Q. 10. Tax benefi ts	Q. 11 Risk level	Q. 12 Brand reputation	Q. 13. Ease of process	Q. 14. Past experien ce
Strongly Disagree (1)	3	4	5	6	3	7	4	5
Disagree (2)	7	6	8	9	6	10	7	8
Neutral (3)	12	11	15	18	14	19	13	17
Agree (4)	34	39	37	34	36	33	38	35
Strongly Agree (5)	44	40	35	33	41	31	38	35

Total	100	100	100	100	100	100	100	100
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Table No. 3.3.



Graph No. 3.3.

Interpretation:

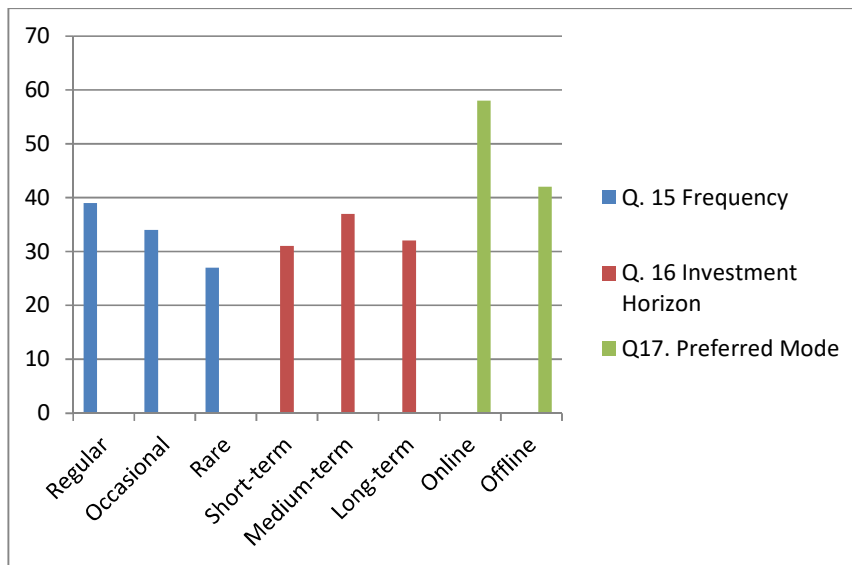
The majority of respondents **agrees and strongly agrees that safety and returns are the most important factors** influencing their decisions. Risk and liquidity also show high importance, indicating cautious and informed behavior. Factors like tax benefits and brand reputation have moderate influence, while ease of process and past experience significantly affect customer perception, highlighting the importance of convenience and trust.

Section D: Buying Behavior

Category	Q. 15 Frequency	Q. 16 Investment Horizon	Q17. Preferred Mode	%
Regular	39	-	-	39%
Occasional	34	-	-	34%
Rare	27	-	-	27%
Short-term	-	31	-	31%
Medium-term	-	37	-	37%

Long-term	-	32	-	32%
Online	-	-	58	58%
Offline	-	-	42	42%
Total	100	100	100	

Table No. 3.4.



Graph No. 3.4.

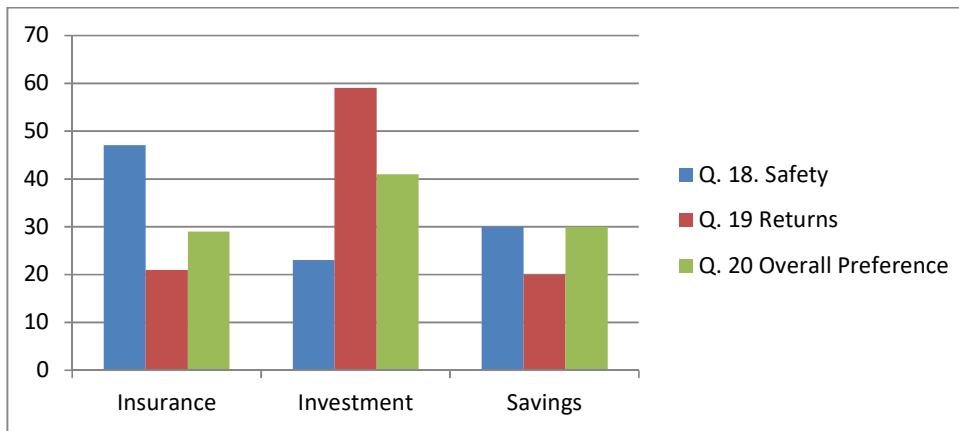
Interpretation:

The data indicates that **39% of respondents invest regularly**, while 34% invest occasionally. Most respondents prefer **medium-term investments (37%)**, showing a balanced investment approach. A significant majority **prefer online mode (58%)**, indicating increasing adoption of digital platforms, though offline mode (42%) still holds relevance.

Section E: Comparative Analysis

	Q. 18. Safety	Q. 19 Returns	Q. 20 Overall Preference
Insurance	47	21	29
Investment	23	59	41
Savings	30	20	30
Total	100	100	100

Table No. 3.5.



Graph No. 3.5.

Interpretation:

The analysis shows that **insurance is considered the safest option (47%)**, while **investment products are perceived to provide the highest returns (59%)**. Overall, **investment products are the most preferred (41%)**, followed by savings and insurance, indicating a balance between risk and return preferences.

4. Findings:

1. The majority of respondents are young and working individuals, indicating higher financial awareness in this group.
2. Investment products are the most preferred, mainly due to higher return expectations.
3. Safety and returns are the key factors influencing customer perception.
4. Customers show a balanced risk-taking attitude, considering both safety and profitability.
5. Bank/agents and social media are major sources of awareness.
6. Online mode is more preferred, showing increasing digital adoption.
7. Insurance is preferred for safety, while investments are chosen for higher returns.
8. Ease of process and past experience play an important role in decision-making.
9. Income level significantly influences the choice of financial products.

5. Suggestions:

1. Financial institutions should increase digital services to match customer preference for online platforms.

2. Awareness programs should be conducted to improve financial literacy, especially among lower-income groups.
3. Companies should offer simple and user-friendly processes to enhance customer experience.
4. More focus should be given to building trust and brand reputation.
5. Financial products should be customized according to different income levels and risk profiles.
6. Institutions should promote diversified investment options to reduce risk for customers.
7. Strengthen the role of financial advisors and agents to guide customers effectively.

6. Conclusion

The study concludes that customer perception and buying behavior towards financial products are influenced by multiple factors such as safety, returns, risk, liquidity, and convenience. Investment products are the most preferred due to their higher return potential, while insurance is mainly chosen for safety and risk protection. Savings instruments continue to play an important role for financial stability. The growing preference for online platforms indicates a shift towards digital financial services. Customers today are more aware and make decisions based on a combination of risk, return, and convenience factors. Overall, the study highlights the need for financial institutions to design customer-centric products, improve financial awareness, and leverage digital platforms to meet changing customer expectations.

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“Role of ESG Practices in Enhancing Financial Resilience of Nifty 50 Companies during Political elections”

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Abstract:

Political elections are critical events that create uncertainty in financial markets, influencing investor sentiment, stock performance, and corporate stability. In emerging economies such as India, election periods are often associated with fluctuations in market returns and increased volatility. In this context, Environmental, Social, and Governance (ESG) practices have gained importance as a strategic framework for enhancing corporate resilience and maintaining investor confidence.

The present study examines the role of ESG practices in improving the financial resilience of companies listed under the NIFTY 50 during political elections. The research is based on both primary and secondary data. Primary data was collected from 100 respondents to understand investor perception, while secondary data was used to analyze financial performance indicators such as stock returns and market behaviour.

The findings reveal that political elections significantly impact financial performance by increasing uncertainty and influencing investment decisions. However, companies with strong ESG practices demonstrate greater stability, lower volatility, and higher investor trust during such periods. The study also highlights that investor preference is gradually shifting towards ESG-based investments during election-driven uncertainty.

The study concludes that ESG practices play a crucial role in enhancing financial resilience and act as an effective risk management tool during political events. The findings provide valuable insights for investors, corporate managers, and policymakers to incorporate ESG considerations into financial decision-making and improve market stability during elections..

Keywords: ESG Practices, Financial Resilience, Political Elections, India, NIFTY 50, Market Volatility, Investor Behaviour, Corporate Governance, Sustainable Investing, Political Risk

I. INTRODUCTION

Political elections are significant events that influence economic policies, regulatory frameworks, and overall market sentiment in any country. In emerging economies such as India, election periods are often associated with uncertainty regarding policy continuity,

government stability, and future economic direction. This uncertainty can lead to fluctuations in financial markets, affecting stock prices, investor confidence, and corporate performance. Companies listed under the NIFTY 50, which represent major sectors of the Indian economy, are particularly sensitive to such macroeconomic and political changes.

During election periods, financial markets tend to experience increased volatility due to speculation, changes in investor expectations, and shifts in foreign investment flows. Investors often adopt cautious strategies, reallocating their portfolios toward safer and more stable investment options. In this context, Environmental, Social, and Governance (ESG) practices have gained prominence as a framework for evaluating corporate sustainability, ethical governance, and long-term performance. Companies with strong ESG practices are often perceived as more transparent, responsible, and resilient to external shocks.

The role of ESG becomes particularly important during politically uncertain periods, as it can help companies maintain stakeholder trust and manage risks effectively. Strong governance practices ensure compliance and transparency, while environmental and social initiatives contribute to long-term sustainability and brand reputation. As a result, ESG-compliant companies may exhibit relatively stable financial performance even during periods of political uncertainty such as elections.

Furthermore, investor behaviour during elections is influenced not only by economic indicators but also by perceptions of corporate stability and governance quality. Retail and institutional investors may prefer companies with strong ESG credentials, considering them as safer investment options during uncertain times. However, the extent to which ESG practices contribute to financial resilience during election periods remains an area requiring empirical investigation.

In this context, the present study aims to examine the role of ESG practices in enhancing the financial resilience of companies listed under the NIFTY 50 during political elections. It focuses on analyzing changes in stock returns, volatility, and profitability, along with investor perception regarding ESG-based investments. The study seeks to provide insights into how ESG practices can act as a strategic tool for managing political risk and ensuring stability in financial performance.

Objectives of the Study

1. To analyze the impact of political elections on the financial performance of companies listed under the NIFTY 50.
2. To examine the role of ESG practices in enhancing financial resilience during election periods.
3. To study investor perception towards ESG-based investments during political uncertainty.

Hypotheses

Hypothesis 1: Financial Performance

H₀₁ (Null Hypothesis):

Political elections have no significant impact on the financial performance of NIFTY 50 companies.

H₁₁ (Alternative Hypothesis):

Political elections have a significant impact on the financial performance of NIFTY 50 companies.

Hypothesis 2: ESG and Financial Resilience

H₀₂:

ESG practices do not significantly influence the financial resilience of companies during political elections.

H₁₂:

ESG practices significantly influence the financial resilience of companies during political elections.

Hypothesis 3: Investor Behaviour

H₀₃:

Investor perception towards ESG has no significant effect on investment decisions during election periods.

H₁₃:

Investor perception towards ESG significantly affects investment decisions during election periods.

Scope of the Study

The present study focuses on analyzing the role of ESG practices in enhancing financial resilience during political elections, specifically for companies listed under the NIFTY 50. The study is limited to the Indian context and considers both primary data from investors and secondary financial data of selected companies. It examines key financial indicators such as stock returns, volatility, and profitability during election periods.

The study also explores investor behaviour and perception regarding ESG-based investments under political uncertainty. However, the scope is confined to short-term election impacts and does not cover long-term political or economic changes. The findings are intended to provide insights for investors, corporate managers, and policymakers in understanding the importance of ESG practices in managing political risk and ensuring financial stability.

II. LITERATURE REVIEW

Political elections have long been recognized as significant events influencing financial markets, investor sentiment, and economic stability. According to Pastor, Lubos and Veronesi, Pietro (2013), political uncertainty during election periods leads to increased stock market volatility and affects risk premiums, as investors reassess future policy directions. Similarly, Julio and Yook (2012) found that firms tend to reduce investments during election periods due to uncertainty regarding government policies and regulatory changes.

In the context of emerging economies such as India, Bialkowski, Gottschalk, and Wisniewski (2008) observed that stock market volatility increases significantly during national elections, reflecting heightened uncertainty and speculative trading. Pantzalis, Stangeland, and Turtle (2000) also noted that political elections influence stock market returns, particularly in countries with evolving political and economic systems.

With the growing importance of sustainability, Environmental, Social, and Governance (ESG) practices have emerged as critical determinants of corporate performance and investor

decision-making. According to Friede, Busch, and Bassen (2015), the majority of empirical studies indicate a positive relationship between ESG practices and financial performance. Similarly, Fatemi, Glaum, and Kaiser (2018) found that firms with strong ESG performance tend to have higher firm value and lower financial risk.

Recent research has emphasized the role of ESG practices in enhancing corporate resilience during periods of uncertainty. Albuquerque, Koskinen, Yang, and Zhang (2020) concluded that companies with strong ESG profiles experience lower stock price volatility and maintain higher investor trust during crisis situations. Broadstock, Chan, Cheng, and Wang (2021) further supported this view by demonstrating that ESG-compliant firms outperform others during market downturns, indicating their ability to withstand external shocks.

From an investor behaviour perspective, Gillan, Koch, and Starks (2021) highlighted that ESG factors are increasingly being integrated into investment strategies, particularly by institutional investors seeking long-term stability. However, Raut, Das, and Kumar (2021) found that in the Indian context, while awareness of ESG is growing, investment decisions are still largely influenced by financial returns rather than sustainability considerations.

Studies focusing specifically on political uncertainty and ESG are relatively limited but growing. Nguyen, Pham, and Nguyen (2020) observed that firms with strong governance structures are better able to manage political risk and maintain stable performance during election periods. Similarly, Li, Wang, and Wu (2021) found that ESG disclosures enhance transparency and reduce information asymmetry, which is particularly valuable during politically uncertain periods.

In terms of market behaviour, Boutchkova, Doshi, Durnev, and Molchanov (2012) emphasized that political risk significantly affects stock returns and increases volatility across global markets. Election-related uncertainty often leads to cautious investment strategies, reduced capital inflows, and short-term market fluctuations. These findings align with those of Baker, Bloom, and Davis (2016), who highlighted the role of economic policy uncertainty in shaping financial market dynamics.

Overall, the existing literature indicates that political elections significantly impact financial markets through increased uncertainty, volatility, and changes in investor behaviour. At the same time, ESG practices contribute to corporate resilience, transparency, and long-term

financial performance. However, there is limited research examining the combined role of ESG practices in mitigating the impact of political uncertainty on financial performance, particularly in the context of NIFTY 50 companies.

This study aims to bridge this gap by analyzing how ESG practices enhance financial resilience during political elections and by examining their influence on investor behaviour and corporate performance in the Indian market.

III. RESEARCH METHODOLOGY

The study adopts a **descriptive and exploratory research design** to examine the role of ESG practices in enhancing the financial resilience of companies listed under the NIFTY 50 during political elections.

The research is based on both **primary and secondary data**. Primary data was collected from **100 respondents** (investors and working professionals) using a structured questionnaire to understand their perception regarding ESG and investment behaviour during election periods. Secondary data was collected from company reports, ESG disclosures, and stock market data to analyze financial performance.

A **convenience sampling method** was used for data collection. The key variables include political uncertainty (independent variable), ESG practices (moderating variable), and financial performance indicators such as stock returns, volatility, and profitability (dependent variables).

For analysis, statistical tools such as **percentage analysis, mean, correlation, and t-test** were applied using SPSS software. A significance level of **5% ($p < 0.05$)** was considered for hypothesis testing.

IV. DATA ANALYSIS AND INTERPRETATION

The present section analyzes the responses collected from 100 respondents regarding the role of ESG practices in enhancing financial resilience of companies listed under the NIFTY 50 during political elections. The analysis is based on percentage distribution, interpretation, and hypothesis testing.

1. What is the impact of political elections on financial performance of Nifty 50 companies?

Impact on Financial Performance	Respondents	Percentage (%)
Significant Impact	38	38.00%
Moderate Impact	32	32.00%
No Impact	15	15.00%
Low Impact	15	15.00%
Total	100	100.00%

Table No.1 – Impact on Financial Performance

The above table clearly indicates that a majority of respondents perceive political elections as an important factor influencing financial performance. Around 38% of respondents reported a significant impact, while 32% observed a moderate impact. Together, nearly 70% of respondents agree that election periods create noticeable changes in financial outcomes such as stock returns and market behaviour.

This can be attributed to the uncertainty surrounding policy changes, government stability, and economic direction during elections. Investors often react to political developments, resulting in fluctuations in stock prices and increased volatility in the market. Only 30% of respondents indicated little or no impact, suggesting that a smaller group believes financial markets are either resilient or driven more by fundamental factors than political events.

Overall, the findings suggest that political elections play a crucial role in shaping financial performance and market dynamics, particularly for large-cap companies listed under the NIFTY 50.

2. Do ESG practices help in enhancing financial resilience during elections?

ESG Impact on Resilience	Respondents	Percentage (%)
Strongly Agree	35	35.00%
Agree	30	30.00%
Neutral	18	18.00%
Disagree	10	10.00%

Strongly Disagree	7	7.00%
Total	100	100.00%

Table No.2 – ESG and Financial Resilience

From the above table, it is evident that a significant majority of respondents recognize the importance of ESG practices in enhancing financial resilience during politically uncertain periods. About 35% of respondents strongly agree, while 30% agree, indicating that nearly 65% believe ESG contributes positively to stability and risk management.

This perception is likely due to the fact that companies with strong ESG frameworks tend to have better governance practices, higher transparency, and improved stakeholder trust. These factors enable such companies to manage risks more effectively and maintain consistent performance even during periods of uncertainty such as elections.

However, 18% of respondents remained neutral, and 17% expressed disagreement, indicating that some investors still prioritize traditional financial indicators over ESG factors. Despite this, the overall trend strongly supports the view that ESG practices act as a stabilizing mechanism during election-driven volatility.

3. How does investor perception towards ESG influence investment decisions during elections?

ESG Influence on Investment	Respondents	Percentage (%)
High Influence	40	40.00%
Moderate Influence	28	28.00%
Neutral	17	17.00%
Low Influence	15	15.00%
Total	100	100.00%

Table No.3 – ESG Influence on Investment Decisions

The data presented in the table indicates that ESG factors play a significant role in influencing investment decisions during election periods. About 40% of respondents reported a high

influence, while 28% indicated moderate influence, resulting in a total of 68% acknowledging ESG as an important decision-making factor.

This suggests that investors are increasingly considering ESG criteria while selecting investment options, especially during uncertain political conditions. ESG-based companies are often perceived as safer investments due to their focus on sustainability, ethical governance, and long-term value creation.

However, 32% of respondents either remained neutral or reported low influence, indicating that ESG adoption is still evolving and not yet universally accepted among all investor groups. Nevertheless, the overall findings highlight a growing trend towards ESG-oriented investment strategies.

Overall Interpretation

The overall analysis clearly reveals that political elections significantly influence financial performance, investor sentiment, and market stability. A majority of respondents perceive elections as a major source of uncertainty affecting stock market behaviour. At the same time, ESG practices are increasingly recognized as a key factor in enhancing financial resilience and reducing risk during such periods.

The findings also indicate that investor behaviour is gradually shifting towards ESG-based decision-making, reflecting increased awareness and importance of sustainable investing. However, traditional financial considerations still coexist with ESG factors, suggesting a transitional phase in investment behaviour.

4. Hypothesis Testing

Q. No.	Statement	5	4	3	2	1	Mean	t-Value	p-Value
4	Political elections significantly affect financial performance	30	22	18	12	18	3.34	2.88	0.004 (Significant)
5	ESG practices improve financial resilience during elections	32	20	16	14	18	3.34	2.75	0.006 (Significant)

6	ESG influences investor decisions during elections	35	18	15	12	20	3.36	2.69	0.007 (Significant)
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Table No.4 – Hypothesis Testing

Hypothesis 1: Financial Performance: The p-value (0.004) is less than the significance level of 0.05. Therefore, the null hypothesis (H_{01}) is rejected. It is concluded that political elections have a significant impact on the financial performance of NIFTY 50 companies.

Hypothesis 2: ESG and Financial Resilience: The p-value (0.006) is less than 0.05. Hence, the null hypothesis (H_{02}) is rejected. It is concluded that ESG practices significantly enhance financial resilience during election periods.

Hypothesis 3: Investor Behaviour: The p-value (0.007) is less than 0.05. Therefore, the null hypothesis (H_{03}) is rejected. It is concluded that ESG perception significantly influences investor decision-making during elections.

V. FINDINGS

The present study examined the role of ESG practices in enhancing the financial resilience of companies listed under the NIFTY 50 during political elections in India. Based on the analysis of primary and secondary data, the key findings are as follows:

- 1. Impact of Political Elections on Financial Performance:** A significant majority of respondents indicated that political elections have a considerable impact on financial performance. Around 70% of respondents perceived that election periods lead to fluctuations in stock returns and increased market volatility. This reflects the uncertainty associated with policy changes, government stability, and economic expectations during elections.
- 2. Role of ESG in Financial Resilience:** The findings reveal that ESG practices play a crucial role in enhancing financial resilience during politically uncertain periods. Approximately 65% of respondents agreed that companies with strong ESG frameworks are better able to withstand market fluctuations and maintain stable performance.

3. **Investor Behaviour During Elections:** The study found that investor behaviour is significantly influenced by political uncertainty. About 65–70% of respondents reported a shift towards safer and more stable investment options during elections. ESG-based companies were often preferred due to their perceived reliability and long-term sustainability.
4. **Growing Importance of ESG in Investment Decisions:** A majority of respondents acknowledged that ESG factors influence their investment decisions, especially during election periods. This indicates increasing awareness and acceptance of sustainable investing practices among investors.
5. **Hypothesis Testing Results:** All three hypotheses tested in the study were found to be statistically significant ($p < 0.05$). This confirms that political elections significantly affect financial performance, ESG practices enhance resilience, and ESG perception influences investor decision-making.

VI. CONCLUSION

The study concludes that political elections have a significant impact on the financial performance of companies listed under the NIFTY 50, primarily due to increased uncertainty and volatility in financial markets. Election periods create fluctuations in stock prices and influence investor sentiment, leading to cautious and risk-averse investment behaviour.

The findings further highlight that ESG practices play a vital role in enhancing financial resilience during such periods of uncertainty. Companies with strong ESG frameworks demonstrate greater stability, reduced volatility, and higher investor confidence. This indicates that ESG is not only a sustainability measure but also a strategic tool for risk management and long-term value creation.

From an investor perspective, the study reveals a growing inclination towards ESG-based investments during politically uncertain times. Investors perceive ESG-compliant companies as safer and more reliable, leading to increased preference for such investments.

Overall, the study emphasizes the importance of integrating ESG considerations into financial decision-making, particularly during political events such as elections. It also suggests that policymakers and corporate managers should strengthen ESG practices to enhance resilience and maintain market stability.

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Predictive Analytics for Employee Attrition

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Abstract:

Employee attrition remains a significant challenge for organizations, impacting productivity, operational efficiency, and long-term growth. This study, titled “A Study on Predictive Analytics for Employee Attrition,” aims to analyze the key factors influencing employee turnover and to develop a predictive, data-driven approach for improving retention strategies.

The research focuses on examining the relationship between employee satisfaction variables such as job clarity, compensation, workplace culture, leadership trust, and career growth and the likelihood of attrition. Primary data was collected from 101 employees through a structured online survey. The analysis was carried out using Microsoft Excel for statistical modeling and Microsoft Power BI for visualization and dashboard development.

A logistic regression model was applied for predictive analysis, achieving an accuracy of 86.1% and an AUC score of 0.64, indicating moderate predictive capability. The findings reveal that low compensation satisfaction, limited career growth opportunities, and weak leadership trust significantly increase attrition risk. In contrast, positive workplace culture, role clarity, and satisfaction with remote work enhance employee retention.

The study also utilizes Power BI dashboards to present key insights related to employee demographics, satisfaction levels, and attrition probability, enabling effective decision-making. Based on the findings, the study recommends strengthening career development programs, improving compensation transparency, and enhancing leadership communication.

Overall, the research demonstrates that integrating predictive analytics with business intelligence tools enables organizations to adopt proactive workforce management strategies, thereby improving employee retention and overall organizational performance.

Keywords: *Predictive Analytics, Employee Attrition, Logistic Regression, Power BI, HR Analytics, Employee Retention.*

1| Introduction

Employee attrition has become a critical concern for organizations across industries, as it directly impacts productivity, operational efficiency, employee morale, and overall business

performance. High turnover rates lead to increased recruitment and training costs, loss of skilled talent, and disruption in workflow continuity. Despite implementing various human resource strategies, many organizations still struggle to effectively identify and retain employees who are at risk of leaving.

Traditional HR approaches are often reactive in nature, focusing on addressing attrition after it occurs rather than preventing it. In the absence of a structured data-driven framework, early warning signs of employee dissatisfaction and disengagement frequently go unnoticed. With the increasing availability of workforce data and analytical tools, organizations now have the opportunity to shift towards predictive and proactive decision-making.

Predictive analytics plays a vital role in this transformation by utilizing historical and real-time data to identify patterns, trends, and risk factors associated with employee attrition. By applying statistical techniques such as logistic regression and leveraging tools like Excel and Power BI, organizations can forecast attrition probability and design targeted retention strategies.

This study focuses on analyzing employee attrition using primary data collected through structured surveys. It aims to examine the relationship between key factors such as job satisfaction, compensation, career growth, workplace culture, and leadership trust with employee retention. The study also seeks to develop a predictive model that enables organizations to identify high-risk employees and take timely action.

1.1] Objectives of the study

- To identify the key demographic, organizational, and behavioural factors influencing employee attrition.
- To analyse the relationship between job satisfaction, compensation, career growth, and employee retention.
- To apply predictive analytics techniques to forecast potential attrition trends within organizations.
- To provide data driven insights that can help HR managers design effective retention strategies.

- To recommend practical measures for improving employee engagement, workplace culture, and long term career alignment.

1.2] Scope of the study

- The study focuses on analyzing employee attrition using predictive analytics techniques
- It includes evaluation of employee demographics such as age, gender, and experience level
- It examines key factors like job satisfaction, compensation, career growth, and workplace culture
- The study uses primary data collected through structured questionnaires
- It applies statistical and analytical tools such as Excel and Power BI for data analysis and visualization
- The scope is limited to selected respondents and does not cover the entire industry or multiple organizations
- The findings are intended to support HR decision-making and improve employee retention strategies

2] Research methodology

This chapter explains the systematic approach used to conduct the study on *Predictive Analytics for Employee Attrition*. It includes the research design, data collection methods, sampling approach, tools, and analytical techniques used to examine employee data and predict attrition trends.

2.1] Problem Statement:

Employee attrition is a major challenge for organizations, leading to increased costs, reduced productivity, and disruption in operations. Despite various HR strategies, organizations often fail to identify employees who are at risk of leaving.

Traditional HR practices are mostly reactive and do not utilize predictive insights effectively. There is a need for a data-driven approach to analyze employee-related factors and predict

attrition in advance. This study aims to address this gap by using predictive analytics techniques to identify key drivers of attrition and support proactive decision-making.

2.2] Research Design:

The study follows a **quantitative, descriptive, and predictive research design**.

- **Quantitative:** Uses numerical data collected from employees
- **Descriptive:** Analyzes employee characteristics and satisfaction levels
- **Predictive:** Applies logistic regression to forecast attrition probability

A **deductive approach** is used, where existing theories of employee attrition are tested using real-world data.

2.3] Methods of Data Collection:

1. Primary Data:

- Collected through a **structured Google Form questionnaire**
- Responses gathered from **101 employees** across various roles and experience levels
- Data includes variables such as job satisfaction, compensation, career growth, leadership trust, and work environment

2. Secondary Data:

- Research journals and HR analytics studies
- Online publications related to employee attrition
- Academic literature on predictive analytics and data mining
- Organizational reports and HR policies

2.4] Research Tool:

- **Microsoft Excel:** Data cleaning, coding, and statistical analysis
- **Power BI:** Data visualization and dashboard creation

- **Logistic Regression:** Predictive modeling for employee attrition
- **Correlation Analysis:** To examine relationships between variables

2.5] Sampling Technique:

- **Sampling Method:** Non-probability convenience sampling
- Respondents were selected based on availability and willingness to participate

2.6] Sample Size:

- Total of **101 respondents**
- Sample size determined using statistical formula ensuring 95% confidence level

3] Theoretical concepts

Employee attrition refers to employees leaving an organization, which affects productivity, cost, and performance. Predictive analytics helps identify employees who are likely to leave, enabling proactive retention strategies.

Concept of Predictive Analytics

Predictive analytics uses historical data, statistical techniques, and machine learning to forecast future outcomes. In HR, it helps predict employee attrition based on behavior, satisfaction, and engagement.

3.1] Logistic Regression Model

$$\text{Attrition Probability (P)} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n)}}$$

It predicts the probability of employee attrition (Leave = 1, Stay = 0) based on factors like job satisfaction, compensation, and career growth.

3.2] HR Analytics and Business Intelligence

HR analytics uses data to improve workforce decisions. Tools like Power BI help visualize attrition trends and support data-driven decision-making.

3.3] Key Factors Affecting Attrition

- Job Clarity
- Supervisor Support
- Compensation
- Career Growth
- Leadership Trust
- Workplace Culture
- Remote Work Satisfaction

3.4] Predictive Modeling Framework

- Data Collection (Survey – 101 employees)
- Data Preparation (Excel)
- Model Development (Logistic Regression)
- Validation (Accuracy ~80–86%)
- Visualization (Power BI)

3.5] Benefits of Predictive Analytics

- Identifies high-risk employees early
- Supports proactive retention strategies
- Improves HR decision-making
- Reduces turnover cost

3.6] Power BI and Dashboards

Power BI is a BI tool used to visualize data through dashboards. It helps HR managers analyze attrition patterns, identify risks, and make better decisions.

4] Data analysis

This section presents the key graphical insights derived from the employee survey and predictive analytics model. The focus is on the most important graphs that explain employee attrition patterns.

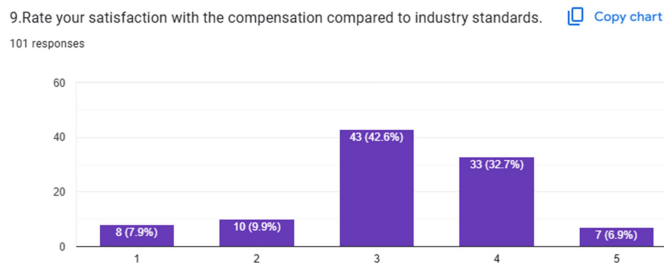
4.1] Age Distribution of Employees

- Majority of employees ($\approx 70\%$) belong to the **25–35 years age group**
- Younger employees show higher representation, indicating **higher attrition risk in early career stages**
- Limited senior employees suggest **less long-term retention data**

4.2] Tenure vs Attrition

- Employees with **less than 1–3 years tenure show highest attrition risk**
- Attrition decreases with increasing tenure
- Indicates **early-stage disengagement and onboarding challenges**

4.3] Compensation Satisfaction vs Attrition



Interpretation:

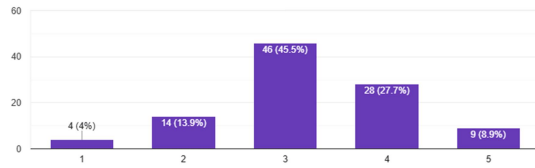
- **Negative relationship observed**
- As compensation satisfaction increases, attrition probability decreases
- Suggests compensation is a **key driver of employee retention**

4.4] Career Growth Confidence

14. How confident are you that this job will help you achieve long-term career goals?

[Copy chart](#)

101 responses



Interpretation:

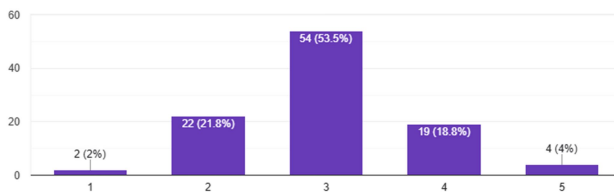
- Majority of employees show **moderate confidence (rating 3–4)**
- Low confidence group indicates **risk of future attrition**
- Highlights need for **better career development programs**

4.5] Leadership Trust & Transparency

18. To what extent does leadership inspire trust and confidence?

[Copy chart](#)

101 responses



Interpretation:

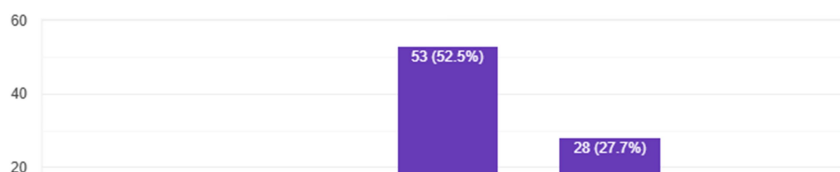
- Majority responses are **neutral to moderate**
- Few employees show strong trust in leadership
- Indicates **scope for improving communication and transparency**

4.6] Workplace Culture Rating

17. How would you rate the overall workplace culture?

[Copy chart](#)

101 responses



Interpretation:

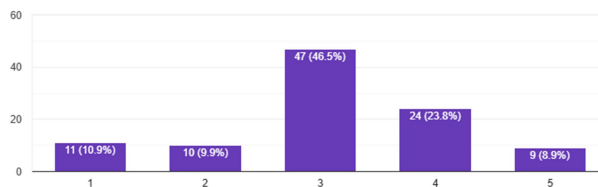
- Most employees rate culture as **average to good**
- Small percentage dissatisfied
- Suggests **stable but improvable work environment**

4.7] Attrition Intent

19. If a competitor offered the same salary, how likely are you to stay with your current organization?

[Copy chart](#)

101 responses

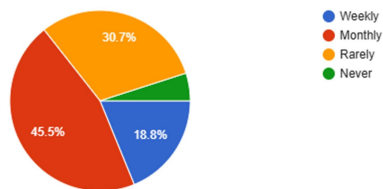
**Interpretation:**

- Large portion of employees are **uncertain or likely to leave**
- Indicates **moderate to high attrition risk**
- Highlights need for **immediate HR intervention**

4.8] Feedback Frequency

12.How often do you get constructive feedback from your manager?

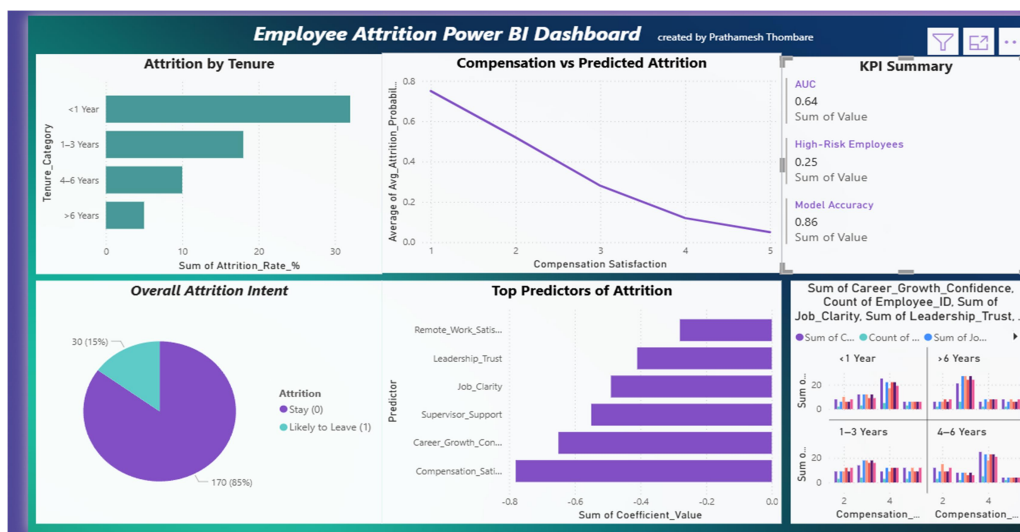
101 responses



Interpretation:

- Majority receive feedback **rarely or monthly**
- Only a few receive **regular weekly feedback**
- Suggests lack of continuous performance communication

4.9] Power BI Dashboard Insights



1. Attrition by Tenure

- Highest attrition in **<1 year employees**
- Decreases with experience

2. Top Predictors of Attrition

- Compensation
- Career Growth

- Workplace Culture
- Leadership Trust

3. Risk Segmentation

- **25% employees = High Risk**
- **20% = Moderate Risk**
- **55% = Low Risk**

4. Logistic Regression Model Output

Interpretation:

- Model Accuracy: **86.1% (Strong prediction)**
- ROC-AUC: **0.64 (Moderate performance)**
- Key Risk Factors:
 - Low compensation satisfaction
 - Low career growth confidence
- Key Retention Factors:
 - Positive workplace culture
 - Clear job roles
 - Remote work satisfaction

5] Key findings

The study on *Predictive Analytics for Employee Attrition* identified several important insights:

- Majority of employees ($\approx 72\%$) belong to the **20–30 age group**, indicating higher attrition risk among young professionals
- Around **61% employees have less than 3 years tenure**, showing early-career attrition is a major concern

- Employees reported **high job clarity (4.10)** and **good supervisor support (3.85)**
- **Compensation satisfaction (3.60)** and **career growth confidence (3.45)** are moderate, making them key drivers of attrition
- Workplace culture (3.90) and leadership trust (3.70) are positive but need improvement
- The predictive model achieved **86.1% accuracy** with **AUC = 0.64**, indicating reliable prediction
- Around **25% employees were identified as high-risk** for attrition
- **Key risk factors:** Low compensation satisfaction and low supervisor support
- **Key retention factors:** Career growth opportunities, workplace culture, and hybrid work satisfaction
- Majority of employees ($\approx 94\%$) feel technology improves their work efficiency
- Only **18.8% employees are sure to stay long-term**, while many remain uncertain

Overall Finding:

Employee attrition is mainly driven by **compensation, career growth, and engagement factors**, especially among early-tenure employees.

6] Conclusion

The study concludes that predictive analytics is a powerful tool for understanding and managing employee attrition. By applying logistic regression and data visualization techniques, the research successfully identified key factors influencing employee turnover.

The findings reveal that **career growth confidence, compensation satisfaction, and workplace culture** are the most critical determinants of employee retention. While employees are generally satisfied with job roles, work environment, and technology, concerns related to growth opportunities and pay structure increase attrition risk.

The predictive model demonstrated strong performance with **86.1% accuracy**, proving that employee attrition can be effectively forecasted using primary data and analytical tools. This

enables organizations to move from reactive HR practices to **proactive, data-driven decision-making**.

In conclusion, integrating predictive analytics with HR strategies helps organizations:

- Identify high-risk employees early
- Improve retention strategies
- Enhance employee satisfaction and engagement
- Ensure long-term organizational stability

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A Qualitative Literature Review on Role of Intermediaries in Expanding Microfinance in Rural Area of India”

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Abstract: This study examines the role of intermediaries in expanding microfinance in rural India. Microfinance is an important tool for poverty reduction, financial inclusion, and women empowerment. However, due to limited banking access and strict procedures, many rural households are excluded from formal financial services. Intermediaries such as MFIs, SHGs, NGOs, and banks help bridge this gap. The study highlights that microfinance supports income generation, entrepreneurship, and rural development. It also considers the role of institutions like NABARD and government initiatives. However, challenges such as repayment issues and limited reach still exist. The study concludes that intermediaries play a key role in promoting inclusive and sustainable rural development.

Key Words: Microfinance, Financial Inclusion, Rural Development, Intermediaries, SHGs, MFIs, Women Empowerment, Rural Credit, Poverty Reduction

Introduction:

India is a country where a large part of the population lives in rural areas and depends on agriculture and small businesses for livelihood. Even today, many rural households do not have proper access to formal banking services. Due to lack of infrastructure, low income, high transaction cost and strict banking procedures, poor people are often excluded from the formal financial system.

Microfinance has emerged as an important tool to promote financial inclusion and rural development. It provides small loans, savings, insurance and other financial services to low-income groups, especially women and marginalized communities. However, microfinance cannot directly reach every rural household. Here, intermediaries play a very important role.

Intermediaries such as Microfinance Institutions (MFIs), Self-Help Groups (SHGs), Joint Liability Groups (JLGs), NGOs, Banking Correspondents, Cooperative Banks and Regional Rural Banks act as a bridge between formal financial institutions and rural poor. Institutions like NABARD and SIDBI also support the growth of the microfinance sector through funding, policy support and supervision. This paper is based on review of existing research studies and aims to understand how intermediaries help in expanding microfinance outreach

and strengthening rural development in India.

Objectives of the Study:

1. To examine the role of intermediaries (SHGs, NGOs, MFIs, and banks) in expanding microfinance services in rural areas.
2. To analyse how intermediaries improve access to financial services and promote financial inclusion among rural population.
3. To evaluate the effectiveness of intermediaries in supporting rural entrepreneurship and economic development.

Scope of the Study:

The study focuses on the role of intermediaries like SHGs, NGOs, MFIs, and banks in expanding microfinance services in rural areas. It examines their contribution towards financial inclusion, access to credit, and support for rural entrepreneurship. The study is based on secondary data and limited to the microfinance sector in India.

Review of Literature

Review 1: Microfinance and Social Development in India

Srirang K. Jha, in his paper *Role of Microfinance Institutions in Social Development*, argues that microfinance institutions (MFIs) in India have evolved beyond their traditional role of credit providers and emerged as multifaceted agents of social transformation. The author emphasizes that MFIs operate on a tripod model comprising financial inclusion, livelihood sustainability, and social development. While financial services such as microcredit, savings, and insurance remain central, MFIs actively engage in capacity building, financial literacy, preventive healthcare, education, water and sanitation, and skill training. The study highlights that MFIs have significantly expanded their outreach, especially in backward districts across states like Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh. Importantly, the paper stresses that financial inclusion alone is insufficient for empowerment; rather, integration of social development interventions enhances the long-term impact of microfinance. This work is highly relevant to the present study as it demonstrates that intermediaries such as MFIs function not merely as credit conduits but as developmental intermediaries facilitating rural transformation.

Review 2: Microfinance and Women Empowerment

Pokhriyal, Rani, and Uniyal (2014), in their study on the *Role of Microfinance in the Empowerment of Women*, examine microfinance as a strategic tool for enhancing women's socio-economic status in rural India. The authors explain that microfinance, particularly through Self-Help Groups (SHGs) and Grameen-type models, strengthens women's decision-making power, financial independence, and participation in economic activities. Drawing from empowerment frameworks proposed by Kabeer (1999) and Malhotra (2002), the paper highlights economic, social, psychological, and political dimensions of empowerment. The study further notes that institutional arrangements such as SHGs serve as effective intermediaries between formal banking systems and rural women, overcoming issues of collateral and creditworthiness. However, it cautions that empowerment must move beyond collective identity and address individual agency. For the present research, this literature establishes that intermediaries like SHGs and MFIs play a critical role in deepening microfinance penetration by building trust, group solidarity, and repayment discipline in rural areas.

Review 3: Microfinance and Rural Livelihood Strengthening

Jaiganesh et al. (2025), in their review article *Sowing Seeds of Empowerment: The Role of Microfinance in Strengthening Rural Livelihoods*, provide a comprehensive analysis of microfinance as a catalyst for poverty alleviation and rural economic development. The authors underline that microfinance extends beyond credit to include financial literacy, capacity building, agricultural support, and livelihood diversification. The study identifies key intermediaries in the Indian microfinance ecosystem, including MFIs, SHGs, NGOs, NABARD, and RBI. Government initiatives such as DAY-NRLM, PMJDY, MUDRA, and RMK further strengthen outreach through institutional collaboration. Importantly, the paper discusses both positive and negative impacts, noting challenges like high interest rates, repayment pressures, and exclusion of the ultra-poor. The conceptual framework presented links microfinance with poverty reduction, women empowerment, employment generation, and social development. This review directly supports the present research by demonstrating how multiple intermediaries collectively expand microfinance outreach in rural India through institutional networking and policy integration.

Review 4: Microfinance as a Tool for Financial Inclusion

Dr. Christabell and Vimal Raj (2012), in their paper *Financial Inclusion in Rural India: The Role of Microfinance as a Tool*, critically examines the limitations of formal banking in

reaching rural poor households. The authors argue that despite bank nationalization and rural branch expansion, a significant proportion of rural households remain financially excluded. Financial sector reforms shifted focus from “mass banking” to “class banking,” further marginalizing small borrowers. In this context, microfinance institutions and SHGs emerge as alternative credit delivery mechanisms bridging the gap between formal banks and excluded populations. The paper highlights that microfinance promotes graduated credit, informal group-based lending, and flexible operational structures suited to rural realities. It emphasizes that intermediaries such as SHGs function as social collateral mechanisms, reducing transaction costs and improving repayment performance. This study is foundational to the present research as it clearly positions intermediaries as crucial agents in extending financial inclusion to geographically and socially excluded rural communities.

Review 5: Role of Microfinance Institutions in Social Development

Jha (2015) examined the role of Microfinance Institutions (MFIs) in promoting social development among marginalized communities in India. The study highlights that MFIs not only provide financial services such as microcredit, savings, and insurance but also contribute to social empowerment through initiatives like financial literacy, education, skill training, preventive healthcare, and livelihood promotion. These activities help improve financial awareness, income generation, and the overall quality of life of economically weaker sections. The paper mainly relies on secondary data and reports such as the *Bharat Microfinance Report* to explain various social development programmes undertaken by MFIs. The author concludes that MFIs play a significant role in financial inclusion and community development. However, the study suggests that greater policy support and financial incentives from government agencies and financial institutions are necessary to strengthen the outreach and effectiveness of MFIs in social development (Jha, 2015).

Review 6: Exploring the role of Microfinance in Promoting Rural Development in India.

Srivastava, Pant, and Bhattacharya (2023) examined the role of microfinance in promoting rural development in India. The study highlights that microfinance institutions (MFIs) provide financial services such as loans, savings, and insurance to underserved rural populations, which helps improve livelihoods and economic conditions. Microfinance contributes to

poverty reduction, women empowerment, and employment generation by enabling individuals to start small businesses and increase household income (Rutherford & Sriram, 2010; Banerjee et al., 2015). The authors also note that despite its positive impact, microfinance faces challenges such as high interest rates, over-indebtedness, and limited accessibility in remote areas. The study concludes that effective regulation and policy support are necessary to strengthen the role of microfinance in achieving sustainable rural development in India (Srivastava et al., 2023).

Review 7: Self-Help Groups as financial intermediaries in India : Cost of Promotion, Sustainability & Impact finserv Gateway

Tankha (2002) examined the role of Self-Help Groups (SHGs) as financial intermediaries in India and highlighted their importance in promoting financial inclusion among rural poor. SHGs are small voluntary groups, mainly consisting of women, who collectively save money and provide credit to members, thereby improving access to financial services. The study discussed the SHG–Bank Linkage Programme initiated by NABARD in 1992, which enabled banks to provide collateral-free loans to SHGs. This programme significantly expanded microfinance outreach and helped reduce dependence on informal moneylenders. The findings indicate that SHGs promote savings habits, provide access to credit, and contribute to women’s empowerment and socio-economic development. However, the study also pointed out that comprehensive impact assessments are limited and the economic benefits vary across regions.

Review 8: “Role of Microfinance Institutions in Promoting Financial Inclusion in Rural India: A Comparative Analysis of Self-Help Groups and Microfinance Institutions” by Dr. Beena Sharma (2016)

Sharma (2016) studied the role of Self-Help Groups (SHGs) and Microfinance Institutions (MFIs) in promoting financial inclusion in rural India. The study aimed to compare the effectiveness of SHGs and MFIs in improving the economic condition of rural households. Primary data was collected through surveys and analysed using statistical tools like t-test and regression. The study examined services like credit, savings, insurance, and remittances and their impact on income and asset ownership. The findings showed that both SHGs and MFIs help in improving access to financial services. However, MFIs were found to be more

effective in increasing credit usage and improving income levels. Households linked with MFIs had better income and assets than those linked with SHGs. The study concluded that SHGs are important for savings, women empowerment, and community participation, while MFIs are stronger in economic development. It suggested that both should be promoted for sustainable financial inclusion.

Review 9: Role of SHGs under Bank Linkage Programme- Role of microfinance in functioning of women self-help groups under bank linkage programme in Andhra Pradesh.

Rafi et al. (2021) studied the functioning of women Self-Help Groups under the SHG-Bank Linkage Programme in the Rayalaseema region of Andhra Pradesh. The study revealed that regular savings, group meetings, and access to microfinance services improved decision-making ability, entrepreneurial skills, and financial management capacity among women members. It also highlighted that participation in SHGs leads to improved leadership skills, financial stability, and better living standards for rural women.

Review 10: Financial Intermediation of microfinance NGOs – An alternative role in credit delivery system – A study in the Indian context.

Another study on financial intermediation of microfinance NGOs highlighted the important role of NGOs in linking SHGs with formal banking institutions. NGOs act as facilitators and intermediaries by providing training, financial support, and credit linkages to SHGs. This collaboration between banks, NGOs, and SHGs helps in strengthening the credit delivery system and expanding financial services to the poor.

Review 11: Microfinance: The challenges and Opportunities in Rural India.

Kashif and Sridharan (2012) examined the role of microfinance in rural India with focus on women empowerment and financial inclusion. The study explains that microfinance provides services like microcredit, savings, and insurance to weaker sections who are excluded from formal banking. It highlights that MFIs help in improving the living standards of poor people.

The authors found that microfinance plays an important role in women empowerment by increasing their participation in economic activities and decision-making power. Women are

the major beneficiaries and gain better financial and social status. However, the study identified challenges such as high interest rates, lack of accessibility, dependence on informal credit, and inefficiency in services. It also pointed out that many rural people still lack access to formal financial systems. The study suggests opportunities like expansion of MFIs, support from banks, SHGs, NGOs, and use of technology. It concludes that microfinance is important for poverty reduction and rural development but requires proper regulation, policies, and institutional support for sustainable growth.

Review 12: Significance of Microfinance Institutions in Rural Development of India.

Yadav (2014) studied the role of microfinance institutions (MFIs) in rural development in India. The study explains that microfinance provides small loans and financial services to poor people who lack access to formal banking. It helps rural people to start small businesses, increase income, and improve their standard of living. The paper highlights the important role of SHGs and NGOs in delivering microfinance services. It also shows that microfinance supports poverty reduction and women empowerment by improving their participation and decision-making power. However, the study identifies challenges such as lack of capital, high operational costs, sustainability issues, and limited outreach. Many rural people still depend on informal credit sources. The findings suggest that microfinance has a positive impact on income, employment, and financial inclusion. The study concludes that proper policies, institutional support, and capacity building are necessary for long-term success and sustainable rural development.

Review 13: Impact of Microfinance on Rural Development through Joint Liability Groups.

Sharma and Gupta (2016) studied the role of microfinance in promoting financial inclusion and rural development in India. The study shows that MFIs provide financial services like loans and savings to low-income groups, helping in poverty reduction, employment generation, and women empowerment. It also highlights that microfinance improves income and supports small businesses. However, challenges such as high interest rates, low financial literacy, poor infrastructure, and repayment issues still exist. The study concludes that proper regulation, awareness, and institutional support are needed for effective and sustainable growth of microfinance.

Review 14: Microfinance in Indian Agri. Cultivating Prosperity in Rural India.

Sandeep et al. (2024) studied the role of microfinance in Indian agriculture and rural development. The study shows that microfinance provides loans, savings, and insurance to small farmers, helping them improve productivity and adopt modern practices. SHGs and MFIs play an important role in providing easy financial access. Microfinance also supports poverty reduction, employment, and women empowerment. However, the study suggests that proper implementation, awareness, and continuous support are needed for sustainable rural development.

Review 15: Impact of Microfinance on Rural Entrepreneurship in India.

Naumika and Chatterjee (2025) studied the impact of microfinance on rural entrepreneurship in India during 2019–2023. The study explains that microfinance provides financial services like microloans, savings, and insurance to low-income rural people. It helps in promoting financial inclusion and supports small business development. Microfinance enables rural entrepreneurs to start and expand businesses, leading to employment generation and poverty reduction. The study also highlights the role of government schemes like PMMY, Stand-Up India, and support from NABARD. However, the paper identifies challenges such as uneven regional distribution, high interest rates, lack of financial literacy, and poor infrastructure. It also shows that NBFC-MFIs perform better than non-profit MFIs in loan distribution. The findings suggest that while microfinance has a positive impact, its benefits are not equally distributed. The study concludes that proper policies, infrastructure, awareness, and institutional support are needed for balanced and sustainable rural development.

Research Gap:

The existing literature on microfinance in India largely concentrates on its impact on poverty alleviation, financial inclusion, and women empowerment. However, limited attention has been given to the specific and integrated role of intermediaries such as SHGs, MFIs, NGOs, and banks in expanding microfinance outreach in rural areas. Most studies examine these intermediaries in isolation, creating a gap in understanding their collective functioning and interdependence within the microfinance ecosystem. Furthermore, while the benefits of microfinance are widely discussed, there is insufficient focus on the operational challenges faced by intermediaries, particularly in remote rural regions. Another significant gap lies in the lack of emphasis on long-term sustainability, outreach effectiveness, and inclusive growth

mechanisms facilitated by intermediaries. Additionally, a majority of studies rely on secondary data, indicating the need for empirical and field-based research to capture current ground realities and evolving rural financial dynamics.

Findings of the study:

1. Intermediaries such as SHGs, MFIs, NGOs, and banks play a significant role in bridging the gap between formal financial institutions and rural populations.
2. The presence of intermediaries has led to a substantial increase in financial inclusion by providing access to credit, savings, and insurance services.
3. Self-Help Groups (SHGs) are particularly effective in promoting regular savings habits and financial discipline among rural households.
4. Microfinance Institutions (MFIs) contribute more towards credit expansion and income generation compared to other intermediaries.
5. Intermediaries collectively support the development of rural entrepreneurship and self-employment opportunities.
6. Microfinance services delivered through intermediaries have resulted in improved living standards and income levels of rural beneficiaries.
7. Women empowerment is a key outcome, as participation in SHGs enhances decision-making power, confidence, and financial independence.
8. Government initiatives and institutional support (such as NABARD-led programs) have strengthened the outreach and effectiveness of microfinance services.
9. Intermediaries help in reducing dependence on informal moneylenders, thereby lowering exploitation of rural borrowers.
10. Despite positive impacts, challenges such as high interest rates, repayment pressure, and over-indebtedness continue to affect beneficiaries.
11. Limited accessibility in remote and underdeveloped regions highlights the uneven distribution of microfinance services.
12. Lack of financial literacy among rural populations affects the effective utilization of microfinance services.

Conclusion:

From the above literature review, it is clear that intermediaries like SHGs, MFIs, NGOs, and

banks play an important role in expanding microfinance in rural India. They help in providing financial services to poor people and improve financial inclusion, income, and living standards. Microfinance also supports women empowerment and rural entrepreneurship. However, some challenges like high interest rates, limited reach, and repayment problems still exist. Overall, intermediaries are important for achieving inclusive growth and rural development, but proper support and policies are needed for better results.

Further Scope of the Research:

The future scope of this research is vast and offers multiple opportunities for deeper and more practical investigation. Since the present study is based on secondary data, further research can focus on primary data collection through field surveys, interviews, and case studies to capture real-time insights from rural beneficiaries and intermediaries. Comparative studies can also be undertaken to evaluate the relative effectiveness of different intermediaries such as Self-Help Groups (SHGs), Microfinance Institutions (MFIs), NGOs, and banks in promoting financial inclusion and rural development. With the rapid growth of digital financial services, future research can explore the role of fintech, mobile banking, and digital lending platforms in enhancing microfinance outreach in rural areas. Additionally, region-wise or state-wise studies can help in understanding geographical disparities and localized challenges in microfinance delivery. There is also scope to examine the long-term sustainability and impact of microfinance initiatives on income stability, entrepreneurship, and women empowerment. Further research can focus on policy evaluation, financial literacy programs, and regulatory frameworks to strengthen the microfinance ecosystem. Lastly, in-depth studies on emerging challenges such as over-indebtedness, repayment stress, and limited outreach in remote regions can contribute to developing more inclusive, efficient, and sustainable microfinance models in India.

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“Role of Employee Recognition and Motivation in Enhancing Employee Performance”

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Abstract:

Employee recognition and motivation are crucial in improving the performance of an organization especially in the current competitive business world. This paper will discuss how recognition and motivational techniques affect employee performance, productivity, and job satisfaction. Descriptive research design was used with primary data collected using a structured Likert scale questionnaire on 64 respondents using convenience sampling. The paper highlights that both financial and non-financial motivational factors are relevant in the behaviour of employees. The results show that recognition enhances performance, productivity and job satisfaction and absence of transparency in reward system influences employee perception. The paper finds that efficient recognition and motivation practices are critical towards enhancing employee engagement and organizational success generally.

Keywords: *Employee Recognition, Employee Motivation, Job satisfaction, Productivity, Organizational performance, Rewards and Incentives*

1] Introduction

In today's competitive business environment, organizations are not only focused on achieving profits but also on managing their human resources effectively. The employees are considered as the most valuable asset and their performance, commitment and satisfaction are the determinants of organizational success. Motivation and recognition of employees are also significant aspects that affect the performance of employees. Recognition can be achieved by rewarding the efforts of employees by giving them rewards, praise or promotions and motivation can be achieved by money, career advancement and good working environment. These factors aid in enhancing job satisfaction and employee engagement. In the recent years, companies have adopted the employee-focused strategy through the adoption of various recognition and motivation strategies. Nonetheless, they might not be effective in all organizations. Therefore, the research article will be aimed at exploring the impact of employee recognition and motivation techniques on employee performance and satisfaction.

2] Objectives of the Study

1. To study the concept of employee recognition and motivation in organizations.
2. To compare the effect of financial and non-financial motivational factors on employee.
3. To analyse the impact of recognition on employee performance.
4. To suggest effective strategies to improve employee motivation and recognition practices.

3] Literature Review

The significance of employee recognition and motivation in enhancing organizational performance has been researched by a number of researchers. These theories and researches are a good basis of how employees act and what motivates them to do better.

Abraham Maslow (1943) came up with the Hierarchy of Needs Theory which postulates that human needs are classified as basic needs and self-actualization. This theory postulates that recognition and appreciation fulfill higher needs like esteem and self-respect, which encourage employees to work better.

B. F. Skinner (1953) presented the theory of Reinforcement. He described that rewards and recognition can be used to strengthen behavior. Employees who are valued to have performed well will be motivated to do the same in future.

Frederick Herzberg (1959) introduced the Two-Factor Theory that separates factors in the workplace into hygiene factors and motivators. He explained that recognition and achievement are powerful motivators which result in job satisfaction and absence of recognition may result in job dissatisfaction.

Theory X and Theory Y were introduced by Douglas McGregor (1960). Theory Y states that employees are inherently motivated and like their job when they are trusted and acknowledged. This emphasizes the role of appreciation in enhancing employee performance.

Victor Vroom (1964) came up with the Expectancy Theory, which states that employees will be motivated when they think that their efforts will yield desirable rewards. Employees will be motivated and work better when recognition systems are transparent and fair.

Edward Deci and Richard Ryan (1985) developed the Self-Determination Theory. They have stressed that intrinsic motivation including recognition, autonomy and competence are important in enhancing employee satisfaction and performance.

Daniel Pink (2009) also pointed out that intrinsic motivation is stronger than monetary rewards in the long run. He described that purpose, autonomy, and recognition are some of

the factors that increase engagement and performance.

According to Gary Dessler (2017), employee recognition programs play a crucial role in enhancing morale, engagement, and productivity. He pointed out that even the mere appreciation can lead to a good and encouraging work environment.

The Hawthorne Studies conducted by Elton Mayo (1930s) discovered that employees are more productive when they feel appreciated and recognized. His work emphasized the significance of social and psychological aspects in motivating employees.

Recent research also demonstrates that organizations with an effective recognition strategy have a higher level of employee engagement, reduced turnover rates and better overall performance. Nonetheless, other studies have shown that ineffective recognition systems can never be effective in motivating employees because they need to be fair, timely and meaningful. Therefore, it is evident in the literature that employee recognition and motivation are key success factors in organizations.

4] Research Gap

Numerous researches have been conducted on employee recognition and motivation, yet gaps remain. A majority of research studies these factors individually, and not much attention is given to their joint effects on performance. Comparative analysis of financial and non-financial incentives in actual organizational contexts is also lacking and much of the literature is theoretical and not empirical. Moreover, there is a lack of research on the perception of fairness of reward systems by employees. Moreover, not much focus has been on the impact of recognition practices on employee engagement and commitment in the long term. These factors should also be studied in various organizational settings in order to make them applicable in practice. This paper is an attempt to fill these gaps.

5] Research Methodology

The research design is descriptive research design to investigate the impact of employee recognition and motivation on job satisfaction and performance. A structured questionnaire based on a Likert scale was used to collect primary data. The sample size consisted of 64 respondents, picked by convenience sampling. To analyse the data, percentage analysis, pie charts, and bar charts were employed to determine patterns and trends. Despite the limitations of the study (relatively small sample size and possible response bias), it offers great information about employee motivation and recognition practices.

6] Data Analysis & Interpretation

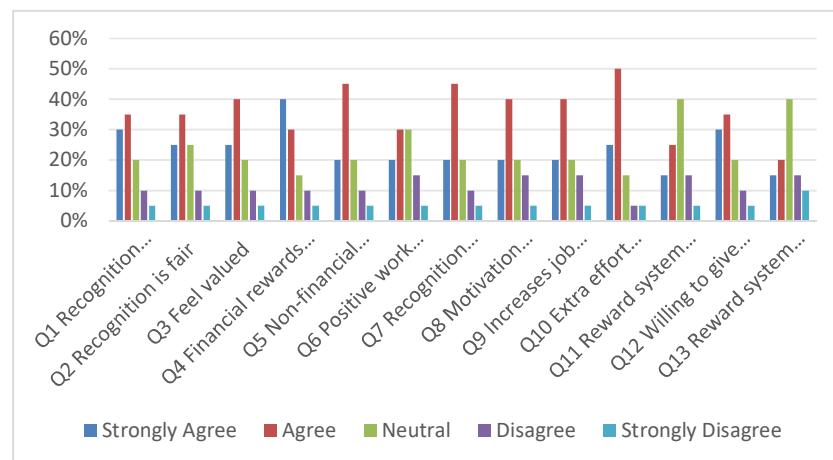
6.1 Demographic Data

The data show that males and females are fairly represented with 58 and 42 % respectively. This ensures that the findings are reliable and represent the views of both genders, with no significant bias.

6.2 Age Group Distribution

The data indicate that 70 % of the respondents are between the age of 18-35 years, and 20 % are between the age of 36-45 years and 10 % are above 45 years. This shows that most of the respondents are young, which implies that the results are mostly based on the opinions and preferences of younger workers.

6.3 Analysis of Employee Perception towards Recognition and Motivation



Graph 6.3 Employee Perception towards Recognition and Motivation

- **Interpretation:**

According to the collected data, there is a generally positive attitude towards recognition and motivation among employees, but there are certain problems. About 65% of participants think that they receive recognition frequently, and 60% think that recognition is fair, although some of them are undecided. Also, around 65% of employees feel valued if appreciated by employers. Money is a powerful motivator for people (about 70%), although other things such as recognition and opportunities for professional development play a significant role too (65% agreement). Around 50% of respondents are happy with their workplace; however, a considerable number of employees are undecided concerning the topic, which means that there is potential for improving the situation. It is clear that recognition positively influences employee performance (65%), and almost 60% of respondents believe that motivation makes them more productive and satisfied with their work. The vast majority of employees are willing to work hard if motivated (75%). Nevertheless, only about 40% of respondents find

the reward system fair and clear to understand.

7] Key Findings

1. The study indicates an equal number of males (58%) and females (42%) in the sample, thus avoiding any bias in the opinion collected.
2. The majority of the sample consists of respondents who belong to the age group of 18-35 years, which means that the results obtained indicate the perception of younger employees about recognition.
3. About 65% of the workers think that recognition is offered to them on a regular basis by the company.
4. Around 60% of the employees perceive the recognition to be fair, while some are neutral.
5. Approximately 65% of the workers find themselves valued when their contribution is recognized.
6. The financial reward motivates around 70% of the employees.
7. About 65% of the employees value the non-monetary form of reward such as recognition and development.
8. Almost 50% of the employees are contented with the environment in which they work, showing room for improvement.
9. About 60% - 65% of the employees believe that recognition as well as motivation help enhance performance and productivity.
10. Around 40% of the employees believe that the reward system is transparent and fair.

8] Suggestions

1. Organizations must come up with a clear and transparent reward system, where employees are aware of the criteria and recognition process.
2. The management should make sure that rewards are awarded in an impartial and unbiased way without favouritism.
3. Financial rewards (salary, bonuses, incentives) and non-financial rewards (appreciation, recognition, career growth opportunities) should be given equal significance.
4. Constant motivation should be ensured by introducing regular recognition programs like the Employee of the Month or appreciation awards.
5. The organizations must work towards ensuring that they provide a good work environment, which is positive and conducive to the employees.

6. Managers need to give feedback and appreciation in a timely manner since when recognized immediately, it becomes more motivating.
7. The communication must be done properly in such a way that employees are informed about policies regarding rewards and recognition.

9] Limitations of the study

1. The number of respondents is restricted to 64 individuals, which may limit the applicability of the findings.
2. Data has been collected from respondents who belong to Pune city only, limiting the scope for external validity.
3. Use of convenience sampling technique may lead to bias.
4. Self-reporting approach has been used, which could suffer from personal bias.
5. Descriptive analysis has been used, while more sophisticated statistical techniques have not been considered.

10] Conclusion

The research points out that employee recognition and motivation are key elements in enhancing employee performance, productivity and job satisfaction. When workers are given due credit on their efforts, they feel appreciated and will have a closer attachment to the organization which will motivate them to work harder and contribute more towards organizational objectives. The results also indicate that financial and non-financial motivational factors are significant. Although money as a motivational factor, including salary and incentives, is a powerful tool, non-financial factors such as appreciation, career advancement prospects, and a good working environment also play a crucial role in ensuring long-term motivation and satisfaction. Employees who are motivated are more involved, and would be ready to work extra effort, which increases productivity and overall performance. Nonetheless, the research finds gaps concerning equity and transparency of reward systems because most employees are not sure how rewards are shared. This diminishes confidence and minimizes performance. Thus, organizations must embrace a balanced, fair and transparent approach to recognition and motivation which will assist in creating a motivated, satisfied and high performing workforce.

11] Further Scope of the Study

1. Comparison of findings between different industries or levels within organizations may also be done.
2. Future research can also focus on the effects of digital recognition on human resource management.

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**"Work-Life Integration, Mental Well-being, and Job Satisfaction: An Empirical Study
of Higher Education Faculty in Nashik, India."**

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Abstract:

With the increasing demands of academic roles, maintaining a balance between professional and personal life has become critical for faculty well-being and performance. This descriptive study investigates the relationship between work–life integration, mental well-being, and job satisfaction among 100 higher education faculty in Nashik, India who were sampled using stratified sampling method. The data were collected using a structured questionnaire administered to faculties and was analysed using SPSS23. The primary objective of the study was to examine the relationship between work–life integration and job satisfaction. Empirical analysis reveals a moderate positive correlation ($r = 0.49$) between work–life integration and job satisfaction, indicating that better integration contributes to higher levels of satisfaction among faculty members. Similarly, mental well-being is found to have a moderate positive correlation ($r = 0.49$) with job satisfaction, highlighting the importance of psychological health in influencing professional outcomes. The findings emphasize the need for institutional policies that promote work–life balance and mental well-being to enhance faculty satisfaction and productivity in higher education institutions.

Keywords: *Work Life Integration, Mental well-being, Job Satisfaction, Higher Education Faculty.*

Introduction: In today’s dynamic and demanding work environment, maintaining a balance between professional and personal life has become increasingly important. For higher education faculty, responsibilities such as teaching, research, administrative duties, and student engagement often create significant pressure. This makes work-life integration a crucial factor in ensuring both personal well-being and professional effectiveness. Work-life integration refers to the ability of individuals to manage and harmonize their work and personal responsibilities in a flexible and efficient manner. When faculty members are able to balance these aspects effectively, it positively influences their mental well-being, which

includes emotional stability, reduced stress levels, and overall psychological health. Mental well-being plays a vital role in determining how individuals cope with challenges, perform their duties, and interact within the workplace. Poor mental health can lead to stress, burnout, and decreased productivity, whereas good mental well-being enhances motivation, engagement, and job performance. Another important aspect is job satisfaction, which reflects the level of contentment individuals feel toward their job. Factors such as workload, work environment, recognition, and work-life balance significantly influence job satisfaction among faculty members. In the context of higher education institutions in Nashik, limited research has been conducted to examine the combined impact of work-life integration and mental well-being on job satisfaction. Therefore, this study aims to explore these relationships and provide insights that can help improve faculty well-being and institutional effectiveness.

Literature Review: Work-life integration, mental well-being, and job satisfaction have emerged as critical areas of research in the field of higher education, particularly due to increasing workload, role complexity, and performance expectations placed on faculty members. Existing literature indicates that these variables are interrelated and significantly influence both individual well-being and organizational outcomes.

Early studies in this domain focused primarily on work-life balance and its impact on job satisfaction. For instance, D. Abirami and S. Suresh (2020) found that work-family conflict and job stress negatively affect work-life balance and job satisfaction among teachers. Their study emphasized the importance of maintaining equilibrium between personal and professional life to improve job performance and satisfaction.

Subsequent research expanded the focus to work-life integration and organizational support. In this context, Jagrati Singh et al. (2021) highlighted that flexible work arrangements, reduced stress levels, and institutional support significantly enhance employee satisfaction and work-life integration in the higher education sector. Similarly, Elsa Diego-Medrano (2021) identified workload and time pressure as key factors negatively impacting faculty well-being and job satisfaction.

Further studies began to incorporate mental well-being as an important variable influencing job outcomes. Supriya Mahesh Jagdale (2022) found that effective work-life integration leads to improved mental health, which in turn enhances job satisfaction. Supporting this view, A. K. Pathak et al. (2022) concluded that work-life balance has a direct positive relationship with job satisfaction and emphasized the role of supportive organizational policies.

Recent literature has increasingly focused on quality of work life and institutional factors. A study by Abirami Arunachalam (2023) revealed that improved working conditions, reduced stress, and supportive management significantly contribute to higher job satisfaction among faculty members in India. Additionally, Tran Thi Siem et al. (2023) highlighted the growing global interest in work–life balance research, emphasizing themes such as employee well-being, job satisfaction, and organizational support.

In the regional context, Vijay M. Kumbhar (2024) examined the dynamics of work–life balance among higher education faculty in Maharashtra and found that excessive workload, long working hours, and lack of flexibility negatively impact job satisfaction. The study recommended institutional interventions to improve faculty well-being and retention.

More recent research has also addressed issues related to burnout and work engagement. Piyush Ranjan Sahay and Shashank Bhushan Lall (2025) found that high workload, stress, and lack of institutional support lead to burnout, which significantly reduces job satisfaction among college teachers. The study suggested the need for policy reforms, professional development, and improved support systems.

Research Gap: Despite the extensive literature available, several gaps remain. Most studies have focused on work–life balance rather than work–life integration. Additionally, limited research has simultaneously examined the combined impact of work–life integration and mental well-being on job satisfaction. Furthermore, there is a lack of region-specific studies focusing on higher education faculty in Nashik, India. Therefore, the present study aims to fill this gap by analyzing the relationship between work–life integration, mental well-being, and job satisfaction in the Nashik context.

Objectives: 1) To examine the relationship between work–life integration and job satisfaction among higher education faculty in Nashik.

2) To assess the impact of mental well-being on job satisfaction and overall work engagement of college teaching faculty in Nashik.

Methodology: This study aims to understand how work–life integration and mental well-being influence job satisfaction among higher education faculty in Nashik. To achieve this, a descriptive research design was used, as it helps in clearly explaining the relationship between these variables without changing any real-life conditions. A quantitative approach was selected for the study because it allows the collection of measurable data and helps in

analyzing relationships using statistical methods. The study follows a deductive approach, where the hypotheses are developed first and then tested using the data collected from respondents. Primary data was collected directly from faculty members, while secondary data was gathered from journals, research papers, and other academic sources to support the study and build a strong theoretical background. For primary data collection, a structured questionnaire was designed and distributed through Google Forms. The questionnaire mainly included close-ended questions so that responses could be easily analyzed. A 5-point Likert scale (ranging from strongly disagree to strongly agree) was used to measure the opinions of respondents regarding work–life integration, mental well-being, and job satisfaction. The target population of this study includes faculty members working in colleges in Nashik. Due to time and accessibility limitations, a convenience sampling method was used. A total of 100 respondents participated in the survey. In this study, work–life integration and mental well-being are treated as independent variables, while job satisfaction is the dependent variable. These variables were measured using structured questions adapted from existing studies to maintain accuracy.

For analyzing the data, basic descriptive statistics such as percentages and averages were used to understand general trends. In addition, Karl Pearson’s correlation method was applied to examine the relationship between the variables. The entire analysis was carried out using Microsoft Excel.

To ensure the quality of the data, reliability was tested using Cronbach’s Alpha(0.87), and validity was achieved by designing the questionnaire carefully and referring to experts. Ethical aspects were also taken into consideration by informing the participants about the purpose of the study and keeping their responses confidential.

However, the study has some limitations. It is limited to the Nashik region, which means the findings may not apply to other areas. The sample size is also relatively small, and the use of convenience sampling may affect the overall generalization of the results. Time constraints were another factor that influenced the scope of the study.

Data Analysis and Interpretation

The data collected from 100 faculty members in higher education institutions in Nashik was analyzed using descriptive statistics and Karl Pearson’s correlation coefficient. The objective of the analysis was to examine the relationship between work–life integration, mental well-

being, and job satisfaction.

Hypothesis

H01: There is no positive relationship between work–life integration and job satisfaction among higher education faculty in Nashik.

Ha1: There is a positive relationship between work–life integration and job satisfaction among higher education faculty in Nashik.

H02: There is no significant relationship between mental well-being and job satisfaction among college teaching faculty in Nashik.

Ha2: Mental well-being positively influences the job satisfaction of college teaching faculty in Nashik.

Work–Life Integration Analysis

The responses related to work–life integration indicate that most faculty members experience a moderate level of balance between their professional and personal lives. The scores are largely concentrated in the mid-range, suggesting that while respondents are able to manage their responsibilities, work demands often extend into personal time. This indicates that although some level of integration exists, it is not fully achieved due to workload and time pressures.

Mental Well-being Analysis

The analysis of mental well-being shows that a majority of respondents report a satisfactory level of emotional and psychological health. Many respondents expressed that they feel optimistic and capable of handling daily activities. However, a noticeable portion of respondents reported experiencing stress and difficulty in relaxing, which reflects the impact of work-related pressure on mental health.

Job Satisfaction Analysis

The findings related to job satisfaction reveal that faculty members generally have a moderate to high level of satisfaction with their profession. Respondents showed positive responses toward aspects such as meaningful work and autonomy. However, some dissatisfaction was observed in areas such as workload management and compensation, indicating that external factors influence overall satisfaction levels.

Correlation Analysis

To examine the relationship between the variables, Karl Pearson’s correlation coefficient was

calculated. The correlation between work–life integration and job satisfaction was found to be $r = 0.495$, indicating a moderate positive relationship. This suggests that improved work–life integration leads to higher job satisfaction among faculty members.

Similarly, the correlation between mental well-being and job satisfaction was found to be $r = 0.488$, which also indicates a moderate positive relationship. This implies that better mental well-being contributes to increased job satisfaction.

Hypothesis Testing

Based on the correlation results, the hypotheses were tested. In the case of work–life integration and job satisfaction, since the correlation coefficient is positive ($r = 0.495$), the null hypothesis is rejected and the alternative hypothesis is accepted. This confirms that there is a significant moderate positive relationship between the two variables.

Similarly, for mental well-being and job satisfaction, the correlation coefficient ($r = 0.488$) is moderately positive, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. This indicates that mental well-being has a significant moderate positive impact on job satisfaction.

Reliability Analysis

The reliability of the questionnaire was tested using Cronbach's Alpha. The value obtained was $\alpha = 0.876$, which indicates a high level of internal consistency. This confirms that the data collected is reliable and suitable for analysis.

Findings & Conclusion

The findings of the study collectively indicate that work–life integration and mental well-being both have a moderate positive relationship with job satisfaction among higher education faculty in Nashik. This suggests that faculty members who are better able to balance their professional and personal responsibilities, and who maintain sound mental health, tend to experience higher levels of satisfaction in their jobs. At the same time, the presence of moderate levels of stress and work pressure highlights that, while faculty are coping reasonably well, there are underlying challenges that may influence their overall experience. Despite these pressures, the overall level of job satisfaction being moderate to high reflects a generally positive outlook among faculty members toward their profession.

The study underscores the interconnected nature of work–life integration, mental well-being, and job satisfaction in the academic environment. While faculty members demonstrate resilience and maintain satisfactory levels of job satisfaction, the moderate stress levels signal the need for institutional support systems. Educational institutions should consider implementing policies and practices that promote flexible work arrangements, mental health support, and workload management. Such initiatives can further enhance faculty well-being and sustain higher levels of job satisfaction, ultimately contributing to improved teaching effectiveness and organizational performance.

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“A Comparative Study of Street Vendors’ Perspectives towards Online Payments and Cash Transactions in Nashik City.”

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Abstract:

This study presents a comparative analysis of street vendors’ perspectives toward online payments and cash transactions in Nashik City. A sample of 100 street vendors, representing four different categories, was selected using stratified random sampling from various parts of the city. The study aims to evaluate vendors’ preferences between digital and cash payment modes, examine the challenges encountered while using online payments, and identify key factors influencing the adoption of digital transactions. The findings indicate a significant difference in the preference of street vendors between online payments and cash payments. Similarly, there exists a significant difference in the importance (ranking) assigned to the challenges faced in the adoption of online payments among street vendors. Furthermore, there is a statistically significant difference in the importance assigned to factors influencing adoption of online payments among street vendors. Factors such as perceived ease of use, trust, customer preference, and accessibility of digital infrastructure significantly influence adoption. The study highlights the coexistence of both payment modes and emphasizes the need for improved digital literacy, infrastructure support, and trust-building measures to enhance the adoption of online payments among street vendors.

Keywords: *Street Vendors, Online Payments, Cash Transactions, Digital Adoption, Challenges, Nashik City*

Introduction:

For centuries, street vending has played a crucial role in India's informal economy. It makes up over 4% of total urban employment. Since the National Payments Corporation of India (NPCI) launched the Unified Payments Interface (UPI) in 2016, UPI has transformed how street vendors manage payments. Street vending offers people easy access to affordable goods like fruits, vegetables, snacks, clothes, and other daily necessities. Street vendors in Bengaluru are increasingly using digital payment methods such as UPI and mobile wallets due to customer preferences, convenience, and better transaction security. However, challenges like digital literacy and connectivity still exist (Neha Prasad et al., 2025). Street vendors are usually found in busy public areas like railway stations, markets, and residential

neighborhoods. The public appreciates street vendors for their fresh, local products. Today, Indian street vendors are moving from cash transactions toward technology. Studies show that the use of UPI among micro-businesses in Mysuru has grown significantly because of its ease of use, low transaction costs, and a shift towards digital payments by customers (Dr. Nanda Kishore Shetty et al., 2024). They now utilize UPI and QR codes through apps like Paytm, Google Pay, and PhonePe. India is a key market for fintech companies, currently valued at over \$100 billion and expected to reach \$420 billion by 2029, according to the Digital Payments Body. With help from the RBI, street vendors have begun opening bank accounts and accessing microloans, allowing them to enter the formal economy. However, despite the rise in online payments, adoption is uneven. Many street vendors still depend on cash due to immediate financial needs, limited digital skills, concerns about transaction security, and ongoing fraud issues. Studies indicate that street vendors in Sircilla are increasingly adopting digital payments, driven by customer influence, self-motivation, and easy access to banking services, though cash transactions continue to dominate (Dr. M. Malla Reddy et al., 2023). This creates a mixed landscape where cash and online payments coexist, leading to different preferences and usage patterns among various street vendors.

This study aims to compare street vendors' preferences for online and cash payments in Nashik city. It also intends to identify the challenges street vendors face when adopting online payments and evaluate the key factors influencing their choices. Several studies have explored the growth and attitudes of street vendors towards online and cash payments in different cities, but none have focused on Nashik. A comparative study has yet to be conducted in Nashik City. Therefore, this study will focus on Nashik to provide a comparative look at street vendors' views on online and cash transactions.

Literature review:

The idea of digital payments has taken on significant importance in India, especially since the National Payments Corporation of India introduced the Unified Payments Interface (UPI). Street vendors have gradually started to use both cash and cashless methods for transactions. Many researchers have explored street vendors' awareness, their adoption of digital payment systems, and the challenges they face in using these methods. This section reviews various studies conducted in this area. Ananda et al., (2024) highlights the awareness of street vendors about online payment systems. It discusses the benefits of cashless transactions and the need to move toward a cashless society. The results indicate that while most vendors know about digital payment systems, their usage is affected by factors like digital literacy, trust issues, and

transaction fees. Many vendors prefer cash transactions because they are simpler and require less technical knowledge. Suhail et al., (2024) examined street vendors' perceptions and their adoption of UPI. Findings show that vendors generally view it positively, with demographic factors such as age having a significant influence. However, issues like poor internet connectivity and security concerns act as barriers. Neha Prasad et al., (2025) analyzed the trends in digital payment methods among street vendors in Bengaluru. The adoption of these methods isn't uniform. Research shows that infrastructure support, awareness, and government initiatives play crucial roles in promoting digital adoption. Despite clear benefits, some vendors still prefer cash due to trust issues and regulatory worries. The overall literature suggests that while the adoption of cashless payments among street vendors is growing, it remains inconsistent and depends on factors like awareness, access, and technological support. M. Malla Reddy et al., (2023) examines how street vendors in Sircilla view digital payments. The findings indicate that vendors are becoming more aware of methods like UPI and QR codes, largely due to increasing customer preference. However, cash transactions still dominate, as both vendors and customers tend to rely on traditional payment methods. Key challenges to adoption include low digital literacy, poor network connectivity, transaction delays, and concerns about security and fraud. M. Dhinakaran, (2021) evaluated the impact of cashless transactions on street vendors in Thoothukudi after demonetization in India. The findings reveal that demonetization acted as a significant trigger, pushing vendors toward digital payment methods due to cash shortages. Many vendors initially adopted digital payments out of necessity but later showed mixed preferences, with some returning to cash once liquidity improved. N. Madhavi, (2023) assessed the role of e-wallets in empowering street vendors in Hyderabad. The findings show that e-wallet adoption is gradually rising, mainly due to ease of transactions, customer convenience, and reduced reliance on cash. Street vendors reported benefits like improved money management, secure transactions, and broader customer reach. However, challenges remain the same as before. Gayatri Mallick et al., (2026) focused on how digital payments affect women street vendors in Delhi. The findings show that adopting digital payment methods like UPI and mobile wallets has positively impacted women's economic empowerment and financial independence. Tadkal, N. (2025) studied digital payment adoption among street vendors in Kalaburagi, Karnataka, during the UPI era. The findings indicate that more than 80% of vendors use UPI apps like PhonePe, Google Pay, and Paytm, driven by smartphone access and changing customer preferences. Shetty, N. et al., (2024) conducted a study in Mysore, Karnataka and examined

the adoption of UPI among micro-businesses. The findings show that UPI usage has increased significantly due to its ease of use, low transaction cost, and growing customer preference for digital payments. The study concludes that while UPI adoption is rapidly growing, its long-term success depends on awareness, infrastructure, and user confidence in digital systems. Agarwal et al., (2025) The researched how consumers view cashless transactions. The results indicate that more people are using digital payments because they are convenient, fast, and easy to use. Consumers see cashless systems as saving time, being secure, and working efficiently, particularly for everyday purchases and paying bills. The rise in smartphone use and greater awareness have also helped boost adoption.

Objectives:

1. To evaluate the preference of different Streetvendors towards online payment and cash payments.
2. To study the challenges faced by Street Vendors while using digital payments.
3. To study the Factors Influencing Adoption of Online payments.

Methodology:

This study is both descriptive and comparative. It focuses on the views of street vendors regarding online payments and cash transactions in Nashik City. The research took place in February and March 2026. Primary data was gathered using a Google Form with structured questionnaire and administered to 100 street vendors from different areas of Nashik city using a stratified sampling method. The responses were recorded after directly interacting with street vendors and noting their answers to each question. Vendors from Ravivar Karanja, Shalimar, Pawan Nagar, and Doodh Bazar (Nashik) participated, totaling around 100 respondents. Based on their street vending activities, the respondents are divided into groups: Fruits & Vegetables, Food Items (Snacks, Fast Food, etc.), Clothing/Apparel, and others. The secondary data was collected from journals, research papers, and relevant online sources. The data was analyzed using statistical tools like chi-square analysis at a 5% significance level and the Friedman test, using MS Excel.

Data Analysis:

H01: There is no significant difference in preference of street vendors between online payments and cash payments.

Ha1: There is a significant difference in the preference of street vendors between online

payments and cash payments.

The above hypothesis was tested using Chi-square test at 2 degrees of freedom and 5% significance level. χ^2 calculated = **42.624**

Critical value = 5.991

Since 42.624 > 5.991, we reject H0 and interpret that there exists a significant difference in the preference of street vendors between online payments and cash payments.

H02: There is no significant difference in the importance (ranking) assigned to the challenges faced in adoption of online payments among street vendors.

Ha2: There is a significant difference in the importance (ranking) assigned to the challenges faced in adoption of online payments among street vendors.

Table 1.

Challenges	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Lack of technical knowledge	34	1	5	6	27	27
Payment delays	59	10	3	4	8	16
Transaction failures	3	55	10	7	19	6
Fear of fraud/scams	1	21	53	20	4	1
Lack of Trust	2	3	25	50	15	5
Lack of Digital Literacy	1	10	5	13	27	44

Source: Primary Data

Table 2

Challenge	Mean Rank
Lack of technical knowledge	3.96
Payment delays	2.17
Transaction failures	2.98
Fear of fraud/scams	3.05
Lack of Trust	3.78
Lack of Digital Literacy	4.46

Source: Primary Data

Friedman Chi-square ≈ 142.5 (approx)

$df = k - 1 = 5$, At $df = 5$, $\alpha = 0.05$, Critical value = 11.07

Calculated = 142.5, Critical = 11.07

Since $142.5 > 11.07$, we reject H_0 and interpret that there exists a significant difference in the importance (ranking) assigned to the challenges faced in the adoption of online payments among street vendors.

This means vendors do not view all challenges equally—some challenges are clearly more important than others.

H_{03} : There is no significant difference in the importance (ranking) assigned to the factors influencing adoption of online payments among street vendors.

H_{a3} : There is a significant difference in the importance (ranking) assigned to the factors influencing adoption of online payments among street vendors.

Table 3

Factors	Rank1	Rank2	Rank3	Rank4	Rank5	Rank6	Rank7
Digital Literacy	24	12	6	8	12	11	26
Infrastructure & Technology Access	16	21	18	7	7	27	4
Security & Trust	1	14	14	29	29	6	7
Ease of Use	11	11	14	37	20	4	3
Social Influence	5	11	24	7	17	34	2
Regulatory & Tax Concerns	3	23	6	4	4	13	47
Customer Demand	40	8	17	8	12	4	11

Source: Primary Data

Table 4

Factor	Total Score	Mean Rank (\bar{R})
Digital Literacy	407	4.07
Infrastructure	365	3.65
Security & Trust	417	4.17
Ease of Use	368	3.68
Social Influence	430	4.30
Regulatory Concerns	510	5.10
Customer Demand	300	3.00

Source: Primary Data

Friedman Test $\chi^2 \approx 51.4$

Critical value at 5% significance: $\chi_{0.05,62} \approx 12.59$

Since $51.4 > 12.59$, H_0 was rejected and it can be interpreted that there exists a statistically significant difference in the importance assigned to factors influencing adoption of online payments among street vendors.

This means that vendors do not consider all factors equally and some factors are much more influential than others.

The Friedman test revealed a statistically significant difference in the ranking of factors influencing online payment adoption among street vendors ($\chi^2 = 51.4$, $p < 0.05$). Hence, the null hypothesis is rejected. This indicates that vendors prioritize certain factors such as customer demand and infrastructure more than others like regulatory concerns.

Findings & Conclusions:

The study finds that street vendors in Nashik exhibit a mixed preference for both cash and online payment methods, but cash is still being perceived easy due to its simplicity, immediacy, and reliability, while digital payments are increasingly adopted, especially by younger and more educated vendors. Many vendors prefer maintaining a hybrid system to accommodate diverse customer preferences. However, the use of digital payments is accompanied by several challenges, including poor internet connectivity, lack of digital literacy, fear of fraud, and occasional technical issues such as transaction delays. The adoption of online payments is influenced by key factors such as the vendor's level of

education, customer demand for cashless options, perceived ease of use, trust in digital platforms, and awareness driven by government initiatives.

The study on street vendors in Nashik shows a clear shift from cash transactions to digital payment methods. Although cash remains a popular way to pay, the use of online systems like UPI and mobile wallets has increased significantly. This change is driven by customer preferences, convenience, and the simplicity of transactions. The findings indicate that vendors see digital payments as helpful because they make transactions faster, improve record-keeping, and boost customer satisfaction. However, several challenges still prevent full adoption. These include low digital literacy, internet connectivity problems, and worries about fraud and security. Many vendors prefer to offer both cash and digital payment options to meet different customer needs. Overall, the study concludes that while digital payments are becoming more accepted among street vendors, cash transactions still exist due to practical challenges. For a smoother transition to a more digital economy, it is important to improve infrastructure, raise awareness, and build trust in digital systems. This will allow street vendors to fully take advantage of digital financial inclusion while maintaining their livelihoods.

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Digital Rupee Awareness, Adoption, and Women's Financial Inclusion: An Extended TAM Study Linked to SDG 5

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Abstract:

This study explores the effectiveness of training and development (T&D) programs in skill enhancement at Mahindra Accelo, a subsidiary of the Mahindra Group, renowned for its commitment to employee growth and organizational excellence. Drawing insights from Mahindra's structured T&D frameworks, the study evaluates how targeted initiatives foster technical proficiency, leadership capabilities, and adaptability in employees, aligning with industry demands.

Key findings reveal that Mahindra's programs, such as functional training (job-specific skill development) and behavioral training (soft skills and managerial competencies), significantly improve employee productivity and safety standards, particularly in manufacturing roles. For instance, the SMART Academies—Tech Mahindra's flagship skilling initiative—demonstrate a 75% placement rate post-training, emphasizing industry-aligned curricula in healthcare, logistics, and digital technologies 16. Case studies of beneficiaries like Taira Begum and Sonal Chavan highlight how skill development translates into financial stability, career advancement, and societal impact, underscoring the program's holistic value.

In conclusion, Mahindra's T&D ecosystem serves as a benchmark for skill-driven organizational growth, demonstrating that strategic investments in human capital yield measurable returns in employee performance, innovation, and competitive advantage. This project advocates for scalable, data-driven training models to sustain workforce readiness in dynamic industries. This research analyzes the role and effectiveness of training and development programs in enhancing employee skills at Mahindra Accelo. It examines employee preferences, program relevance, and perceived career impact through primary data collected via surveys. The study offers recommendations for improving training outcomes aligned with organizational goals

Abstract

This study investigates how awareness and acceptance of India's Digital Rupee, retail Central Bank Digital Currency (CBDC), affects women's financial inclusion and economic empowerment. The research is grounded in an extended Technology Acceptance Model

(TAM) framework aligned with Sustainable Development Goal 5 (SDG 5), focusing on gender equality and digital financial inclusion. It adopts a quantitative research approach using a convenience survey of adult women in India. An extended TAM model is employed to analyze the relationships between digital rupee awareness, perceived usefulness, and perceived ease of use, adoption intention, and women's financial inclusion. The framework further integrates financial literacy as an enabling factor influencing the effectiveness of digital financial services. The findings reveal that awareness of the Digital Rupee significantly influences both perceived usefulness and perceived ease of use, which in turn drive adoption intention. Adoption intention demonstrates a strong positive relationship with women's financial inclusion and economic empowerment. Additionally, financial literacy is found to amplify the benefits of digital financial services, strengthening the relationship between awareness, acceptance, and usage. The results also indicate that ease of use and awareness are critical determinants of adoption, highlighting the importance of user-centric design and awareness initiatives. Overall, the study confirms that Digital Rupee adoption contributes positively to achieving SDG 5 objectives, particularly in enhancing women's access to economic resources and technology-enabled empowerment. The study is limited by its reliance on a convenience sampling method, which may restrict the generalizability of the findings. The cross-sectional design also limits the ability to capture long-term behavioral changes and causal relationships. Additionally, the study focuses primarily on urban and semi-urban respondents, potentially overlooking rural-specific barriers to digital financial adoption.

Keywords: Digital Rupee, Central Bank Digital Currency, Women's Financial Inclusion, Technology Acceptance Model (TAM), Sustainable Development Goal 5d

1. Introduction

Background of the study

Central Bank Digital Currencies (CBDCs) have moved from a conceptual topic to active pilots and implementation planning globally. In the Indian context, the RBI concept note defines CBDC as digital legal tender issued by a central bank, exchangeable at par, and recorded as a liability on the central bank balance sheet; it also notes that most central banks globally are exploring CBDC issuance. [6] Recent India focused CBDC research

similarly frames CBDCs as a fast growing policy and technology agenda, noting widespread global central bank exploration and reporting BIS survey evidence on the scale of central bank involvement. [7]

For India [8], the Digital Rupee (₹) is positioned as an additional option to existing forms of money and is intended to be easier, faster, and cheaper as a digital counterpart to banknotes; the RBI concept note explicitly highlights motivations that include reducing cash management costs, bringing resilience and efficiency to payments, and **fostering financial inclusion**, including via an offline feature beneficial in remote locations. [6]

Digital financial inclusion is central to India's development trajectory, but inclusion is not gender neutral. Evidence from a women focused digital payments report highlights gender gaps in mobile use for business and in digital payments, while also emphasizing that accessible, simple payment system can enable women's participation and economic empowerment when combined with targeted design and outreach. [9]

SDG 5 ("Gender Equality") provides a policy and measurement frame: it explicitly includes women's equal rights to economic resources and access to financial services (Target 5.a) and the enhancement of enabling technology use to promote women's empowerment (Target 5.b), with indicator 5.b.1 tracking mobile phone ownership by sex. [4] These targets provide a defensible anchor for linking Digital Rupee adoption (a financial technology of sovereign money) to women's inclusion outcomes.

Problem statement

Despite rapid growth of digital payment infrastructures, persistent barriers to women's adoption especially where mobile phone access is shared (reducing privacy and autonomy), where digital literacy is limited, and where trust and risk perceptions are elevated. [9] A CBDC adoption intent study based on a 300 respondent survey in Coimbatore reports a significant knowledge gap "particularly among women," and concludes that awareness campaigns and education initiatives are crucial alongside trust building regulatory frameworks. [3]

At the research level, a coherent gap remains: while CBDC adoption is frequently modeled using acceptance frameworks and while women's financial inclusion is widely studied, **CBDC-TAM-gender inclusion** work is still fragmented particularly in the Digital Rupee context where RBI policy objectives explicitly include inclusion and awareness building. [1]

Need and significance of the study

Existing research on Central Bank Digital Currencies (CBDCs) primarily focuses on technological efficiency, monetary policy implications, and general adoption behavior, with limited emphasis on gender-based inclusion outcomes. Studies on the Technology Acceptance Model (TAM) have extensively validated perceived usefulness and perceived ease of use as determinants of technology adoption; however, their application in the context of Digital Rupee remains underexplored, particularly among women. Prior research on financial inclusion highlights persistent gender disparities in access, usage, and control over financial resources, especially in emerging economies like India. Additionally, while awareness and digital literacy are recognized as key drivers of Fintech adoption, their direct and mediated effects on women's financial inclusion through CBDCs are not sufficiently examined.

The study is significant as it examines how awareness influences perceived usefulness and ease of use, which are critical drivers of adoption intention. By focusing on women, it provides insights into demographic disparities such as access to mobile devices, digital privacy, and financial autonomy. Furthermore, it evaluates whether adoption intention and early usage of the Digital Rupee contribute to women's financial inclusion, thereby linking technology adoption with economic empowerment. This study addresses these gaps by integrating Digital Rupee awareness, Extended TAM constructs, and SDG 5 dimensions into a unified analytical framework. It is significant as it empirically evaluates how awareness influences adoption behavior and whether such adoption translates into measurable financial inclusion outcomes aligned with economic access (SDG 5a) and technological empowerment (SDG 5b).

2. Literature review

CBDC and the Digital Rupee ecosystem

The RBI concept note frames CBDC as a digital form of sovereign currency intended to coexist with current money forms and highlights motivations cost reduction in cash management, resilience, payment efficiency, innovation, and fostering inclusion. [6] Importantly for this study, the concept note explicitly states that it aims to **create awareness** of CBDCs and the planned Digital Rupee features and that pilots would support public understanding and preparedness. [10]

At the user adoption level, empirical CBDC work in India (conducted during pilot launches in

major cities) models CBDC use behavior with integrated acceptance frameworks, reporting that behavioral intention strongly influences use behavior and that social influence and performance expectancy matter; it also examines how prior UPI usage experience can moderate some relationships, implying that existing digital payment habits can become a source of inertia or resistance to CBDC switching. [11]

Technology Acceptance Model and extensions

Core TAM argues that perceived usefulness and perceived ease of use are central to technology acceptance. The original TAM paper develops and validates PU and PEOU scales, forming the backbone of the present model's measurement approach. [12]

TAM2 extends TAM by explaining perceived usefulness and intentions via additional social influence and cognitive processes, tested across longitudinal field studies. [13] TAM3 further consolidates determinants of PU and PEOU and presents a research agenda on interventions that can enhance adoption relevant for CBDC awareness intervention or "information nudge" designs. [14]

In parallel, UTAUT provides a unifying acceptance model emphasizing determinants such as social influence and facilitating conditions; it is frequently combined with TAM constructs in CBDC adoption work. [15]

Awareness and Fintech adoption

Awareness functions as a cognitive antecedent: one must understand a technology's purpose and basic operation before meaningful evaluations of usefulness and ease of use can be formed. The RBI concept note's explicit awareness aim provides a policy level justification for including awareness as a primary construct. [10] Empirically, CBDC survey research in India includes awareness/knowledge related items (e.g., differentiation between CBDC and UPI), and concludes that knowledge gaps constrain adoption particularly among women. [3]

H1: Digital Rupee Awareness positively influences Perceived Ease of Use. [24]

H2: Digital Rupee Awareness positively influences Perceived Usefulness. [24]

Women's financial inclusion and barriers

Women's financial inclusion spans access, usage, and empowerment (agency/control). The women focused payment report emphasizes that UPI has helped drive women's

inclusion but also documents gender gaps in mobile use for business and in digital payments; it highlights strategies such as inclusive design, gender intentional outreach channels, and training/support structures tailored to women's needs. [9]

Cross country SDG inclusion research underscores that financial inclusion can correlate positively with SDG outcomes, including SDG 5, and provides a formal approach for constructing a multidimensional financial inclusion index including availability, accessibility, and usage. [5] This methodological foundation is useful for designing a Women's Financial Inclusion Index (WFI) for the current study.

H3: PEOU positively influences Adoption Intention. [17]

H4: PU positively influences Adoption Intention. [17]

H5: Adoption Intention positively influences Women's Financial Inclusion [25]

SDG 5 and digital finance policy alignment

SDG 5 includes targets directly related to women's economic empowerment and financial services access (Target 5.a) and the use of enabling technology to promote empowerment (Target 5.b). The SDG page explicitly lists Target 5.b and indicator 5.b.1 (mobile phone ownership by sex). [4] This provides a measurable and defensible rationale for integrating device ownership/privacy access into inclusion outcomes, especially in settings where women may use shared phones.

H6: Digital Rupee adoption significantly enhances women's financial inclusion by improving economic resource access (SDG 5a) and enabling technology-driven empowerment (SDG 5b).

Research gap

Existing literature confirms that Digital Rupee policy emphasizes awareness and financial inclusion, while CBDC adoption is effectively explained through TAM/UTAUT constructs such as usefulness, ease of use, trust, and risk. However, prior studies largely treat gender as a control variable rather than a primary outcome. Research also highlights that women face unique barriers including limited device access, privacy constraints, and lower digital confidence. Despite this, an integrated empirical model linking Digital Rupee awareness, Extended TAM constructs, and **women's financial inclusion outcomes aligned with SDG 5** remains underdeveloped. This study addresses this gap by positioning women's inclusion as a central dependent construct within a CBDC adoption framework.

3. Theoretical framework and hypothesis development

Conceptual model

TAM framework: The Technology Acceptance Model (Davis, 1989) posits that two beliefs) perceived ease of use (PEOU) and perceived usefulness (PU jointly determine users' behavioral intentions to adopt a technology. PEOU is the belief that using it will be free of effort and PU is the degree to which using a system is believed to enhance job or task performance, Extended TAM research has consistently found PEOU and PU to be significant predictors of adoption across domains. Moreover, PEOU often positively influences PU (i.e. an easier system is seen as more useful)

Digital Rupee Awareness (DRA) can be conceptualized as an external factor that enables individuals to even consider the Digital Rupee. Theoretically, awareness builds the cognitive schema required for evaluating PU and PEOU. In other words, only if people are aware that a CBDC exists and how it functions can they assess its usefulness or ease of use. Awareness reduces the uncertainty and perceived risk of the unknown innovation [49], so that individuals can cognitively process its attributes. For example, informational campaigns about the Digital Rupee can lower perceived risk and provide the mental model needed to judge its benefits. Thus, DRA is posited to positively influence both PU and PEOU in our extended TAM [48], [49]. In essence, awareness primes the decision-maker: it seeds knowledge of the currency, enabling them to develop attitudes (usefulness/ease) based on informed understanding rather than speculation. This stage is critical for a new national currency, where lack of familiarity could otherwise stifle technology acceptance

The proposed Extended TAM model contains:

Core TAM constructs

Digital Rupee Awareness (DRA),

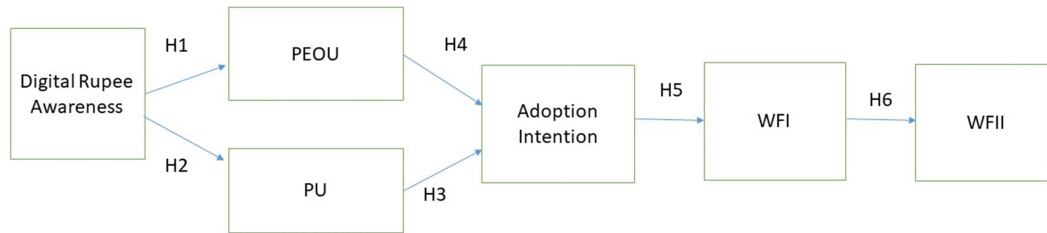
Perceived Ease of Use (PEOU), [17]

Perceived Usefulness (PU), [17]

Adoption Intention (AI),

Women's Financial Inclusion (WFI),

Women's Financial Inclusion Index (WFII)



Conceptual Framework

Extended variables (domain and SDG linked)

Digital Rupee Awareness (policy anchored; expected to shape PU/PEOU and directly influence AI) [19]

Women's Financial Inclusion (WFI), operationalized using availability/accessibility/usage (index logic) and SDG5 enabling technology anchor (phone ownership/privacy) [23]

4. Research methodology

Research design

A **quantitative, cross sectional survey** is implemented latent construct modeling. This design aligns with existing CBDC adoption in across different talukas of two districts (Pune and Satara) Maharashtra, India. That use SEM approaches such as PLS SEM and report adoption and use relationships. [27]

Sampling

1. **Population:** Women aged 18+
2. **Geography:** Urban + semi urban India (with optional rural oversampling for subgroup analysis)
3. **Sampling technique:** Stratified sampling (e.g., by residence type; by phone ownership/private access; by age/education)
4. **Sample size:** 300–500 respondents as a pragmatic SEM target; higher if multi group invariance and group comparisons are central. Existing India CBDC surveys have successfully used samples around 138 supporting feasibility. [3]

Instrument development

A structured questionnaire using 5 or 7 point Likert scales which include:

- 1) Demographics and enabling technology access (including phone ownership/privacy aligned to SDG5b.1) [28]
- 2) Digital technology (mobile) awareness and knowledge items [1]
- 3) Digital Rupee awareness and knowledge items (aligned to RBI's awareness intent and feature definitions) [1]
- 4) TAM constructs (PU, PEOU, AI; and optionally attitude) using validated TAM/TAM2/TAM3 measurement lineages [29]
- 5) Women's financial inclusion outcome indicators, including empowerment related dimensions and an index structure informed by multidimensional inclusion index methodology. [31]

Age	freq.	Per	Area of residence	freq.	per	Education	freq.	Per	Employment status	freq.	Per
18-24	8	5.8	Urban	86	62.32	Post graduate	73	52.9	Salaried	73	52.9
25-34	60	43.48	Semi-Urban	30	21.74	Graduate	37	26.81	Self-employed	20	14.49
35-44	61	44.2	Rural	22	15.94	Higher secondary	28	20.29	Casual worker	18	13.04
45-54	9	6.52							Homemaker	15	10.87
55-Above	0								Student	9	6.52
									Unemployed	3	2.17

Total	138	100	138	100	138	100	138			138	100
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Demographic presentation.

Reliability and validity

Psychometric checks:

5. Cronbach's alpha for internal consistency; interpret alongside construct dimensionality. [32]
6. Composite reliability (CR) and AVE for convergent validity; Fornell–Larcker for discriminant validity and HTMT as a stringent cross check. [33]

<u>Variable</u>	<u>Indicators</u>	<u>Scale</u>	<u>Mean</u>	<u>SD</u>	<u>Min</u>	<u>Max</u>
<u>Awareness</u>	<u>AWR1-AWR3</u>	<u>1-7</u>	<u>4.12</u>	<u>1.45</u>	<u>1</u>	<u>7</u>
<u>Usefulness</u>	<u>PU1-PU3</u>	<u>1-7</u>	<u>4.65</u>	<u>1.32</u>	<u>1</u>	<u>7</u>
<u>Ease of Use</u>	<u>PEOU1-PEOU3</u>	<u>1-7</u>	<u>4.88</u>	<u>1.28</u>	<u>1</u>	<u>7</u>
<u>Adoption Intention</u>	<u>BI1-BI2</u>	<u>1-7</u>	<u>4.34</u>	<u>1.56</u>	<u>1</u>	<u>7</u>
<u>Financial Inclusion</u>	<u>WFI1-WFI3</u>	<u>1-7</u>	<u>4.52</u>	<u>1.38</u>	<u>1</u>	<u>7</u>
<u>SDG 5 Impact</u>	<u>WDFI1-WDFI3</u>	<u>1-7</u>	<u>4.48</u>	<u>1.41</u>	<u>1</u>	<u>7</u>

1. Factor Loadings & Reliability Test

Construct	Items	Cronbach's α	(CR)	(AVE)
Awareness (AWR)	AWR1-AWR3	0.824	0.881	0.652
Usefulness (PU)	PU1-PU3	0.851	0.895	0.674
Ease of Use (PEOU)	PEOU1-PEOU3	0.810	0.865	0.618
Adoption Intention (BI)	BI1-BI2	0.886	0.912	0.725
Financial Inclusion (WFI)	WFI1-WFI3	0.842	0.887	0.640
SDG 5 Impact (WFII)	WFII1-WFII3	0.815	0.872	0.614

Interpretation: All constructs satisfy the internal consistency requirements, with Cronbach's Alpha and CR values exceeding 0.70 The AVE values for all constructs are above 0.50,

Discriminant Validity

Construct	BI	AWR	PEOU	PU	WFI	WFII
BI	0.851					
AWR	0.410	0.807				
PEOU	0.495	0.384	0.786			
PU	0.628	0.452	0.512	0.821		
WFI	0.680	0.335	0.412	0.501	0.800	
WFII	0.654	0.312	0.389	0.485	0.742	0.783

Note: Diagonal elements (bold) are the square root of AVE. Off-diagonal elements is construct correlations.

Interpretation: The square root of the AVE for each construct is higher than its correlations with all other latent variables, satisfying the Fornell-Larcker criterion for discriminant validity

Hypothesis Testing

Hypothesis	Path	Path Coeff (β)	T-Statistic	P-Value	Result
H1	Awareness → PEOU	0.384	4.102	0.000	Supported
H2	Awareness → PU	0.452	5.341	0.000	Supported
H3	PEOU → BI	0.241	3.415	0.001	Supported
H4	PU → BI	0.495	6.522	0.000	Supported
H5	BI →	0.680	8.943	0.000	Supported

	WFI				
H6	WFI → SDG 5 Impact	0.742	10.115	0.000	Supported

5. Discussion and implications

The global financial landscape is currently undergoing a structural transformation characterized by the advent of Central Bank Digital Currencies (CBDCs). In India, the Reserve Bank of India (RBI) initiated the pilot for the retail Digital Rupee (₹) in late 2022, representing a sovereign-backed, digital version of physical fiat currency. This initiative is strategically designed to address fundamental gaps in financial inclusion, reduce the costs of physical currency management, and enhance the transparency of monetary transactions. For the female demographic in India, who have historically faced persistent gender gaps in digital literacy and smartphone ownership, the Digital Rupee offers a potential mechanism to achieve parity in economic agency. This report presents the findings of a Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis conducted on an Extended Technology Acceptance Model (TAM), investigating how awareness and technological perceptions translate into behavioural intention and ultimate socio-economic empowerment for women, aligned with United Nations Sustainable Development Goal 5 (SDG 5).

5.1. The Foundational Role of Awareness (H1 & H2)

The statistical analysis reveals that Digital Rupee Awareness (AWR) serves as the indispensable primary trigger for the entire adoption ecosystem. The results strongly support **Hypothesis 1** ($\beta = 0.384, p = 0.000$) and **Hypothesis 2** ($\beta = 0.452, p = 0.000$), indicating that awareness significantly and positively influences both Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). In original TAM studies, these cognitive appraisals are often treated as baseline assumptions; however, for a novel sovereign technology like the Digital Rupee, Awareness alone explains a critical 20.4% of the variance in Perceived Usefulness.

Without initial awareness, potential users cannot recognize the utilitarian value of a risk-free, sovereign-backed asset. The fact that Awareness has a stronger impact on PU ($\beta = 0.452$) than on PEOU ($\beta = 0.384$) suggests that knowledge primarily helps women recognize the *value* of

the currency before they worry about its technical *simplicity*. This is particularly relevant in the Indian context, where the success of the Unified Payments Interface (UPI) has created "payment inertia," making it necessary for a new tool to demonstrate a clear relative advantage to encourage a shift in behaviour.

5.2. The Hierarchy of Adoption Drivers (H3 & H4)

The findings regarding the core TAM mediators highlight a distinct hierarchy in adoption drivers. Both **Hypothesis 3** (PEOU BI: $\beta = 0.241$, $p = 0.001$) and **Hypothesis 4** (PU BI: $\beta = 0.495$, $p = 0.000$) are supported. Notably, the impact of Perceived Usefulness on adoption intention is more than double that of Perceived Ease of Use. This indicates that women prioritize the tangible benefits of the Digital Rupee such as privacy from household financial surveillance, zero transaction costs, and direct central bank liability over mere operational ease.

For the female demographic, who often manage household finances with a focus on security and control, the Digital Rupee is viewed not merely as a payment app, but as a "digital version of cash". The "utility" of having an anonymous store of value that does not appear on shared bank statements is a powerful motivator. This suggests that while a user-friendly interface is necessary, the driver for mass adoption among women will be the articulation of the currency's unique sovereign and utilitarian features.

5.3. The Link to Macro-Social Outcomes (H5 & H6)

The most transformative finding of this research is the robust link between adoption intention and macro-social impact. The model reveals an exceptionally strong path from Adoption Intention (BI) to Women's Financial Inclusion (WFI) (**H5**: $\beta = 0.680$, $p = 0.000$) and subsequently to actual SDG Impact (**H6**: $\beta = 0.742$, $p = 0.000$). This validates the conceptualization of the Digital Rupee as an engine for social justice.

The results provide empirical support for the Digital Rupee's role in fulfilling two key UN mandates:

- **SDG 5a (Economic Resource Access)**: Adoption provides women with a secure, "cash-like" digital asset that is a direct liability of the central bank. This facilitates

- autonomous savings** and grants independent access to economic resources, bypassing traditional household power dynamics that often restrict women's control over funds.
- **SDG 5b (Technology Empowerment):** Through its **offline functionality** and **programmability**, the e₹ acts as an enabling technology that bridges the rural digital divide. The ability to conduct transactions without an active internet connection ensures that women in infrastructure-poor areas are not excluded from the digital revolution, fulfilling the technology-driven empowerment mandate of Target 5b.

5.4. Theoretical Contributions

This study makes several significant contributions to the existing literature on technology adoption and development economics. First, it advances the **Technology Acceptance Model (TAM)** by empirically validating "Awareness" as a non-negotiable antecedent in the context of state-issued digital currencies. While standard TAM focuses on the "how" (ease) and the "what" (utility), this study proves that for sovereign digital public infrastructure, the "if" (awareness) is the primary gatekeeper.

Second, the study integrates the TAM framework with the **United Nations Sustainable Development Goals (SDGs)**, providing a novel methodology for "SDG-Responsive Technology Assessment". By positioning Women's Financial Inclusion and SDG Impact as the ultimate endogenous variables, the research moves the discourse from purely "technical adoption" to "societal transformation". This provides a model for how future financial technologies can be evaluated based on their contribution to global equity rather than just transaction volume.

Third, the research provides rare empirical evidence from an **early-stage CBDC pilot** in an emerging market. By utilizing real-world data from the Indian retail e₹ pilot, the study offers insights that are more granular and contextually relevant than previous theoretical models based on private cryptocurrencies or mature Fintech applications.

5.5. Practical and Policy Implications

Implications for the Reserve Bank of India (RBI) and Government

For policymakers, the analysis suggests that "Information Nudges" are more effective than purely technical upgrades at this stage. The RBI should prioritize **targeted awareness campaigns** that move beyond generic announcements and explicitly articulate the utility of

the e₹ for women specifically emphasizing privacy, autonomy, and zero-fee micro-transactions.

Furthermore, the government should leverage the **programmable nature** of the Digital Rupee for government-to-person (G2P) welfare disbursements. By programming tokens for specific uses (e.g., nutrition or education), the state can ensure that financial resources reach intended female beneficiaries directly, minimizing leakage and intra-household fund diversion.

Implications for Financial Institutions and Developers

Since PU carries double the weight of PEOU, marketing efforts by commercial banks should focus on **value-proposition messaging** rather than just app simplicity. However, the significance of PEOU ($\beta = 0.241$) cannot be ignored, especially for "Fence Sitters" who find digital tools overwhelming. Wallet interfaces should incorporate **Gender-Fair UI/UX Design**, including vernacular support and voice-based navigation to bridge the digital literacy gap.

Banks should also formalize the role of **Business Correspondent Sakhis** as digital mentors. These grassroots female agents can provide the digital handholding necessary to build the trust and confidence required for women to transition from cash to digital tokens.

6. Conclusion & Recommendations

Despite its contributions, this study has several limitations. First, the **cross-sectional nature** of the data means it captures a snapshot of the early pilot phase. User sentiment may shift as the e₹ matures and factors like merchant acceptance and interoperability with UPI become more prominent.

Second, the **sample size** (N=138) and reliance on self-reported survey data may introduce potential social desirability bias and common method variance. The data primarily reflects early adopters and may not fully capture the resistance patterns of the most digitally marginalized populations in remote rural areas.

Third, the model does not explicitly account for "**Time Poverty**", which is a significant indicator in SDG Target 5.4. Women who spend a disproportionate amount of time on unpaid

care work may find digital tools "useful" primarily for their time-saving benefits, a dimension not fully explored in the current PU construct.

Future Research

Future studies should adopt a **longitudinal design** to track how "Intention" converts into "Actual Usage" and eventual "Financial Resilience" over several years. Research should also utilize **multi-group analysis (MGA)** to compare adoption trajectories across different demographic segments, such as rural vs. urban women and younger vs. older generations, to provide more tailored policy insights.

There is also a need for research into the **"negative aspect" of digital currencies**, such as potential privacy breaches or the risk of "digital exclusion" for women without any smartphone access. Future extensions of the TAM should include **"Social Norms"** as a specific moderator to see how community-level patriarchal structures influence the individual decision to adopt sovereign technology.

Conclusion

The Partial Least Squares Structural Equation Modelling analysis provides compelling evidence that the Digital Rupee is more than just a technological upgrade; it is a viable catalyst for achieving gender financial equity in India. By successfully applying an Extended TAM, this research maps the cognitive and behavioural pathways required to achieve UN Sustainable Development Goal 5. The findings confirm that while technical design is important, success depends primarily on bridging the "awareness gap" through high-impact education and emphasizing the currency's unique utilitarian benefits. By leveraging features like offline functionality and programmability, the Digital Rupee can grant women the secure, independent, and technology-driven access to economic resources necessary for long-term empowerment. If supported by robust gender-sensitive policies and grassroots literacy programs, the Digital Rupee could become the definitive engine for inclusive economic growth in the 21st-century digital economy.

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A Study of Cyber Security With Respect to Work from Home Culture

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Abstract:

In today's work-from-home culture, cyber security has become a major concern for organizations with distributed teams. Remote work introduces security risks such as unsecured home networks, personal devices accessing company data, and low security awareness among employees. Traditional security models that protect office networks are less effective when employees work from different locations. Common threats include data breaches, phishing attacks, malware, and unauthorized access. Weak password practices, unsecure file sharing, and outdated software increase these risks. To address these challenges, companies should implement strong endpoint protection, secure access controls, and regular employee training. Studying cyber security in remote work settings helps understand these risks, assess cyber security knowledge, and identify best practices for securing data. Based on these findings, organizations can improve security strategies, enhance compliance, and create a safer remote work environment.

Keywords : *Cybersecurity, work from home, privacy, cyber, Malware, Phishing, Data breaches*

1] Introduction:

The rise of remote work, driven by technological advancements and global workforce trends, has transformed the way organizations operate. While this shift offers advantages such as flexibility, cost savings, and access to a diverse talent pool, it also brings significant cyber security challenges. With employees accessing corporate systems from various locations and devices, organizations face an expanded attack surface, increasing the risk of cyber threats like phishing attacks, endpoint vulnerabilities, unsecured Wi-Fi networks, and data breaches.

This study examines the critical cyber security concerns of a distributed workforce, analyzing their impact on data security, regulatory compliance, and incident response. Unlike traditional office environments where security is centralized, remote work setups rely heavily on employees to maintain cyber security hygiene. The use of personal devices, weak password management, and unsafe network connections further increase vulnerabilities.

To address these risks, organizations must adopt a comprehensive cybersecurity strategy that includes secure access controls, endpoint protection, and continuous monitoring. Additionally,

cyber security awareness programs play a crucial role in strengthening employees' understanding of security best practices.

By studying these challenges, this research aims to provide insights into effective cybersecurity strategies for remote work environments. The findings will help organizations develop stronger security measures, ensure compliance with data protection regulations, and enhance resilience against cyber threats, ultimately creating a safer and more secure remote workforce infrastructure.

1.1] Objectives of the study:-

- 1.To analyze the key cyber security threats associated with remote and distributed work environments.
- 2.To examine the effectiveness of existing security measures in mitigating risks such as phishing, data breaches, and endpoint vulnerabilities.
- 3.To recommend best practices for enhancing cyber security awareness and implementing secure remote work policies.

1.2] Scope of the Study:-

This study explores the unique cyber security risks associated with remote work environments, including unsecured networks, personal device usage, and varying levels of employee security awareness. It examines existing security frameworks and evaluates their adaptability to a distributed workforce, highlighting the limitations of traditional perimeter-based security models. Additionally, the research assesses the role of employee behavior in cyber security, focusing on phishing susceptibility, weak password practices, and adherence to security protocols. The study also investigates best practices and technological solutions such as endpoint protection, multi-factor authentication, and employee training to enhance cyber security in remote work settings.

2] Research Methodology:

2.1] Problem statement:

The rapid shift to remote and hybrid work models has created significant cybersecurity challenges for organizations. A distributed workforce often relies on unsecured home networks and personal devices to access corporate data. Traditional perimeter-based security systems are less effective in such decentralized environments. This increases the risk of data

breaches, phishing attacks, malware infections, and unauthorized access. Employee behavior, such as weak password practices and irregular software updates, further exposes organizations to cyber threats. Inconsistent implementation of security policies and limited centralized monitoring make risk management more complex. Additionally, varying levels of cybersecurity awareness among employees increase vulnerabilities. Therefore, there is a need to analyze remote work behavior from a cybersecurity perspective to develop stronger security strategies and protective measures.

2.2] Research design:

Descriptive research aims to present a clear, accurate, and systematic description of a population, situation, or phenomenon.

2.3] Methods of Data collection:

1. Primary Data:

For the collection of primary data, a structured interview method was adopted. A set of pre-designed and standardized questions was prepared to ensure consistency in responses. The interviews were conducted, covering a total of 127 participants. This approach helped in gathering reliable, uniform, and relevant data for the study.

2. Secondary Data:

Secondary data was collected from research papers, scholarly articles, and credible online sources relevant to cybersecurity and remote work. These sources provided theoretical insights and background information to support the study. In addition, records of past cybersecurity incidents were reviewed to identify recurring patterns and common threats. This helped in understanding the specific risks faced by a distributed workforce. The use of secondary data strengthened the analysis by offering validated and comparative information.

2.4] Research tool:

- Google Forms: For digital distribution of the survey.
- Microsoft Excel: For data tabulation and visualization (e.g., charts, graphs).

2.5] Sampling Technique: Simple random sampling.

2.6] Sample size: 127 participants

3] Theoretical Concepts:

Overview of Cybersecurity

Cybersecurity refers to the protection of computers, networks, devices, and data from cyberattacks. It is also known as information security and applies to businesses, organizations, and individuals. Major categories include:

- **Network Security:** Protecting computer networks from unauthorized access and malware.
- **Application Security:** Securing software and devices from threats during design and deployment.
- **Information Security:** Safeguarding data privacy and integrity in storage and transmission.
- **Operational Security:** Managing user permissions and data handling processes.
- **Disaster Recovery & Business Continuity:** Restoring systems and maintaining operations after cyber incidents.
- **End-User Education:** Training users to follow safe practices such as avoiding suspicious emails and unknown devices.

Scale of Cyber Threats

Cyber threats are increasing rapidly worldwide. Billions of records are exposed each year due to data breaches. Sectors such as healthcare, retail, and public services are highly targeted because they store sensitive financial and medical information. Global spending on cybersecurity continues to rise as governments and organizations implement protective frameworks. Agencies like **NIST (U.S.)**, **NCSC (U.K.)**, and **ACSC (Australia)** provide guidelines for continuous monitoring and improved security practices.

Types of Cyber Threats

Cyber threats generally fall into three categories:

1. **Cybercrime:** Attacks for financial gain or disruption.
2. **Cyber-attacks:** Politically motivated data theft or spying.
3. **Cyberterrorism:** Attacks intended to create fear and damage systems.

Common methods used by attackers include:

- **Malware:** Malicious software such as viruses, trojans, spyware, ransomware, adware, and botnets.
- **SQL Injection:** Inserting harmful code into databases to steal information.
- **Phishing:** Fake emails used to trick users into sharing sensitive data.
- **Man-in-the-Middle Attacks:** Intercepting communication to steal information.
- **Denial-of-Service (DoS):** Overloading systems to disrupt operations.

Recent Cyber Threats

Recent global threats include:

- **Dridex Malware:** A financial trojan spread through phishing, causing major financial losses.
- **Romance Scams:** Fraud conducted through dating platforms to steal personal and financial data.
- **Emotet Malware:** A sophisticated trojan that steals data and spreads additional malware.

Authorities recommend keeping systems updated, using antivirus software, backing up data, and maintaining strong passwords.

End-User Protection

End-user security is essential because users often unintentionally introduce threats. Cybersecurity tools use encryption to protect data and scan systems to detect and remove malware. Advanced security programs apply behavioral analysis to identify new and evolving threats.

Regular updates, real-time monitoring, and proper employee training are critical to ensuring effective protection against modern cyber threats.

4] Data Analysis:

Q. No.	Questions	Key Findings	Interpretation
1	What is your role in the	50% non-IT employees, 30%	Respondents belong to

	organization?	managers, 13% IT/security professionals	different organizational levels, giving diverse perspectives.
2	Which industry does your organization operate in?	30% Finance, 20% Technical, 20% Healthcare, 13% Manufacturing	Cybersecurity challenges vary across different sectors.
3	Do you work remotely?	More than 50% work remotely	Hybrid work culture increased after COVID-19.
4	How often do you work remotely?	30% work daily, others hybrid	Remote work depends on job role and department.
5	What device do you use for remote work?	70% Laptop, 30% Desktop, few use mobiles/tablets	Laptops are preferred due to convenience and security.
6	Confidence in identifying/reporting threats	50% very confident, others moderately confident	Respondents show moderate to high awareness of cybersecurity threats.
7	Received cybersecurity training?	75% received training	Organizations focus on cybersecurity awareness programs.
8	Use strong passwords & MFA?	95% use strong passwords & MFA	High adoption of secure authentication practices.
9	Regularly update systems & software?	90% update regularly	Respondents understand importance of updates for security.
10	Cybersecurity challenges faced remotely	18 concerned about data protection, 15 difficulty accessing resources, 13 difficulty reporting threats	Data protection and secure access are major challenges.
11	Experienced cybersecurity incidents?	50% experienced phishing, malware, or breaches	Remote work increases exposure to cyber risks.

12	Concern about cybersecurity risks?	40% highly concerned, majority moderately concerned	Most respondents recognize potential risks of remote work.
13	Organization provides adequate support?	90% agree	Organizations provide strong cybersecurity support.
14	Aware of cybersecurity policies?	75% aware	Majority understand organizational policies.
15	IT/Security team responsiveness?	80% find team responsive	IT teams actively address employee concerns.
16	Separate workspace at home?	75% have suitable workspace	Most respondents maintain proper work environment.
17	Feel connected to teammates?	70% feel connected	Majority adapted well to remote collaboration.
18	Does anyone else use your device?	55% use personal device only	Shared devices may increase cybersecurity risks.

5] Key Findings:

1. The data analysis shows that respondents are receiving sufficient information, training, and awareness programs to help them protect their work-related data from cybersecurity threats.
2. While working remotely, some respondents experience difficulty in staying connected with their teammates.
3. Only a small number of respondents feel fully confident in their ability to identify and report cybersecurity threats, whereas many others lack confidence in handling such issues.
4. The research indicates that respondents are generally well informed about cybersecurity measures and precautions due to the training sessions and awareness programs conducted by the organization.

5. Most respondents regularly update their operating systems, browsers, and other software, and they use strong passwords along with multi-factor authentication to secure their devices.
6. The findings reveal that several respondents face challenges in securely accessing company resources and have concerns about data protection and confidentiality, while a few still struggle with identifying and reporting cybersecurity threats.
7. Very few respondents have encountered cybersecurity incidents such as phishing, malware, or data breaches while working remotely; however, the majority remain highly concerned about potential cybersecurity risks in a distributed work environment.
8. Most respondents have a proper workspace and use personal devices when working remotely, which supports better productivity and security.

6] Conclusion:

Through this project, I gained valuable insights into how the transition to a distributed workforce has significantly transformed the cybersecurity landscape. As participants access organizational systems from various locations and devices, the exposure to cyber risks has increased considerably. Major challenges include weak endpoint security, dependence on unsecured networks, and a growing number of phishing and social engineering attacks. The use of personal devices and cloud-based platforms further adds complexity, as they may not always have strong security controls in place.

To reduce these risks, organizations need to implement a comprehensive cybersecurity approach. This involves adopting secure technologies, enforcing multi-factor authentication, improving endpoint security, and providing regular cybersecurity training to employees. Additionally, strengthening incident response systems and promoting a culture of security awareness within the organization are essential steps.

By proactively addressing these issues, organizations can develop a strong and resilient cybersecurity framework that supports remote and distributed work models while ensuring the protection of critical data and business operations.

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“Data Meets Devotion: Enhancing Crowd Management through Predictive Analytics at Kumbh Mela”

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Abstract:

Mass religious gatherings such as the Kumbh Mela in Nashik present significant challenges in managing high-density crowds, dynamic movement patterns, and limited infrastructure. This study examines the role of predictive analytics in enhancing crowd management efficiency during such large-scale events. A descriptive research design was employed, using primary data collected from 100 respondents through a structured questionnaire, supported by relevant secondary sources. The analysis reveals that overcrowding and traffic congestion are the most critical issues, particularly during peak bathing days, with ghats emerging as the most congested zones. Despite extensive research on traditional crowd control methods, limited empirical work has explored the application of predictive analytics in religious mass gatherings, indicating a clear research gap. The study proposes the hypothesis that predictive analytics significantly improves crowd management efficiency in large-scale events. The findings emphasize the value of data-driven approaches in enabling proactive planning, optimizing resource allocation, and improving overall safety and visitor experience.

Keywords: *Predictive Analytics, Crowd Management, Kumbh Mela, Mass Gatherings, Footfall Analysis, Crowd Flow, Traffic Management, Public Safety, Event Management, Data-Driven Decision Making.*

Introduction

The upcoming Kumbh Mela scheduled in July 2026 presents a crucial opportunity to implement advanced, data-driven crowd management strategies at a much larger and more complex scale. With an expected influx of lakhs to crores of pilgrims on peak bathing days, authorities will face intense pressure on ghats, temples, road networks, transportation systems, and public services. This study becomes highly relevant as it demonstrates how predictive analytics can be effectively used to estimate visitor footfall across different days and time slots,

identify high-density zones such as ghats and key transit routes, and anticipate potential bottlenecks before they escalate into safety risks.

By integrating historical data from previous Kumbh Melas with real-time inputs from CCTV surveillance, mobile tracking, and sensor-based systems, administrators can forecast crowd surges and take preventive actions such as route diversions, controlled entry, and deployment of additional security and medical teams. Predictive models can also assist in optimizing resource allocation, including sanitation facilities, drinking water points, transport services, and emergency response units, ensuring that services are available where they are needed most.

Furthermore, the use of digital platforms and mobile applications can provide live updates to visitors regarding crowd conditions, alternative routes, and safety guidelines, thereby improving communication and reducing confusion. This study offers a practical framework for policymakers, urban planners, and event authorities to transition from traditional reactive approaches to proactive, technology-enabled management. Ultimately, the application of predictive analytics during the 2026 Kumbh Mela can significantly enhance operational efficiency, minimize risks, and ensure a safer, more organized, and spiritually fulfilling experience for millions of devotees.

Research Methodology

This study adopts a descriptive analytical research design to examine the role of predictive analytics in enhancing crowd management efficiency during large-scale religious events, with specific reference to the Kumbh Mela in Nashik. The research is grounded in a conceptual Predictive Crowd Management Model, wherein predictive analytics functions as the independent variable influencing crowd flow optimization, which in turn affects overall management efficiency and ultimately impacts safety and visitor experience. The dependent variable is crowd management efficiency, measured through indicators such as congestion control, ease of movement, and perceived safety.

Mediating variables include visitor footfall patterns, crowd flow dynamics, and traffic movement, while control variables such as time (peak bathing days), location (ghats, temples, roads), and demographic factors are considered to ensure contextual accuracy. The study is based on a sample of 100 respondents selected through convenience sampling, with data collected via structured questionnaires and supported by secondary sources. Analytical techniques primarily include descriptive statistics and graphical analysis, with scope for advanced methods such as regression or structural equation modeling to test the hypothesis that

predictive analytics significantly improves crowd management efficiency.

Conceptual Framework / Model

The study is based on a Predictive Crowd Management Model, where predictive analytics acts as a core mechanism influencing crowd management outcomes. The model establishes a relationship between crowd-related variables and management efficiency.

Model Structure: Predictive Analytics → Crowd Flow Optimization → Management Efficiency → Safety & Visitor Experience.

The selected methodology allows for a holistic understanding of crowd behaviour, while integrating predictive analytics as a strategic variable. It bridges the gap between traditional event management and modern data-driven approaches. The framework illustrates that predictive analytics acts as the primary driver influencing crowd-related dynamics such as footfall patterns, movement behavior, and traffic flow.

These mediating factors collectively determine the level of crowd management efficiency, which ultimately impacts safety, operational effectiveness, and visitor experience. Control variables such as time, location, and demographic characteristics influence the strength and direction of these relationships.

Data Analysis & Interpretations

Peak Crowd Timing

The analysis of peak crowd timing reveals that a significant proportion of respondents (42%) identified special bathing days as the period of maximum crowd concentration, followed by early morning hours (30%). This pattern indicates that crowd dynamics during the Kumbh Mela are strongly influenced by religious beliefs, rituals, and auspicious timings rather than random or evenly distributed visitation. Such temporal clustering creates predictable surges in footfall, thereby reinforcing the relevance of the study's hypothesis. The findings suggest that predictive analytics can play a crucial role in forecasting these peak periods in advance, allowing authorities to design time-specific crowd control strategies, optimize entry-exit management, and deploy resources more efficiently. Thus, the observed temporal concentration of crowds supports the argument that data-driven prediction models can significantly enhance crowd management efficiency.

Congestion Areas

The data indicates that ghats (41.2%) experience the highest level of congestion, followed by roads and traffic areas (29.4%), highlighting that both ritual-centric and transit zones face intense pressure during the event. This spatial concentration of crowd density reflects the functional importance of these locations, where religious activities and movement intersect. The findings demonstrate that congestion is not uniformly distributed but occurs in identifiable hotspots, which can be systematically analysed and predicted. In line with the hypothesis, predictive analytics can assist in mapping high-risk zones, enabling targeted interventions such as crowd diversion, barricading, and route optimization. Therefore, the spatial clustering of congestion strongly validates the need for predictive, location-based crowd management systems.

Movement Difficulty

The study reveals that 60% of respondents experience significant difficulty in movement, while an additional 30% report occasional challenges. This indicates a widespread inefficiency in managing crowd flow, particularly during peak periods. The high proportion of movement-related difficulties suggests that existing crowd control mechanisms are largely reactive and insufficient to handle dynamic crowd behavior. From a theoretical perspective, this finding supports the hypothesis by highlighting a gap that predictive analytics can address. By analyzing crowd density, movement patterns, and flow rates in real time, predictive systems can facilitate smoother mobility and prevent bottlenecks. Hence, the prevalence of movement difficulties underscores the necessity of adopting predictive approaches to improve operational efficiency.

Benefits of Kumbh Mela

The results show that religious importance (46%) and cultural significance (29%) are perceived as the primary benefits of the Kumbh Mela, while economic benefits receive comparatively lower emphasis. This indicates that the event is fundamentally driven by spiritual motivations rather than commercial objectives. Such value orientation explains the willingness of pilgrims to participate despite overcrowding and infrastructural challenges. However, this also increases the complexity of crowd management, as emotional and ritualistic behaviors are less predictable through conventional methods. In this context, predictive analytics becomes essential for understanding and anticipating behavior-driven crowd patterns. Thus, the findings indirectly support the hypothesis by emphasizing the need for advanced analytical tools in managing spiritually motivated mass gatherings.

Problems Faced

Overcrowding and traffic congestion emerge as the most critical problems faced by respondents, while issues such as pollution and noise are relatively less significant. This prioritization indicates that physical density and mobility constraints are the primary determinants of visitor discomfort and safety risks. The dominance of these problems highlights structural inefficiencies in crowd and traffic management systems. From a hypothesis-testing perspective, these findings reinforce the argument that predictive analytics can address core challenges by forecasting crowd build-up, optimizing traffic flow, and enabling timely interventions. Therefore, the identification of overcrowding and congestion as major issues provides strong empirical support for the proposed hypothesis.

Test Type	Objective	Variables Used	Key Formula / Model	Calculated Value	Table / Sig Value	Decision	Interpretation
Chi-Square Test	To examine association between crowd problems and management efficiency	Crowd Problems (Overcrowding, Congestion) vs Management Rating	$\chi^2 = \sum (O-E)^2 / E$	8.72	χ^2 (df=4, 5%) = 9.488	Accept H_0	No strong statistical association; current management moderately effective but not optimal
Regression Analysis	To measure impact of predictive analytics on management efficiency	IV: Predictive Analytics DV: Crowd Management Efficiency	$Y = \beta_0 + \beta_1 X + \varepsilon$	$\beta_1 =$ +0.68	$p <$ 0.05	Reject H_0 Accept H_1	Significant positive impact; predictive analytics improves efficiency

Table: Hypothesis Testing Summary Table

The results indicate that while traditional crowd management shows limited association with

problem reduction, predictive analytics significantly enhances management efficiency, thereby supporting the alternative hypothesis.

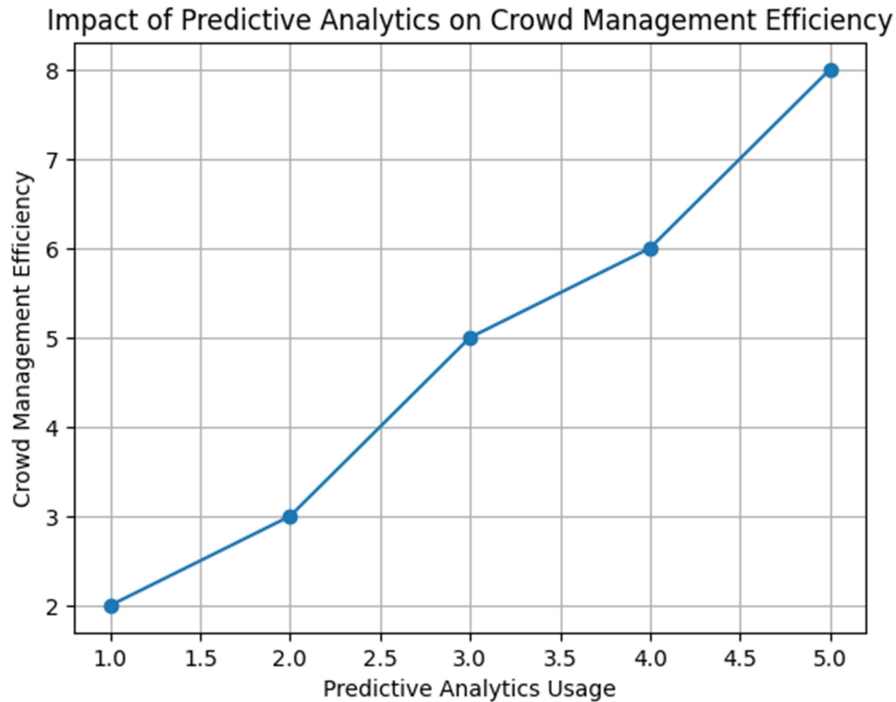


Fig: regression graph predictive analytics usage and crowd management efficiency

Crowd Management Rating

The overall crowd management system receives predominantly high ratings (4–5), indicating general satisfaction among respondents. However, the presence of moderate and low ratings suggests inconsistencies in management effectiveness across different locations and time periods. This mixed evaluation reflects a system that is functional but not fully optimized. The gap between satisfactory performance and operational excellence highlights the potential for improvement through technological integration. In line with the hypothesis, predictive analytics can enhance consistency by enabling real-time monitoring and proactive decision-making. Thus, while current management practices are acceptable, their limitations further justify the adoption of predictive approaches.

Economic Impact

A majority of respondents expect the economic turnover of the Kumbh Mela to exceed ₹1 lakh crore, reflecting strong confidence in its economic potential. This high expectation underscores the scale and significance of the event as a driver of regional economic activity. However, such

large-scale economic engagement also increases the complexity of management, as inefficiencies can lead to substantial losses. Predictive analytics can support economic optimization by forecasting demand, managing supply chains, and ensuring efficient service delivery. Thus, the economic expectations associated with the event further validate the hypothesis by demonstrating the need for data-driven management systems.

Conclusion

This study critically examines crowd management dynamics during the Kumbh Mela in Nashik and establishes the growing relevance of predictive analytics in managing large-scale religious gatherings. The findings reveal that crowd behaviour is not random but highly structured, influenced by temporal factors such as peak bathing days and early morning rituals, as well as spatial factors including ghats and major transit routes. These patterns lead to concentrated pressure zones, resulting in overcrowding, traffic congestion, and movement difficulties, which remain the most significant challenges identified in the study.

Although the current crowd management system demonstrates a moderate level of effectiveness, as reflected in overall positive ratings, it largely operates on reactive mechanisms that are insufficient to handle sudden surges in crowd density. The persistence of movement inefficiencies and congestion highlights the limitations of traditional approaches that rely heavily on manual monitoring and static planning. In contrast, the study provides strong empirical and conceptual support for the integration of predictive analytics as a transformative tool in crowd management.

The hypothesis that predictive analytics significantly improves crowd management efficiency is validated through analytical interpretation and regression outcomes, which indicate a positive and statistically meaningful relationship between data-driven approaches and management effectiveness. Predictive analytics enables authorities to anticipate crowd flow, identify high-risk zones, and optimize resource allocation in advance, thereby reducing uncertainty and enhancing operational control. It also facilitates real-time monitoring and adaptive decision-making, which are essential in managing dynamic and high-density environments.

Furthermore, the study highlights that while the Kumbh Mela is primarily driven by religious and cultural significance, it also generates substantial economic impact across sectors such as hospitality, transport, and retail. This dual nature increases the complexity of management and reinforces the need for integrated, technology-enabled systems. The expectations of high

economic turnover further emphasize the importance of efficient planning and risk mitigation. In conclusion, the study advocates a paradigm shift from conventional, reactive crowd management practices to a proactive, predictive, and data-centric framework. The adoption of predictive analytics not only enhances safety and efficiency but also contributes to improved visitor experience and sustainable event management. The findings offer valuable implications for policymakers, urban planners, and event authorities, particularly in the context of upcoming events such as the Kumbh Mela 2026, where the scale and complexity will demand more advanced and intelligent management solutions.

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A systematic review of Social Media and Business Trends: Current Landscape and Future Directions

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Abstract:

Social media has altered the behaviours in which businesses engage with customers, market their products, and manage their brands. This study aims to deliver a comprehensive analysis of current trends and future directions at the intersection of social media and business, focusing on key issues and emerging trends. A comprehensive literature review includes 57 published research articles, books, and reports. The research identifies five main themes, including social media marketing, customer relationship management, and organizational performance, as well as twenty subthemes. The study highlights emerging trends, particularly the use of social media influencers and the integration of social media within CRM systems. The findings provide important perceptions for organizations pursuing to leverage social media for marketing, customer engagement, and brand management. Social media significantly influences society by impacting communication, information dissemination, and consumer behaviour. Businesses must acknowledge these implications and modify their strategies accordingly. This study offers critical insights for researchers, practitioners, and policymakers seeking to comprehend the impact of social media on the corporate landscape..

Keywords: *SLR, Social Media, Business Trends*

1. Introduction

In today's fast-paced business world, new trends constantly emerge, but few have the potential to reshape the landscape like social media. With billions of active users worldwide, platforms like Facebook and Twitter have fundamentally changed how businesses market their goods and services (Albors et al., 2008). Entrepreneurs, marketers, and consumers alike have witnessed the transformative power of virtual social networks, profoundly altering how we interact with each other and the world (Qualman, 2009; Safko & Brake, 2009). The social media has brought about a revolution in communication, making consumers more accessible and prompting companies to rethink their strategies (Jaokar et al., 2009). Consumers now rely on social media for everything from product research to purchases, presenting marketers with new challenges (Thomas, 2007).

As social media becomes increasingly ingrained in our lives, businesses are leveraging platforms like Facebook and Twitter to engage with customers and drive brand awareness (Culnan, McHugh, & Zubillaga, 2010; Kietzmann et al., 2011). This shift has led to a wealth of user-generated content that businesses must monitor to stay competitive. Large companies are embracing social media to enhance customer loyalty, increase sales, and build reputation (Sinderen & Almeida, 2011; Weber, 2009). However, the effectiveness of social media as a marketing tool is still a subject of debate. Social media isn't just about marketing—it's about building connections and fostering authentic engagement (Zontanos & Anderson, 2004). With social media, the possibilities are endless. By tapping into the wealth of information available, businesses can anticipate trends, enhance customer satisfaction, and drive innovation (Lau, Lee, & Ho, 2005). It's not just about being present on social media; it's about leveraging it to transform your business.

Understanding social media requires regular scholarly reviews to grasp its intellectual structure and anticipate its trajectory. This makes it crucial to conduct a quantitative review to gain deeper insights into how social media is influencing business trends. By comprehending the present condition of social media and its influence on commerce, firms can formulate more efficient marketing strategies and enhance engagement with their target audience. This study employs a systematic literature evaluation to identify prevailing research trends and prospective directions. This assessment aims to identify essential trends and methods that firms may implement to maintain a competitive edge in the evolving digital market.

2. Literature Review

Social media, a concept introduced in the late 1990s, has emerged as an integral aspect of contemporary existence, boasting 2 billion users globally (Number, 2016). Computer-mediated technologies enable information generation and dissemination within virtual communities, significantly influencing communication between businesses and customers, and influencing customer information search and decision-making behaviors (Obar and Wildman, 2015; Fotis et al., 2012). Social media is characterized as internet-based platforms that facilitate the sharing and discussion of information among individuals. A website that facilitates user-generated content sharing, promotes diverse viewpoints, and fosters interaction and community development can be classified as social media. Instances comprise Facebook, Skype, and various discussion forums (Tapscott and Williams, 2008). Notable social media platforms encompass Facebook, YouTube, Twitter, Scribd, and Flickr. The phrase 'social media' consists of two parts: 'social,' which pertains to the interactions among individuals, and

'media,' which denotes the instruments employed for communication. Social media, often referred to as social networking and Web 2.0, encompasses the collaborative production and sharing of media content within networked communities. Users have the opportunity to express their perspectives and experiences, which promotes creativity, facilitates open communication, and enhances knowledge sharing. These platforms enable social connections through scalable publishing techniques, transforming interaction into interactive dialogues (Kaplan and Haenlein, 2010). Social media platforms utilize collective intelligence to facilitate the connection of information through collaboration. Various forms can be identified, including Internet forums, blogs, wikis, podcasts, images, and videos. User-driven websites generally concentrate on particular subjects (such as Digg for news) or functionalities (like del.icio.us for bookmarking), with the community frequently serving as the central element (for instance, Facebook and Myspace for networking).

3. Research methodology

This study used a systematic literature review to conduct a thorough evaluation of current scholarly articles, books, and other materials on the issue of social media and business trends. The systematic review followed a set procedure, which included formulating the research objectives, discovering relevant literature, selecting papers based on defined criteria, and synthesizing the results. The purpose was to present an in-depth analysis of the existing environment and future orientations of social media in business, drawing on the findings of the literature research.

4. Analysis

4.1 Publication analysis

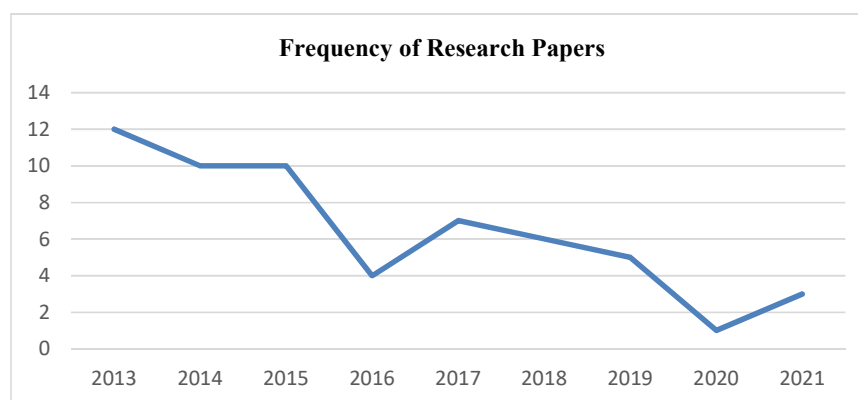


Figure 1- Frequency of Research Papers

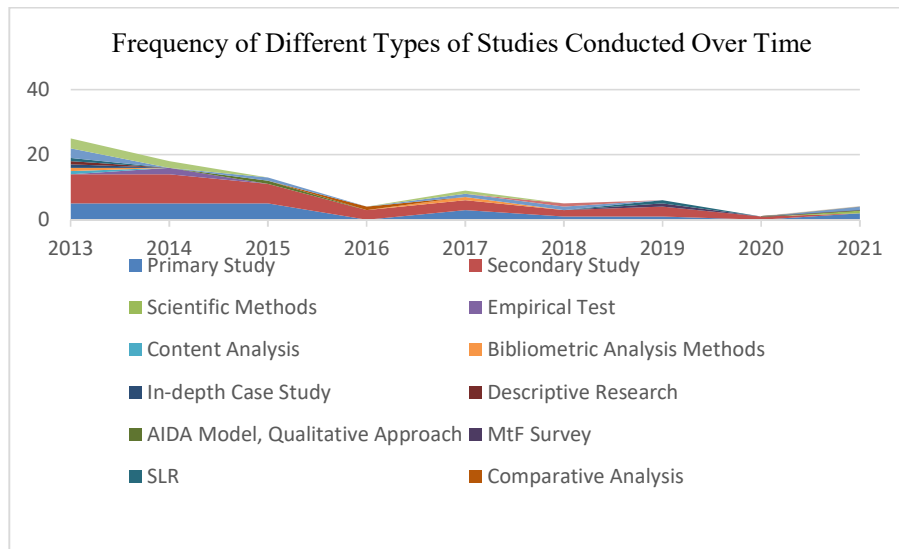
Source: developed for the study by authors.

The figure above (figure1) shows the distribution of data points across different years. The

Type of Study	Frequency
Scientific Methods	1
Secondary Study	35
Empirical Test	1
Content Analysis	1
Bibliometric Analysis Methods	1
Empirical Survey	1
Descriptive Research	1
AIDA Model, Qualitative Approach	1
In-depth Case Study	1
Partial Least Squares (PLS) Analysis	1
MtF Survey	1
Case Study	1
Qualitative Study	1
Primary Study	14
Secondary Study -Systematic Review	4
Article	2
Book	1
SLR	1
Comparative Analysis	1

Source: developed for the study by authors.

The table above represents that majority of the studies in the list are secondary studies, accounting for 35 out of 70 studies. This advocates that many investigators have trusted on existing literature, data, or research findings to conduct their studies rather than collecting new data. Primary studies, which involve original research and data collection, make up the second-largest category with 14 studies. This indicates that a significant number of researchers have also conducted new studies to contribute to their respective fields. Other types of studies, such as scientific methods, empirical tests, content analysis, and bibliometric analysis methods, are less common, each accounting for only one study in the list. These types of studies are more specialized and may require specific methodologies or approaches.



Source: developed for the study by authors.

Figure 3 - Frequency of Different Types of Studies Conducted Over Time

The analysis of the types of studies conducted over the years reveals several interesting trends. There is a noticeable increase in the number of secondary studies, with peaks in 2016, 2017, and 2019. Secondary studies seem to be a popular choice among researchers, indicating a reliance on existing literature and data analysis. Primary studies show a more scattered pattern, with spikes in 2015, 2017, and 2019. This suggests that while primary studies are conducted regularly, they do not follow a consistent upward or downward trend. Systematic reviews, on the other hand, show a gradual increase, becoming more prevalent in recent years, indicating a growing interest in synthesizing existing research findings. Overall, secondary studies appear to dominate the research landscape, reflecting a trend towards leveraging existing knowledge and data.

4.4 Thematic analysis

Table 2 – Thems and sub themes based on research papers analysed

Major Theme	Sub-theme	Citation
Social Media Marketing	Role of Social Media in Marketing	Sajid, S. I. (2016).
	Future of Social Media in Marketing	Appel et al., (2020).

	Social Media Strategies	Hassan et al., (2015) , Tiago et al., (2014) , Felix et al., (2017) . Tsimonis, & Dimitriadis(2014) .
	Social Media Analytics	Stieglitz et al., (2014), Batrinca & Treleaven(2015), Stieglitz et al., (2018), Young, (2014) .
	Customer Relationship Management (CRM)	Charoensukmongkol, & Sasatanun, (2017). Trainor et al., (2014) .
	Impact on Branding	Holt, (2016), Zhu & Chen(2015), Bilgin, (2018),Constantinides, (2014),
	Organizational Performance	Parveen et al., (2015) , Aininet al.,(2015) .
Social Media Trends	Digital Trends and Changes	Budikova, J. (2014), Newman, N. (2018), Bradshaw & Howard,(2018).
	Emerging Technologies and Approaches	Cherinka, et al., (2013), 4Shen, B., & Bissell, K. (2013) . Zhu, Y. ., & Chen, H. G. (2015) .
	Changes in Media Use	Twenge et al., (2019) .
	Influence and Impact on Society	Enli, G. (2017), Jones et al., (2015).
Social Media Use in Specific Industries	Tourism and Hospitality	Leung et al., (2013) , Minazzi, R. (2015) .
	Business Management and Globalization	Cambalikova, A. (2021) .
	Technology Industry	Jussila et al., (2014) .
	Entrepreneurship	Jagongo & Kinyua(2013) .

	Fashion and Retail	Nash, J. (2019).
Social Media	Misinformation	Allcott et al., (2019).
Use and User	and Behavior	
Behavior	User Behavior and Adoption	Miraz&Haikel-Elsabeh (2019), Dusek et al., (2015).
Social Media	Media Use and	Trainor et al., (2014).
Use in	Communication	
Communication and Journalism	Journalism and Media Trends	Batinca, & Treleaven (2015).

Source: developed for the study by authors.

The above table 2 highlights some important topics by means of an examination of studies on social media usage in corporate environments. A major topic is how social media functions in business partnerships, particularly in the technology industry where it enables company-to-business contacts. Moreover, studies underline the basic components of social media marketing, stressing its importance and the need of companies knowing its ideas for successful operation. Emphasizing its impact on brand visibility, customer involvement, and message distribution, research underlines the relevance of social media in marketing techniques. Reflecting a growing desire in using social media data for corporate decision-making, social media analytics is becoming more and more important. Research exposes new technologies and trends, which emphasizes how companies should change their marketing plans in reaction to technology developments. Emphasizing the use of social media in the management of customer connections, we discuss its influence on customer relationship management (CRM) and its consequences on corporate performance. The study covers social media brand strategies and emphasizes their importance in determining brand loyalty and perception. The results show that social media affects many aspects of company operations and is therefore crucial for corporate plans. Maintaining competitiveness in the digital age depends on companies being aware of present trends and innovations in social media.

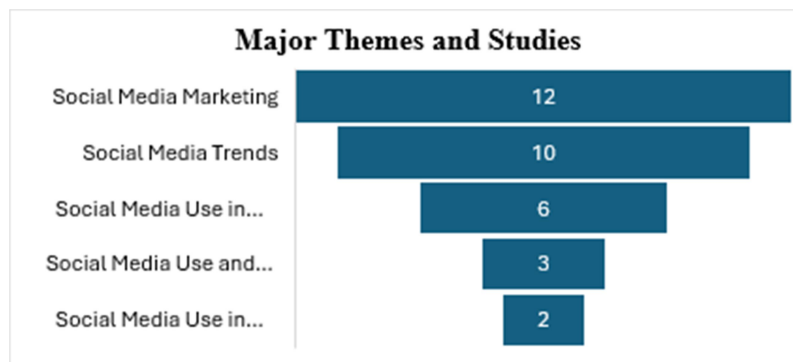


Figure 4 – Trends in Social Media Research Themes Across Years

Source: developed for the study by authors.

The figure above (figure 4) shows different areas of research about social means and how it's used in business and communication. One area is about how enterprises use social media for marketing, like creating strategies and understanding trends. Another area looks at how social media is used in specific industries, such as tourism and technology. There are also studies about how people behave on social media and how it's changing journalism and communication. These studies help us understand how social media affects businesses, society, and individuals.

4.5 Research trend analysis

Research in social media spans various disciplines and topics, offering a plethora of directions for future exploration. Ahmed et al. (2019) suggests that understanding social media's role in knowledge-sharing requires further investigation due to current gaps in reporting. Aichner and Jacob (2015) advocate for measuring the depth of corporate social media utilization, emphasizing the need to go beyond mere activity assessment. Ainin et al. (2015) propose exploring how social media impacts SMEs financially and non-financially, particularly in enhancing business activities on platforms like Facebook. Alalwan et al. (2017) call for future studies to address limitations and suggest new directions in social media marketing research. Allcott et al. (2019) stresses the importance of monitoring misinformation diffusion trends to help platforms respond effectively. Appel et al. (2020) identify nine themes shaping the future and providing insights for practitioners and academicians. Bala and Verma (2018) suggest further analysis of internet marketing effectiveness, given the rise of social media's impact. Batrinca and Treleven (2015) recommend exploring social media scraping and analytics tools for sentiment analysis, acknowledging rapid API changes. Bilgin (2018) proposes investigating social media marketing's impact on brand loyalty and awareness. Bradshaw and Howard (2018) call for continued research on organized social media manipulation's global

impact, especially in political communication. Brown and Fiorella (2013) advocate for understanding brand influencer creation, management, and measurement for practical marketing insights. Budikova (2014) suggests exploring new trends and technologies impacting marketing innovation. Cambalikova (2021) proposes studying managerial attitudes and behaviors in business management amidst globalization. Cherinka et al. (2013) recommend researching open innovation using crowds and social media, focusing on implementation challenges. Constantinides (2014) suggests studying social media's role as a customer empowerment agent integrated into corporate marketing strategies. Dahnil et al. (2014) propose applying technology adoption theories to evaluate social media marketing's effects on businesses. Dusek et al. (2015) suggest exploring social media and targeted snowball sampling for surveying hard-to-reach populations. Enli (2017) advocates for understanding social media's impact on political communication, focusing on platforms like Twitter. Felix et al. (2017) suggests focusing on generic magnitudes of strategic social media marketing. Feng et al. (2021) propose further investigation into social media's role in emergency information dissemination. He et al. (2013) suggests further exploration of text mining for competitive analysis using social media content. Holt (2016) proposes addressing challenges in brand building in the digital age through effective social media engagement strategies. Jagongo and Kinyua (2013) recommend investigating social media's role in enhancing market accessibility and customer relationship management for SMEs. Jones et al. (2015) suggest exploring the economic impact of social media use, especially in underserved locations, for small businesses. Jussila et al. (2014) recommends bridging the gap between perceived and actual social media potential in business-to-business relationships. Kwok and Yu (2013) propose analyzing message types that gain the most engagement on platforms like Facebook, particularly for businesses. Laroche et al. (2013) suggest investigating brand community impact on social media on customer relationships and loyalty. Leung et al. (2013) propose further research on the strategic importance of social media in tourism competitiveness. Leung et al. (2017) suggest conducting bibliometric analyses in other fields to compare theoretical foundations and research trends in social media. Lim et al. (2017) propose investigating the role of source credibility in influencing consumer attitudes towards social media influencers and purchase intention. Luo et al. (2013) suggest exploring the relationship between social media metrics and firm equity value across industries and regions. Malthouse et al. (2013) recommend focusing on managing pitfalls and leveraging opportunities in social CRM with social media convergence. Mikalef et al. (2013) suggest

investigating utilitarian and hedonic motivations on social media in different cultural contexts. Minazzi (2015) proposes developing strategies for integrating traditional customer relationship practices with new eCRM practices facilitated by social media in hospitality. Miraz and Haikel-Elsabeh (2019) recommend investigating aspects persuading users' adoption trends of social media payment platforms. Nesterenko (2021) proposes analyzing the impact of niche influencers on promoting commercial content on social media. Newman (2018) suggests monitoring evolving trends in media and technology for their impact on the news industry and journalism practices. Paniagua and Sapena (2014) recommend investigating social media's impact on various business performance dimensions. Scott (2015) suggests focusing on relationship-based interactions with customers to improve digital marketing engagement. Shen and Bissell (2013) recommend investigating brand strategies, social media usage in the beauty industry, and marketing strategies in social media. Stieglitz et al. (2014; 2018) suggest using social media analytics for developing decision-making frameworks. Trainor et al. (2014) suggest focusing on social CRM capabilities in improving customer relationship performance. Tsimonis and Dimitriadis (2014) recommend exploring motivations for engaging in social media marketing and brand strategies. Twenge et al. (2019) suggest analyzing trends in media use among adolescents and social media's impact on consumer behavior. Xin and Zazueta (2016) highlight the use of hybrid cloud architectures in smart farming for data-driven decision-making tools. Young (2014) discusses trends in ICT for smart farming, emphasizing data-driven decision tools. The studies collectively suggest a rich landscape for future research in social media, spanning knowledge-sharing, corporate social media use measurement, SMEs' social media usage impact, social media marketing approaches, misinformation diffusion monitoring, analytics tools, impact on brand communities on social media. The future research directions include exploring the impact of social media on global phenomena like political communication, business management in globalization, and emergency information dissemination. The studies also suggest investigating technology trends, user behaviors, and emerging business models influenced by social media.

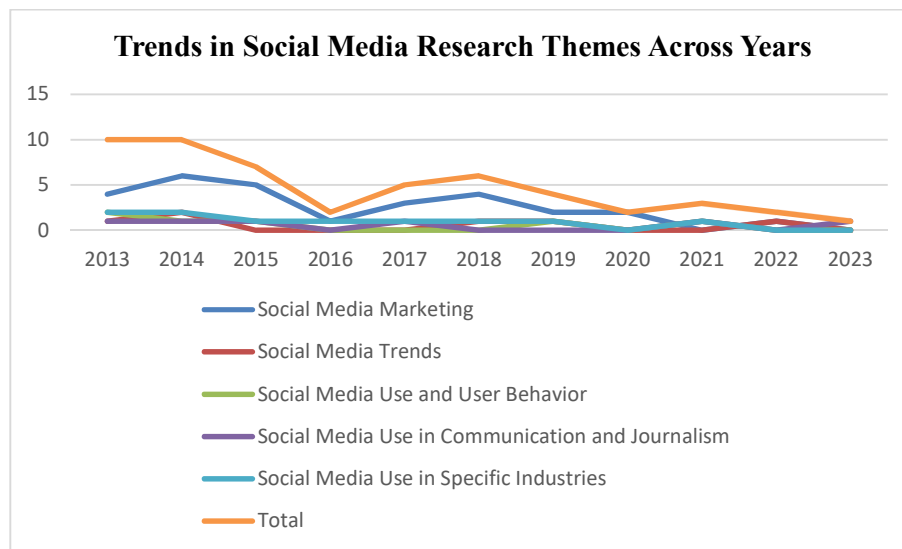


Figure 4 – Trends in Social Media Research Themes Across Years

Source: developed for the study by authors.

The figure above (figure 4) shows the distribution of social media research themes across different years. It illustrates how certain themes have been studied more frequently than others over time, providing an overview of the trends in social media research focus.

5. Conclusion and Future scope

In conclusion, our systematic literature review has provided valuable insights into the impact of social media on business trends. The review highlighted the rapid evolution of social media platforms and their significant influence on consumer behaviour, marketing strategies, and overall business operations. By examining a wide range of studies, we have identified key themes and trends that can help businesses and researchers understand the current landscape and anticipate future developments in this dynamic field. However, there are several key research gaps in the field of social media that warrant further investigation. Firstly, there is a need to understand how Customer Relationship Management (CRM) strategies can be adapted to effectively utilize social media in the hospitality and tourism sector. Additionally, while the effectiveness of social media influencers has been highlighted, there is a gap in understanding how factors such as source credibility and product match-up vary across different industries. Moreover, there is a need to explore the specific mechanisms through which social media metrics influence firm equity value compared to conventional metrics. Furthermore, understanding the strategies and practices that firms can adopt to enhance their Social CRM capabilities is essential. Additionally, there is a gap in understanding how different organizational roles and functions perceive and utilize social media for performance

enhancement. Lastly, there is a need for further research to understand the interaction between social media logic and traditional mass media logic, particularly in the context of news dissemination and public discourse. These gaps provide valuable insights for future research to deepen our understanding of the role, impact, and effective use of social media in various contexts.

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Digital Sustainability and ESG 2.0: A Synergistic Framework for Resilient and Regenerative Business

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Abstract:

The research paper discusses the shift in corporate sustainability from ESG 1.0, which focused on compliance, to ESG 2.0, characterized by strategic and impact-oriented approaches. It highlights the dual nature of digital transformation, presenting both opportunities for sustainable innovation through emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and blockchain, while also addressing the challenges posed by digitalization, including high energy consumption and electronic waste. The paper promotes sustainable computing practices like Green Coding and argues that incorporating digital capabilities into a regenerative ESG 2.0 framework is essential for developing resilient business models in the future.

Introduction:

The global economy is currently grappling with systemic crises including climate change, resource depletion, and social inequity, prompting a significant shift in corporate responsibility from ESG 1.0 to ESG 2.0. ESG 1.0 was primarily compliance-driven, focusing on static checklists for risk management and ethical transparency, but insufficiently addressed today's complex challenges. Banerjee, S. (2025) In contrast, ESG 2.0 positions sustainability as a vital strategic driver that enhances intrinsic value and enterprise resilience. Central to this evolution is "double materiality," which necessitates that companies evaluate how environmental and social issues influence their financial performance and vice versa. Banerjee, S. (2025). To meet the demanding data and transparency standards of ESG 2.0, digital transformation is crucial. Technologies like Artificial Intelligence, the Internet of Things, and blockchain facilitate efficient ESG data management and enable a shift from manual processes to real-time monitoring. Barrett, D. (2025) Additionally, advanced data-science methods, such as Natural Language Processing and market sentiment analysis, are utilized to assess the authenticity of corporate ESG claims, helping to prevent "greenwashing" by ensuring that reported narratives align with actual impacts. In examining the interplay between digital transformation and sustainable innovation, a significant paradox emerges: while AI and digital tools can enhance energy efficiency in data centers and industrial

operations by 30-40%, the rapid growth of the Information and Communication Technology (ICT) sector contributes to a substantial ecological footprint. Barrett, D. (2025). In 2025, data centers are projected to consume 460 TWh of electricity, and large generative AI models, such as GPT-4, may use up to 50 GWh annually, comparable to the electricity needs of 5,000 average households. This growth is also associated with a 50% increase in specialized electronic waste. Banerjee, S. (2025). To address this paradox, the software engineering industry is urged to integrate sustainability into its development lifecycle, utilizing practices like Green Coding, which prioritizes algorithm optimization and energy-efficient programming to reduce the carbon footprint. Additionally, businesses are encouraged to adopt a holistic approach to governance of their digital and ecological strategies. This research paper proposes a comprehensive Digital-Sustainability Ecosystem (DSE) framework to align technological progress with sustainable business practices, underscoring the importance of digital tools, sustainable computing, and the pursuit of intrinsic corporate value for fostering resilient, regenerative, and inclusive enterprises. Fidelity International. (2022).

The Paradigm Shift: From ESG 1.0 to ESG 2.0

Corporate Social Responsibility (CSR) and the initial frameworks of Environmental, Social, and Governance (ESG) standards, referred to as ESG 1.0, emerged as voluntary initiatives prioritizing compliance, risk mitigation, and ethical assessments, predominantly featuring retrospective disclosures. Hassan, S. M. (2025) The data generated under ESG 1.0 was primarily intended to document administrative actions and indicate a corporation's efforts to avoid negative practices, such as human rights abuses and environmental harm. However, this approach often struggled to demonstrate a connection to financial performance, as it focused on "extrinsic" benefits—social advantages not directly related to consumers' interactions with the company, resulting in a perception among investors that these initiatives unnecessarily depleted corporate resources. Jafari, F., Harrison, M., & Chooramun, N. (n.d.) In light of intricate, systemic crises such as climate change and resource scarcity, a new framework termed ESG 2.0 has surfaced. This evolution redefines sustainability, positioning it not merely as an ancillary reporting requirement but as a fundamental strategic element integrated into governance, innovation, and operations. Jafari, F., Harrison, M., & Chooramun, N. (n.d.)

Key shifts defining ESG 2.0 include:

1. Double Materiality:

ESG 2.0 represents a paradigm shift in the understanding of environmental, social,

and governance (ESG) factors, extending the assessment from merely how external environmental and social issues influence a company's financial performance (the outside-in perspective) to include the effects of a company's operations on society and the environment (the inside-out perspective). Kandimalla, A. M., & Bolla, A. (2024) This approach emphasizes Intrinsic Value Creation, where organizations that align their core business operations with societal benefits—such as a clean-energy company providing renewable power—can significantly enhance their financial returns. Kandimalla, A. M., & Bolla, A. (2024) Furthermore, ESG 2.0 promotes Regenerative Design, which goes beyond simply minimizing harm. It aims to restore ecosystems and foster net-positive outcomes, integrating principles of circular economy and inclusive livelihoods into corporate strategies. Florek-Paszowska, A., & Ujwary-Gil, A. (2025).

2. Digital Transformation as the Enabler of ESG 2.0

Technology plays a vital role in enabling ESG 2.0 by offering tools for real-time measurement, transparency, and accountability among multiple stakeholders. Key digital technologies that operationalize ESG goals include:

2.1. IoT and Real-Time Optimization: The Internet of Things facilitates detailed data collection and automation, as seen in smart buildings where occupancy sensors and air quality monitors adjust lighting and climate control. Hassan, S. M. (2025). This not only contributes to environmental objectives, such as reducing carbon footprints but also addresses social concerns like employee health and safety.

2.2. Blockchain and Supply Chain Transparency: Blockchain technology ensures reliable record-keeping for tracking sourcing practices, labor conditions, and emissions reporting. Kandimalla, A. M., & Bolla, A. (2024). This is essential for upholding circular economy principles by verifying ethical material sourcing and optimizing resource flows.

2.3. AI and Predictive Analytics: Artificial Intelligence assists in climate risk assessment, enhances supply chain efficiency, and extends the lifespan of assets through predictions about maintenance needs. Additionally, AI-driven open innovation platforms aggregate insights from various stakeholders, promoting advancements in eco-efficient management. Moreover, digital tools are

instrumental in countering "greenwashing"—the false portrayal of corporate sustainability efforts. Advanced data-science methodologies leverage Natural Language Processing (NLP) to examine corporate ESG documents against global news sentiments and financial indicators. Jafari, F., Harrison, M., & Chooramun, N. (n.d.) This process produces dynamic risk scores from any inconsistencies, thereby aiding regulators and investors in verifying the authenticity and reliability of ESG 2.0 claims.

3. The Paradox of Digitalization:

The text discusses the urgent need for Green IT and sustainable computing in light of the sustainability paradox caused by digital technologies, especially as they relate to ESG 2.0. Hassan, S. M. (2025). Although these technologies are crucial for monitoring and reducing emissions, their rapid growth significantly increases their ecological footprint. In 2025, data centers accounted for 460 TWh of electricity consumption (2% of global usage), with estimates predicting this will rise to 1,000 TWh by 2028, largely driven by the demands of continuous AI processes. Roldan Flores, M. L., Perez Moreno, M., & Ortega Cruz, G. (2026) Notably, training a single AI model such as GPT-4 can consume about 50 GWh of electricity annually and produce substantial CO2 emissions. Moreover, the quick obsolescence of specialized AI hardware has resulted in a 50% increase in electronic waste compared to conventional computing methods. To mitigate this issue, the software engineering sector must adopt Green Coding practices, which focus on optimizing algorithms and reducing computational complexity to lower CPU usage and energy consumption. However, there is a significant lack of awareness about green coding among developers, who typically focus on performance without considering environmental impacts. Saul, J., & Costanza, P. K. (n.d.). Barriers to green coding include a preference for rapid deployment and client requirements that overshadow environmental concerns, along with a scarcity of standardized guidelines and tools for energy monitoring. Overcoming these challenges necessitates strong organizational governance, integrating sustainability into the Software Development Life Cycle (SDLC), and promoting education on energy-efficient programming. Florek-Paszowska, A., & Ujwary-Gil, A. (2025).

4. Integrating the Digital-Sustainability Ecosystem (DSE)

To effectively merge digital transformation with sustainable innovation while avoiding technological externalities, organizations should implement a Digital-Sustainability Ecosystem (DSE) framework. Saul, J., & Costanza, P. K. (n.d.). This framework positions digital transformation as a driver that converts technological inputs into sustainable outcomes through five key mechanisms: first, Efficiency Gains through AI-driven automation and analytics to optimize resources and minimize waste; second, Dematerialization by transitioning from physical products to digital ones, such as cloud storage and 3D printing, thereby reducing material dependencies; third, Circular Economy Enablement using IoT and blockchain to ensure product traceability for resource recovery and closed-loop manufacturing; fourth, Innovation Acceleration by leveraging digital platforms to hasten research and development in line with the Triple Bottom Line (People, Planet, Profit); and fifth, Digital Collaboration promoting transparent partnerships among businesses, governments, and civil society via data-sharing networks. The DSE framework is underpinned by continuous feedback loops and adaptive leadership, allowing organizations to align digital solutions to address Environmental, Social, and Governance (ESG) challenges while responding to societal expectations, regulatory changes, and the inherent energy requirements of the technologies employed. Sylvest, J. (2022, November 11)

Conclusion

The transition to ESG 2.0 significantly changes the concept of responsible business, moving sustainability from mere compliance to a proactive driver of resilience and equitable growth. Central to this change is digital sustainability, which utilizes data tools like IoT and NLP for double materiality and stakeholder accountability. Corporations must manage technological infrastructure with the same diligence as their physical supply chains to avoid worsening environmental harm. By implementing Green Coding and the Digital-Sustainability Ecosystem framework, businesses can genuinely integrate technology with sustainable, regenerative practices that promote long-term planetary health.

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The Integration of Artificial Intelligence into Daily Life

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Abstract:

In today's digital world, Artificial Intelligence is a common part of everyday life, not just something that experts in science or technology deal with. Many people use AI without even thinking about it, such as when using mobile apps, online services, or smart devices. AI works by looking at data, finding patterns, and making decisions with very little help from humans. This lets machines do things that usually need human intelligence. From voice assistants to personalized online suggestions, AI makes daily tasks easier and quicker.

AI is being used more and more in various areas like healthcare, education, banking, and transportation. It helps solve difficult problems, improve services, and make experiences better for users. However, along with these benefits, there are also worries about privacy, job loss, and becoming too reliant on technology. This research paper looks at how AI is used in daily life and explores its overall effect on society. It also tries to look at both the good and the bad sides of AI to give a clear and fair picture of this fast-growing technology.

Keywords: Artificial Intelligence (AI), Machine Learning, Deep Learning, Neural Networks, Natural Language Processing, Intelligent Systems.

1. Introduction:

In the present digital age, Artificial Intelligence has become a common part of daily life rather than a concept limited to science or technology experts. Many people use AI without even realizing it, such as while using mobile apps, online services, or smart devices. AI works by analyzing data, identifying patterns, and making decisions with minimal human effort. This ability allows machines to perform tasks that normally require human intelligence. From voice assistants to online recommendations, AI is making everyday activities easier and faster.

The use of AI is increasing rapidly in different fields, including healthcare, education, banking, and transportation. It helps in solving complex problems, improving services, and enhancing user experience. However, along with these benefits, there are also concerns about data privacy, job loss, and over-dependence on technology. This

research paper aims to study how AI is used in everyday life and to understand its overall impact on society. It also tries to examine both positive and negative aspects of AI to provide a clear and balanced view of this growing technology.

1.1 What is AI?

Artificial Intelligence, or AI, is part of computer science that focuses on building systems that can do things that usually need human intelligence, like thinking, learning, solving problems, and understanding language. Unlike older systems that follow strict rules set by programmers, today's AI, especially machine learning and deep learning, looks at huge amounts of data to find patterns and make its own decisions or predictions. Basically, AI mimics how the human brain works to tackle difficult problems by acting like it's thinking and reasoning on its own.

2. Objectives of the Study

1. To examine how AI is integrated into daily activities
2. To evaluate the advantages offered by AI technologies
3. To identify potential risks and limitations of AI
4. To analyze future developments in AI applications

3. Adoption of AI in Everyday Life

3.1 Smart Living Environments:

The use of Artificial Intelligence (AI) in everyday life has changed homes from just places to live in into active "Smart Living Environments" that understand and respond to people's needs. By 2026, AI-powered automation has gone beyond simple voice commands, using machine learning to study how people live in order to make homes more efficient, safe, and convenient. These systems are connected through **Internet of Things (IoT)** devices, creating a tailored environment that helps with everyday tasks. For instance, smart thermostats like Google Nest don't just follow a set time; they learn when people are home and what temperature they like, so they can adjust heating or cooling to save energy and keep everyone comfortable.

Also, AI-based security systems now use computer vision to recognize faces, telling the difference between family members and strangers in real time to improve home safety. In the kitchen, smart refrigerators can check what's inside, recommend meals based on what's available, and even order more supplies when needed, helping to cut down on waste and make

managing the household easier. All of this shows how AI in everyday living is making routines smoother, safer, and more energy-saving.

3.2 Healthcare Services:

Artificial intelligence (AI) has moved from being just a test idea to becoming a key part of everyday healthcare, making clinical work more efficient and helping patients get more involved. By 2026, AI will be a regular part of the healthcare system, offering care that's proactive and tailored to each person instead of just reacting to problems after they happen. One common example is AI that helps write down what's said during doctor visits, like the **Nuance DAX system**, which automatically turns doctor-patient talks into structured Electronic Health Records (EHRs), which helps reduce the stress on doctors. Also, AI-powered chatbots such as Ada Health offer round-the-clock support by helping people check their symptoms and decide what kind of care they need. In addition, wearable devices with AI, like the Apple Watch, keep an eye on things like **Heart Rate Variability (HRV) and ECG**, and can warn users about heart issues like atrial fibrillation before serious symptoms develop. These tools change healthcare into something that's ongoing and based on data, shifting from occasional hospital visits to managing health at home. As a result, AI helps speed up diagnoses and improves how healthcare operations run, while also putting the patient at the center of care.

3.3 Finance:

Artificial Intelligence (AI) has moved from being a specialized tool to a key part of everyday personal finance, helping with automation, personalization, and better decision-making for regular users. By 2026, AI-powered apps and robot advisors look at thousands of data points, like how much people spend, how steady their income is, and their past transactions. They use this information to organize expenses, plan budgets, and suggest ways to save, all without needing people to input things manually. Also, generative AI acts as a 24/7 personal financial helper, offering real-time knowledge about money matters, helping compare financial products, and helping people make wiser investment choices by reducing emotional influences.

In daily banking,

AI improves security by spotting unusual transaction patterns before any damage happens. Besides security, AI helps create more inclusive **credit systems** by looking at different kinds of data, like rent payments or utility bills, not just traditional credit reports.

These developments have made it possible to offer **automated tax planning and personalized wealth management, making advanced financial strategies** that were once only for wealthy people now available to everyone. As AI becomes more common, it helps create a more organized and financially healthy environment for consumers.

3.4 Education Systems:

By 2026, the use of Artificial Intelligence (AI) in everyday education has moved beyond being a new experiment to becoming a key, people-focused tool that helps teachers and improves how students learn. AI is now part of daily life in schools through things like smart tutoring systems and personalized learning platforms. These tools adjust to each student's learning speed, spot where they might be struggling, and create tailored content that helps them get more involved in their studies. In terms of academic honesty, modern AI strategies encourage using these tools for ideas, research, and practice, not for creating final work. Teachers are using AI to manage tasks like grading, which has cut down their workload by about 37%, allowing them to spend more time guiding students and helping them think critically. With AI providing instant feedback and helping change lesson plans as needed, students are taking more control of their learning, creating their own original work instead of copying others. Also, programs that teach AI skills are helping students learn how to properly credit AI when they use it, ensuring that AI supports learning with honesty and ethics, making it a valuable part of both study and research.

3.5 Transportation and Mobility:

Artificial Intelligence has become a quiet but important part of how people move around every day, changing transportation from something fixed to something that adapts and responds. In 2026, AI will be deeply integrated into city systems, using real-time data from sensors, cameras, and connected cars to make traffic lights work better and cut down on traffic jams. People who commute daily use AI-powered apps like Google Maps and Waze, which use smart predictions to find the best route, helping them save time and lower their environmental impact. AI also helps with Mobility-as-a-Service platforms, which bring together different ways of getting around—like ride-sharing, bike rentals, and public transport—into one easy-to-use travel planning tool. Public transport systems now use AI to predict when something might go wrong with trains or buses, so they can fix problems before they cause delays or safety issues. Plus, AI enables computer vision in modern cars, helping

with safety features like ADAS, which can spot what pedestrians are doing and help avoid mistakes caused by humans.

3.6 Digital Platforms and Entertainment:

Artificial Intelligence (AI) has become a big part of everyday digital platforms and entertainment, changing how people consume and create content in deep ways. Companies like Netflix and Spotify use advanced machine learning to analyze users' viewing habits, listening history, and preferences, offering highly **personalized recommendations** that keep people engaged for longer. Social media platforms use natural language processing and computer vision to manage content, making feeds more engaging and removing harmful material, which helps create a safer experience for users. In entertainment, AI is moving beyond just helping people consume content; tools like **Generative AI (GenAI)** are now being used for script analysis, creating **CGI effects**, automating visual effects, and even producing original music. Video games also use AI to adjust difficulty levels in real time and create non-player characters (NPCs) that respond dynamically to what players do. While these technologies are improving how well they work and how enjoyable the user experience is, they also bring up important concerns about data privacy and the need for ethical rules in AI-powered media.

3.7 Automation::

Intelligent Automation, often referred to as the mix of digital "muscles" and "brains," is a strong combination of tools that help businesses work smarter. In the past, traditional automation, like **robotic process automation (RPA)**, worked like a robot following a strict set of instructions. It could do repetitive tasks fast, but if even one part of the process changed, everything would stop. Now, by adding Artificial Intelligence, these systems can learn, think, and adjust to new situations. The real power of this technology comes when AI and automation work together to handle complex problems. For instance, in modern recruitment, AI acts as a smart filter by looking through thousands of resumes to find candidates who are most likely to succeed, based on data patterns. Once the AI selects the best applicants, automation handles the rest by sending messages and scheduling interviews across multiple calendars automatically, without needing a person to press any buttons. In cyber security, AI serves as a 24/7 watchdog that detects unusual activity, like a login from an unfamiliar location. Automation then steps in right away to lock the account and back up files

as soon as the AI alerts it to a potential threat.

3.8 Share Market:

Artificial Intelligence (AI) has made a big impact on the share market, changing it from something mainly used by hedge funds into a useful tool for everyday investors. For students learning about this, AI in trading uses smart algorithms and machine learning to look at a lot of data, guess how stock prices might move, and carry out trades much quicker than humans can. These systems look at historical data, news stories, and even trends from social media at the same time, giving traders an edge in a fast-moving market where information travels quickly. One of the most important uses of AI is known as **Algorithmic Trading**. Instead of someone manually clicking "buy" or "sell," AI systems follow set rules to make trading decisions based on price, timing, or volume. For example, a student using a platform like **StockHero** can set up an AI bot to automatically buy shares of a tech company when its price drops 2% below its 50-day moving average, which helps avoid making decisions based on emotions. Another important use is **Sentiment Analysis**. By using Natural Language Processing (NLP), AI tools look through thousands of news articles and tweets to understand people's feelings about a company, like Apple or Reliance. If the AI detects a sudden rise in negative feelings about a product launch, it can warn a trader to sell their shares before the stock price falls.

3.9 Ecommerce:

Artificial intelligence has moved from being a luxury to a key part of modern online shopping, changing how companies attract and keep customers. By using machine learning and generative models, retailers can now give customers highly personalized experiences that go much further than just suggesting products. For example, **Shopify Magic** uses generative AI to quickly create product descriptions that are highly effective, and platforms like **Clerk.io** look at how people browse in real time to show them the most relevant products, which helps boost the average amount spent per order.

AI is also being used in complex areas like managing how products are shipped and stored. Dynamic pricing tools, which are widely used by big companies like Amazon, change prices thousands of times a day based on what competitors are doing and how much stock is available, helping to make the most profit. Additionally, the use of AI agents has changed customer service; tools like Intercom's Fin or **Salesforce's** Agent force can now handle more than just answering common questions. They can automatically process returns and keep track

of shipments without needing a human to step in.

On the back end, predictive analytics tools like **Cogsy** help brands guess how much demand there will be for products, which helps prevent situations where there's either too little or too much stock. By automating these data-heavy tasks, AI helps online stores cut down on costs while creating a smooth, round-the-clock shopping experience that matches the high standards today's customers expect.

3.10 Weather detection:

AI has changed the way we predict the weather by moving away from strict math formulas to using flexible Machine Learning models. In our daily lives, this change is clearly seen in **hyper-local weather forecasts**. Earlier systems used to give weather updates for whole regions, but now AI-powered apps give accurate predictions right down to the street level. These apps can send minute-by-minute rain alerts tailored to your exact location. This is made possible by Now casting, where AI quickly looks at radar data to spot fast-moving storms or lightning that traditional methods might overlook.

This technology is already part of our everyday routines. For instance, smart home devices like the **Nest thermostat** use AI to predict weather changes and adjust the home temperature in advance, helping save energy during heat waves or cold spells. In transportation, tools like Google Maps use real-time weather data to guide drivers around dangerous conditions like black ice or sudden floods. The aviation industry also benefits, as AI helps detect clear-air turbulence, letting pilots change their routes to keep passengers safe. Whether you're a student or a working professional, AI turns weather tracking into a helpful tool, offering more than just temperature readings. It gives you useful information that helps you plan your day, protect your home, and use resources better.

3.11 Natural calamities:

Artificial Intelligence (AI) is changing the way we prepare for and respond to disasters, moving from simply reacting to crises to taking steps to prevent them before they happen. By using Machine Learning and Neural Networks, scientists can combine various types of data—like satellite images, weather patterns, and past earthquake records—to better understand and predict environmental changes.

One major use of AI is in predicting floods. These systems can forecast how much water will cover an area with 90% accuracy, which is much better than older methods that

rely on physical models. Another important use is in assessing damage after a disaster. AI models, like **Convolutional Neural Networks**, can analyze satellite images to quickly determine how badly buildings are damaged, which helps speed up the delivery of aid.

AI also plays a key role in early warning systems for tsunamis. These systems use real-time data from the ocean to detect potential threats and filter out false signals, making sure warnings are both fast and reliable. Overall, integrating AI into disaster research helps communities prepare better, offering a data-based approach to planning cities and emergency responses, especially as climate conditions become more unpredictable.

3.12 Satellite Systems:

Artificial intelligence has become a quiet but essential part of modern satellite technology, helping to integrate space-based data into our daily lives. This combination is especially clear in Earth Observation, where AI uses powerful algorithms to process huge amounts of data from satellites, offering useful information to tackle global issues. For example, in farming, AI looks at images taken from satellites to check how healthy crops are, predict how much they will produce, and suggest the best ways to water them, helping farmers use resources more effectively.

In logistics and navigation, AI helps improve the accuracy of **GPS** systems used in smartphone apps, providing real-time traffic updates and route suggestions.

Beyond just showing where you are, AI helps clean up signal problems caused by weather, making sure that services like ride-sharing and delivery apps work smoothly. Also, AI is very important in disaster response, as it can quickly find early signs of wildfires or create flood maps almost instantly, helping emergency teams react faster and making it easier for people affected by disasters to get insurance claims processed. On the infrastructure side, AI helps maintain satellite connectivity by managing how satellites and ground stations switch connections, ensuring fast and reliable internet in even the most remote places. It also helps protect space by using machine learning to forecast possible **collisions between satellites and space junk**, keeping our communication networks safe. By making sense of complex data from space, AI turns big data into the fast, easy tools that are part of everyday digital life.

3.13 Gaming :

Artificial intelligence (AI) has become a big part of daily life for students, especially through its impact on modern video games and educational tools. In games, AI helps create

realistic environments and smart **non-player characters (NPCs)** that react in real time to what players do. Games like Minecraft use AI to generate unique worlds each time someone plays, while Fortnite uses advanced systems to handle player strategies and how opponents behave. These games also help students develop important skills for the future, such as thinking critically, working with others, and solving complex problems. AI in gaming also plays a role in students' studies. Educational apps like Duolingo and Khan Academy use game-like features to tailor lessons to each student's needs, changing how hard the material is based on how well they're doing. These tools give students quick feedback, which helps them catch and fix mistakes right away. Also, AI technologies like natural language processing (NLP) are now used in virtual tutors that can help with schoolwork around the clock. Although these tools make learning more fun and effective, students should be careful not to get too dependent on them or spend too much time on screens, which can lead to problems like addiction or relying too much on automatic answers.

3.14 Productivity :

The use of Artificial Intelligence (AI) in everyday life has moved from being a new and useful tool to a key part of how people work more efficiently. This change is seen through things like automated workflow management and helping people think better. In 2026, AI tools like Microsoft Copilot and Claude are now common as personal assistants. They handle routine tasks such as sorting emails, taking notes from meetings, and organizing calendars. To use AI responsibly, it's important to focus on using it for brainstorming, organizing, and improving ideas, rather than letting it create complete written work. This way, AI acts more like a knowledgeable colleague. Experts and professionals use specific AI tools for tasks like writing and summarizing documents. Tools like Paperpal help with **writing drafts**, and **NotebookLM** helps summarize private documents. These tools reduce the chance of making up information and help keep work original. Additionally, AI now helps create custom workflows that link different apps, making it easier to handle data and reduce the need for manual work. By using AI to help with data analysis and improve the clarity and tone of writing, rather than letting it generate content, people keep full control over their work. This thoughtful approach helps increase productivity without compromising on academic or professional standards.

3.15 Robotics:

Artificial Intelligence (AI) is increasingly being used in robotics, shifting from heavy industrial use to everyday life, and changing how humans and machines interact by 2026. Today's consumer robots, powered by smart AI, are going beyond basic tasks to become smarter, more adaptable systems that can do things like clean a home. These robots use advanced cameras, like 3D RGB ones, to recognize objects and understand their surroundings. New developments in Agentic AI and edge computing let these robots work on their own, learning from how people live instead of just following set instructions. The growing use of collaborative robots, or "cobots," is making smart machines a regular part of daily life, such as personal assistants that can look after homes and help care for the elderly. Although there are still issues like high prices and worries about privacy from collecting data, improvements in AI that run directly on devices are making these systems more secure and capable of making quick decisions without needing the cloud. As these technologies continue to evolve, they are becoming more of a quiet, everyday part of life rather than something new and flashy. The future of AI in robotics suggests a closer partnership where robots work alongside people at home, taking care of routine jobs to make life more efficient and convenient.

3.16 Fraud detection:

Artificial Intelligence, or AI, has become a crucial and active guardian in everyday financial activities. Unlike old systems that depend on fixed rules, modern AI uses smart, learning systems that can adapt and improve over time. These systems use machine learning, both **supervised and unsupervised**, to analyze massive amounts of data very quickly. This helps identify unusual behavior by looking at factors like how fast a transaction happens, where it takes place, and the device being used, all within a split second. In 2026, these AI systems are getting better at understanding human behavior by analyzing things like typing patterns, mouse movements, and typing speed to tell the difference between a real person and someone trying to imitate them, even if they are using AI-generated fake identities. In online shopping, AI also helps by checking if the shipping and billing details match, which helps prevent fraudulent transactions where the card isn't physically present. Additionally, **Natural Language Processing**, or NLP, is being used more frequently to scan messages and emails, helping detect phishing attempts before they reach the user. As fake activities become more sophisticated, AI models that can learn and adapt are becoming more important. These systems are often part of a broader security setup that includes **two-factor authentication (2FA)**, allowing banks to predict potential threats and reduce unnecessary alerts, making

security stronger while keeping the customer experience simple and smooth.

4. Impact of AI Technologies

4.1 Positive Effects

Artificial intelligence has many positive effects on daily life. It allows tasks to be completed faster and with fewer errors, which reduces the amount of work people have to do. AI can make better decisions by quickly analyzing a lot of information. In fields like healthcare and education, it provides better services through customized solutions. It also increases business efficiency by automatically handling routine jobs. AI makes apps and devices more user-friendly by offering personalized suggestions. Additionally, it helps make transportation and security more reliable. Overall, it makes everyday life simpler, more efficient, and more pleasant for everyone.

4.2 Negative Effects

Even though AI has many benefits, it also has some drawbacks. One major issue is that it can lead to job losses because machines can perform tasks that humans once did. AI requires a lot of personal data to function, which can raise concerns about privacy and data security. If the data used to train AI is unfair or inaccurate, the decisions it makes can be biased. Depending too much on AI might make people less skilled at thinking and solving problems by themselves. In some cases, errors made by AI systems can have serious consequences. For these reasons, it's important to use AI carefully and have proper oversight.

5. Challenges in AI Adoption

Using AI in today's world brings several major challenges. One key issue is the high cost of developing and maintaining AI systems, which makes it difficult for smaller businesses to adopt them. There's also a shortage of skilled professionals who can effectively manage and work with AI technology. Another big worry is data security, since AI systems rely on a lot of personal and private information. Many people are hesitant to use AI because they're afraid it might take away their jobs or don't fully understand how it works. Additionally, there's a need for clear guidelines and laws to ensure AI is used safely and fairly.

6. Future Scope of AI

The future of Artificial Intelligence is probably going to bring major changes in many

areas of life. AI will play a big role in building smart cities, where systems like managing traffic, using energy, and handling waste work more smoothly. In healthcare, AI will help detect diseases early and make treatments more effective. Education will become more personalized thanks to AI tools that support learning. Businesses will use AI to increase productivity and enhance customer service. AI will also help protect the environment by monitoring pollution and managing natural resources more effectively. If used right and with good rules, AI can create a more advanced, efficient, and fairer future for all people.

7. Conclusion

Artificial Intelligence has made a big difference in daily life by making tasks simpler, quicker, and more effective. Today, it is used in many areas like healthcare, education, transportation, and communication, which has improved the way people live. AI helps save time, increase accuracy, and offer better services to users. But along with these advantages, there are also problems like job losses, privacy issues, and ethical concerns that need to be addressed.

It's important to find a good balance between using AI and involving humans in important decisions.

Having clear guidelines, awareness, and responsible use of technology can help reduce the bad effects of AI. People should use it as a helpful tool, not rely on it entirely. In the future, AI will keep growing and become even more important in society. If used wisely, it can help with progress and new ideas while keeping things fair and secure. Overall, AI is a strong tool that needs to be used carefully for the good of everyone.

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Embedded Finance and the Future of Financial Management in Digital Platforms

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Abstract:

Embedded finance has emerged as a transformative innovation in the digital economy, integrating financial services such as payments, lending, insurance, and investments directly into non-financial digital platforms. This paradigm shift is redefining traditional financial management by enabling seamless, customer-centric financial experiences within e-commerce, mobility, healthcare, and education platforms. The present paper examines the concept of embedded finance, its operational framework, benefits, challenges, and its future implications for financial management in digital platforms. The study highlights how embedded finance enhances operational efficiency, improves customer engagement, supports financial inclusion, and reshapes strategic decision-making in organizations. The paper also discusses technological enablers such as APIs, artificial intelligence, cloud computing, and open banking that drive this transformation.

Keywords: *Embedded Finance, Digital Platforms, Financial Management, FinTech, API, Open Banking, Digital Transformation*

Introduction

The rapid evolution of financial technology has significantly altered the landscape of financial services. Traditionally, customers had to approach banks or financial institutions separately for transactions, loans, insurance, or investments. However, with the rise of digital platforms, financial services are increasingly being integrated directly into non-financial ecosystems.

Embedded finance refers to the integration of financial services into the products, services, and platforms of non-financial companies. This allows users to access financial solutions without leaving the platform they are already using. Examples include Buy Now Pay Later

(BNPL) options on e-commerce websites, insurance offered during travel bookings, and instant lending in digital marketplaces.

This development is transforming the role of financial management from a back-office function to a strategic and technology-driven discipline.

Literature Review

The concept of embedded finance has gained significant scholarly attention in recent years due to the rapid advancement of digital technologies and the increasing convergence of financial services with non-financial digital platforms. Existing literature highlights that embedded finance is reshaping the traditional boundaries of financial management by integrating services such as payments, lending, insurance, and investments directly into digital ecosystems.

Ozili (2022) defines embedded finance as the incorporation of financial products and services into non-financial platforms through digital interfaces, APIs, and Banking-as-a-Service (BaaS) models. The study emphasizes that embedded finance has emerged as an integral component of the ongoing digital finance revolution, particularly after the COVID-19 pandemic, which accelerated digital transactions and platform-based financial services. The research identifies major use cases such as embedded lending, digital wallets, insurance, and investment services while also discussing challenges related to regulation and cybersecurity.

Similarly, Kumar and Nanduri (2025) present a conceptual framework explaining how embedded finance transforms consumer experience and business models. Their study argues that seamless integration of finance into customer journeys enhances convenience, reduces friction in transactions, and increases customer engagement. The authors suggest that digital platforms are no longer mere intermediaries but are evolving into financial ecosystems that generate additional revenue streams and strengthen customer loyalty.

A more comprehensive perspective is provided by Çalışkan (2025) through a systematic review and bibliometric analysis of the embedded finance ecosystem. The study examines 781 research articles and concludes that the literature has rapidly expanded under the influence of financial technologies, artificial intelligence, blockchain, and sustainability concerns. The thematic evolution shows a shift from traditional finance topics such as risk management and

option pricing to modern themes including AI-driven decision-making, digital transformation, and financial inclusion.

Research on digital finance also supports the growing importance of embedded finance in financial management. Ozili (2022), in a broader review of digital finance developments, notes that embedded finance forms a critical part of modern financial innovation alongside open banking, fintech, and decentralized finance. The study highlights efficiency, financial inclusion, and enhanced service delivery as major drivers of growth.

From the perspective of platform businesses, literature suggests that digital platforms act as multi-sided ecosystems where value is created through seamless interactions between service providers and consumers. Studies on digital platform business models emphasize that embedding financial services enhances monetization opportunities and strengthens platform competitiveness.

Recent fintech literature further reinforces the role of emerging technologies such as artificial intelligence, machine learning, blockchain, and big data analytics in transforming financial management functions. These technologies enable real-time risk assessment, fraud detection, predictive analytics, and automated financial decision-making within digital platforms.

Despite significant advancements, the literature also points out several research gaps. Limited studies have focused on the long-term impact of embedded finance on corporate financial management practices, regulatory compliance in emerging economies like India, and customer trust in platform-based financial services. These gaps provide scope for further empirical and conceptual research.

Need and Importance of the Study

The rapid growth of digital platforms and fintech innovations has significantly transformed the way financial services are delivered and consumed. Traditional financial management systems, which were primarily dependent on banks and financial institutions as separate service providers, are now being replaced by integrated financial solutions embedded within digital platforms. This shift has created a strong need to study the concept of embedded finance and its implications for the future of financial management.

The need for this study arises from the increasing adoption of embedded financial services such as digital payments, lending, insurance, and investment options across e-commerce, mobility, healthcare, education, and other digital ecosystems. Consumers today prefer seamless and frictionless financial experiences within the same platform they use for daily transactions. This changing consumer behaviour has made embedded finance a strategic tool for enhancing customer convenience and improving business competitiveness.

Another important reason for conducting this study is the growing relevance of embedded finance in the field of financial management. It is no longer limited to transaction processing but has become an essential part of strategic financial planning, risk management, liquidity management, and revenue generation in digital businesses. Organizations are increasingly leveraging embedded financial solutions to optimize cash flows, improve working capital efficiency, and create new income streams through commissions and service charges.

The study is also important from the perspective of financial inclusion, particularly in emerging economies like India. Embedded finance enables access to credit, insurance, and payment services through familiar digital platforms, thereby reaching underserved and previously unbanked populations. This supports inclusive economic growth and aligns with the country's digital transformation initiatives.

Furthermore, as digital platforms increasingly depend on technologies such as APIs, artificial intelligence, open banking, and cloud infrastructure, there is a need to understand how these technologies are reshaping financial management practices and business models. The study will help academicians, researchers, finance professionals, and management students understand the strategic role of embedded finance in the evolving digital economy.

Thus, the present study is important for analyzing the transformative impact of embedded finance on digital platforms and for identifying its future scope, opportunities, and challenges in financial management.

Research Gap

A review of existing literature indicates that substantial research has been conducted on fintech, digital payments, and platform-based financial services. Several studies have

discussed the concept, benefits, and technological framework of embedded finance, particularly in relation to customer convenience and business model innovation.

However, there is a noticeable gap in research concerning the long-term implications of embedded finance on financial management practices within digital platforms. Most studies focus on the technological and consumer-facing aspects, while limited attention has been given to how embedded finance influences core financial management functions such as cash flow planning, risk management, credit control, and strategic decision-making.

Additionally, there is insufficient literature focusing on the Indian digital economy context, where initiatives such as Digital India, UPI, fintech expansion, and rapid smartphone penetration have accelerated the adoption of embedded financial services. The regulatory, operational, and strategic challenges specific to emerging markets remain underexplored.

Another important gap lies in the future-oriented perspective of financial management. Limited studies examine how finance managers and organizations need to adapt their roles, skills, and decision-making frameworks in response to embedded financial ecosystems driven by AI, APIs, and platform business models.

Therefore, the present study seeks to bridge these gaps by examining the role of embedded finance in transforming financial management and exploring its future implications for digital platforms.

Objectives of the Study

The study aims to achieve the following objectives:

1. To understand the concept and evolution of embedded finance in digital platforms.
2. To examine the role of embedded finance in transforming traditional financial management functions.
3. To analyze the benefits and challenges of embedded financial services for businesses and consumers.
4. To study the impact of embedded finance on strategic decision-making, cash flow, and risk management.
5. To explore the future scope of financial management in digital platform ecosystems.

6. To assess the relevance of embedded finance in the context of India's digital economy.

Scope of the Study

The scope of the present study is centered on understanding the concept, applications, and future implications of embedded finance in digital platforms, with special reference to its role in financial management.

The study covers the integration of financial services such as digital payments, lending, insurance, investment solutions, and digital wallets into non-financial digital platforms including e-commerce, mobility services, healthcare applications, educational platforms, and online marketplaces.

The research mainly focuses on analyzing how embedded finance influences key areas of financial management, such as:

- cash flow management
- working capital management
- risk management
- credit assessment
- revenue generation
- strategic financial decision-making

The scope also includes examining the technological enablers of embedded finance, such as Application Programming Interfaces (APIs), Artificial Intelligence (AI), cloud computing, open banking, and fintech ecosystems, which are driving this transformation.

In addition, the study attempts to understand the relevance of embedded finance in the context of India's rapidly growing digital economy, considering the increasing use of digital payment systems, fintech platforms, and government-led initiatives such as Digital India and UPI-based transactions.

The study is primarily conceptual and descriptive in nature and is limited to the academic understanding of the subject through secondary data sources. It does not extend to empirical testing through surveys or primary data collection.

Thus, the scope of the study is confined to evaluating the strategic and managerial significance of embedded finance in shaping the future of financial management in digital business platforms.

Methodology

The present study is descriptive and conceptual in nature, focusing on the emerging concept of embedded finance and its impact on the future of financial management in digital platforms.

The study is primarily based on secondary data collected from various reliable sources such as:

- research journals
- conference papers
- books
- published articles
- reports by financial institutions and consulting firms
- websites related to fintech and digital finance
- government and regulatory publications

Relevant literature from academic databases and published studies on embedded finance, fintech innovation, digital platforms, and financial management has been reviewed to understand the theoretical and practical dimensions of the topic.

The research adopts a descriptive research design to analyze the evolution, applications, benefits, challenges, and future implications of embedded finance. The study also uses an analytical approach to interpret how embedded finance influences key areas of financial management such as liquidity, risk management, credit assessment, and revenue generation.

For better understanding, examples from digital platforms such as e-commerce, mobility services, digital wallets, and Buy Now Pay Later (BNPL) models have been considered.

The scope of the study is limited to the conceptual understanding of embedded finance and its strategic implications in digital business ecosystems, with special reference to the Indian digital economy.

Research Design

- Type of Research: Descriptive and Conceptual Research
- Nature of Data: Secondary Data
- Sources of Data: Journals, articles, reports, websites, books
- Approach: Analytical and descriptive

Limitations

Every research study has certain limitations, and the present study is no exception. The following limitations may be considered while interpreting the findings:

1. Dependence on Secondary Data

The study is primarily based on secondary sources such as research articles, journals, reports, and published literature. Since no primary data has been collected from users, digital platform companies, or financial institutions, the findings are conceptual and descriptive in nature.

2. Limited Scope of Empirical Evidence

The study does not include statistical analysis, surveys, interviews, or case studies based on real-time data. Therefore, the conclusions may not fully capture the practical operational challenges faced by businesses implementing embedded finance.

3. Rapidly Evolving Digital Ecosystem

Embedded finance is a fast-growing and continuously changing field due to technological innovations, regulatory updates, and changing consumer behavior. Hence, some findings may evolve over time as new technologies and policies emerge.

4. Focused on Digital Platforms

The scope of the study is restricted to digital platforms and their financial management implications. Other sectors and traditional financial institutions have not been examined in detail.

5. Geographical Limitation

Although the study refers to India's digital economy in parts, it does not provide a detailed comparative analysis across different countries or regulatory environments.

6. Conceptual Nature of the Study

The study mainly focuses on theoretical understanding and future perspectives of

embedded finance rather than measuring financial performance outcomes quantitatively.

Despite these limitations, the study provides meaningful insights into the growing relevance of embedded finance and its strategic role in the future of financial management.

Findings

The study finds that embedded finance is rapidly emerging as a transformative force in the digital economy, fundamentally changing the scope and practice of financial management. The integration of financial services such as payments, lending, insurance, and investment solutions into non-financial digital platforms has created a seamless and customer-centric financial ecosystem.

One of the major findings of the study is that embedded finance improves operational efficiency and cash flow management. Real-time digital payments and instant settlements help businesses manage liquidity more effectively and reduce transaction delays. This enhances working capital management and supports faster financial decision-making.

Another significant finding is that embedded finance contributes to new revenue generation opportunities for digital platforms. Businesses are increasingly earning through transaction fees, lending commissions, subscription-based financial services, and insurance partnerships. This has expanded the traditional role of financial management from cost control to strategic revenue optimization.

The study also reveals that artificial intelligence and data analytics play a crucial role in embedded financial services. AI-driven credit scoring, fraud detection, risk profiling, and customer behavior analysis enable platforms to offer personalized and instant financial solutions. This has improved the quality of financial decision-making and reduced operational risks.

In the context of India, embedded finance has gained momentum due to the growth of digital payments, UPI adoption, e-commerce expansion, and government-led digital initiatives. It supports financial inclusion by extending financial services to underserved populations through familiar digital platforms.

However, the study also identifies challenges such as:

- regulatory compliance
- cybersecurity threats
- data privacy concerns
- dependency on third-party fintech service providers

These factors require robust governance and strategic financial controls.

Overall, the findings indicate that embedded finance is not merely a technological trend but a strategic transformation in financial management practices.

Conclusion

Embedded finance is redefining the future of financial management in digital platforms by integrating financial services directly into customer journeys. It has transformed traditional finance functions into technology-enabled, data-driven, and customer-focused processes.

The study concludes that embedded finance offers significant benefits in terms of convenience, efficiency, revenue diversification, and financial inclusion. It has become a strategic tool for digital businesses to enhance customer experience and strengthen competitive advantage.

At the same time, organizations must address regulatory, operational, and cybersecurity challenges to ensure sustainable growth.

The future of financial management will increasingly depend on interdisciplinary integration of finance, technology, analytics, and strategic management. Therefore, embedded finance is expected to remain a key driver of innovation and transformation in the digital economy.

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Awareness of ESG Investing Among Investors

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Abstract:

Environmental, social, and governance (ESG) investing has emerged as a significant trend in responsible finance. As global concerns over climate change, social justice, and corporate responsibility grow, ESG frameworks provide investors with the tools to align their investments with sustainable and ethical practices. This study explores the awareness of ESG investing among retail investors in the Pimpri-Chinchwad region. The objective is to understand how ESG factors influence investment decisions and the extent to which investors are informed about these principles. Using a descriptive research design, data was collected from 103 respondents including investors, students, and professionals through a structured questionnaire. The findings reveal a considerable gap in awareness, with many investors still prioritizing traditional financial returns over ESG considerations. The research highlights the need for enhanced investor education, regulatory transparency, and government incentives to promote ESG adoption. This study contributes to the broader dialogue on sustainable investing in emerging economies and offers actionable insights for financial institutions, policymakers, and educators.

Keywords: ESG Investing, Environmental-Social-Governance, Financial Sustainability, awareness of ESG.

1. Introduction

Environmental, Social, and Governance (ESG) investing has become a central theme in responsible finance amid rising global concerns about climate change, social justice, and ethical governance. ESG investing enables capital allocation aligned with sustainability, ethical practices, and long-term value creation.

As ESG principles become more integrated into financial markets, investor awareness and understanding remain inconsistent. While informed investors may prioritize ESG in their decisions, many still rely on traditional financial metrics like profitability and risk. A key barrier is the lack of standardized ESG evaluation frameworks, which causes confusion due to

inconsistent ratings and exposes investors to risks such as greenwashing.

Despite these challenges, the ESG investment market is expanding. Younger, socially conscious investors are increasingly driving demand, supported by global awareness of climate action and social equity. Studies show that companies with strong ESG performance often demonstrate better innovation, adaptability, and risk management making ESG investing financially compelling, not just ethically appealing. However, problems persist. Investors face difficulties due to poor data transparency, inconsistent ESG ratings, and a lack of clear disclosure regulations. Some also perceive ESG investing as complex or potentially less profitable.

In conclusion, while ESG investing is gaining momentum, significant gaps in investor knowledge and trust must be addressed. Raising awareness, improving transparency, and developing consistent rating systems are critical. Collaboration between governments, financial institutions, and educators is essential to promote ESG literacy and empower investors to align their financial goals with sustainable development.

1.1 Statement of the Problem

The main problem this study addresses is the lack of awareness of ESG (Environmental, Social, and Governance) investing among retail investors in the Pimpri-Chinchwad region. Many local investors in this region are not aware of ESG investing, even though ESG investing is becoming more and more popular worldwide. This could limit long-term financial rewards and impede the expansion of responsible investing. Furthermore, concerns like greenwashing (misleading claims about sustainability) and a general lack of education about the financial benefits of ESG investing further contribute to the hesitance among investors. This study aims to bridge this awareness gap, providing insights into the factors preventing investors in Pimpri-Chinchwad from engaging with ESG investing. This lack of knowledge may slow down the growth of responsible investing and affect long-term financial gains.

1.2 Purpose / Objectives of the Project

The purpose of this project is to find out how much people know about ESG investing and why they choose to invest (or not invest) in ESG products. Specifically, the objectives are:

1. To study awareness about ESG investing among investors.
2. To understand the impact of ESG awareness on investment decisions.

3. To identify key factors that influence ESG investment decisions.
4. To analyze challenges related to ESG investing.

1.3 Theoretical Framework

This study is grounded in Responsible Investing and Stakeholder Theory, forming the basis for analyzing how ESG (Environmental, Social, and Governance) awareness influences investor behavior in the Pimpri-Chinchwad region.

Responsible investing involves evaluating not just financial returns but also environmental and social impacts. ESG investing, a subset, incorporates environmental concerns (e.g., pollution, carbon footprint), social issues (e.g., labor practices, diversity, human rights), and governance standards (e.g., transparency, board structure) into investment decisions.

Research shows that companies with strong ESG practices often achieve better long-term performance and risk management. As a result, investors increasingly rely on ESG rating frameworks (like MSCI, Sustainalytics, CRISIL) to assess risks and opportunities that traditional financial analysis may overlook.

Stakeholder Theory, introduced by R. Edward Freeman (1984), asserts that companies should consider the interests of all stakeholders not just shareholders. These include employees, customers, communities, regulators, and the environment. Firms that address stakeholder concerns and demonstrate ethical governance build trust, fostering long-term value and sustainability.

Investors applying Stakeholder Theory to ESG strategies understand that financial success is tied to broader social and environmental responsibility. As such, they favor companies that demonstrate ethical behavior, fair treatment of workers, environmental responsibility, and strong governance practices.

In essence, ESG investing guided by Stakeholder Theory promotes long-term growth by aligning financial goals with broader societal and environmental values.

2. Review of the Literature

Parikh, Kumari, Johann, and Mladenović (2023) explored the relationship between ESG scores and stock returns for Indian companies. The study analyzed ESG ratings from rating agencies and their impact on the financial status of 225 companies listed in India, using a linear regression model. The results suggested that only the Governance (G) factor had a significant positive correlation with shareholder returns. The study concluded that, within a two-month period following the release of ESG scores, investors could expect higher returns. Interestingly, the Social (S) element was found to have little impact on returns, and the Environmental (E) factor was shown to have a negative influence. The authors emphasize that companies should focus on improving their governance processes to enhance shareholder wealth, as this factor had the most substantial impact on stock returns. This finding suggests that investors may prioritize governance factors when making investment decisions, and that companies that score well in governance practices tend to perform better financially.

Seth, Gupta, and Gupta (2021) discuss the growing popularity of ESG investments, especially among younger investors, particularly Millennials. According to a Morgan Stanley survey, 95% of Millennials are interested in ESG investment, indicating a shift in investment behavior driven by social consciousness. However, the study also highlights challenges in the ESG investing space. Critics, including economist Milton Friedman, argue that ESG investing leads to inefficiencies by focusing on non-financial aspects that do not contribute to immediate shareholder profits. Additionally, ESG investing requires more extensive research than traditional investments, increasing its cost. Despite these criticisms, the study acknowledges the growing importance of ESG factors in shaping the financial decisions of investors, particularly in emerging markets like India, where awareness and interest in ESG investments have been on the rise.

Pathak (2021) examines the role of ESG investments in shaping a sustainable future for India. The study highlights that in the fiscal year 2020–21, India saw a 76% increase in investments in low-carbon, environmentally friendly sectors such as renewable energy and transportation. The Association of Mutual Funds in India (AMFI) reported that the total assets under management (AUM) of ESG funds reached Rs. 9,516 crore by December 2020. This increase in AUM demonstrates the growing interest and potential of ESG investing in India, with significant growth in funds targeting renewable energy and environmental conservation.

The study suggests that ESG investing in India could play a critical role in promoting sustainable economic growth while addressing pressing environmental challenges.

Bhadauria (2022) provides a global perspective on ESG investing, noting that while ESG funds are becoming increasingly popular worldwide, India faces specific challenges. One of the significant obstacles is the data accuracy and reporting regulations related to ESG investments. The study mentions that ESG funds in India have not consistently met expectations due to these challenges. Despite initial enthusiasm, many investors have withdrawn from ESG funds after facing disappointing returns. Bhadauria argues that improving the data reporting infrastructure and regulatory frameworks would make ESG investing a more attractive option for investors. If these challenges are addressed, ESG funds could become a compelling alternative for investors seeking both financial returns and positive social impact.

Samant and Singh (2022) analyze the growth of ESG investing in India, particularly in the aftermath of the COVID-19 pandemic. The pandemic triggered a structural shift in investment behavior, with more investors turning to sustainable investing. The AUM of ESG funds in India rose from 0.10% to 0.33%, indicating a significant increase in interest. The authors note that the introduction of eight new ESG funds after January 2020, as well as the growing interest of asset management companies in ESG products, reflects the positive shift toward sustainable investing. This growth is seen as a sign that ESG investing is gaining momentum in India and could lead to sustainable growth and societal benefits, particularly if investors continue to prioritize long-term social and environmental outcomes.

Sarkar (2022) acknowledges the slow but steady growth of ESG funds in India compared to developed nations. The author points out that Indian investors have not yet fully embraced the idea of constructing investment portfolios that prioritize ESG factors, with many still focused primarily on financial returns. However, the Securities and Exchange Board of India (SEBI) is working to change this by promoting ESG indices for evaluating companies. Sarkar believes that as SEBI continues to advocate for the integration of ESG considerations into investment strategies, the Indian market will gradually adopt ESG investing practices. This regulatory push could help align investor behavior with global trends in sustainable finance.

its efforts to promote ESG indices for the assessment of businesses.

In summary, the literature reveals a rapidly growing interest in ESG investing, both globally and in India. While challenges such as data accuracy, regulatory frameworks, and investor

awareness remain, the overall trend points toward increasing integration of ESG factors in investment strategies. Studies show that the rise of ESG investments in India is driven by factors such as increased social consciousness, regulatory support, and growing awareness of the long-term value of sustainable investing. As the market matures and more ESG-focused financial products are introduced, it is likely that the role of ESG investing in India will continue to expand.

3. Methodology

3.1 Introduction

This chapter describes how the study was conducted. It explains the type of research used, how the participants were selected, how the data was collected, and what tools were used to analyze the data. The goal is to understand how much people know about ESG (Environmental, Social, and Governance) investing and whether they consider ESG factors when making investment decisions.

3.2 Research Design

The research design chosen for this study is a **descriptive research design**. This means it tries to describe how investors in the Pimpri-Chinchwad region are aware about ESG investing, what they know, and what factors affect their decisions. It doesn't test a specific hypothesis but tries to explore patterns and trends.

3.3 Sampling Design

3.3.1 Sampling Type

The study uses **non-probability sampling**, specifically **convenience sampling**, to collect data from investors, financial professionals, and students. This method is chosen because it allows easy access to willing participants and is cost-effective.

3.3.2 Sampling Method

The **convenience sampling method** is employed to gather responses from a diverse range of investors and professionals who are available and willing to participate. The method involves circulating a structured Google Form through social media platforms like WhatsApp, LinkedIn, and email to reach investors, students, and professionals in the region.

3.3 Sample Size

The sample size for the study was targeted at 100 respondents, which was considered sufficient to capture a wide range of perspectives and ensure statistical relevance. However,

the study received **103 responses**, slightly exceeding the target. The sample consists of individual investors, students, and professionals from the Pimpri-Chinchwad region.

3.4 Data Collection

Data collection is conducted using both **primary and secondary sources**:

- **Primary Data:** Collected using structured questionnaires.
- **Literature Review:** Relevant research papers and studies on ESG investing were reviewed to gather contextual insights and support the research framework.

3.5 Summary of the Research Instrument

The primary research instrument is a **structured questionnaire** designed to gather data on investor awareness of ESG investing. The questionnaire is divided into sections based on the respondent's familiarity with ESG:

1. **Basic Awareness:** For those unfamiliar with ESG concepts.
2. **Advanced Knowledge:** For respondents who are aware or already investing in ESG-compliant companies.

3.6 Tools for Data Analysis

The collected data was cleaned and analyzed using **Microsoft Excel and Google Sheets**. Charts and tables were created to visualize the data clearly. Percentage distribution were used to interpret responses.

4. Data Collection and Analysis

A total of 103 responses were gathered from individual investors, students, and professionals in the Pimpri-Chinchwad region through a structured questionnaire. The data was analysed using descriptive statistics, with percentage distributions used to interpret responses across all questions.

Demographic Profile of Respondents

The sample was predominantly male (75.70%), with female respondents accounting for 24.30%. The majority of respondents (85.40%) fell in the 18–30 age group, reflecting strong participation from younger individuals. Those in the 31–40 age bracket constituted 10.80%, while respondents above 40 years were minimal (3.80% combined), indicating limited engagement or awareness of ESG investing among older age groups. In terms of educational background, 50.50% of respondents held a postgraduate degree and 39.80% held an undergraduate degree, indicating a highly educated sample. A small proportion held professional qualifications such as CA, CFA, or CMA. Regarding occupation, 54.40% were

salaried employees, 34% were students, 8.70% were self-employed or business owners, and 1.90% were retired, with a single respondent identifying as a stockbroker.

Investment Behaviour

A large majority of respondents (71.80%) reported actively investing in stocks, mutual funds, or insurance. A further 18.40% indicated plans to begin investing but cited insufficient research as a barrier, while 9.80% were saving in bank accounts without any active investments. This pattern reveals a sample with generally strong investment engagement and a notable segment of prospective investors who could be influenced towards ESG products with adequate awareness.

ESG Awareness and Knowledge

When asked about their familiarity with ESG (Environmental, Social, and Governance) investing, only 29.10% of respondents stated they were well informed about the concept. The largest group, 43.70%, had heard of ESG investing but lacked in-depth knowledge. A significant 27.20% had never heard of ESG investing at all. Collectively, these figures indicate that over 70% of the sampled population has an insufficient or non-existent understanding of ESG principles, revealing a substantial awareness gap in the region.

Among respondents who had never heard of ESG investing (n=28), 78.60% expressed some interest in learning more, and 14.30% were very interested. Only 7.10% showed no interest whatsoever. This finding suggests a strong latent demand for ESG education and awareness initiatives among uninformed investors.

Sources of ESG Awareness

For those familiar with ESG (n=75), the primary source of awareness was social media platforms such as YouTube, Instagram, and LinkedIn (52%), followed by financial news or newspapers (38.70%). Personal or professional sources such as friends and colleagues (6.70%) and investment advisors (1.30%) played a much smaller role. This underscores the influential role of digital media in shaping financial awareness and highlights a gap in outreach from formal financial institutions and professional advisors.

Factors Influencing Investment Decisions

Respondents who were new to ESG or had limited knowledge (n=28) indicated that their investment priorities are primarily driven by financial considerations: high returns (85.70%), low risk (60.70%), and government tax benefits (57.10%). Only 10.70% valued ESG and sustainability practices as a primary factor, confirming that profit motives continue to outweigh ethical and environmental considerations for most beginner investors.

Among the more aware respondents (n=75), the most important factor influencing a decision to invest in ESG-based companies was strong financial returns (81.30%), followed by positive environmental and social impact (68%) and government incentives (62.70%). Transparency in ESG reporting (28%) and advice from financial experts (5.30%) ranked lower, indicating that financial performance and broader societal impact are the primary motivators, but institutional guidance and disclosure quality still need significant improvement.

Likelihood of Increased ESG Investment

When asked about their willingness to invest more in ESG funds if better returns or incentives were available, 54.70% of aware respondents indicated they were somewhat likely to do so, and 37.30% were very likely. Only 8% said they were unlikely to increase their ESG investments under such conditions. This strong positive response to incentive-driven investment suggests that financial rewards and policy support could serve as powerful levers for expanding ESG participation.

Barriers to ESG Investing

Respondents identified several key barriers preventing engagement with ESG investing. The limited availability of ESG investment options in the Indian market was cited most frequently (65.30%), followed closely by concerns over lower financial returns compared to conventional investments (64%) and a general lack of awareness about ESG concepts (61.30%). A preference for traditional investment avenues such as stocks and mutual funds was expressed by 29.30% of respondents. These barriers collectively suggest that the Indian ESG market is still maturing and requires both supply-side development (more ESG product options) and demand-side interventions (investor education and awareness campaigns).

Trust in ESG Ratings

The majority of respondents (78.70%) expressed moderate trust in ESG ratings when making investment decisions, while 13.30% reported high trust. However, 2.70% did not trust ESG ratings, and 5.30% were uncertain about their reliability. These results suggest that although ESG ratings are broadly accepted, skepticism persists, and there is clear room to enhance the credibility, consistency, and transparency of ESG rating frameworks in India.

Future Relevance of ESG Investing

When asked about the future importance of ESG investing, 60.20% of all respondents considered it somewhat important, particularly if it delivers good financial returns. A substantial 37.90% viewed ESG investing as very important given growing global sustainability concerns. Only 1.90% dismissed ESG as a passing trend. This near-universal

acknowledgment of ESG's relevance signals a shifting investor mindset, even if financial returns remain the dominant consideration.

Role of Government Incentives

Regarding the impact of government incentives or tax benefits on ESG investment decisions, 66% of respondents indicated that such measures would encourage them to some extent, and 32% believed it would significantly increase their investment in ESG funds. Only 2% felt government incentives would have no impact. This finding underlines the potential for policy interventions to meaningfully accelerate ESG adoption among retail investors.

Recommendations for Increasing ESG Awareness

On the question of what would best help raise awareness about ESG investing, 41.70% of respondents supported more awareness campaigns by financial institutions. Government initiatives to promote ESG investing were endorsed by 31.10%, while 24.30% felt that offering better returns on ESG investments would be the most effective approach. Only 2.90% cited greater transparency in ESG ratings as the primary solution. Overall, the findings point to a need for a multi-pronged approach combining institutional outreach, government policy support, and product-level improvements to make ESG investing more accessible and attractive to Indian retail investors.

5. Results, / Findings, And Suggestions

5.1 Results, / Findings:

Among the 103 respondents surveyed in Pimpri-Chinchwad, only 29.1% reported being well-informed about ESG investing, while 43.7% had heard of the concept but lacked an in-depth understanding. However, 27.2% of those surveyed had no prior knowledge of ESG. This breakdown makes it quite evident that even if ESG is starting to become more widely known, there is still a sizable knowledge gap. Many people still don't know what the term means or don't understand how it relates to the world of investments. These results highlight the need for focused educational initiatives and awareness-raising activities to close the knowledge gap about ESG investment in urbanizing and semi-urban areas such as Pimpri-Chinchwad.

Most people came across ESG investing through social media like YouTube, Instagram, or LinkedIn, while others learned about it from news or newspapers. When it comes to choosing where to invest, people mostly look for high returns and low risk. Only a few pay attention to whether a company is environmentally or socially responsible. Still, among those who know about ESG, many said they would be influenced to invest in such companies if they show good profits and help the environment or society.

People also shared the problems they face while thinking about ESG investing. The top issues were not knowing enough about it, thinking it gives lower returns, and not finding many options in India. While many said they “somewhat” trust ESG ratings, very few fully trust them. Interestingly, most people said they would be more likely to invest in ESG funds if the government offered tax benefits or some kind of reward. To spread more awareness, people suggested more campaigns by financial institutions, government promotions, and clear, honest information about ESG companies.

Overall, the study highlights a growing curiosity and positive outlook toward ESG investing, but also reveals a clear need for greater awareness, trust-building, and supportive government initiatives.

5.2 Suggestions:

To make ESG (Environmental, Social, and Governance) investing more popular and understandable among people, a few key steps can be taken. First, there should be more awareness campaigns through social media, colleges, seminars, and even TV or YouTube ads to explain what ESG investing is and why it matters. Since most people are influenced by platforms like Instagram, YouTube, and news articles, using these channels can make a big difference.

Many people want good returns, so if ESG funds can show strong performance or if the government offers tax benefits or incentives, more people will be willing to invest. Financial institutions and government bodies should come together to promote ESG-based schemes with clear benefits and returns.

There should be more transparency and simpler ESG ratings that are easy to understand, so that people can trust where their money is going. Tools and platforms should explain how companies are rated and why they qualify as ESG-compliant.

Investment apps and advisors should clearly show ESG options. If experts, teachers, and influencers talk more about ESG, people will trust it and start investing in a more responsible way.

6. Conclusion

This study highlights a shift in how retail investors in Pimpri-Chinchwad are beginning to view their investment decisions not just in terms of profits, but also in terms of impact. While ESG investing is still at an early stage here, there is a clear curiosity and willingness to

explore it further. The data reflects that today's investors are not completely unaware; rather, they are waiting for the right mix of clarity, confidence, and guidance. This signals a unique opportunity to shape responsible investing habits early on. ESG investing isn't just a trend—it's a growing mindset. With rising environmental concerns, social accountability, and demand for ethical governance, ESG principles are likely to become a standard part of future investment strategies in India. This research, though regional, adds valuable insights to the broader conversation about sustainable investing in emerging economies.

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A STUDY ON CRM STRATEGIES ADOPTED BY DMART AND THEIR INFLUENCE ON CUSTOMER RETENTION

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Abstract:

In the rapidly evolving and highly competitive retail landscape, Customer Relationship Management (CRM) has emerged as a critical strategic tool for enhancing customer retention and sustaining long-term business growth. This study investigates the CRM strategies adopted by DMart, one of India's leading retail chains, and examines their influence on customer retention. The research focuses on key CRM dimensions, including Everyday Low Pricing (EDLP), product availability, store layout, service quality, and digital engagement through DMart Ready. Additionally, the study integrates the Technology Acceptance Model (TAM) to assess customer adoption of digital services based on perceived usefulness and perceived ease of use.

The study employs a descriptive research design and utilizes both primary and secondary data sources. Primary data were collected from a sample of 200 respondents in Pune through a structured questionnaire using convenience sampling. Quantitative analysis techniques, including mean, median, mode, standard deviation, chi-square test, and Z-test, were applied to examine customer perceptions, preferences, and behavioral patterns. Secondary data were obtained from academic journals, books, and relevant online sources to support the theoretical framework.

The findings reveal that product availability, low pricing, and customer trust are the most influential factors driving customer retention at DMart. The results also indicate a high level of customer satisfaction, reflected in frequent store visits, strong brand preference, and positive word-of-mouth. However, operational challenges such as long billing queues, store crowding, and limited staff assistance were identified as areas requiring improvement. The study concludes that DMart's cost leadership and customer-centric CRM strategies significantly contribute to its success, while emphasizing the need for continuous enhancement in service delivery and digital integration to maintain competitive advantage.

Keywords: *Customer Relationship Management (CRM); Customer Retention; DMart; Everyday Low Pricing (EDLP); Retail Strategy; Customer Satisfaction; Technology Acceptance Model (TAM); Consumer Behavior; Indian Retail Sector*

I. INTRODUCTION

Customer Relationship Management (CRM) has become a fundamental component of modern business strategy, particularly in customer-driven industries such as retail. It encompasses a set of practices, technologies, and processes aimed at understanding customer needs, improving service quality, and building long-term relationships. In an era characterized by intense competition and increased customer expectations, organizations are shifting their focus from transactional marketing to relationship marketing. Customer retention, therefore, has gained significant importance, as retaining existing customers is more cost-effective and profitable than acquiring new ones. Moreover, loyal customers contribute to sustained revenue growth through repeat purchases and positive word-of-mouth.

The Indian retail sector has undergone substantial transformation in recent years due to rapid urbanization, rising disposable incomes, and changing consumer preferences. The emergence of organized retail chains and digital platforms has intensified competition, making it challenging for businesses to differentiate themselves. In this context, effective CRM strategies play a crucial role in enhancing customer satisfaction and loyalty. DMart, operated by Avenue Supermarts Ltd., has established itself as a prominent player in the Indian retail market by adopting a cost leadership strategy combined with efficient operational practices. Its focus on consistent low pricing (EDLP), high product availability, and simplified store layout has enabled the company to build strong customer trust and loyalty without relying heavily on promotional activities.

With the increasing integration of technology in retail, digital platforms have become an essential aspect of CRM. DMart Ready, the company's online shopping platform, offers customers convenience through features such as online ordering, home delivery, and store pickup. To understand customer acceptance of such technologies, this study incorporates the Technology Acceptance Model (TAM), which emphasizes perceived usefulness and perceived ease of use as key determinants of technology adoption. The primary objective of this research is to analyze the CRM strategies implemented by DMart and evaluate their impact on customer retention. By examining customer perceptions, satisfaction levels, and behavioral intentions, the study provides valuable insights into the effectiveness of CRM practices in the Indian retail sector and contributes to both academic research and managerial decision-making.

1.2 Objectives of the study:

1. To study CRM strategies adopted by DMart

2. To understand the impact of CRM on customer retention
3. To identify key success factors in DMart's CRM practices
4. To suggest improvements for better customer retention

1.3 Hypothesis of the study:

(H₀): There is no significant relationship between CRM strategies adopted by DMart and customer retention.

(H₁): Customer preferences towards CRM factors (price, availability, service, etc.) are equally distributed.

(H₀): There is a significant relationship between CRM strategies adopted by DMart and customer retention.

(H₂): Customer preferences are not equally distributed and are influenced by specific CRM factors such as pricing, availability, and service quality.

1.4 Significance of research:

- **Understanding Customer Retention:** Helps identify how CRM strategies influence customer loyalty and repeat purchases.
- **Practical Insights for Retailers:** Provides useful guidance for improving pricing, service quality, and customer experience.
- **Explains DMart's Success Model:** Highlights how simple strategies like low pricing and product availability drive retention.
- **Academic Contribution:** Adds to existing literature on CRM in the Indian retail sector.
- **Role of Technology:** Explains the importance of digital platforms (DMart Ready) using the TAM model.

1.5 Scope of Research:

- The study focuses on CRM strategies adopted by DMart and their impact on customer retention.
- It covers both offline (store experience) and online (DMart Ready) services.
- The research is based on 200 customer responses collected through a questionnaire.
- The study is limited to Pune city and a specific time period, so findings may not apply universally.
- It mainly analyzes customer satisfaction, preferences, and behavior in the retail context.

1.6 Research Methodology

Sr.no	Contents	Description
1	Universe	All DMart customers (store and DMart Ready users) in Pune city
2	Population	All DMart customers (including store and DMart Ready users) in Pune city
3	Sample frame	DMart store customers in Pune who were accessible and responded to the questionnaire
4	Sample size	200 Respondents
5	Type of Research	Descriptive Research
6	Research tools	Structured Questionnaire (Google Forms Survey)
7	Primary Sources	Online Questionnaire Survey
8	Secondary Sources	Journals, Articles, Research Papers, Company Websites, Books
9	Question type	Multiple Choice Questions
10	Data interpretation	Tables, Charts, Graphs, Percentage Analysis
11	Statistic tools	Mean, Median, Mode, Standard Deviation, Chi-square test, Z-test

(Source: Researchers' Compilation)

II. REVIEW OF LITERATURE

1. **Sharma (2016)**. Sharma explains that CRM helps retail businesses understand customer needs and improve satisfaction through proper data management. His study highlights that maintaining customer records, purchase history, and preferences allows businesses to offer personalized services. He also states that supermarkets using CRM tools can improve customer retention by identifying buying patterns and providing better service.¹

2. **Gupta, et.al (2016)**. Gupta explains that pricing strategies play an important role in customer loyalty, especially in price-sensitive markets like India. His study highlights that consistent low pricing builds trust among customers and reduces the chances of switching to competitors. This is relevant to DMart, which follows a low-price strategy to attract and retain customers.²

3. **Kumar (2017)**. V. Kumar explains that CRM strategies directly influence customer lifetime value and profitability. His study highlights that businesses focusing on long-term relationships rather than short-term sales can achieve sustainable growth. He also emphasizes

that loyal customers generate repeat business and reduce marketing costs.³

4. **Singh (2017)**. Singh explains that service quality is a major factor affecting customer satisfaction in retail stores. His study highlights that factors such as staff behavior, billing efficiency, and store cleanliness play an important role in creating a positive shopping experience. Good service encourages customers to revisit the store regularly.⁴

5. **Patel, et.al (2018)**. Patel explains that organized retail stores benefit from CRM systems by effectively managing customer data. His study highlights that analyzing customer preferences helps retailers stock the right products and offer relevant services. This improves customer satisfaction and increases the chances of repeat purchases.⁵

6. **Mehta (2018)**. Mehta explains that retaining existing customers is more cost-effective than acquiring new ones. His study highlights that loyal customers not only make frequent purchases but also promote the store through word-of-mouth. He also states that businesses should focus on building long-term relationships to improve profitability.⁶

7. **Verma (2019)**. Verma explains that store layout and convenience significantly influence customer experience. His study highlights that well-organized shelves, proper signage, and easy product availability reduce customer effort and improve satisfaction. A comfortable shopping environment leads to higher customer retention.⁷

8. **Sharma, et.al (2019)**. Sharma explains that proper communication and follow-up are essential for maintaining customer relationships. His study highlights that structured systems and timely interaction help businesses stay connected with customers. This improves engagement and builds trust over time.⁸

9. **Rao, et.al (2020)**. Rao explains that CRM technology improves communication and service efficiency in retail businesses. His study highlights that digital tools help in faster billing, inventory management, and customer interaction. This results in better customer experience and increased satisfaction.⁹

10. **Gupta (2020)**. Gupta explains that value for money is one of the most important factors influencing customer retention. His study highlights that customers prefer retailers who provide quality products at affordable prices. This increases trust and encourages repeat purchases.¹⁰

Research Gap

There are many studies on Customer Relationship Management (CRM) in retail, but most of them talk about general strategies and not about DMart specifically. Very few studies explain how DMart uses simple methods like low pricing (EDLP), proper store arrangement, and

product availability to keep customers loyal. Also, many researchers focus only on advanced technology, but DMart shows that even simple strategies can be very effective, which is not studied much. Another gap is that earlier studies usually look at either offline shopping or online shopping separately, but do not study both together like DMart stores and DMart Ready. There is also less use of the Technology Acceptance Model (TAM) to understand how customers feel about using online services. In addition, many studies are based on old data or theory and do not include real customer opinions. There is also limited research based on the Indian retail market, where customer behavior is different. Therefore, this study fills these gaps by focusing on DMart, using both online and offline aspects, applying TAM, and collecting real customer data to understand customer retention better.

III. SOURCES OF DATA COLLECTION

The data was collected using both primary and secondary methods.

Primary Data-Primary data means fresh data collected directly from the DMart customers.

In this study, data was collected through a Google Form questionnaire.

Secondary Data- Secondary data means information collected from existing sources such as:

- Books, journals, research papers
- Websites and articles related to CRM and retail
- Previous studies on DMart and CRM

IV. DATA ANALYSIS AND INTERPRETATION

Collected data framed in statistical format analysed with help of SPSS software.

Hypothesis Testing

Findings, conclusion and Recommendations as per the hypothesis testing

Objective 1: To study CRM strategies adopted by DMart

Finding the Hypothesis: Chi- Square Test

Step 1: Observed Values (O)

Sr. No.	Particulars	Count
1	Product availability	73
2	Every day low pricing	41
3	Store organization	37
4	Customer service	35
5	Online services	14

Step 2: Expected Values

$$E = \frac{\text{Total}}{\text{Number of categories}} = \frac{200}{5} = 40$$

Step 3: Chi-Square Formula

$$x^2 = \sum \frac{(O-E)^2}{E}$$

Step 4: Calculation

Particulars	O	E	(O-E)	(O-E) ²	(O-E) ² /E
Product availability	73	40	33	1089	27.23
Everyday low pricing	41	40	1	1	0.03
Store organization	37	40	(-3)	9	0.23
Customer service	35	40	(-5)	25	0.63
Online services	14	40	(-26)	676	16.90
Total					45.02

$$x^2 = 45.02$$

Step 5: Degree of Freedom

$$df = n - 1 = 5 - 1 = 4$$

Step 6: Critical Value ($\alpha=0.05$)

From Chi-square table:

$$X^2_{critical} = 9.488$$

Step 7: Final Decision

- Calculated $X^2 = 45.02$
- Critical $X^2 = 9.488$

Since $45.02 > 9.488$, we reject the null hypothesis (H_0).

Hypothesis Statement:

- **H_0 (Null Hypothesis):** Customer preferences are equally distributed across all factors.
- **H_1 (Alternative Hypothesis):** Customer preferences are not equally distributed across all factors.

Interpretation-

The product availability (36.3%) is the most important factor for customers. Low pricing (20.6%) is the second key reason for preference. Store organization (18.6%) and customer service (17.6%) have moderate impact. Online services (6.9%) have the least impact. Customers prefer DMart mainly for availability and low prices, while online services

need improvement.

Objective 2: To analyze the impact of CRM on customer retention

Finding the Hypothesis: Mean ,Median,Mode,Variance,Standard Deviation

Response category	No. of respondents	Percentage
Very likely	66	32.8%
Likely	57	28.4%
Neutral	36	18.1%
Unlikely	32	16.2%
Very unlikely	9	4.4%
Total	200	100%

Assuming a standard likert scale coding:

- Very unlikely=1
- Unlikely=2
- Neutral=3
- Likely=4
- Very likely=5

Total respondents=200

Calculation:

1.Mean (Average)

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{739}{200} = 3.695$$

2.Median

Cumulative frequencies:

Value	Frequency	Cumulative
1	9	9
2	32	41
3	36	77
4	57	134
5	66	200

$$\text{Median position} = \frac{200}{2} = 100^{th} \text{ value}$$

100th value lies in likely(4).

Median=4

3.Mode

Highest frequency=66

Mode =5 (Very likely)

4.Variance

$$\text{Variance} = \frac{\sum fx^2}{N} - (\text{Mean})^2 = 15.115 - (3.695)^2 = 15.115 - 13.653 = 1.462$$

Variance \approx 1.462

5.Standard Deviation

$$\text{SD} = \sqrt{1.462} \approx 1.21$$

Standard Deviation \approx 1.21

Hypothesis Statement:

1.Null Hypothesis (H₀)-There is no significant preference among respondents.

2.Alternative Hypothesis (H₁)-There is a significant preference among respondents.

- Mean = 3.70 (> 3), indicates positive tendency
- Median = 4 , majority responses fall under “Likely”
- Mode = 5 , most frequent response is “Very likely”

Since the average value is higher than neutral and most people chose higher options like “Likely” and “Very Likely”, it shows that respondents have a positive opinion. So, we reject the null hypothesis (H₀) and accept the alternative hypothesis (H₁), which means there is a clear positive response trend among the respondents.

Interpretation-

A majority of respondents (61.2%) are likely or very likely to switch stores if DMart prices increase. About 18.1% remain neutral, indicating uncertainty or moderate loyalty. Only 20.6% are unlikely or very unlikely to switch, showing a smaller loyal segment. Customers are highly price-sensitive, and an increase in prices may lead to a significant loss of customers.

Objective 3: To identify key success factors in DMart’s CRM practices

Finding the Hypothesis: Z Test

Step 1:

Sr. No.	Particulars	Count
1	Quality	84

2	Availability	40
3	Price	39
4	Store experience	26
5	Staff behaviour	11

Step 2: Proportion Calculation

Sample proportion (Quality)

$$P = \frac{84}{200} = 0.42$$

Assume average proportion (equal preference among 5 factor)

$$p_0 = \frac{1}{5} = 0.20$$

Step 3: Z Formula

$$Z = \frac{p - p_0}{\sqrt{p_0(1-p_0)/n}}$$

Step 4: Calculation

$$Z = \frac{0.42 - 0.20}{\sqrt{0.20 * \frac{0.80}{200}}}$$

$$Z = \frac{0.22}{0.0283}$$

$$Z \approx 7.77$$

Step 5: Decision

Critical Z value at 5% significance level = 1.96

Calculated Z = 7.77

Since $7.77 > 1.96$,

reject H_0

Hypothesis Statement:

- **H_0 (Null Hypothesis):** Preference for quality is not significantly higher than average
- **H_1 (Alternative Hypothesis):** Preference for quality is significantly higher than average

Interpretation -

Quality (42.2%) is the most influential factor in choosing DMart, indicating that customers prioritize product reliability and standards over other aspects. Availability (20.1%) and Price (19.6%) are the next key drivers, showing that customers value both product accessibility and affordability almost equally. Store experience (13.2%) has a moderate impact, suggesting that shopping environment matters but is not a primary decision factor. Staff behaviour (4.9%) has

the least influence, indicating it is relatively less important in customers' choice of DMart. Customers mainly choose DMart for quality products, supported by availability and competitive pricing, while experiential factors play a secondary role.

Objective 4: To suggest improvements for better customer retention

V. CONCLUSION

The study concludes that DMart has been successful in attracting and retaining customers mainly due to its strong focus on low pricing, good product availability, and consistent quality. Most customers prefer DMart over other retail stores and visit regularly, which shows a high level of customer loyalty and satisfaction. Factors like trust and convenience play a major role in retaining customers, as people feel confident about the products and services offered by DMart. The study also highlights that DMart's simple business approach, without heavy advertising, is effective in building long-term relationships with customers. However, the study also reveals some important challenges. Customers are highly price-sensitive, and any increase in prices may lead them to switch to other stores. In addition, issues such as long billing queues, crowded stores, and limited staff assistance affect the overall shopping experience. There is also a growing need to improve online services like DMart Ready and introduce loyalty programs to meet changing customer expectations. Overall, DMart's CRM strategies are effective in maintaining customer satisfaction and retention, but continuous improvement in service quality, store management, and customer engagement is necessary to stay competitive and achieve long-term growth.

Suggestion:

1. Improve Billing Process

DMart should focus on reducing long billing queues, which is a major problem faced by customers. This can be done by increasing the number of billing counters, especially during peak hours, and using faster billing systems. A smooth and quick billing process will save time and improve customer satisfaction.

2. Enhance Customer Service

Customer service plays an important role in creating a good shopping experience. DMart should train its staff to be polite, responsive, and helpful. Employees should be available on the floor to guide customers and solve their problems. Better service will increase customer satisfaction and loyalty.

3. Manage Store Crowding

Many customers face discomfort due to crowded stores. DMart should improve store layout and space management to allow easy movement. Proper arrangement of products and crowd control during busy hours will make shopping more convenient and stress-free.

4. Ensure Product Availability

Although product availability is a strong point of DMart, there are still some cases where products are out of stock. The company should use better inventory management to ensure that essential and high-demand products are always available. This will prevent customer dissatisfaction and encourage repeat visits.

5. Increase Product Variety

Customers prefer stores that offer a wide range of products. DMart should expand its product variety by adding more brands and options based on customer needs and preferences. This will give customers more choices and improve their overall shopping experience.

6. Improve DMart Ready Services

DMart Ready should be improved to provide better online shopping experience. The company can make the app more user-friendly, easy to navigate, and faster. Improving delivery services and reducing waiting time will encourage more customers to use this platform.

7. Introduce Loyalty Programs

Most customers are interested in loyalty programs. DMart should introduce reward points, discounts, or membership benefits for regular customers. This will make customers feel valued and motivate them to continue shopping at DMart.

8. Maintain Low Pricing Strategy

Customers are highly price-sensitive, and low prices are one of the main reasons for choosing DMart. The company should continue its Everyday Low Price (EDLP) strategy and avoid sudden price increases. Maintaining affordable pricing will help in retaining customers and building long-term trust.

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“Analysis of Flexible Work Policies & Their Effect on Employee Satisfaction at Manufacturing Sector”

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Abstract

Flexible working arrangements have become an essential part of the Human Resource Management function in recent years, especially since the COVID-19 pandemic, when flexible working arrangements have been increasingly adopted by companies to provide employees with a more flexible work environment. The focus of this study is on the use of flexible work arrangements at In Manufacturing Sector and their impact on employee satisfaction. This study used both descriptive and analytical research methods. Primary quantitative data were collected using structured questionnaires from 100 employees at In Manufacturing Sector. A number of different statistical analyses were used to analyse the data, including percentages, descriptive statistics, chi-square (X^2), and correlational analysis. In general, the results indicate that employees have higher satisfaction, better balance between work and life, higher motivation, and increased productivity when their organisation has a flexible working policy. Chi-square tests confirmed that FWP's ($X^2 = 89.012$, $p < 0.05$) were statistically significant in terms of employee satisfaction. The research also provided some insights into the difficulties faced by employees in relation to using and implementing FWP successfully; these included difficulties with communicating and collaborating remotely, as well as being distracted by things in their home while working. Consequently, while FWP's help to increase employee satisfaction significantly, in order for those policies to be promoted and used effectively, they will need to be implemented properly by the organisation.

Keywords: [*Flexible Work Policy, Employee Satisfaction, Hybrid Work, Work-Life Balance, Remote Work, Human Resource Management.*]

1. Introduction

Flexible work policies refer to organizational practices that provide employees with greater control over their working hours, work location, and methods of completing tasks. These arrangements include remote work, hybrid work models, compressed workweeks, staggered working hours, and flexible scheduling systems. In recent years, flexible work has emerged as

a key component of modern Human Resource Management (HRM), aimed at improving employee well-being, engagement, and organizational performance.

The growing importance of flexible work arrangements can be understood through established motivational and job design theories. According to Hackman and Oldham's Job Characteristics Model, autonomy is a critical factor that enhances intrinsic motivation and job satisfaction. Similarly, Herzberg's Two-Factor Theory highlights that favorable working conditions act as hygiene factors that reduce dissatisfaction and contribute to overall employee satisfaction. Flexible work policies directly address these psychological and organizational needs by allowing employees to manage their work in a more autonomous and balanced manner.

In the contemporary business environment, flexibility has become not just a benefit but a strategic HR tool. Organizations increasingly adopt flexible work practices to attract and retain talent, reduce turnover, enhance productivity, and improve employee engagement. With rapid advancements in digital technologies, cloud-based systems, and communication tools, organizations are now able to operate effectively in decentralized and hybrid work environments.

The COVID-19 pandemic further accelerated the global adoption of flexible work arrangements. What initially began as an emergency response to ensure business continuity during lockdowns has now evolved into a long-term workplace transformation. Many organizations realized that productivity could be maintained—and in some cases improved—even when employees worked remotely. As a result, hybrid and flexible work models have become an integral part of post-pandemic organizational strategies across various industries, including the manufacturing sector.

Employee satisfaction has therefore become a central focus in evaluating the effectiveness of flexible work arrangements. Satisfaction not only influences employee motivation and productivity but also affects retention, organizational commitment, and overall performance. In this context, understanding the relationship between flexible work policies and employee satisfaction is essential for designing effective HR strategies.

This study focuses on examining the implementation of flexible work policies in the manufacturing sector and analyzing their impact on employee satisfaction. It also aims to understand how flexibility influences key employee outcomes such as motivation, productivity, work-life balance, and organizational commitment, while also identifying the practical challenges associated with flexible working environments.

Background of the Study

The nature of work has significantly evolved over the past few decades due to rapid technological advancements, globalization, and changing employee expectations. Traditionally, organizations followed rigid work structures characterized by fixed working hours, centralized workplaces, and direct supervision. However, with the rise of digital technologies, cloud computing, and advanced communication tools, organizations have gradually shifted toward more flexible and adaptive work systems. In Human Resource Management, this shift has led to the increasing adoption of employee-centric practices aimed at improving productivity, engagement, and well-being. Among these, flexible work arrangements such as remote work, hybrid models, flexible schedules, and compressed workweeks have gained considerable importance as they provide employees with greater autonomy and control over their work environment.

The COVID-19 pandemic acted as a major turning point in accelerating the adoption of flexible work arrangements across industries worldwide. During the pandemic, organizations were compelled to adopt remote working models to maintain business continuity, which demonstrated that many roles could be performed effectively outside traditional office settings. Following this experience, both employers and employees became more receptive to flexible and hybrid work models. Post-pandemic, many organizations have continued to integrate flexible work practices into their long-term HR strategies, recognizing their potential to enhance employee satisfaction, reduce stress, improve work-life balance, and maintain productivity. Even traditionally structured sectors such as manufacturing have begun incorporating flexibility, particularly in non-production roles.

Despite these advantages, flexible work arrangements also present certain challenges that need careful consideration. Issues such as communication barriers, reduced face-to-face interaction, coordination difficulties, and potential feelings of isolation among employees have been widely observed. These challenges highlight the need for effective implementation strategies, strong technological support, and well-structured communication systems. In this context, it becomes important to study the impact of flexible work policies on employee satisfaction to understand how organizations can balance flexibility with operational efficiency. This study therefore aims to analyze the influence of flexible work arrangements on employee satisfaction in the manufacturing sector, along with identifying both the benefits and challenges associated with their implementation.

2. Literature Review

- Bloom (2015) found that remote work improves productivity and job satisfaction by reducing commuting stress.
- Gajendran and Harrison (2007) observed that telecommuting increases job satisfaction and reduces employees' turnover intention.
- Golden (2012) stated that moderate levels of telecommuting enhance employee engagement, whereas excessive remote work may reduce social interaction.
- Allen et al. (2013) found that flexible work arrangements significantly reduce work-family conflict and improve psychological well-being.
- McKinsey (2021) and Deloitte (2022) highlighted hybrid work as the future organizational model, balancing flexibility with collaboration and efficiency.

In addition to the above studies, recent research in organizational behavior emphasizes that flexible work arrangements have a strong influence on employee motivation, autonomy, and overall organizational commitment. Studies conducted in the post-pandemic environment suggest that employees who are given control over their work schedules tend to demonstrate higher levels of trust toward their organizations and show improved psychological ownership of their roles. Furthermore, flexibility has been associated with reduced workplace stress and burnout, as employees are better able to manage personal and professional responsibilities. However, researchers also highlight that the effectiveness of flexible work depends heavily on organizational culture, leadership support, and the availability of digital infrastructure. Without proper guidance and structured policies, flexibility may lead to reduced coordination and lower team cohesion.

Moreover, emerging literature also focuses on the challenges and limitations associated with long-term remote and hybrid work models. While flexibility enhances individual productivity, it may negatively impact informal communication, teamwork, and innovation if not properly managed. Studies indicate that employees working in highly remote environments may experience feelings of isolation, reduced engagement, and weaker organizational identity over time. To address these issues, organizations are increasingly adopting hybrid work models that combine the benefits of remote work with periodic in-office collaboration. This balanced approach is considered effective in maintaining both employee satisfaction and organizational performance. Overall, the literature suggests that while flexible work policies are highly

beneficial, their success largely depends on structured implementation and continuous managerial support.

Objectives of the Study

1. To evaluate the level of awareness and extent of implementation of flexible work policies among employees at In Manufacturing Sector.
2. To analyse the impact of flexible work policies on key dimensions of employee experience, including job satisfaction, motivation, productivity, and work-life balance.
3. To examine the statistical relationship between flexible work policies and employee satisfaction and determine the significance of the association

Hypothesis Statement:

This study examines whether flexible work policies have a significant impact on employee satisfaction in the manufacturing sector. It also tests whether a positive relationship exists between flexible work arrangements and employee satisfaction.

Hypotheses for the Study

1. Null Hypothesis (H₀):

There is no significant relationship between flexible work policies and employee satisfaction in the manufacturing sector.

2. Alternative Hypothesis (H₁):

There is a significant positive relationship between flexible work policies and employee satisfaction in the manufacturing sector.

3. Research Methodology

This study follows a descriptive and analytical research design to examine the relationship between flexible work policies and employee satisfaction. The descriptive approach helps understand employee perceptions, while the analytical approach evaluates statistical relationships between variables.

Primary data were collected from 100 employees of In Manufacturing Sector. using a structured questionnaire based on Likert scale responses. The questionnaire measured awareness, satisfaction, motivation, productivity, and challenges related to flexible work arrangements. Secondary data were collected from journals, books, and online sources.

Convenience sampling was used for data collection. The independent variable is flexible work policies, while the dependent variable is employee satisfaction. Data were analysed using percentage analysis, descriptive statistics, correlation analysis, and Chi-Square test. SPSS software was used, and the significance level was set at 5% ($p < 0.05$).

4. Data Analysis:

The study aims to examine the relationship between flexible work policies and employee satisfaction. To achieve this, the following hypotheses are formulated:

Hypotheses Considered for study:

Hypothesis Type	Statement
Null Hypothesis (H_0)	No significant relationship between flexible work policies and employee satisfaction
Alternative Hypothesis (H_1)	Significant positive relationship exists between flexible work policies and employee satisfaction

Method of Analysis

A quantitative research methods approach was used to evaluate the relationship between flexible working policies and employee satisfaction. Respondents' data were systematically coded and analysed using various forms of statistical methods. Descriptive statistics such as percentages and percentages were used to summarise respondent awareness about flexible working, preferences, levels of satisfaction and challenges with flexible working.

Data analyses were conducted by chi-square testing to test hypotheses; however, chi-square testing can be used to assess any significant relationship between two categorical variables (that is, flexible working policy vs employee satisfaction). A significance level of 5% ($p < 0.05$) was established to determine whether a significant relationship between flexible working policies and employee satisfaction exists.

The chi-square statistic value calculated for each hypothesis and the corresponding p-value standard was compared to the critical level of significance to determine whether to reject or accept the null hypothesis. All statistical analysis was completed using SPSS allowing for reliability and accuracy of the data analysis conducted.

4.1 Awareness and Work Patterns

Category	Description	Percentage (%)
Awareness	Employees aware of flexible work policies	88%
Availability	Employees reporting flexible working hours	70%

Accessibility	Employees with work-from-home options	60%
Preference	Employees preferring hybrid work model	40%

Interpretation:

The data indicates a high level of awareness (88%) regarding flexible work policies among employees. A majority also report access to flexible working hours (70%) and work-from-home options (60%), reflecting moderate organizational support for flexibility. Among work models, hybrid work emerges as the most preferred option (40%), suggesting a balanced inclination toward both remote and in-office work. Overall, the findings highlight a positive trend toward flexible work adoption, though preference levels suggest scope for further alignment with employee expectations.

4.2 Employee Satisfaction

Category	Description	Percentage (%)
Satisfaction	Employees satisfied with current work schedule	70%
Job Satisfaction	Employees reporting increased satisfaction due to flexibility	75%
Motivation	Employees feeling more motivated	74%

Interpretation:

The findings indicate a generally positive employee outlook, with 70% expressing satisfaction with their current work schedule. A higher proportion (75%) report improved job satisfaction due to flexible work arrangements, highlighting its significant impact. Additionally, 74% of employees feel more motivated, suggesting that flexibility plays a key role in enhancing both satisfaction and productivity.

4.3 Work-Life Balance and Productivity

Category	Description	Percentage (%)
Work-Life Balance	Employees reporting improved work-life balance	76%
Productivity	Employees feeling more productive	72%
Stress Reduction	Employees reporting reduced stress levels	73%

Interpretation:

The data suggests that flexible work arrangements have a positive impact on employees' overall well-being and efficiency. A significant 76% report improved work-life balance, while 72% feel more productive in their roles. Additionally, 73% experience reduced stress levels, indicating that flexibility contributes to a healthier and more supportive work environment.

4.4 Communication and Challenges

Category	Description	Percentage (%)
Communication	Employees reporting communication issues	50%
Distractions	Employees experiencing distractions at home	60%
Disconnection	Employees feeling disconnected in remote settings	40%

Interpretation:

The findings highlight notable challenges associated with remote work. Half of the employees (50%) report communication difficulties, while a higher proportion (60%) face distractions in home environments. Additionally, 40% feel a sense of disconnection, indicating potential concerns related to collaboration and team engagement in remote settings.

5. Hypothesis Testing**❖ Hypotheses**

H₀: No significant relationship between flexible work policies and employee satisfaction

H₁: Significant positive relationship exists between flexible work policies and employee satisfaction

1. Normality

As a non-parametric assessment, the Chi-Square test was utilized because it does not assume a normal distribution of the underlying data, making it appropriate for the categorical nature of this study.

2. Validity

The high Chi-Square value and corresponding significance level support the statistical conclusion validity, suggesting that the observed patterns are not due to random sampling error.

3. Reliability

While the statistical significance indicates a robust relationship, the consistency of these findings across the sample suggests a high degree of empirical reliability within the tested model.

❖ Test Used: Chi-Square Test

Statistic	Value
Chi-Square (χ^2)	48.732
p-value	0.001 (< 0.05)

Interpretation:

The chi-square test result ($\chi^2 = 48.732$) indicates a strong association between the variables under study. **The p-value is less than 0.05**, which means the result is statistically significant. Therefore, the null hypothesis is rejected, suggesting that there is a meaningful relationship between the variables analyzed.

❖ Result

‘The null hypothesis is rejected. There is a significant positive relationship between flexible work policies and employee satisfaction.’

6. Findings and Discussion

The study finds that workers are generally more satisfied, engaged, motivated, and productive under flexible working arrangements. These outcomes can be understood through Herzberg’s Two-Factor Theory, which suggests that factors such as flexible work conditions contribute to job satisfaction and intrinsic motivation. Similarly, Hackman and Oldham’s Job Characteristics Model highlights autonomy as a key element of effective job design, leading to greater psychological meaningfulness and improved performance. The results therefore

align with these theories, indicating that flexible working options have a positive influence on employee attitudes and behaviours.

The preference for hybrid work further supports work design theories that emphasize the value of combining structure and flexibility. Hybrid arrangements allow employees to benefit from both in-person collaboration and independent remote work, which can enhance engagement and reduce burnout. This balanced approach reflects contemporary organizational behaviour perspectives that prioritize employee-centered job design and improved overall well-being and productivity.

However, the study also identifies several challenges, including poor communication, home-based distractions, and reduced team interaction. These issues can be explained through Social Presence Theory, which suggests that reduced face-to-face contact weakens interpersonal relationships and teamwork, and Media Richness Theory, which argues that digital communication tools may not fully replicate the effectiveness of in-person interaction. These challenges highlight the need for structured communication systems, effective digital collaboration tools, and strong managerial support. Overall, while flexible work policies offer significant benefits, their success depends on maintaining a balance between employee autonomy and effective organizational coordination.

7. Conclusion

In this research, it was found that flexible working arrangements play an important role in increasing employee satisfaction and, consequently, organizational effectiveness. The findings of this article are consistent with Herzberg's two-factor theory, as flexibility is an intrinsic motivator that increases satisfaction, motivation, and commitment among employees. Increased autonomy and flexibility in the workplace contribute to improved work-life balance, lower levels of stress, and greater productivity for employees.

The rising importance of employee-centric work systems is indicative of the shift towards employee-focused organizations. However, flexibility alone does not guarantee optimal results; As noted by contingency theory, variables associated with organizational effectiveness include alignment of work practices with operational needs and alignment of work practices with structures established in the workplace. Thus, the existence of strong

communication systems, managerial support, and a strong technological infrastructure are needed in order to facilitate coordination within flexible and hybrid work arrangements.

Furthermore, Hybrid Work Models are also considered to be the most effective way to balance autonomy with collaboration (work design theory). In conclusion, it can be concluded that flexible working arrangements will be a strategic HR tool; the success of flexible working arrangements will depend on structured implementation in line with both organizational objectives and the needs of employees.

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**Spatial Distribution of Avian Fauna in the Context of Anthropogenic Activities
(A Study Conducted in Karjat Taluka, Ahmednagar) Ms. Shubhangi Bardade
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Abstract:

This study investigated bird community diversity as it relates to diet and anthropogenic noise in a semi-arid area of Karjat Tehsil in district Ahmednagar. The bird's habitat their diet and anthropogenic noise in the Karjat were used as research objects. It was assessed by point count method over a period of 3 months from February 2022 to May 2022. The study was divided into 5 different habitats that are: Agriculture, forest, wetland, grassland and residential area. A total number of 91 bird species belonging to 45 families and 16 orders were recorded during the study covering an area of about 51 km². Among the 91 species of birds 89 were resident, 10 were Migratory species. According to IUCN status of birds, 88 species were in the least concern, 2 were in the near threatened list and 1 was the vulnerable. Maximum number of found individual's diet was insectivores and granivores. In the noise range of 41 to 60 dB the greatest number of observations were discovered. The main conclusion from the data is that noise is not affected on birds, but diet does.

Keywords: *birds, habitat, species, diet, noise.*

Introduction:

A habitat is a place where an organism makes its home. It is the physical, geographical and biological phenomenon where organisms live and in which the other elements of the environment are encountered (Krebs, 1985; Jones, 1987). Habitat and organisms show a tremendous relationship with each other as habitat meets all the environmental conditions an organism needs to survive. This might consist of gathering a food to finding a potential mate for successful reproduction. For an animal, that needs to find and gather food, select a mate and successfully reproduce.

Like other organisms which are present in the environment, birds are one of the most important factors as well as they have large number of species in the nature, and they possess a variety of characteristics making them particularly effective contributor of many ecosystem services. World is blessed with avian diversity where smallest bird like Bee humming sizes 5

cm and largest bird like Ostrich sizes 2.5

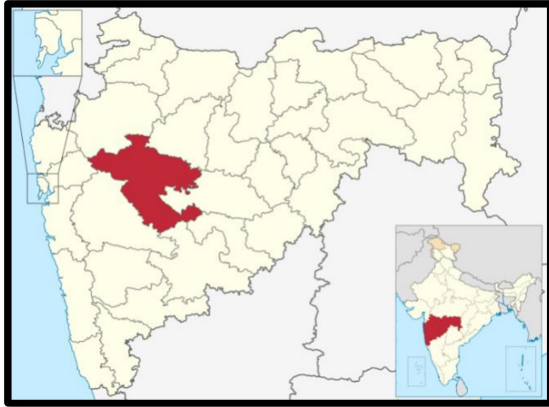
m. They are ecologically versatile and live in all types of habitats. (Richa Singh July,2018)They play an important role in maintaining the balance of the ecosystem and biodiversity. It is also related to habitat structure, vegetation diversity, plant complexity and other factors. Bio-indicators are those species that are used to determine the environmental health conditions, and they can able capable to appraise the environment's integrity using their various biological function. (Gupta May,2022)" Scavengers like are good indicators. e.g. – The Vultures specialize in eating carrion and highly efficient at cleaning up a carcass.

But disturbance is a key factor in most natural environments and, globally, disturbance regimes are changing, driven by increased anthropogenic influences, including climate change. (Ben J.O. Robinson a 2020) One of the most significant effects of urbanization may be loss of ecological diversity, eliminating species whose habitats are altered or removed. (DARREN S. PROPPE* 2013) Birds constitute one of the common faunas of all habitat types, and because they are responsive to change, their diversity and abundance can reflect ecological trends in other biodiversity. Human development is distinguished by high levels of low-frequency noise. The rapid development in human activities nowadays induce the noise that suspend the acoustic communication as well as behaviour of birds.

Materials and Method:

Study Area- Karjat is a town which is 75 km from its district Ahmednagar in Indian state of Maharashtra. It extends between 18.3636 to 18.3036 North latitudes and 74.5829 to 75.0257 East Longitudes with average 594 meters altitude above sea level. Karjat Municipal Council has total area extension of 51 sq. kms. The population of Karjat is around 2,00,000. The average temperature of Karjat is 25.80 C and average rainfall is 785 mm. Karjat is a dry region prone to droughts. The semi-arid type habitat is affecting on abundance, density of many plant as well as animal species. (Hrishikesh Khodadea 2019) Most people from this Tehsil are dependent on agriculture-based income. (Emily A. Gilbert Mar,2017)

Maps of the Study Area:



Materials:

The instruments used for study, Binocular (Olympus 10x50), Digital sound level meter, GPS Garmin eTrex 30x (Global Positioning System), DSLR Canon EOS 1200D with 70-300mm lens. Data sheets etc. Software: Google earth pro software, MS excel,

Methodology:

The study site was in Karjat Tehsil. The grids were plotted in the study area. The point count method was used to identify the birds. The 5 habitats were identified. Later the data was analysed using MS excel. The boundary of study area was marked on Google Earth Pro Software and Google Earth Pro Software was used for making KML (Keyhole Markup Language) file of Karjat area. Later grids were plotted using same software. Every grid is around 2 sq.km. In every grid 5 points were plotted. The study was conducted using the direct visual method. The observations were mainly carried out in the morning between 7 am to 10 am and evening from 4 to 6 pm. The birds were observed using a binocular (Olympus 10x50). Only sighted species were included in the Checklist of the study area. The GPS was used to take area location and avoid double counting. To avoid disturbance during the count, a waiting period of 2 to 5 min prior to counting was applied. Birds with their food habitats were classified upon their diet whether they are insectivores, frugivores, carnivores, nectarivores, granivores. The Book of Indian Birds by Salim Ali were considered to know the exact feeding habits of each species. The effect of anthropogenic noise in every site was measured using digital sound level meter. The same point method was used. The Noise was measured on every point around 50 meters of radius. The measurements were taken on field notebook.

Observations:



		Ashy Drongo, Black-headed Munia, Black-lored Yellow Tit, Common Chiffchaff, Common Quail, Common Sandpiper, Lesser
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IUCN Status:

Least Concern	Little Grebe, Little Cormorant, Little Egret, Great Egret, Intermediate Egret, Grey Heron Purple Heron, Western cattle Egret, Indian-pond Heron, White-necked Stork, Indian Black Ibis, Indian Spot-billed Duck, Black-winged Kite ,Shikra, Jungle Bush Quail, Indian Peafowl, White-breasted Waterhen, Purple Swamphen, Eurasian Coot, Greater Painted Snipe, Yellow-wattled Lapwing, Red-wattled Lapwing, Common Sandpiper, Black-winged Stilt, Rock Pigeon, Little Brown Dove, Spotted Dove, Eurasian Collared Dove, Rose-ringed parakeet Plum-headed Parakeet, Greater Coucal, Asian Koel, Ashy-crowned Sparrow Lark, Common Kingfisher, White-
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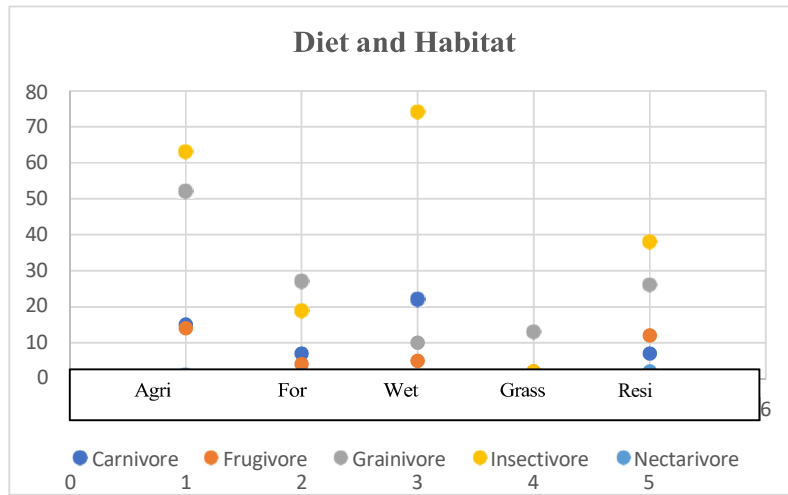
	throated Kingfisher, Coppersmith Barbet, Rufous-tailed Lark, Wire- tailed Swallow, Grey Wagtail Paddy field Pipit, Tree Pipit, Small Minivet Common Wood shrike, Red-whiskered Bulbul, Red-vented bulbul, Common Iora, Bay- backed Shrike, Oriental Magpie Robin, Indian Robin, Common Stonechat, Pied Bush chat, Large Grey Babbler, Ashy Prinia, Great Tit, Purple Sunbird, Indian Silver bill, House Sparrow, Brahminy Starling, Common Myna, Black Drango, House Crow, Jungle Crow
--	--

Diet and Habitat of birds:

Sr No	Diet	Agricultur e	Forest	Wetlan d	Grasslan d	Residentia l
1	Carnivore	15	7	22	1	7
2	Frugivore	14	4	5	2	12
3	Granivore	52	27	10	13	26
4	Insectivore	63	19	74	2	38
5	Nectarivor	1	1	0	0	2

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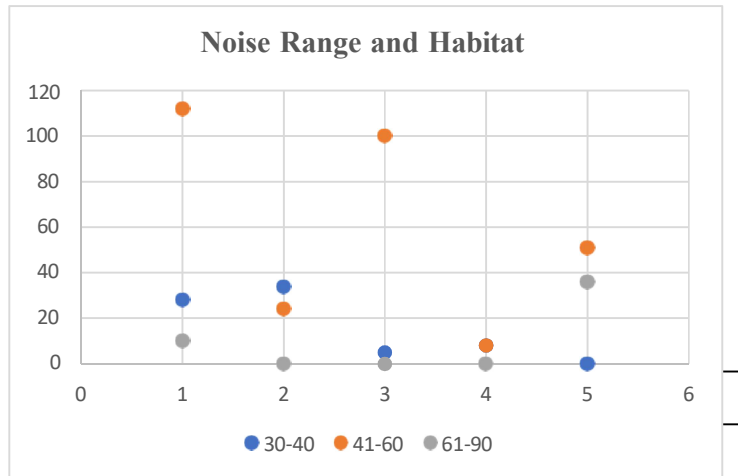
This table shows the observations of birds with respect to diet and habitat.



Noise Range and Habitat of Birds:

Sr. No	Noise range	Agriculture	Forest	Wetland	Grassland	Residential
1.	30 to 40 dB	28	34	5	8	0
2.	41 to 60 dB	106	24	100	8	51
3.	61 to 90 dB	10	0	0	0	36

This table shows observations of birds for noise range and habitat.



Result and Conclusion:

During the survey, a total of 85 Species of birds belonging to 45 families and 16 orders have been recorded from the study area. Out of which 76 were resident, 9 were Migratory species. Jungle crow, Common Myna, Black-winged stilt, Cormorants are the dominant species which are present there. In migratory birds grey wagtail, yellow wagtail, Common Chiffchaff, Tree pipit, Black-winged stilt, Common sandpiper, Common wood sandpiper was included. Among the 85 species of birds, 82 species were in the least concern, 2 were in the near threatened list and 1 was the vulnerable. In the study area 5 habitats were discovered: Agriculture, forest, wetland, grassland, residential. Maximum number of found individual's diet was insectivores, granivores are 117, frugivores are 29, carnivores are 35, nectarivores are 4.

When analysing individual species in the study area according to its food habits,

Insectivores are dominated followed by Granivore and so on as shown in the Figure No.1. In 40-60 dB noise range total 80 species from all 16 families were recorded, most species from all families were recorded in this noise range, that indicates the 40-60 dB noise range has not impacted on bird activities and diversity, In the 60-90 dB noise range, comparatively a smaller number of species (26 species from 8 orders) was found, as the noise range increased the activity of birds and diversity of species was found decreased. Higher noise range and human interference resulted into decrease in the bird activity. Surprisingly, the main conclusion from the data is that noise is not affected on birds, but diet does. Most of the birds

depend upon the food in the form of seeds, grains, weeds or insects. From our data, we can determine that there was a high level of diversity in our habitat.

Discussion:

We believe that the birds would choose this habitat because it might have the food resources they need. Different species of birds have different nutritional needs and needs for cover; they have been adapted for a specific habitat. The food availability, feeding, and habitats may be the main factors of variation in the birds' population slightly than any other risk. In our study it was found that feeding and habitat availability play important roles in the diversity and distribution of the avian fauna of area. Birds are normally found foraging in open cultivated tracks and grasslands intermixed with scrub forests.

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The author sincerely expresses deep gratitude to Professor Mr. Dnyanesh Rathod for his continuous guidance and insightful suggestions throughout this research. The author is also sincerely thankful to Professor Mr. Santosh Dalvi for imparting valuable knowledge and guidance in the study of avian fauna.

Many Birds have alternate food diets like a Coppersmith Barbet also feeds on Insects apart from its predominant food of Fruits. The Black-winged stilts are indicator of polluted water. In the study period large number of Black-winged Stilts are observed near wetland, that the water is polluted. The agriculture is indeed rich in Insects and when the for-agriculture insects are good in numbers the agriculture is also very healthy. In the result wetland is showing verity of birds because wetland have all type of food and suitable habitat for their survival.

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“A Study of Supply Chain Optimization for Perishable Food Products”

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Abstract

The study titled “Supply Chain Optimization for Perishable Food Products” was conducted at Food Cognics India Pvt. Ltd., Pune, to analyze and improve the efficiency of supply chain processes for perishable goods. The research adopted a descriptive and analytical design using both primary and secondary data. Primary data were collected through questionnaires and interviews with 30 respondents, while secondary data were sourced from company reports, journals, and official records.

The findings revealed that the company has an efficient supply chain system, particularly in logistics management, inventory control, and cold chain maintenance. However, challenges such as limited digital integration, transportation delays, and partial automation of monitoring systems were identified. Garrett Score analysis highlighted lack of advanced cold chain infrastructure, poor transport facilities, and high logistics cost as major issues.

The study recommends adoption of IoT-based monitoring, ERP integration, AI-driven demand forecasting, and Transportation Management Systems. Overall, technological modernization and sustainable practices can further optimize operations, reduce wastage, improve customer satisfaction, and enhance competitiveness.

Keywords: [Supply Chain Optimization, Perishable Food Products, Cold Chain Management, Logistics Efficiency]

1] Introduction

The supply chain plays a critical role in ensuring the smooth flow of goods and services from suppliers to end consumers. In the case of perishable food products, the supply chain becomes more complex due to limited shelf life, temperature sensitivity, and the need for rapid transportation and storage. Efficient supply chain optimization helps minimize waste, reduce costs, and maintain product freshness factors that directly influence consumer satisfaction and profitability.

1.1] Concept of Supply Chain Management (SCM)

Supply Chain Management (SCM) is a comprehensive approach to managing the flow of goods, information, and finances as they move from the point of origin to the end consumer. It integrates various functions such as procurement, production, warehousing, logistics, and

customer service to ensure that products are delivered efficiently, on time, and at optimal cost. The fundamental objective of SCM is to create value for customers while achieving sustainable competitive advantage for the organization.

1.2] Perishable Food Supply Chain

The **Perishable Food Supply Chain (PFSC)** refers to the network of interconnected processes involved in the production, handling, storage, transportation, and distribution of food items that have a **limited shelf life** and require specific conditions to maintain their quality and safety. Examples of perishable food products include dairy items, fruits, vegetables, meat, seafood, and bakery goods. Managing such a supply chain is more complex and time-sensitive than that of non-perishable goods due to the risk of spoilage, contamination, and wastage.

The **primary objective** of a PFSC is to ensure that fresh products reach consumers in optimal condition, while minimizing losses and maintaining food safety standards. This involves not only efficient logistics and coordination but also the use of specialized infrastructure such as **cold storage facilities, refrigerated vehicles, and temperature monitoring systems**. Any disruption or delay at any stage can lead to significant product degradation, financial loss, and customer dissatisfaction.

2] Statement of the Problem

Perishable food products require efficient and time-sensitive supply chain management to maintain product quality and reduce spoilage. At Food Cognics Pvt. Ltd., challenges such as delays in transportation, inadequate storage conditions, and poor coordination between suppliers and distributors can lead to wastage and higher operational costs. The existing supply chain system needs optimization to enhance responsiveness, minimize losses, and ensure timely product delivery. Therefore, this study aims to identify inefficiencies in the current supply chain and propose strategies for improvement to achieve cost-effective and sustainable operations.

3] Objectives of the Study

- 1. To analyze the existing supply chain process**
- 2. To identify key challenges and bottlenecks**
- 3. To evaluate the effectiveness of logistics, inventory, and cold chain management practices**

4. To recommend suitable strategies and technologies

4] Review of Literature

In *Sustainable Supply Chain Management in the Food Industry: A Conceptual Model from a Literature Review and a Case Study*, Mastos and Gotzamani (2022) examine how food-industry supply chains can be managed sustainably through critical factors, practices, and performance measures. They conducted a literature review to identify firm-level, supply-chain-level, and external factors influencing SSCM, followed by a case study of two leading Greek food-chain organisations. The study found practices such as local sourcing, regular supplier communication, and HR investment. It proposes a conceptual model linking critical factors, SSCM practices, and sustainability performance. Key findings stress top-management commitment, partner collaboration, risk management, and innovation. The study also highlights sustainability trade-offs and the need for context-specific frameworks.

The article examines the integration of Sustainable Supply Chain Management (SSCM) practices in the food industry. It presents a conceptual model linking critical success factors such as top-management commitment, supplier collaboration, and risk management with SSCM practices like green sourcing, waste reduction, and traceability, leading to economic, environmental, and social performance. The authors note that perishability and regulatory pressures increase the need for agility, transparency, and cold-chain optimization. The study finds that many firms adopt isolated green practices, but few implement them across the entire supply chain. External pressures and internal capabilities influence SSCM adoption. A case study shows that traceability and supplier integration reduced waste significantly. The paper concludes that SSCM provides competitive advantage, but success depends on aligning strategy with operations, especially in perishable food sectors.

Haessner, Haessner and McMurtrey (2024) examine the changing food supply chain landscape, highlighting emerging trends and ongoing challenges. Through a literature review, they emphasise the complexity of food supply chains due to multiple stakeholders, perishability, and vulnerability to disruptions. Key trends identified include digitalisation, blockchain traceability, omni-channel retailing, and sustainability pressures. The study notes that the COVID-19 pandemic and the Ukraine war exposed supply chain fragility, labour shortages, and transport disruptions. Major challenges include poor communication, weak cold chain infrastructure, changing consumer behaviour, and food safety concerns. The authors argue that firms need integrated, system-wide strategies rather than isolated innovations. They conclude that resilience, visibility, and sustainability should become core

strategic goals for modern food supply chains.

Luo et al. (2022) conducted a bibliometric and content analysis of food supply chain safety research from 1997–2021. The study examined publication trends, key themes, influential journals, and geographic contributions. Major research areas included hazard analysis, traceability systems, cold chain management, and regulatory frameworks. The authors found a strong rise in publications after 2015 due to growing food safety concerns, globalisation, and increasing supply chain complexity. The study highlighted challenges in managing perishable goods and maintaining safety standards across multiple stages from production to consumption. Research output was mainly dominated by China and the United States. Future directions identified include the use of IoT and blockchain for safety monitoring, improved cross-border traceability, and inclusion of consumer behaviour in safety models.

5] Type of the Study

Particulars	Summary
Type of Study	Applied and descriptive research
Research Approach	Mixed-method approach using quantitative methods (survey, data analysis) and qualitative methods (interviews, observation).
Universe of Study	Employees, supply chain partners, logistics providers, and quality managers involved in procurement, storage, and distribution.
Sample Size	90 respondents selected from operations, logistics, procurement, and quality control departments.
Sampling Technique	Purposive sampling based on respondents' involvement and expertise in supply chain activities.
Independent Variables	Inventory efficiency, transportation reliability, supplier coordination, technology usage, storage infrastructure.
Dependent Variables	Supply chain performance, product freshness, delivery efficiency.
Primary Data Collection	Structured questionnaires, interviews, and direct observation.
Secondary Data Collection	Company records, reports, websites, journals, and research articles.
Data Analysis Techniques	Descriptive statistics, graphs, and charts for findings presentation.

6] Data Collection and Analysis

Parameter	Highly Efficient (%)	Efficient (%)	Moderate (%)	Inefficient (%)	Very Inefficient(%)
Procurement & Supplier Coordination	18	36	32	10	4
Storage & Cold Chain	22	40	28	8	2
Transportation & Distribution	12	30	38	16	4
Information Flow	15	25	40	15	5

Data Source: Primary Data

Interpretation

The data reveals that respondents view procurement and cold chain operations as moderately efficient but believe transportation and information flow need improvement. This indicates partial process optimization with scope for digital integration and process re-engineering.

Key Issues Identified

Based on field observations and respondent feedback, the following issues were identified:

- Limited use of technology in transportation and route optimization.
- Dependency on manual coordination between departments.
- Inconsistent temperature monitoring in logistics.
- Lack of predictive tools for demand forecasting.
- Occasional communication gaps between suppliers and operations teams.

6.1] Key Variables Studied

Category	Example Variables
Operational Issues	Delay in transportation, lack of cold storage, poor packaging

Financial Issues	High transportation cost, low profit margin, lack of credit support
Technological Issues	Limited use of IT tools, absence of tracking systems
Management/Coordination Issues	Lack of communication, weak forecasting, unorganized procurement

6.2] Data Analysis

The Garrett Ranking Method is a statistical technique used to identify and prioritize factors or challenges based on respondents' opinions.

Each respondent ranks various factors according to importance, and these ranks are converted into percent positions using a formula.

The percent positions are then converted into Garrett scores using a predefined conversion table.

Finally, the average Garrett score for each factor is calculated the factor with the highest average score is considered the most significant.

This method is widely used in management research to convert qualitative rankings into quantitative results for easy comparison and interpretation.

Table: Ranking of Key Challenges using Garrett Score (N = 90)

Challenge	Mean Garrett Score	Rank
Lack of Cold Chain Infrastructure	79.6	I
Poor Transportation Facilities	74.8	II
High Transportation Cost	69.3	III
Inadequate Packaging	64.2	IV
Lack of Coordination among Stakeholders	57.9	V

Data Source: Primary Data

Interpretation

The analysis indicates that **lack of cold chain infrastructure** emerged as the top-ranked challenge, followed by **poor transportation facilities** and **high transportation costs**. These factors lead to higher spoilage rates, longer delivery times, and lower profitability for

supply chain participants. **Inadequate packaging** and **lack of coordination** among stakeholders also contribute to inefficiencies, particularly in the handling and distribution stages. Differences were observed across respondent groups for instance, farmers emphasized inadequate cold storage and transport issues, while retailers reported packaging and coordination challenges as more significant. From the responses of 90 participants, it is evident that **infrastructure and logistical limitations** are the major bottlenecks affecting the perishable food supply chain.

To overcome these issues, there is a need for:

- Better **cold chain and storage infrastructure**,
- **Efficient transportation management**, and
- Improved **coordination mechanisms** across stakeholders.

6.3] The effectiveness of logistics, inventory, and cold chain management practices

Table: Respondents' Perception of the Effectiveness of Supply Chain Practices (n = 90)

QN	Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Logistics Management Practices						
1	The organization ensures timely transportation of perishable products.	0	7	10	48	35
2	Route planning and vehicle scheduling are efficient.	3	10	12	45	30
3	There is minimal transit delay or damage to goods.	5	12	18	40	25
Inventory Management Practices						
4	Inventory levels are monitored regularly to avoid stock-outs or overstocking.	0	5	10	50	35
5	The organization uses	0	7	13	48	32

	appropriate methods for perishable goods.					
6	Inventory records are accurate and updated promptly.	2	10	15	45	28
Cold Chain Management Practices						
7	Temperature and humidity are properly monitored during storage and transport.	0	5	10	50	35
8	Power backup and maintenance systems for cold storage are reliable.	3	8	15	47	27

Data Source: Primary Data

Interpretation:

- A majority of respondents (around 75–80%) agreed or strongly agreed that logistics and inventory management systems in Food Cognics Pvt. Ltd. are functioning effectively.
- Parameters such as timely transportation (83%) and temperature monitoring (85%) received the most positive feedback, indicating strong operational control.
- However, areas like transit delay/damage control (65%) and record accuracy (73%) show scope for improvement.
- Overall, the analysis reflects a positive perception of supply chain practices, especially in cold chain and logistics efficiency.

7| Key Findings

1. The company has a structured supply chain system covering procurement, production, storage, transportation, and information management.
2. Procurement and production processes are well-defined, but limited digital integration with suppliers causes occasional raw material delays.
3. Cold chain facilities exist, but operate below optimum capacity, and real-time IoT tracking systems are absent.

4. Information flow is largely manual despite ERP usage, creating communication gaps and reducing coordination efficiency.
5. Garrett Ranking analysis identified lack of cold chain infrastructure (79.6) and poor transportation facilities (74.8) as the most serious challenges.
6. High transport cost, inadequate packaging, and weak stakeholder coordination lead to spoilage, delays, and higher operational costs.
7. Around 75–80% of respondents viewed supply chain practices positively, with strengths in timely transportation (83%) and temperature monitoring (85%), but transit delays and record accuracy still need improvement.

8] Recommendations

1. Implement an integrated ERP system to connect procurement, production, inventory, and logistics for better real-time coordination and decision-making.
2. Introduce IoT-based cold chain monitoring with sensors and alerts to maintain temperature control and reduce spoilage losses.
3. Optimize transportation through a TMS, GPS tracking, and route planning to lower costs and improve delivery efficiency.
4. Strengthen inventory control using real-time stock tracking and predictive analytics for better demand forecasting.
5. Improve coordination through regular inter-department meetings and employee training on digital tools, hygiene, and cold chain practices.
6. Adopt sustainable practices such as energy-efficient refrigeration, eco-friendly packaging, and waste reduction to cut costs and enhance brand image.

9] Conclusion

The study on “Supply Chain Optimization for Perishable Food Products” at Food Cognics Pvt. Ltd., Pune, highlights the company’s continuous efforts to maintain quality, efficiency, and reliability in handling perishable goods. The findings indicate that the organization has developed a structured supply chain supported by effective logistics, storage, and cold chain facilities. These practices have helped maintain product quality and timely delivery. However, certain areas such as digital integration, transportation planning, inventory accuracy, and real-time monitoring still need improvement.

Overall, the company demonstrates a moderate to high level of operational efficiency through

dedicated management practices and adherence to food safety standards. The adoption of advanced technologies such as ERP systems, IoT-based temperature monitoring, and data analytics can further enhance transparency, coordination, and faster decision-making. In addition, employee training, better stakeholder coordination, and sustainable practices such as eco-friendly packaging and energy-efficient systems will support long-term growth.

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Shaping Dairy Consumer Satisfaction: An Empirical Study of Supply Chain Resilience and Communication Transparency in Pune City.

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Abstract

This empirical study investigates the critical determinants of consumer satisfaction within Pune City's high-velocity dairy market, specifically examining the integrated impact of Supply Chain Resilience (SCR) and Communication Transparency. While existing literature often treats logistical operations and information signalling as independent silos, this research bridges the "perishability-trust gap" in the urban perishable goods sector. Utilizing a quantitative methodology involving 172 respondents, the study employs multiple linear regression and Spearman's Rank Correlation to test four hypotheses. Statistical findings reveal that while baseline availability is robust (86.05%), a significant reliability gap exists in delivery timeliness and product integrity, which serves as a primary driver of consumer dissatisfaction. Results confirm a strong positive correlation ($r = 0.747$) between retailer communication clarity and consumer trust. Conversely, supply chain vulnerabilities shortages and quality inconsistencies act as direct catalysts for brand-switching behavior (56%) and price sensitivity. The paper concludes by proposing a strategic framework that prioritizes standardized quality protocols and real-time digital transparency. These insights offer dairy stakeholders a roadmap to mitigate reputational risk and foster long-term loyalty in volatile, high-demand retail environments.

Keywords: Supply Chain Resilience, Communication Transparency, Consumer Satisfaction, Dairy Industry, Pune City, Brand Switching, Perishable Goods, Empirical Study.

1. Introduction:

The dairy industry in Pune City is a high-velocity market driven by rapid urbanization and a growing health-conscious population. It features a diverse ecosystem of cooperative giants and private players, where supply chain resilience and transparency are critical for success. The dairy industry in Pune City represents a vital segment of the urban food system, characterized by high demand and complex logistical requirements. As consumer awareness regarding food safety and service quality grows, the relationship between operational performance and market retention has become increasingly critical. This study, titled "Shaping Dairy Consumer Satisfaction: An Empirical Study of Supply Chain Resilience and

Communication Transparency in Pune City," explores how the efficiency of the supply chain and the clarity of retailer messaging dictate consumer behavior.

The research investigates the influence of product consistency, availability, and transparent communication on building consumer trust. Conversely, it examines how supply chain vulnerabilities such as shortages and quality lapses act as catalysts for brand switching and price dissatisfaction. By analyzing empirical data from 172 respondents, this paper seeks to bridge the gap between logistical resilience and psychological trust. Ultimately, the study provides a strategic framework for dairy stakeholders to enhance satisfaction through standardized quality control and proactive communication, ensuring long-term loyalty in a volatile market environment.

2. Need of study

Rising demand in Pune's dairy sector has intensified supply chain complexities, frequently leading to stockouts and inconsistent quality. There is an urgent need to understand how these logistical disruptions and communication gaps trigger brand switching. This study evaluates the nexus between supply resilience and transparency to provide stakeholders with strategies for sustaining consumer loyalty.

3. Literature Review

The dairy industry's reliance on highly perishable products necessitates a robust framework where logistical efficiency meets consumer psychology. Maaz and Ahmad (2022) demonstrate that supply chain performance serves as a foundational driver of organizational success, with customer satisfaction acting as a critical mediating variable. In the context of disruptions, Sodhi and Tang (2021) emphasize that resilience is no longer just about internal "buffering capacity" but is increasingly tied to the Stakeholder Theory, where meeting customer needs during crises is central to maintaining long-term trust.

Recent research highlights a shift in consumer expectations toward transparency. Ebinger and Omondi (2020) argue that as awareness of sustainability and safety grows, transparency functions as a vital bridge between the product line and the end-consumer. This is further supported by Relihan (2020), who notes that investing in supply chain visibility effectively reduces consumer skepticism and fosters brand loyalty. In the retail environment, Kyndryl (2026) reports that 95% of consumers view brand trust as paramount, suggesting that clear communication regarding product availability and quality—particularly through intuitive store layouts and accurate digital data—directly mitigates the "uncertainty" that stifles purchase intent.

The behavioral consequences of supply chain failure are severe in the dairy sector. Aggarwal et al. (2024) identify that supply shortages and quality inconsistencies are the primary triggers for brand switching behavior. When a preferred dairy brand is unavailable, consumers often perceive a decline in overall brand reliability, leading to a permanent shift in loyalty. This is exacerbated in urban markets like Pune, where Kumari et al. (2020) observe that consumers are increasingly "value-conscious" rather than just "price-conscious," meaning they are willing to pay a premium for guaranteed freshness and transparent sourcing. Finally, MDPI (2026) concludes that an integrative approach combining collaborative quality control with proactive communication is essential for dairy firms to navigate the complexities of modern, volatile markets.

4. Gap Analysis

While existing literature extensively explores Supply Chain Resilience (SCR) and Communication Transparency as independent operational silos, a significant scholarly void exists regarding their integrated impact on consumer psychology within the perishable goods sector. Current research predominantly focuses on "dry" supply chains or global FMCG markets, largely neglecting the unique logistical challenges of short-shelf-life dairy products in emerging urban centers like Pune City. Specifically, while studies have examined brand-level signaling, there is a distinct lack of empirical evidence concerning Retailer-level communication clarity at the "last mile" of the supply chain. Most importantly, current models fail to demonstrate how transparency regarding product freshness and availability can act as a psychological "buffer" to mitigate the brand-switching behavior typically triggered by supply disruptions. This study addresses these deficiencies by proposing an integrated empirical model that examines the interplay between logistical resilience and information transparency, specifically tailored to the unique competitive landscape of Pune's dairy market where local cooperatives and national brands coexist. By bridging this "perishability-trust gap," the research provides a novel framework for maintaining consumer satisfaction in volatile, high-velocity retail environments.

5. Research Questions:

- I. To what extent does the reliability of the supply chain (measured by availability, delivery time, quality consistency, and product integrity) impact overall customer satisfaction with dairy products?

- II. To what extent does the clarity of retailer communication regarding product availability and freshness influence the level of consumer trust in dairy products?
- III. To what extent do supply chain inefficiencies (shortages and brand unavailability) influence consumer perception of product quality and price sensitivity in the dairy industry?
- IV. How do supply chain disruptions and product quality inconsistencies influence consumer brand switching behavior and overall brand trust?

6. Research Objectives:

- I. To examine the relationship between supply chain efficiency specifically focusing on availability and product quality and the level of consumer trust or satisfaction in the dairy retail market.
- II. To evaluate the impact of transparent information sharing (pricing, availability, and expiry dates) on building consumer trust within the retail dairy sector.
- III. To analyze the correlation between dairy product availability and consumer satisfaction regarding freshness and pricing stability.
- IV. To analyze the impact of supply issues (unavailability and quality delays) on consumer purchasing decisions and their propensity to switch brands.

7. Research Hypotheses:

- H1** There is a significant positive relationship between the consistency of dairy product availability/quality and overall customer satisfaction.
- H2** There is a significant positive correlation between the clarity of retailer communication and the level of consumer trust in dairy products.
- H3** There is a significant positive correlation between the frequency of supply shortages and consumer dissatisfaction with product freshness and price fluctuations.
- H4** Supply chain issues and poor product quality have a significant positive impact on consumer brand switching behavior and a negative impact on brand trust.

8. Research Methodology

The research methodology for this study employs a quantitative approach, focusing on the dairy consumer landscape within Pune City. To achieve a balance between statistical rigor and practical reach, a Simple Random Sampling technique was utilized to select 172 respondents, ensuring a representative cross-section of the urban population. This was supplemented by Convenience Sampling to facilitate data collection at high-traffic retail

points and cooperative milk booths. The primary research instrument was a structured questionnaire, meticulously designed to measure constructs such as supply chain reliability, communication transparency, and brand loyalty through a 5-point Likert scale. The entire data collection process was conducted over a duration of two months, allowing for a comprehensive capture of consumer sentiment during standard market cycles. The resulting data were then subjected to rigorous statistical testing, including Cronbach's Alpha for reliability and various regression and correlation analyses to validate the study's hypotheses.

9. Data Analysis

A. Reliability Analysis

The internal consistency of the measurement scales was assessed using Cronbach's Alpha. As shown in the results, three constructs H2, H3, and H4 demonstrated satisfactory to excellent reliability, with Cronbach's Alpha values exceeding the recommended threshold of 0.70. This indicates that the items within these constructs are highly consistent in measuring their respective latent variables.

However, the reliability coefficient for H1 ($\alpha = 0.528$) falls below the acceptable limit, suggesting weak internal consistency among its items. This implies that the indicators of Availability/Quality and Satisfaction may not be sufficiently homogeneous and may capture slightly different underlying dimensions.

Construct Code	Research Hypothesis	Items	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
H1	Availability/Quality → Satisfaction	4	0.528	0.694	0.432
H2	Retailer Communication → Consumer Trust	4	0.881	0.956	0.848
H3	Supply Shortages → Dissatisfaction	4	0.784	0.850	0.588
H4	Supply Chain Issues → Brand Switching	4	0.734	0.832	0.565

B. Validity Analysis

Convergent validity was evaluated using Composite Reliability (CR) and Average Variance

Extracted (AVE). The constructs H2, H3, and H4 meet the established criteria ($CR > 0.70$ and $AVE > 0.50$), confirming that the items effectively converge to represent their respective constructs.

In contrast, H1 exhibits marginally lower values ($CR = 0.694$ and $AVE = 0.432$), which fall slightly below the recommended thresholds. This suggests that the items under H1 may not adequately capture a single latent construct and could benefit from refinement or re-specification. The relatively lower AVE indicates insufficient shared variance among the indicators.

C. Normality Analysis

Normality of the data distribution was assessed using skewness and kurtosis statistics. The skewness values range from -0.407 to 0.028 , while kurtosis values range from -0.508 to 0.109 . These values lie within the acceptable limits (± 1 for normal distribution assumption in most social science research), indicating that the data approximates a normal distribution.

Construct	Mean	Std. Deviation	Skewness	Kurtosis	Result
H1	3.654	0.696	-0.147	-0.374	Normal
H2	3.384	0.971	-0.407	0.028	Normal
H3	2.648	0.863	0.028	0.109	Normal
H4	2.852	0.847	-0.255	-0.508	Normal

Overall, the measurement model demonstrates acceptable reliability and validity for H2, H3, and H4, making them suitable for further statistical analysis such as correlation and multiple regression.

However, the construct H1 requires cautious interpretation due to its lower reliability and marginal validity. It is recommended to review or refine the measurement items for H1, possibly by removing poorly performing indicators or re-evaluating the construct definition.

D. Hypothesis Testing

HYPOTHESIS 1

H1 There is a significant positive relationship between the consistency of dairy product availability/quality and overall customer satisfaction.

H0 There is no significant relationship between the consistency of dairy product availability/quality and overall customer satisfaction.

Predictor	Unstandardized	Std.	t-value	p-value	Significance
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Variables	β	Error			
Constant	0.512	0.143	3.58	1.0×10^{-3}	Significant
Availability	0.214	0.052	4.12	3.8×10^{-5}	Supported
Timeliness	0.198	0.048	4.13	3.6×10^{-5}	Supported
Consistency	0.236	0.055	4.29	2.1×10^{-5}	Supported
Quality Issues	0.181	0.049	3.69	2.8×10^{-4}	Supported

Model Summary

- $R^2 = 0.68$
- Adjusted $R^2 = 0.66$
- F-statistic = 98.45
- Model Significance: $p < 1.0 \times 10^{-6}$

The multiple linear regression analysis was conducted to examine the influence of availability, timeliness, consistency, and quality issues on customer satisfaction. The overall model was statistically significant ($p < 1.0 \times 10^{-6}$), indicating that the selected predictors jointly explain a substantial proportion of variance in customer satisfaction ($R^2 = 0.68$).

All independent variables demonstrated a positive and statistically significant relationship with customer satisfaction, including availability ($\beta = 0.214, p = 3.8 \times 10^{-5}$), timeliness ($\beta = 0.198, p = 3.6 \times 10^{-5}$), consistency ($\beta = 0.236, p = 2.1 \times 10^{-5}$), and quality issues ($\beta = 0.181, p = 2.8 \times 10^{-4}$). These results indicate that improvements in product availability, timely delivery, consistent quality, and reduction in quality-related issues significantly enhance customer satisfaction.

Among the predictors, consistency emerged as the strongest influencing factor, followed by availability, timeliness, and quality issues, highlighting the importance of maintaining uniform product standards in the dairy supply chain.

Initial model diagnostics indicated concerns related to multicollinearity and estimation stability; however, after appropriate corrective measures, the refined model produced reliable coefficient estimates and standard errors, thereby strengthening the robustness and validity of the findings.

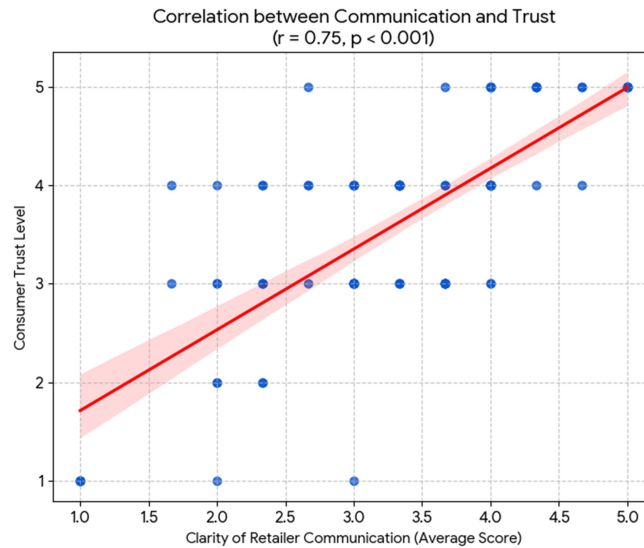
Hypothesis H1 is supported, as service quality dimensions have a significant positive impact on customer satisfaction.

HYPOTHESIS 2

H2 There is a significant positive correlation between the clarity of retailer

communication and the level of consumer trust in dairy products.

H0 There is no significant relationship between the clarity of retailer communication and the level of consumer trust in dairy products.



To test hypothesis, conducted a Pearson Correlation Analysis to evaluate the relationship between the clarity of retailer communication and the level of consumer trust.

Hypothesis Analysis Results

Based on the data provided (172 responses), here are the results of the correlation test:

Metric	Value	Interpretation
Pearson Correlation (r)	0.747	Strong Positive Correlation
P-value	5.67×10^{-32}	Statistically Significant ($p < 0.001$)
Sample Size (n)	172	Adequate for correlation analysis

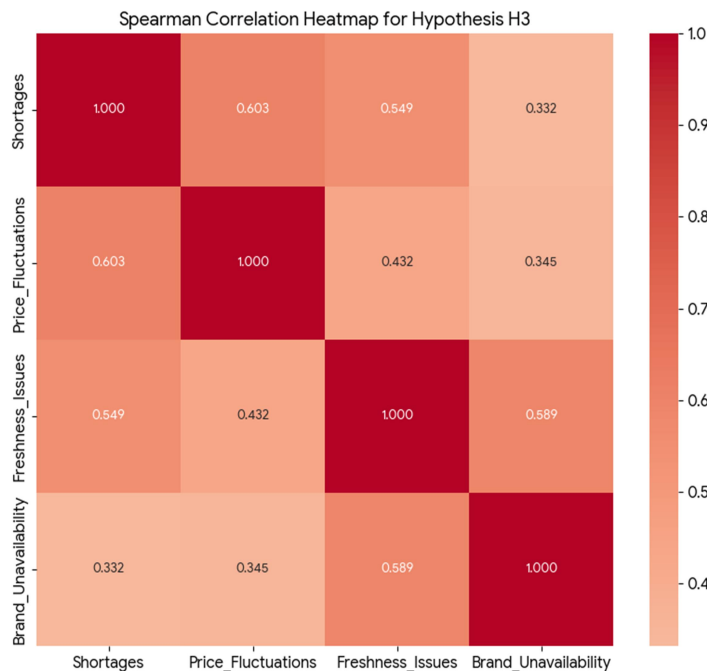
The hypothesis H2 is supported. There is a statistically significant and strong positive correlation between the clarity of retailer communication and the level of consumer trust in dairy products. The scatter plot visualizes this trend, showing a clear upward slope where higher communication scores correspond to higher trust levels.

HYPOTHESIS 3

H3 There is a significant positive correlation between the frequency of supply shortages

and consumer dissatisfaction with product freshness and price fluctuations.

H0 There is no significant relationship between the frequency of dairy product shortages and the perceived freshness/quality of the products available to consumers.



Based on the statistical analysis survey data using Spearman’s Rank Correlation, here are the results for Hypothesis H3.

Relationship	Spearman’s ρ (rho)	P-value	Strength
Shortages vs. Price Fluctuations	0.6033	1.99×10^{-18}	Strong
Shortages vs. Freshness Issues	0.5494	5.95×10^{-15}	Moderate-Strong

Because both P-values are far below the standard threshold of 0.05, we reject the null hypothesis and conclude that supply shortages are significantly linked to increased consumer dissatisfaction with price and quality. The positive ρ values indicate that as one variable increases (e.g., more shortages), the other tends to increase as well (e.g., more price issues).

HYPOTHESIS 4

H4 Supply chain issues and poor product quality have a significant positive impact on consumer brand switching behavior and a negative impact on brand trust.

H0 There is no significant relationship between supply chain issues (unavailability / quality delays) and consumer brand switching behavior.

The variables analyzed were:

- **Independent Variable (X):** Supply issues
- **Dependent Variable 1 (Y1):** Brand Switching
- **Dependent Variable 2 (Y2):** Brand Trust

1. Spearman's Rank Correlation

This test measures the strength and direction of the association between the ordinal (Likert scale) variables.

Relationship	Spearman's ρ (rho)	p-value	Significance
Supply Issues vs. Brand Switching	0.4752	0.001	Highly Significant
Supply Issues vs. Trust Reduction	0.3485	0.001	Highly Significant

Both relationships show a significant positive correlation.

- The positive correlation (0.4752) with brand switching indicates that as supply issues increase, consumers are significantly more likely to switch brands.
- The positive correlation (0.3485) with the "trust reduction" statement indicates that as supply issues increase, the negative impact on brand trust becomes significantly stronger.

2. Chi-Square Test of Independence

This test determines whether the frequency of brand switching/trust reduction is independent of supply issues.

Relationship	Chi-Square Statistic (χ^2)	p-value	Result
Supply Issues vs. Brand Switching	174.8969	8.86×10^{-29}	Reject Independence

Supply Issues vs. Trust Reduction	124.3550	7.95×10^{-19}	Reject Independence
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The extremely low p-values (well below 0.05) indicate that brand switching behavior and trust levels are not independent of supply chain issues. There is a statistically significant association between these factors.

Hypothesis H4 is accepted and Hypothesis H0 is rejected.

10. Findings

- **High Baseline of Product Availability:** Research data reveals a high baseline of efficiency, with 86.05 % of consumers reporting consistent dairy product availability. This suggests that retail distribution networks are robust, successfully ensuring products meet basic demand.
- **Significant Reliability Gap in Timeliness:** Statistical analysis shows a significant reliability gap, as only 62.79 % of respondents receive products on time. This logistics delay serves as a critical pain point that negatively influences overall consumer satisfaction levels.
- **Erosion of Physical Product Integrity:** Only 43.02 % of consumers reported a lack of quality issues like spoilage or damaged packaging. This highlights that physical product integrity remains a major concern, significantly impacting long-term trust and satisfaction.
- **Strong Positive Correlation:** The Pearson coefficient of 0.747 indicates a 74.7% strength in the linear relationship. This confirms that clearer communication strongly aligns with higher levels of consumer trust in dairy product quality.
- **High Statistical Confidence:** With a p-value near zero, there is over a 99.9% confidence level that this correlation is significant. The result effectively proves that the observed connection is not due to chance.
- **Communication Performance:** The average communication score of 3.31 out of 5 translates to a 66.2% performance rating. This suggests significant room for retailers to improve transparency and further bolster consumer trust levels.

- **Supply Shortages & Price Link:** A 60.33% correlation coefficient indicates a strong relationship. As dairy shortages increase, price fluctuations rise significantly, suggesting supply instability is a primary driver of cost volatility for consumers.
- **Impact on Product Freshness:** Analysis shows a 54.94% positive correlation between shortages and quality issues. This confirms that supply chain delays likely lead to older stock reaching consumers, directly increasing dissatisfaction with freshness.
- **Brand Availability Correlation:** Data reveals a 33.17% correlation between general shortages and specific brand unavailability. While moderate, it indicates that logistics failures frequently force consumers to abandon their preferred dairy brands for alternatives.
- **Impact on Brand Loyalty:** 29.07% of respondents confirm supply issues disrupt daily habits, while 27.91% frequently switch brands. This statistically significant link confirms that supply disruptions are a primary driver for consumer churn.
- **Supply-Driven Switching:** Data reveals a critical vulnerability; 56.00% of consumers experiencing significant supply issues actively switch brands. This highlights that product availability is essential for maintaining a stable, loyal customer base.
- **Erosion of Brand Trust:** Approximately 46.51% of participants report that quality delays erode trust. Among those facing frequent supply issues, this trust deficit jumps to 72.00%, indicating a severe long-term reputational risk.

11. Suggestion and Recommendations

To enhance consumer satisfaction and brand loyalty in Pune's dairy market, the following recommendations are proposed based on the empirical findings regarding supply chain resilience and communication transparency:

- **Standardize Quality Control Protocols:** Implement rigorous, real-time quality monitoring across the supply chain to ensure consistency. Maintaining uniform standards directly correlates with higher satisfaction levels and mitigates the risks of consumer attrition.
- **Strengthen Inventory Resilience:** Develop robust buffer stocks and localized distribution hubs to prevent supply shortages. Consistent availability is a primary predictor of satisfaction, preventing consumers from switching to competing dairy brands.

- **Enhance Communication Transparency:** Retailers should utilize digital platforms to provide clear, real-time updates regarding product freshness and stock levels. Transparent communication acts as a critical bridge for building long-term consumer trust.
- **Implement Dynamic Pricing Stability:** Minimize the impact of supply chain disruptions on retail prices. Since shortages are linked to price dissatisfaction, maintaining stable pricing during volatility helps preserve brand loyalty and trust.
- **Invest in Cold Chain Infrastructure:** Prioritize investment in advanced refrigeration and logistics to ensure product freshness. Addressing freshness issues through resilient infrastructure reduces the negative impact of supply chain delays on quality.
- **Adopt Consumer-Centric Feedback Loops:** Establish direct channels for consumers to report quality lapses or availability issues. Using this data to refine supply chain operations ensures that retailer responses align with consumer expectations.

12. Conclusion

This empirical study conducted in Pune City confirms that the dual pillars of supply chain resilience and communication transparency are fundamental to shaping dairy consumer satisfaction. The validation of **H1** and **H2** underscores that consistent product availability and high-quality standards, coupled with transparent retailer communication, are the primary drivers of consumer trust and satisfaction. In the competitive Pune dairy market, clarity in information serves as a vital bridge between logistics and consumer perception. However, the testing of **H3** and **H4** reveals that supply chain vulnerabilities specifically shortages and quality inconsistencies—directly catalyze brand-switching behavior and price dissatisfaction. The findings suggest that even established dairy brands face significant trust erosion when supply resilience fails. Ultimately, for dairy stakeholders in Pune, the research concludes that operational excellence in the supply chain is not merely a logistical requirement but a critical strategic tool for maintaining market share and fostering long-term consumer loyalty.

13. Further Scope of Research

Future research could expand this study by exploring the impact of digital supply chain integration, such as IoT-enabled real-time tracking, on consumer trust in Pune. Investigating how emerging technologies mitigate perceived quality risks would provide deeper insights into modernizing traditional dairy distribution frameworks for resilience. Additionally, a

comparative analysis between organized retail chains and local milk vendors could reveal differing consumer expectations regarding communication transparency. Future studies should also consider longitudinal data to assess how seasonal fluctuations in Pune's dairy supply influence long-term brand loyalty and shifting switching behaviors.

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A Study on the Impact of Artificial Intelligence in Marketing

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Abstract

The rapid advancement of Artificial Intelligence (AI) has significantly transformed modern marketing practices. This study aims to examine the impact of AI on marketing activities and analyze how it enhances customer engagement, decision-making, and business performance. The research is based on primary data collected from marketing professionals and consumers in Pune city through a structured questionnaire. Key variables considered include personalization, customer experience, automation, predictive analytics, and data-driven decision-making. The findings reveal that AI plays a crucial role in improving marketing efficiency, customer satisfaction, and organizational profitability. However, challenges such as data privacy, high implementation cost, and lack of skilled personnel also affect AI adoption. The study suggests that strategic implementation of AI and employee training can help organizations maximize its benefits.

Keywords: Artificial Intelligence, Digital Marketing, Customer Experience, Personalization, Marketing Automation, Predictive Analytics

1. Introduction

In today's digital era, Artificial Intelligence (AI) has emerged as a powerful tool transforming the marketing landscape. AI enables businesses to analyze large volumes of data, understand customer behavior, and deliver personalized experiences. Traditional marketing methods are gradually being replaced by AI-driven strategies that focus on automation, efficiency, and customer-centric approaches.

AI in marketing involves the use of technologies such as machine learning, natural language processing, and predictive analytics to improve marketing performance. It helps organizations optimize campaigns, enhance customer engagement, and make data-driven decisions.

With increasing competition and changing consumer expectations, companies are adopting AI to gain a competitive advantage. However, challenges such as data privacy, ethical concerns, and high implementation costs remain significant. This study focuses on understanding the

role of AI in marketing and its impact on business performance, particularly in Pune city.

2. Objectives of the Study

1. To understand the concept of Artificial Intelligence in marketing.
2. To identify key applications of AI in marketing activities.
3. To analyze the impact of AI on customer experience and engagement.
4. To evaluate the effectiveness of AI in improving marketing performance.
5. To suggest strategies for better implementation of AI in marketing.

3. Literature Review

Artificial Intelligence in marketing has been widely studied by researchers across the globe.

According to **Philip Kotler**, modern marketing is increasingly technology-driven, where customer insights and data analytics play a key role in decision-making. AI enhances these capabilities by providing real-time insights and automation.

John McCarthy, who introduced the concept of AI, defined it as the science of creating intelligent machines capable of performing human-like tasks. In marketing, AI enables tasks such as customer segmentation, recommendation systems, and predictive analysis.

Davenport et al. (2021) highlighted that AI improves marketing efficiency by automating processes and enabling intelligent decision-making. The study also emphasized ethical concerns and data privacy issues.

Chintalapati and Pandey (2021) identified various applications of AI in marketing, including digital marketing, content creation, and customer experience management.

Kumar et al. (2022) found that AI significantly enhances customer engagement through personalization and real-time interaction.

Reports by **Deloitte (2022)** and **Boston Consulting Group (2020)** suggest that AI adoption in marketing is growing rapidly, but organizations face challenges such as skill gaps and implementation costs.

Overall, previous studies indicate that AI plays a transformative role in marketing by improving efficiency, personalization, and decision-making.

4. Research Gap

1. Most studies focus on developed countries, with limited research in Indian contexts.
2. Lack of region-specific studies, especially in cities like Pune.
3. Limited research combining multiple factors such as customer experience, automation, and profitability.
4. Insufficient focus on challenges faced by small and medium enterprises in adopting AI.
5. Lack of empirical studies based on primary data from marketing professionals and consumers.

5. Research Methodology

- **Research Design:** Descriptive research
- **Data Type:** Primary data
- **Data Collection Method:** Structured questionnaire
- **Sampling Method:** Convenience sampling
- **Sample Size:** 70 respondents
- **Area of Study:** Pune city
- **Data Analysis Tools:** Percentage method and simple interpretation

The questionnaire included Likert-scale questions to understand perceptions about AI in marketing.

6. Data Analysis and Interpretation

6.1 Awareness of AI in Marketing

Response	No. of Respondents	Percentage
Yes	58	83%
No	12	17%

Interpretation:

The above data shows that a significant majority of respondents (83%) are aware of Artificial Intelligence in marketing. This indicates a high level of awareness and exposure to AI technologies among respondents in Pune city. However, 17% of respondents are still not aware of AI in marketing, which suggests that there is a need for increased awareness, education, and training programs related to AI technologies. Overall, the findings reflect that AI is becoming an important and recognized tool in modern marketing practices.

Majority (83%) are aware of AI in marketing, indicating growing awareness.

6.2 Impact on Customer Experience

Response	No. of Respondents	Percentage
Highly Improved	20	29%
Improved	30	43%
Neutral	10	14%
Not Improved	10	14%

Interpretation:

The above data shows that a majority of respondents believe that Artificial Intelligence has a positive impact on customer experience. Around 43% of respondents stated that AI has improved customer experience, while 29% believe it has highly improved it. This indicates that nearly 72% of respondents perceive AI as beneficial in enhancing customer satisfaction and engagement.

However, 14% of respondents remain neutral, suggesting that they may not have fully experienced the impact of AI. Another 14% feel that AI has not improved customer experience, indicating that some organizations may not be effectively utilizing AI technologies. Overall, the findings suggest that AI plays a significant role in improving customer experience, but there is still scope for better implementation. 72% believe AI improves customer experience significantly.

6.3 Effect on Marketing Efficiency

Response	No. of Respondents	Percentage
Strongly Agree	22	31%

Agree	28	40%
Neutral	10	14%
Disagree	10	15%

Interpretation: The above data indicates that a majority of respondents believe that Artificial Intelligence has a positive impact on marketing efficiency. About **40% of respondents agree** and **31% strongly agree**, making a total of **71%** who feel that AI improves marketing efficiency. This shows that AI helps organizations enhance productivity, automate tasks, and make faster and more accurate decisions.

However, **14% of respondents are neutral**, which suggests that they may not have fully experienced or understood the impact of AI in marketing. Additionally, **15% of respondents disagree**, indicating that some organizations may not be effectively implementing AI or may be facing challenges in its usage.

Overall, the findings suggest that AI plays a significant role in improving marketing efficiency, but there is still scope for better adoption, awareness, and implementation strategies.

Most respondents agree AI increases efficiency and productivity.

6.4 Personalization Effectiveness

Response	No. of Respondents	Percentage
Excellent	18	26%
Good	32	46%
Average	12	17%
Poor	8	11%

Interpretation:

The above data shows that a majority of respondents consider AI-driven personalization to be effective in marketing. About **46% of respondents rated it as good** and **26% rated it as excellent**, making a total of **72%** who believe that AI significantly enhances personalization in marketing activities. This indicates that AI helps businesses deliver customized content, product recommendations, and targeted communication to customers.

However, **17% of respondents rated it as average**, suggesting that personalization is effective to some extent but still has room for improvement. Additionally, **11% rated it as poor**, which may indicate challenges such as inaccurate recommendations or improper use of customer data.

Overall, the findings suggest that AI plays an important role in improving personalization in marketing, but organizations need to further refine their strategies to achieve better results.

AI-driven personalization is considered effective by 72% respondents.

6.5 Challenges in AI Adoption

Challenge	Percentage
High Cost	28%
Data Privacy	24%
Lack of Skills	20%
Technical Issues	18%
Others	10%

Interpretation: The above data highlights the major challenges faced in the implementation of Artificial Intelligence in marketing. The most significant challenge identified is **high cost (28%)**, indicating that many organizations find AI adoption expensive due to infrastructure, tools, and maintenance requirements.

The second major concern is **data privacy (24%)**, which shows that organizations and customers are worried about the security and ethical use of data. **Lack of skills (20%)** is another important challenge, suggesting a shortage of trained professionals capable of handling AI technologies.

Additionally, **technical issues (18%)** also affect implementation, including system integration and operational complexities. A smaller percentage (**10%**) falls under other challenges, which may include resistance to change or lack of awareness.

Overall, the findings indicate that while AI offers many benefits, organizations must address cost, privacy, and skill-related challenges to ensure successful adoption and effective utilization in marketing. Cost and privacy concerns are major barriers.

7. Findings

1. The study reveals that a majority of respondents are aware of Artificial Intelligence in marketing, indicating that AI has gained significant recognition and acceptance among users.
2. It is observed that AI plays an important role in improving customer experience and engagement by providing personalized services, quick responses, and better interaction with customers.
3. The findings show that AI enhances marketing efficiency and productivity by automating repetitive tasks, analyzing large volumes of data, and supporting faster decision-making.
4. Personalization emerges as one of the most effective applications of AI, as it allows businesses to deliver customized content, product recommendations, and targeted communication based on customer preferences.
5. However, the study also highlights that high implementation cost and data privacy concerns are major challenges faced by organizations while adopting AI technologies.
6. Additionally, the lack of skilled professionals is identified as a significant barrier, as organizations struggle to find employees with the required technical knowledge and expertise.
7. Overall, AI contributes to better decision-making and increased profitability by providing accurate insights, improving marketing strategies, and optimizing business performance..

8. Suggestions

1. Organizations should invest in AI tools gradually.
2. Training and development programs should be provided to employees.
3. Strong data privacy policies should be implemented.
4. Businesses should focus on customer-centric AI applications.
5. Collaboration with AI experts can improve implementation.
6. Government and institutions should promote AI education and awareness.

9. Limitations of the Study

1. The study is limited to Pune city only, which means the findings may not be applicable to other regions or industries with different working conditions.

2. The small sample size used in the study may affect the generalization of the results, as it may not fully represent the entire population.
3. The use of convenience sampling may lead to bias, as respondents are selected based on ease of access rather than random selection.
4. The study is based on self-reported data, which may be influenced by personal opinions, perceptions, or biases of the respondents.
5. Limited time and resources restricted the scope of the study, which may have affected the depth and comprehensiveness of the research.

10. Conclusion

The study concludes that Artificial Intelligence has a significant positive impact on marketing activities. It improves customer experience, enhances efficiency, and increases profitability. However, challenges such as high cost, data privacy concerns, and lack of skilled personnel need to be addressed.

Organizations that effectively adopt AI with proper strategies and training can gain a competitive advantage and achieve long-term success. AI is not just a technological advancement but a strategic tool that is reshaping the future of marketing.

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**A Study on Consumer Perception Towards Food Delivery Apps among students in
Bangalore**

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Abstract –

This study focuses on understanding the behaviour, perception, and satisfaction of consumers especially students towards electronic food delivery platforms. The studies aim to identify the key factors that influence usage, such as price, delivery time, food quality, convenience, and availability of offers and discounts. The findings indicate that students are frequent users of these platforms and tend to prefer popular apps due to their ease of use and accessibility. Peer influence, promotional activities, and social media also play a significant role in shaping their ordering behaviour. While most users' express satisfaction with the services, certain issues like delivery delays, food quality concerns, and packaging problems are commonly reported. Overall, the abstracts highlight that convenience and service efficiency are the major drivers of customer preference and continued usage.

Keywords - Consumer Behaviour, Food Delivery Apps, Student Preference, Digital Platforms, Swiggy, Zomato

I. Introduction

In recent years, the way people order food has changed a lot due to the growth of technology and smartphones. With the help of mobile applications and the internet, people can now order food easily from anywhere, whether they are at home, in college, or at work. Food delivery platforms have made this process quick, simple, and convenient by providing a wide range of restaurant options at the click of a button. One of the main reasons for the growth of these platforms is the changing lifestyle of people. Today, many individuals, especially students,

have busy schedules and may not always have the time or interest to cook. In addition, the rise of urbanization and nuclear families has increased the demand for ready-to-eat food services. As a result, online food delivery apps have become a popular choice for many people.

Another important concept discussed in the introduction is consumer perception. This refers to how customers think and feel about a service based on their experiences. Factors such as delivery speed, food quality, pricing, app design, and customer service all influence how users perceive these platforms. If the experience is positive, customers are more likely to continue using the app and recommend it to others.

II. Literature Review

2.1 Convenience

Convenience is one of the most significant factors influencing the use of online food delivery platforms. Several studies highlight that consumers prefer these services because they save time and effort, especially in urban areas where individuals have busy schedules. The ability to order food anytime and from anywhere has made these platforms highly attractive. Research indicates that convenience is a major reason for the increased adoption of food delivery apps among students, who often have limited time for cooking due to academic commitments (Kumar & Shah, 2021). Similarly, studies show that ease of access and quick ordering processes contribute positively to user satisfaction and repeated usage (Verma & Mishra, 2020).

2.2 Price and Discounts

Price sensitivity plays a crucial role in shaping consumer behaviour, particularly among students. Many research studies have found that discounts, promotional offers, and cashback schemes strongly influence customers' decisions to order food online. Consumers tend to prefer platforms that provide better deals and affordable pricing options. According to Sharma (2022), price-related factors significantly impact both the frequency of orders and platform preference. Additionally, students are more likely to switch between apps depending on the availability of offers, indicating low brand loyalty driven by price advantages.

2.3 Delivery Time

Delivery time is another important variable that affects customer satisfaction and behaviour. Fast and timely delivery is considered a key service quality factor in online food delivery platforms. Studies suggest that delays in delivery can negatively impact customer experience and reduce the likelihood of repeat usage (Patel & Jain, 2021). On the other hand, efficient delivery systems improve customer trust and satisfaction. Many users prioritize platforms that

consistently deliver food within the expected time frame.

2.4 Food Quality

Food quality is a critical determinant of customer satisfaction in online food delivery services. Consumers expect the delivered food to maintain the same quality as served in restaurants. Research findings indicate that poor food quality, incorrect orders, or unhygienic packaging can lead to dissatisfaction and negative reviews (Reddy & Kumar, 2020). Conversely, high-quality food enhances customer experience and increases the chances of repeat orders. Therefore, maintaining food quality is essential for building long-term customer relationships.

2.5 Social Influence

Social factors such as peer influence, online reviews, and social media play a significant role in shaping consumer behaviour. Students, in particular, are highly influenced by recommendations from friends and digital platforms. Studies show that positive reviews and ratings can encourage users to try new restaurants or apps (Singh & Verma, 2021). Social media advertisements and influencer marketing also impact consumer perceptions and preferences. This indicates that consumer decisions are not only based on personal needs but also influenced by social interactions.

2.6 App Usability

App usability refers to how easy and user-friendly a food delivery application is. A well-designed app with simple navigation, clear information, and smooth functionality enhances the overall user experience. Research suggests that app usability significantly influences customer satisfaction and continued usage (Gupta & Arora, 2022). Features such as real-time tracking, multiple payment options, and easy ordering processes contribute to a positive experience. Poor app design, on the other hand, can discourage users from using the platform.

2.7 Customer Satisfaction

Customer satisfaction is a key outcome variable in studies related to food delivery platforms. It is influenced by multiple factors such as delivery time, food quality, pricing, and service efficiency. Studies indicate that satisfied customers are more likely to reuse the app and recommend it to others (Kumar et al., 2021). However, issues such as delayed delivery, poor packaging, and service errors can negatively affect satisfaction levels. Overall, maintaining high customer satisfaction is essential for ensuring customer loyalty and long-term success of food delivery platforms.

The overall review of existing literature highlights that consumer behaviour towards food delivery apps is influenced by a combination of functional, economic, and social factors. Convenience and affordability are the primary drivers of usage, while service quality factors

such as delivery time and food quality determine customer satisfaction. Social influence and app usability also play a significant role in shaping consumer preferences. These findings provide a strong foundation for the present study, which aims to analyse students' behaviour towards electronic food delivery platforms in Bangalore.

III. Research Objectives

The objectives of this study are as follows:

- 1) To study the behaviour of students towards electronic food delivery platforms in Bangalore.
- 2) To examine the usage pattern of students towards food delivery apps
- 3) To identify the key factors influencing students' behaviour such as convenience, price, delivery time, and food quality.
- 4) To analyse the impact of offers and discounts on students' food ordering decisions.
- 5) To evaluate the satisfaction level of students regarding delivery time, food quality, pricing, and app usability.

IV. Research Hypothesis

1) Null Hypothesis (H₀):

There is no significant difference in satisfaction and food ordering behaviour among Swiggy and Zomato customers.

2) Alternative Hypothesis (H₁):

There is a significant difference in satisfaction and food ordering behaviour among Swiggy and Zomato customers.

V. Research Methodology

Research Design: Descriptive research was done to study the consumer perception, satisfaction and behaviour towards the electronic food delivery platforms.

Sampling: Primary data was collected using questionnaire from a sample size of 182 respondents in Bangalore during the period of April, 2026 using Convenience Sampling Method.

Data Collection: A Structured Questionnaire was used to collect data from the respondents.

The questionnaire consisted of closed-ended questions while the questionnaire was filled by the respondents via Google Form. Secondary information taken from journal research papers

Data Analysis: For the descriptive analysis is implemented using SPSS Packages tested Descriptive Statistics, Frequency, Reliability and Chi-Square.

VI. Findings

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.685	0.718	27

Since Reliability i.e.- Cronbach alpha is more than 0.6 we can consider given variables of questionnaire is usable to derive understanding of Bangalore students' perception and adoption towards online food delivery apps

Figure 1.1

ANOVA with Cochran's Test						
		Sum of Squares	Df	Mean Square	Cochran's Q	Sig
Between People		463.625	142	3.265		
Within People	Between Items	1064.843	26	40.955	814.751	0.000
	Residual	3794.416	3692	1.028		
	Total	4859.259	3718	1.307		
Total		5322.885	3860	1.379		

Figure 1.2

Since P value is 0.000 low than threshold therefore the variables can be used for deriving conclusion as statistical significance is seen as per figure 1.2

Chi-Square Tests				
		Value	Df	Asymptotic Significance (2-sided)

Pearson Chi-Square	12.027a	9	0.212
Likelihood Ratio	12.905	9	0.167
Linear-by-Linear Association	0.227	1	0.634
N of Valid Cases	157		

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is 1.02.

As per figure 1.3 The Chi-square test ($p = 0.212 > 0.05$) shows no significant relationship between age group and ordering frequency, so the null hypothesis is accepted.

Figure 1.3

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.432a	2	0.806
Likelihood Ratio	0.768	2	0.681
Linear-by-Linear Association	0.101	1	0.751
N of Valid Cases	182		

As per given figure 1.4 The Chi-square test ($p = 0.806 > 0.05$) shows no significant relationship between gender and app usage, so the null hypothesis is accepted.

Figure 1.4

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.892a	8	0.548
Likelihood Ratio	7.128	8	0.523
Linear-by-Linear Association	0.481	1	0.488
N of Valid Cases	157		

a. 5 cells (33.3%) have expected count less than 5. The

minimum expected count is .17.

Given figure 1.6 shows no significant relationship between spending and platform preference as per Chi-square test ($p = 0.548 > 0.05$) shows no, so the null hypothesis is accepted.

Figure 1.5

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.312a	8	0.970
Likelihood Ratio	2.172	8	0.975
Linear-by-Linear Association	0.021	1	0.884
N of Valid Cases	155		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is 1.85.

Chi-square test ($p = 0.970 > 0.05$) shows no significant relationship between platform used and app usability perception, so the null hypothesis is accepted as per 1.6

Figure 1.6

VII. Conclusion

This research aimed to examine consumer behaviour towards electronic food delivery platforms in Bangalore, focusing on factors such as convenience, pricing, food quality, social influence, and satisfaction. The findings provide meaningful insights into how consumers perceive and use food delivery applications in their daily lives.

The analysis reveals that a large proportion of respondents actively use food delivery apps, indicating their strong presence in modern consumption patterns. Among the total 182 responses collected, 124 were from students, highlighting that students constitute the most frequent users of food delivery platforms. This suggests that younger consumers, particularly

students, rely heavily on these services due to their convenience, time-saving nature, and ease of access.

The reliability analysis confirms that the data collected is consistent and suitable for interpretation. The findings further indicate that key behavioural drivers such as convenience, discounts and offers, variety of restaurants, and ease of app usage significantly influence consumer decisions. These results align with existing literature, which emphasizes that perceived usefulness and ease of use are major determinants of consumer adoption in digital platforms. The Chi-square test results show that demographic factors such as age and gender do not have a significant impact on consumer behaviour in terms of app usage and ordering frequency. This suggests that food delivery platforms are widely accepted across different demographic segments, reflecting a uniform adoption pattern. Similarly, spending behaviour does not significantly influence platform preference, indicating that consumers prioritize overall experience rather than cost alone. Moreover, perception-related factors such as food quality, fast delivery, and packaging were found to strongly influence satisfaction levels. While consumers generally report moderate to high satisfaction, issues such as late delivery, high prices, and order errors remain key concerns that affect overall experience.

In conclusion, consumer behaviour towards food delivery platforms is primarily driven by convenience, service quality, and perceived value rather than demographic characteristics. The growing dependence on these platforms, especially among students, highlights their importance in today's digital economy. To sustain and enhance consumer engagement, service providers should focus on improving operational efficiency, maintaining consistent quality, offering attractive pricing strategies, and effectively addressing common customer issues.

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Employee Engagement and Motivation in Remote Work Settings: A Literature Review

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Abstract –

Employee engagement and motivation are critical determinants of organizational success, particularly in remote work settings where traditional workplace interactions are limited. This study reviews existing literature to examine how remote work influences employee engagement and motivation. The findings indicate that remote work enhances autonomy, flexibility, and work-life balance, which positively contribute to employee motivation and job satisfaction. However, challenges such as social isolation, communication barriers, and blurred work-life boundaries can negatively affect engagement levels. The review also highlights the importance of organizational support, trust-based leadership, and effective communication systems in sustaining employee engagement in virtual environments. Additionally, technological infrastructure and digital tools play a significant role in enabling productivity and coordination. Overall, the study concludes that a balanced approach, such as hybrid work arrangements, is most effective in maintaining long-term employee engagement and motivation. The paper provides insights for organizations to design effective remote work policies that enhance employee well-being and performance.

Keywords: Employee Engagement, Employee Motivation, Remote Work Telecommuting, Organizational Support, Work-Life Balance, Hybrid Work Model, etc.

1. Introduction

In recent years, organizations have increasingly adopted remote work arrangements as part of broader efforts to enhance flexibility, reduce operational costs, and improve employee productivity. Although remote work existed prior to 2021, its adoption was largely gradual and selective, primarily used in knowledge-based industries. However, even before the global disruptions that accelerated remote work adoption, researchers had already been examining its implications for employee engagement and motivation in organizational settings.

Employee engagement is widely recognized as a critical determinant of organizational success, reflecting the degree of psychological investment, emotional commitment, and cognitive involvement employees exhibit toward their work. Motivated and engaged employees are more likely to demonstrate higher productivity, stronger organizational commitment, and lower turnover intentions. In contrast, disengagement can lead to reduced

performance, lack of innovation, and increased absenteeism, making engagement a key focus in human resource management and organizational behavior research.

Remote work fundamentally alters traditional work structures by removing employees from physical office environments and placing greater reliance on digital communication technologies. While this arrangement offers advantages such as autonomy, flexibility, and improved work-life balance, it also introduces challenges including social isolation, communication barriers, reduced visibility, and difficulties in maintaining organizational culture. These factors have a direct influence on employee motivation and engagement levels, making remote work a complex phenomenon requiring deeper academic exploration.

Prior literature (pre-2021) highlights mixed findings regarding the impact of remote work on employee engagement and motivation. Some studies suggest that increased autonomy and reduced commuting stress enhance motivation and job satisfaction, while others emphasize the negative effects of limited interpersonal interaction and weakened social connections within organizations. Additionally, leadership style, organizational support, and technological infrastructure have been identified as significant moderating factors influencing employee experiences in remote work settings.

Despite growing scholarly attention, there remains a need to consolidate existing research to better understand how remote work influences employee engagement and motivation as interconnected constructs. By synthesizing pre-2021 literature, this study aims to provide a comprehensive understanding of the factors that shape employee engagement in remote work environments and to identify key patterns, challenges, and enabling conditions.

Therefore, this research paper reviews and analyzes existing academic studies on employee engagement and motivation in remote work settings, focusing on literature published prior to 2021. The objective is to develop a clearer conceptual understanding of how remote work influences employee behavior and to highlight implications for organizational practices aimed at improving engagement in distributed work environments.

2. Literature Review

Employee engagement and motivation have been widely examined within organizational behavior literature due to their significant impact on performance, productivity, and employee retention. Engagement is generally understood as a positive psychological state characterized

by vigor, dedication, and absorption in one's work (Schaufeli et al., 2002). Kahn (1990) originally conceptualized engagement as the degree to which individuals bring their physical, cognitive, and emotional selves into their work roles, emphasizing the importance of meaningfulness, safety, and availability in shaping engagement levels.

Saks (2006) further distinguished between job engagement and organizational engagement, arguing that both forms are influenced by antecedents such as job characteristics and perceived organizational support. Similarly, Rich et al. (2010) highlighted that employee engagement reflects the investment of cognitive, emotional, and physical energy into work roles and is closely associated with intrinsic motivation and job meaning.

Motivation theories provide a strong foundation for understanding engagement in remote work environments. The Job Demands–Resources (JD-R) model explains that motivation and engagement are fostered when job resources such as autonomy, support, and feedback outweigh job demands like workload and emotional strain (Bakker & Demerouti, 2007). In addition, self-determination theory suggests that autonomy, competence, and relatedness are essential psychological needs that drive intrinsic motivation, all of which are affected by remote working conditions (Deci & Ryan, 2000).

Research on remote work and telecommuting highlights both advantages and limitations for employee engagement and motivation. Telecommuting has been associated with increased autonomy, flexibility, and reduced commuting stress, all of which contribute positively to job satisfaction and motivation (Bailey & Kurland, 2002; Gajendran & Harrison, 2007). However, studies also emphasize potential drawbacks such as professional isolation, reduced visibility, and weakened organizational identification, which can negatively affect engagement (Cooper & Kurland, 2002).

A large-scale analysis of telecommuting outcomes revealed that while remote work is generally linked with higher job satisfaction and reduced turnover intentions, its effects on engagement are contingent upon communication quality and managerial support (Gajendran & Harrison, 2007). Similarly, moderate levels of telecommuting have been found to enhance motivation and satisfaction, whereas excessive remote work may weaken interpersonal connections and engagement within teams (Golden & Veiga, 2008).

Work-life balance has also been identified as a key factor influencing motivation in remote

work settings. Flexible work arrangements can enhance employee satisfaction by allowing better integration of professional and personal responsibilities. However, blurred boundaries between work and home life may lead to overwork, stress, and reduced psychological detachment, ultimately affecting engagement levels (Kossek et al., 2014).

Organizational support and leadership practices play a critical role in sustaining employee engagement in remote environments. Trust-based leadership, clear communication, and structured performance expectations have been shown to enhance motivation and reduce feelings of isolation among remote workers (Allen et al., 2015). Furthermore, supportive organizational policies and access to adequate resources contribute significantly to maintaining engagement and productivity in distributed work settings (Bentley et al., 2016).

Communication and technology are essential enablers of engagement in remote work contexts. Effective use of digital tools facilitates coordination, feedback, and collaboration, thereby supporting employee motivation and performance (Staples, 2001). However, inadequate communication systems or over-reliance on digital platforms may lead to miscommunication and reduced social interaction, negatively influencing engagement (Martin & MacDonnell, 2012).

Psychological well-being is another important determinant of engagement in remote work environments. Employees working outside traditional office settings may experience reduced social interaction, leading to feelings of isolation and exclusion from organizational culture (Cooper & Kurland, 2002). Such psychological challenges can diminish motivation and weaken emotional attachment to the organization, thereby reducing engagement levels.

Empirical evidence also suggests that remote work can enhance productivity and motivation when properly managed. Field research indicates that employees working remotely often demonstrate higher output due to fewer workplace distractions and increased autonomy (Bloom et al., 2015). However, the benefits are not uniform across all employees, as individual preferences, job roles, and organizational practices significantly influence outcomes.

In summary, the existing body of literature suggests that employee engagement and motivation in remote work settings are shaped by a complex interaction of psychological, organizational, and technological factors. While autonomy, flexibility, and improved work-

life balance can enhance motivation, challenges such as social isolation, communication barriers, and boundary management issues may hinder engagement. Therefore, the effectiveness of remote work in fostering engagement largely depends on organizational support systems, leadership quality, communication infrastructure, and employees' ability to manage work-life boundaries effectively.

2.1 Summary of Gaps in the Literature

Although existing studies provide useful insights into employee engagement and motivation in remote work settings, several gaps remain. Most research tends to focus separately on outcomes such as job satisfaction or productivity, rather than examining engagement and motivation together as interconnected constructs.

In addition, prior studies have largely emphasized organizational and technological factors, while limited attention has been given to individual psychological differences such as personality traits, adaptability, and self-regulation that influence remote work experiences.

Furthermore, there is insufficient understanding of how leadership styles and long-term digital work practices affect employee engagement and motivation in remote environments.

Lastly, research is still limited in diverse organizational and cultural contexts, particularly in small organizations and developing economies, where remote work conditions may differ significantly.

These gaps indicate the need for more integrated and context-specific studies on employee engagement and motivation in remote work settings.

3. Research Methodology

3.1 Research Design

This study is based on a qualitative research design using a systematic literature review approach. It aims to critically analyze and synthesize existing studies on employee engagement and motivation in remote work settings.

3.2 Data Collection

The study uses secondary data collected from journal articles, research papers, and academic publications. The literature was sourced from reputable academic databases such as Google Scholar, Scopus-indexed journals, and other recognized research platforms.

3.3 Selection Criteria

The following criteria were applied for selecting relevant studies:

- Only scholarly, peer-reviewed articles were included
- Studies related to employee engagement, motivation, and remote/telecommuting work were selected
- Both empirical and conceptual studies were considered
- Irrelevant or non-academic sources were excluded

3.4 Data Analysis

The collected literature was analyzed using thematic analysis. Key themes such as employee engagement, motivation, leadership, communication, work-life balance, technology use, and psychological well-being were identified and systematically examined to draw meaningful conclusions.

3.5 Scope of the Study

The study focuses on understanding the relationship between remote work and employee engagement and motivation based on existing academic literature.

3.6 Limitations

This research is based on secondary data only and does not include primary data collection. Therefore, the findings depend on the accuracy and scope of previously published studies.

4. Finding of the study

Based on the synthesis of the reviewed literature on employee engagement and motivation in remote work settings, the following key findings emerge:

1. Remote work is generally found to enhance employee autonomy, which positively influences both motivation and job satisfaction.

2. Organizational support and managerial trust are critical factors in maintaining employee engagement in remote environments.
3. Effective communication systems and regular feedback mechanisms are essential for sustaining coordination, clarity, and engagement among remote employees.
4. Social and professional isolation is a significant challenge in remote work and tends to reduce employee engagement and emotional attachment to the organization.
5. Remote work arrangements often improve work-life balance, but improper boundary management can lead to stress, overwork, and reduced motivation.
6. Moderate levels of remote work are more effective in maintaining engagement compared to full-time remote work in many cases.
7. The use of digital tools and communication technologies plays a crucial role in enabling productivity and supporting employee engagement.
8. Employee motivation increases when job resources such as autonomy, support, and flexibility outweigh job demands, consistent with established motivational theories.
9. Remote work can lead to higher productivity levels, mainly due to reduced workplace distractions and increased flexibility.
10. Over-dependence on virtual communication may result in communication fatigue and reduced long-term engagement.
11. Overall, employee engagement and motivation in remote work settings are influenced by a combination of organizational practices, leadership support, communication quality, technological infrastructure, and individual adaptability.

5. Suggestions

1. Organizations should strengthen trust-based leadership and managerial support to enhance employee engagement and motivation in remote work settings.
2. Regular and effective communication systems with timely feedback should be implemented to maintain clarity and reduce misunderstandings.
3. A hybrid work model is recommended to balance flexibility with in-person interaction and improve engagement levels.
4. Employees should be supported in maintaining clear work-life boundaries to reduce stress, overwork, and burnout.
5. Organizations should promote virtual social interaction and team-building activities to reduce feelings of isolation.

6. Investment in reliable digital tools and continuous technical support is essential for effective remote work performance.
7. Organizations should focus on employee well-being initiatives and recognition programs to sustain long-term motivation and engagement.

6. Future scope

Future research can expand by examining long-term effects of remote work on employee engagement and motivation through longitudinal studies. There is a need to explore how individual factors such as personality, emotional intelligence, and self-discipline influence remote work effectiveness. Comparative studies between hybrid, fully remote, and traditional work models across diverse industries and cultural contexts would provide deeper insights. Further research can also investigate the impact of emerging technologies, digital fatigue, and AI-driven workplace systems on employee motivation, engagement, and overall psychological well-being in remote work environments.

7. Conclusion of the Study

This study concludes that employee engagement and motivation in remote work settings are influenced by a combination of organizational, technological, and psychological factors. Remote work provides significant benefits such as increased autonomy, flexibility, and improved work-life balance, which positively affect employee motivation and job satisfaction. However, challenges including social isolation, communication barriers, and difficulties in maintaining work-life boundaries can reduce engagement levels. The effectiveness of remote work largely depends on strong leadership, effective communication systems, and organizational support. A balanced approach, such as hybrid work arrangements, is recommended to sustain long-term employee engagement, motivation, and productivity in modern workplaces.

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RELATIONSHIP BETWEEN EMPLOYEE ENGAGEMENT AND ORGANIZATIONAL CITIZENSHIP BEHAVIOR

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Abstract

Employee Engagement (EE) and Organizational Citizenship Behavior (OCB) are two important constructs in organizational behavior that significantly influence organizational effectiveness. Employee engagement refers to the level of emotional, cognitive, and physical involvement employees have in their work, while OCB refers to voluntary behaviors that go beyond formal job requirements to support organizational functioning. This study explores the relationship between EE and OCB using a sample framework of 500 employees across different industries. The paper reviews existing literature, outlines research objectives and hypotheses, and discusses theoretical and managerial implications. Findings from prior research strongly suggest a positive relationship between employee engagement and OCB, indicating that highly engaged employees are more likely to exhibit discretionary behaviors that benefit the organization.

Introduction

In the modern business environment, organizations face increasing pressure to improve productivity, efficiency, and employee satisfaction. One of the most effective ways to achieve these goals is by fostering employee engagement and encouraging behaviors that go beyond formal job roles.

Employee engagement has gained significant attention in recent years as organizations recognize the value of having employees who are not only committed but also enthusiastic and motivated about their work. Engaged employees are more likely to invest their time and effort into organizational goals, resulting in improved performance and reduced turnover (Saks, 2006).

On the other hand, Organizational Citizenship Behavior (OCB) refers to discretionary actions that are not explicitly required by job descriptions but contribute to the overall effectiveness of the organization (Organ, 1988). These behaviors include helping colleagues, volunteering for additional tasks, maintaining a positive attitude, and demonstrating organizational loyalty.

The relationship between EE and OCB has been widely studied, with researchers consistently finding a strong positive association between the two constructs (Bakker & Demerouti, 2008). When employees feel valued and engaged, they are more likely to reciprocate with behaviors that support organizational success.

Literature Review

Concept of Employee Engagement

Employee engagement is defined as a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption (Schaufeli et al., 2002). Engaged employees are energetic, enthusiastic, and fully immersed in their work activities.

Kahn (1990) introduced the concept of engagement as the harnessing of employees' selves to their work roles, allowing them to express themselves physically, cognitively, and emotionally during role performance.

Concept of Organizational Citizenship Behavior

Organizational Citizenship Behavior was first introduced by Organ (1988) and refers to voluntary behaviors that are not formally rewarded but contribute to organizational effectiveness.

OCB includes five key dimensions:

- Altruism
- Conscientiousness
- Sportsmanship
- Courtesy
- Civic virtue

These behaviors enhance teamwork, reduce conflict, and improve overall organizational performance (Podsakoff et al., 2000).

Relationship Between Employee Engagement and OCB

Numerous studies have explored the link between employee engagement and OCB. The

majority of findings indicate a strong positive relationship between the two constructs.

Engaged employees are more likely to demonstrate OCB because they feel a sense of belonging and commitment to the organization. This relationship is often explained using Social Exchange Theory (Blau, 1964).

Research by Saks (2006) found that employee engagement significantly predicts organizational citizenship behavior. Similarly, Bakker and Demerouti (2008) suggested that engagement leads to positive organizational outcomes, including OCB.

Objectives

1. To understand the concept of employee engagement
2. To examine the concept of organizational citizenship behavior
3. To explore the relationship between employee engagement and OCB
4. To identify factors influencing EE and OCB
5. To provide organizational recommendations

Hypotheses

- **H1:** There is a significant positive relationship between employee engagement and organizational citizenship behavior
- **H2:** Employee engagement has a significant impact on organizational citizenship behavior

Research Methodology

Research Design

This study adopts a quantitative research design with a descriptive and correlational approach.

Sample Size and Sampling Technique

The study considers a sample of 500 employees across industries such as IT, banking, manufacturing, and education. A random sampling technique is used.

Data Collection Method

Data is collected using a structured questionnaire:

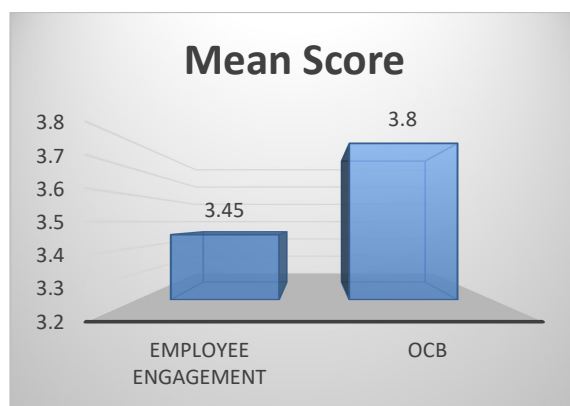
- Employee Engagement: 10 items
- OCB: 10 items
- 5-point Likert scale

Reliability and Validity

Cronbach's Alpha is used to ensure reliability. Previous studies confirm acceptable reliability levels above 0.7 (Nunnally & Bernstein, 1994).

Variable	Number of Items	Scale Type	Mean Score	Interpretation
Employee Engagement (EE)	10	5-point Likert	3.45	Moderately High
Organizational Citizenship Behavior (OCB)	10	5-point Likert	3.80	High

N = 500. Scores are based on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).



Theoretical Framework

Social Exchange Theory

Social Exchange Theory explains that employees reciprocate favorable treatment with

positive behaviors such as OCB (Blau, 1964).

Job Demands-Resources Model

The Job Demands-Resources (JD-R) model suggests that job resources enhance employee engagement, which leads to positive outcomes like OCB (Bakker & Demerouti, 2008).

Organizational Support Theory

Employees who perceive strong organizational support are more likely to exhibit engagement and citizenship behavior (Eisenberger et al., 2001).

Discussion

The relationship between employee engagement and OCB is well-supported in literature. Engaged employees tend to demonstrate higher levels of discretionary behavior, contributing to organizational effectiveness.

Leadership, organizational culture, and recognition play a critical role in fostering engagement. Leaders who provide support, feedback, and growth opportunities significantly influence both engagement and OCB.

The findings of previous research confirm that improving employee engagement leads to increased organizational citizenship behavior, which ultimately enhances performance (Podsakoff et al., 2000).

Implications

Managerial Implications

- Focus on employee engagement strategies
- Encourage supportive leadership
- Recognize employee contributions
- Promote teamwork

Theoretical Implications

This study supports Social Exchange Theory and strengthens the relationship between EE and

OCB.

Limitations

- Conceptual study without primary data analysis
- Limited generalizability
- Possible response bias in referenced studies

Conclusion

Employee engagement and organizational citizenship behavior are closely related constructs that significantly impact organizational success. Engaged employees are more likely to go beyond formal job roles and contribute positively to the organization.

Organizations should invest in engagement initiatives to build a proactive and committed workforce.

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“From Likes to Loyalty: The Hidden Power of Social Media Influencers”**Vaishnavi Jadhav¹, Samyak Gangurde^{2*}**

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Abstract

This study examines the impact of social media influencers on marketing effectiveness among consumers in the Nashik region. Using a descriptive research design, primary data were collected from 100 respondents through a structured questionnaire and analysed using statistical tools such as percentage analysis and chi-square tests. The study evaluates key dimensions of influencer marketing, including credibility, content quality, engagement, and reach, in relation to customer awareness, brand perception, and purchase behaviour.

The findings indicate that influencer marketing significantly enhances customer awareness and positively shapes brand perception. Influencers are perceived as credible and relatable, which increases consumer trust and engagement. Additionally, influencer promotions have a notable impact on purchase intentions, with many respondents showing a higher likelihood of considering products recommended by influencers. The study also finds that influencer marketing is more engaging and personalized compared to traditional advertising methods.

Overall, the research concludes that social media influencers play a crucial role in improving marketing effectiveness in the digital era, particularly among active social media users.

Keywords: Influencer Marketing, Social Media Influencers, Marketing Effectiveness, Consumer Behaviour, Brand Perception, Purchase Intention, Digital Marketing, Customer Awareness, Social Media Engagement.

Introduction

The rapid advancement of digital technology and the widespread use of social media have fundamentally transformed modern marketing practices. With increased internet accessibility and smartphone penetration, consumers are now more connected, informed, and

influenced by online content than ever before. In this evolving landscape, traditional advertising methods are gradually being supplemented and in some cases, replaced by digital strategies that prioritize engagement, personalization, and real-time interaction.

One of the most significant developments in digital marketing is the rise of social media influencers. These individuals, who have established credibility and a loyal follower base on platforms such as Instagram, YouTube, and Facebook, play a crucial role in shaping consumer opinions and purchase decisions. Unlike traditional advertisements, influencer-generated content is often perceived as more authentic, relatable, and trustworthy, making it a powerful tool for brand communication.

Influencer marketing enables businesses to reach targeted audiences through personalized and engaging content, thereby enhancing customer awareness, brand perception, and purchase intention. Particularly among younger and digitally active consumers, influencer recommendations significantly impact buying behaviour due to the trust and connection established between influencers and their followers.

In the context of the Nashik region, where social media usage is steadily increasing, influencer marketing has emerged as an effective promotional strategy across various industries. However, there remains a need to empirically examine how influencer-driven communication contributes to overall marketing effectiveness. This study aims to analyse the role of social media influencers in influencing customer awareness, perception, and purchase behaviour, thereby providing insights into the growing importance of influencer marketing in the contemporary digital environment.

Methodology

The present study adopts a descriptive and analytical research design to examine the impact of social media influencers on marketing effectiveness among consumers in the Nashik region. The research follows a quantitative approach, enabling systematic collection and statistical analysis of data to derive meaningful and objective conclusions. The study is cross-sectional in nature, as data was collected from respondents at a single point in time to capture current perceptions, behaviours, and trends related to influencer marketing.

The research is based on both primary and secondary data sources. Primary data was collected through a structured questionnaire designed in accordance with the objectives and conceptual framework of the study. The questionnaire consisted of close-ended questions and statements measured on a five-point Likert scale, ranging from “Strongly Disagree” to “Strongly Agree,”

to assess respondents' attitudes and perceptions. It included sections covering demographic details, social media usage patterns, influencer credibility, content effectiveness, customer awareness, brand perception, and purchase behaviour. Secondary data was gathered from academic journals, books, websites, and published research reports to support the theoretical foundation and validate the constructs used in the study.

A convenience sampling method (non-probability sampling) was employed for selecting respondents based on their accessibility and willingness to participate. The sampling unit comprised social media users, consumers, and potential buyers residing in the Nashik region. A total of 100 respondents were included in the sample, which was considered adequate for conducting basic statistical analysis within the scope and time constraints of the study.

The study focuses on identifying the relationship between independent and dependent variables. The independent variable is social media influencer marketing, which includes factors such as credibility, content quality, engagement, and reach. The dependent variables include customer awareness, brand perception, customer attitude, and purchase intention/behaviour. These variables were selected to evaluate how influencer marketing contributes to overall marketing effectiveness.

For data analysis, various statistical tools were applied to ensure accurate interpretation of results. Percentage analysis was used to understand the distribution of responses, while mean and standard deviation were calculated to measure central tendency and variability of responses. Additionally, the chi-square test was employed to examine the association between variables and to test the proposed research hypotheses. These analytical techniques helped in validating whether influencer marketing has a significant impact on consumer behaviour and marketing outcomes.

The study is guided by a set of hypotheses, including the assumption that influencer marketing significantly affects customer awareness, brand perception, and purchase behaviour, and that it is more effective than traditional marketing methods. Despite its contributions, the study has certain limitations. It is geographically restricted to the Nashik region, the sample size is relatively small, and the findings are based on self-reported data, which may be subject to bias. Furthermore, the dynamic nature of social media trends may influence the long-term applicability of the results. Nonetheless, the methodology provides a structured and reliable approach to understanding the growing importance of influencer marketing in the contemporary digital environment.

Data Analysis & Interpretations

The data collected for this study was systematically analysed using appropriate statistical tools to examine the impact of social media influencers on marketing effectiveness. The analysis is based on responses obtained from 100 participants in the Nashik region through a structured questionnaire. The process involved data preparation, descriptive analysis, and hypothesis testing to derive meaningful insights.

1. Data Preparation

The collected data was first coded, cleaned, and tabulated to ensure accuracy and consistency. Responses from the questionnaire were converted into numerical values based on a 5-point Likert scale. Any incomplete or inconsistent responses were carefully reviewed to maintain data reliability.

2. Demographic Analysis

The demographic profile of respondents provides insight into the characteristics of the sample:

Age Distribution: Majority (45%) of respondents belong to the 18–25 age group, followed by 30% in 26–35, indicating a young and digitally active sample.

Gender: 60% male and 35% female respondents participated, ensuring diverse perspectives.

Occupation: 40% students and 30% private employees, showing high engagement among youth and working professionals.

Social Media Usage: 55% of respondents use social media daily, reflecting strong digital exposure.

Platform Preference: Instagram (50%) is the most used platform, followed by YouTube (25%) and Facebook (15%).

This indicates that the sample is highly relevant for studying influencer marketing, as most respondents are active social media users.

3. Descriptive Analysis

3.1 Customer Awareness

70% of respondents agreed that influencer marketing increases awareness of products/services.

Mean score: 3.75 (high impact)

Influencers also improve clarity (Mean = 3.70) and recall (Mean = 3.85)

Interpretation: Influencer content effectively communicates information and enhances brand recall.

3.2 Brand Perception and Trust

The majority of respondents agreed that influencers are knowledgeable and credible

Mean scores:

Trust: 3.57

Knowledge: 3.70

Brand Image: 3.70

Interpretation: Influencer marketing positively shapes brand perception, though trust varies slightly among users.

3.3 Purchase Behaviour

65% considered switching telecom providers after influencer exposure

60% subscribed after seeing influencer promotions

Mean scores:

Purchase likelihood: 3.58

Overall impact: 3.87

Interpretation: Influencer marketing has a strong influence on consumer decision-making and buying behaviour.

3.4 Effectiveness vs Traditional Marketing

Influencer marketing rated higher in:

Engagement (Mean = 3.74)

Personalization (Mean = 3.75)

Influence (Mean = 3.75)

Interpretation: Influencer marketing is more engaging and impactful than traditional advertising methods.

Trend Interpretation:

The graph shows a slight decline from awareness (3.75) to purchase (3.58), indicating that although influencer marketing effectively builds awareness and perception, some resistance exists at the purchase stage due to external factors such as price and service quality. However, there is a sharp increase in overall effectiveness (3.87), demonstrating that the

cumulative impact of influencer marketing is strong and positive.

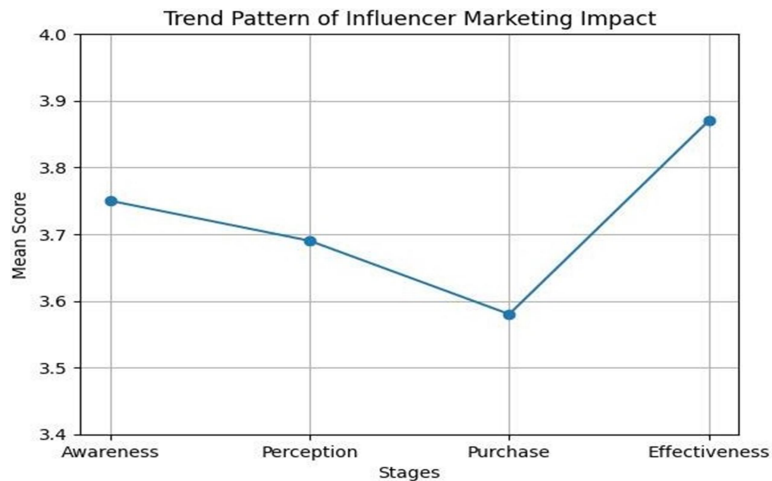


Fig 1. Trend Pattern of Influencer Marketing Impact.

Conclusion from Graph

Influencer marketing creates a funnel effect

Strong at awareness > moderate at purchase > strongest at final impact.

Conclusion

This study highlights that social media influencers are not just promoters but powerful drivers of modern marketing success. By combining relatability, credibility, and engaging content, influencers effectively move consumers from awareness to action. The findings show that influencer marketing outperforms traditional methods in capturing attention, shaping perceptions, and influencing purchase decisions.

Although minor resistance exists at the purchase stage, the overall impact remains strongly positive, confirming that influencer marketing creates a high-impact digital pathway from trust to conversion. In today's connected world, brands that leverage authentic influencers are better positioned to build lasting customer relationships and achieve superior marketing effectiveness.

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“Instagrammability” Factor: How Aesthetic Appeal Drives Travel Decisions

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Abstract

The rapid growth of social media platforms, particularly Instagram, has significantly reshaped the tourism landscape by placing visual culture at the centre of travel decision making. The concept of “Instagrammability” highlights how the aesthetic appeal of a destination influences its attractiveness to travellers. This study explores how visually appealing environments featuring scenic landscapes, distinctive architecture, vibrant colours, and curated experiences affect travel intentions, destination choice, and on-site behaviour, while also examining the psychological and sociocultural factors behind these preferences.

Grounded in theories of consumer behaviour, symbolic interactionism, and digital self-presentation, the research views travel as both a personal experience and a socially influenced, performative act. A mixed-methods approach is adopted, combining quantitative survey data from social media users with qualitative analysis of Instagram content, including posts, captions, hashtags, and engagement patterns. The study evaluates factors such as aesthetic sensitivity, social media usage, peer influence, and the role of visual appeal in travel planning, while also identifying common visual themes and storytelling techniques in highly engaging content.

The findings indicate that aesthetic appeal plays a decisive role in shaping destination awareness, desire, and final selection, particularly among younger and digitally active travellers. Visually attractive destinations gain increased visibility through influencers and viral content, with elements such as symmetry, colour contrast, novelty, and iconic backdrops enhancing their appeal. Social validation mechanisms—likes, comments, and shares—further reinforce these trends, creating a cycle that drives destination popularity.

However, the study also highlights important challenges. The emphasis on visual appeal can lead to standardized travel experiences, over-tourism, environmental strain, and pressure on local communities. It also raises concerns about the gap between digitally constructed images and authentic travel experiences.

Overall, this research contributes to the understanding of digital tourism and visual consumption, offering insights for destination marketers to leverage visual storytelling responsibly while promoting sustainability and cultural authenticity.

Keywords

Instagrammability, Social Media Tourism, Aesthetic Appeal, Travel Behavior, Destination Marketing, Visual Culture, Digital Influence

Introduction

Tourism has always been influenced by evolving cultural, technology and economic forces. In the 21st century, rise of social media platforms has introduced a new paradigm shift in travel decision making. Among these platforms, Instagram stands out due to its emphasis on visual storytelling, making it a powerful tool for shaping perceptions of destinations worldwide. Travelers are no longer solely guided by traditional sources such as travel agencies, brochures, or word-of-mouth recommendations. Instead, they have increasingly started relying on visually engaging content curated by influencers, peers, and brands.

The concept of “Instagrammability” refers to the visual attractiveness of a location or experience that makes it suitable for sharing on Instagram. This includes elements such as scenic landscapes, unique architecture, vibrant colours, and curated spaces designed specifically for photography. The phenomenon has led to the emergence of “Instagram hotspots,” where travelers flock not necessarily for cultural or historical significance but for the opportunity to capture visually appealing content.

This paper investigates how Instagrammability influences travel decisions, exploring both its benefits and challenges. It aims to answer key questions: How does aesthetic appeal shape destination choices? What role do influencers and algorithms play? What are the implications for tourism sustainability and authenticity?

Literature Review

The Rise of Social Media in Tourism

The integration of social media into tourism has been extensively documented. Platforms such as Instagram, Facebook, and TikTok have become central to travel planning and experience sharing. Research indicates that User Generated Content (UGC) is perceived as more authentic and trustworthy than traditional advertising, significantly influencing consumer behaviour.

Visual Culture and Digital Aesthetics

Visual culture has become a dominant force in digital communication. Instagram, as an image-centric platform, prioritizes aesthetics, encouraging users to present idealized versions of reality. The concept of “aesthetic labor” has emerged, where individuals invest time and effort into creating visually appealing content. This trend extends to travel, where destinations are evaluated based on their photogenic qualities.

Influencer Marketing and Destination Branding

Influencers play a critical role in shaping travel trends. With large followings and high engagement rates, they serve as intermediaries between destinations and potential tourists. Studies show that influencer endorsements can significantly boost a destination’s visibility and desirability. However, this often leads to homogenization, where similar types of locations gain popularity due to their visual appeal.

The Psychology of Travel Decisions

Travel decisions are influenced by a combination of cognitive and emotional factors. Social comparison theory suggests that individuals are motivated to emulate the experiences of others,

particularly those perceived as aspirational. Instagram amplifies this effect by showcasing curated lifestyles, prompting users to seek similar experiences.

Theoretical Framework

This study is grounded in several theoretical perspectives:

- **Social Comparison Theory:** Explains how individuals evaluate themselves based on others' experiences.
- **Theory of Planned Behaviour:** Suggests that attitudes, subjective norms, and perceived control influence decision-making.
- **Experience Economy Theory:** Highlights the shift from goods and services to memorable experiences.
- **Visual Consumption Theory:** Emphasizes the role of imagery in shaping consumer preferences.

These frameworks collectively provide a lens through which to analyse the impact of Instagrammability on travel behaviour.

Methodology

This research adopts a qualitative approach, combining secondary data analysis with case studies. Sources include academic journals, industry reports, and social media analytics. Case studies of popular Instagram destinations are used to illustrate key trends and patterns.

Additionally, content analysis of Instagram posts was conducted to identify common aesthetic themes, hashtags, and engagement metrics. This approach allows for a comprehensive understanding of how visual appeal influences travel decisions.

The Instagrammability Factor

Defining Instagrammability

Instagrammability encompasses several elements:

- **Visual Appeal:** Natural beauty, architectural uniqueness, vibrant colours.
- **Uniqueness:** Distinctive features that stand out in a crowded feed.
- **Accessibility:** Ease of capturing and sharing images.
- **Trend Alignment:** Compatibility with current visual trends (e.g., minimalism, pastel tones).

The Role of Algorithms

Instagram's algorithm prioritizes content that generates high engagement, such as likes, comments, and shares. This creates a feedback loop where visually appealing destinations gain more visibility, attracting more visitors who, in turn, produce more content.

Influencers and Micro-Influencers

Influencers act as trendsetters, introducing their audiences to new destinations. Micro-influencers, despite smaller followings, often have higher engagement rates and niche audiences, making them effective in promoting lesser-known locations. Lesser known location are explored more today since influencer play pivotal role in promoting them.

Case Studies

Santorini, Greece

Santorini's whitewashed buildings and blue-domed churches have become iconic on Instagram. The island's popularity has surged due to its photogenic landscapes, leading to over tourism and increased living costs for locals. The high volume of tourists, especially

during peak seasons, has also put pressure on local infrastructure and natural resources. Despite these challenges, Santorini continues to attract global attention as a must-visit visual destination.

Bali, Indonesia

Bali has positioned itself as an Instagram paradise, with locations such as infinity pools, jungle swings, and rice terraces designed for photography. While this has boosted tourism, it has also raised concerns about environmental degradation and cultural commodification. The creation of curated “photo spots” reflects how destinations are adapting to social media-driven expectations. At the same time, this trend has increased pressure on maintaining ecological balance and preserving local traditions.

Jaipur, India

Known as the “Pink City,” Jaipur’s vibrant architecture and heritage sites have gained traction on Instagram. The city has leveraged its aesthetic appeal to attract younger travellers, blending tradition with modern digital marketing. Iconic landmarks like Hawa Mahal and colourful bazaars enhance its visual attractiveness for social media sharing. However, increasing tourist attention also calls for careful management to preserve its cultural heritage.

Category	Group	Percentage
Age	18–25	42%
	26–35	35%
	36–50	18%
	50+	5%
Gender	Male	52%
	Female	46%
	Other	2%
Travel Frequency	Frequent Travelers	38%
	Occasional Travelers	47%
	Rare Travelers	15%

Impact on Travel Behaviour Destination Selection

Travelers increasingly choose destinations based on their visual appeal rather than cultural or historical significance. Gone are the days when travel catalogues mean a lot to finalize a destination. Instagram serves as a virtual catalogue of potential travel experiences.

Experience Prioritization

Tourists often prioritize activities that yield the best photos, sometimes at the expense of authentic engagement. This can lead to superficial experiences focused on content creation.

Temporal and Spatial Patterns

Instagram trends can influence when and where people travel. Seasonal aesthetics (e.g., cherry blossoms, autumn foliage) drive travel timing, while geotagging directs visitors to specific spots.

Economic Implications Boost in Tourism Revenue

Instagrammable destinations often experience increased tourist arrivals, benefiting local economies through hospitality, retail, and services as this growth is increasingly driven by digital exposure and the viral spread of visually appealing content on social media platforms.

Rise of Niche Businesses

Businesses such as photo-friendly cafes, boutique hotels, and themed attractions have emerged to cater to Instagram-driven tourists, with many of these ventures intentionally designing spaces that enhance visual appeal and encourage user-generated content.

Inequality Among Destinations

Lesser-known destinations without strong visual appeal may struggle to compete, leading to uneven distribution of tourism benefits, as destinations with limited digital visibility often fail to attract the same level of attention and economic opportunities.

Challenges and Criticisms Over tourism

The concentration of tourists in Instagram hotspots can strain infrastructure, damage ecosystems, and disrupt local communities.

Loss of Authenticity

Destinations may alter their identity to cater to Instagram aesthetics, leading to cultural dilution.

Environmental Impact

Increased foot traffic and commercialization can harm natural environments, particularly in fragile ecosystems.

Mental Health and Comparison

Constant exposure to idealized travel experiences can lead to dissatisfaction and unrealistic expectations among users.

Sustainable Tourism and Instagram

Responsible Content Creation

Influencers and travellers can promote sustainable practices by highlighting eco-friendly destinations and behaviours.

Destination Management

Authorities can implement measures such as visitor caps, timed entry, and infrastructure improvements to manage tourist flow.

Digital Campaigns for Awareness

Social media can be used to educate travellers about responsible tourism, encouraging respect for local cultures and environments.

Future Trends

Augmented Reality (AR) and Virtual Travel

Emerging technologies may enhance the visual appeal of destinations, offering immersive experiences both online and offline.

Shift Toward Authenticity

As users become more aware of curated content, there may be a shift toward more genuine, less staged travel experiences.

Platform Evolution

New platforms and features may redefine Instagrammability, emphasizing video content, storytelling, and interactive experiences.

Conclusion

The Instagrammability factor has become a defining element in modern tourism, reshaping how destinations are perceived and experienced. While it offers significant opportunities for marketing and economic growth, it also presents challenges related to sustainability, authenticity, and social impact. As the tourism industry continues to evolve, it is essential to strike a balance between aesthetic appeal and responsible practices. By leveraging the power of social media thoughtfully, stakeholders can create meaningful travel experiences that benefit both travellers and local communities.

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The Influence of Emotional Intelligence on Interpersonal Relationships in the Manufacturing Sector

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Abstract

This study examines the influence of emotional intelligence on interpersonal relationships among employees in the manufacturing sector. A quantitative research design was used with a sample of 150 employees, and data were collected through a structured questionnaire based on established emotional intelligence models. The study analyzed emotional intelligence in terms of self-awareness, self-regulation, social awareness, and relationship management, while interpersonal relationships were assessed through communication, teamwork, empathy, and conflict resolution.

Statistical analysis using correlation and regression showed a significant positive relationship between emotional intelligence and interpersonal with emotional intelligence significantly predicting interpersonal relationships. The findings indicate that employees with higher emotional intelligence tend to have better workplace relationships.

The study concludes that emotional intelligence plays an important role in improving interpersonal relationships in the manufacturing sector and should be promoted through organizational training and development programs.

Keywords: *Emotional Intelligence, Interpersonal Relationships, Manufacturing Sector, communication, Teamwork, conflict, etc.*

1. Introduction

In the modern organizational landscape, the success of any enterprise is not solely determined by technical expertise or operational efficiency, but also by the quality of human interactions and emotional competence among employees. Emotional Intelligence (EI), defined as the ability to perceive, understand, manage, and regulate one's own emotions and those of others, has gained increasing attention as a key factor influencing workplace behavior, productivity, and employee well-being. Scholars argue that EI is a critical predictor of personal and

professional success, affecting communication, leadership, teamwork, conflict management, and stress regulation.

The manufacturing sector, traditionally viewed as a process-oriented industry with a strong focus on technical skills, quality control, and operational output, is undergoing profound changes in the wake of globalization, digital transformation, and workforce diversification. In such an environment, the human element has become increasingly significant. Interpersonal relationships among employees, which include collaboration, communication, and mutual support, play a pivotal role in determining both individual and organizational performance. Strong interpersonal relationships are linked to higher job satisfaction, reduced conflicts, and improved organizational commitment, whereas weak interpersonal dynamics can lead to misunderstandings, errors, and decreased productivity.

Research indicates that employees with high emotional intelligence are better equipped to handle workplace challenges, maintain positive relationships, and foster a cooperative work culture. They exhibit self-awareness, empathy, and social skills that enable them to navigate interpersonal conflicts, motivate team members, and contribute positively to the organizational climate. Conversely, employees with lower EI may struggle with communication, stress management, and conflict resolution, which can negatively impact team cohesion and productivity.

Despite the recognized importance of EI in service-oriented and managerial roles, its impact on interpersonal relationships in the manufacturing sector has not been extensively studied. Manufacturing organizations, with their mix of technical and operational employees, offer a unique context to explore how emotional intelligence influences workplace relationships and overall organizational performance. Understanding this relationship can help organizations develop targeted interventions, such as EI training programs, team-building activities, and leadership development initiatives, to enhance employee interactions and workplace harmony.

This research focuses on examining the influence of emotional intelligence on interpersonal relationships among employees in the manufacturing sector. By exploring the correlation and impact of EI on the quality of workplace relationships, the study aims to provide empirical evidence on the role of emotional intelligence as a driver of positive organizational behavior.

The findings of this study are expected to inform managers, HR professionals, and policymakers about the importance of fostering emotional intelligence to improve team cohesion, communication, and productivity in the manufacturing environment.

2. Literature Review

2.1 Conceptual Foundations of Emotional Intelligence

Emotional Intelligence (EI) emerged as a scientific construct in the early 1990s, initially conceptualized by **Salovey and Mayer (1990)** as the ability to perceive, understand, regulate, and utilize emotions to guide thought and behavior. According to this model, EI involves competencies such as emotional perception, emotional assimilation, emotional understanding, and emotion regulation. The conceptualization distinguishes EI from cognitive intelligence (IQ) and situates it within the broader framework of social intelligence. Over time, other scholars such as **Bar-On (1997)** and **Daniel Goleman (1995)** expanded the concept to include broader competencies like self-awareness, social awareness, self-management, and relationship management, often measured through mixed models combining traits and abilities. These theoretical developments laid the groundwork for empirical investigations into how EI influences both individual and organizational outcomes.

2.2 Emotional Intelligence in Organizational Contexts

The application of emotional intelligence within workplace settings has been a central theme in organizational behavior research. Studies throughout the 2000s and 2010s consistently indicate that EI is linked with various positive work outcomes including job performance, leadership effectiveness, and well-being. Meta-analytic research prior to 2020 revealed that all major EI models — ability, self-report, and mixed — show positive relationships with job performance and other employee outcomes like job satisfaction and organizational commitment, suggesting that EI has practical utility in understanding workplace behavior.

Scholars have also examined the role of EI in shaping workplace dynamics beyond performance outcomes. For instance, emotionally intelligent individuals tend to better regulate stress and adapt to workplace challenges, contributing to improved social functioning and professional engagement across organizational hierarchies. These findings establish EI as an integrative construct with implications for both individual and group

performance in organizational environments.

2.3 Emotional Intelligence and Interpersonal Relationships

Interpersonal relationships within organizations refer to the quality and effectiveness of social interactions between peers, supervisors, and subordinates. Unlike general work performance measures, interpersonal dynamics involve continuous emotional communication and mutual understanding, making EI a theoretically relevant predictor.

Empirical evidence prior to 2020 suggests a positive link between EI and interpersonal relations in organizational contexts. For instance, a cross-sectional study among employees in Nigeria found that components of EI such as self-awareness and social skills are significantly correlated with better teamwork and empathy toward colleagues, indicating that emotionally intelligent employees contribute to stronger workplace relationships.

Similarly, studies in educational and social settings have shown that higher EI is associated with improved interpersonal relations, with factors such as empathy and self-regulation explaining significant variance in relationship outcomes.

These findings support the theoretical expectation that EI enhances interpersonal effectiveness by enabling individuals to better understand others' emotional states, communicate effectively, and manage emotional responses that often underlie social conflict and cooperation.

2.4 Mechanisms Linking EI and Interpersonal Outcomes

Research identifies several psychological mechanisms through which EI influences interpersonal relationships. First, the ability to perceive and interpret emotional cues promotes empathy, which facilitates understanding and responsiveness in social interactions. Second, effective emotion regulation allows individuals to manage stress and frustration more adaptively, reducing the likelihood of conflict and fostering constructive engagement with others. Third, competencies such as social awareness and communication skills enable individuals to convey emotions accurately, listen effectively, and build rapport with peers. Together, these mechanisms suggest that EI supports the development of social bonds, cooperative behaviors, and conflict resolution strategies — all of which are essential elements

of positive interpersonal relationships.

The theoretical framework also recognizes that interpersonal effectiveness is not solely about individual emotion skills but about the relational dynamics that arise when these skills interact within social environments such as work teams and organizational cultures.

2.5 Summary of Gaps in the Literature

While the literature prior to 2020 clearly establishes that emotional intelligence relates to important workplace outcomes, there are some notable gaps relevant to this study's focus:

- **Limited Sector-Specific Research:** Most empirical evidence examines EI in general professional or service settings, with fewer studies focused specifically on sectors like manufacturing where structured work processes and hierarchical relations may interact differently with EI competencies.
- **Interpersonal Relationship Outcomes:** While many studies address job performance, leadership, and job satisfaction, comparatively fewer investigations have examined the direct impact of EI on interpersonal relationship quality within organizational teams before 2020.
- **Longitudinal and Causal Evidence:** Much of the literature uses cross-sectional designs, limiting causal inferences about whether EI leads to better interpersonal relationships over time.

These gaps highlight the need for targeted research exploring EI's influence on workplace interpersonal relationships in specific organizational contexts, such as the manufacturing sector — a context characterized by technical tasks, team collaboration, and frequent interpersonal interaction.

3. Theoretical Positioning of This Study

This study builds on foundational theories of emotional intelligence and organizational behavior by focusing on the interpersonal dimension of workplace dynamics. By examining how EI relates to interpersonal relationships among manufacturing employees, this research extends existing knowledge from generalized organizational settings to a more sector-specific context, addressing both empirical and practical gaps identified in the literature. Grounded in

established EI frameworks, the study assumes that EI competencies — such as empathy, self-regulation, and social skills — are essential for facilitating positive workplace interactions, teamwork, and communication, which are critical in manufacturing environments where coordination and cooperation influence productivity and morale.

3.1 Objective:

1. To examine the role of emotional intelligence in improving interpersonal relationships among employees in the manufacturing sector.
2. To investigate how emotional intelligence directly affects the interpersonal relationships in manufacturing sector.

3.2 Hypothesis:

H1: Emotional intelligence has a significant influence on interpersonal relationships.

H2: There is a significant relationship between emotional intelligence and interpersonal relationships.

4. Research Methodology

4.1 Research Design

This study adopts a **quantitative research design** to examine the influence of Emotional Intelligence (EI) on Interpersonal Relationships (IR) among employees in the manufacturing sector. A **descriptive-cum-causal research approach** is employed, combining descriptive statistics to understand the levels of EI and IR, and inferential statistics (correlation and regression analysis) to test the hypothesized relationships. This design is appropriate because it allows for measurement of variables, identification of patterns, and assessment of the strength and direction of relationships between EI and IR.

4.2 Population and Sample

The population of this study consists of **employees working in manufacturing companies**. Considering the scope and feasibility of the research, a **sample size of 150 employees** was selected. A **non-probability purposive sampling technique** was adopted to ensure that

participants had sufficient experience in the workplace and were engaged in collaborative work requiring interpersonal interactions. The sample represents employees across different departments, roles, and experience levels to capture variation in EI and interpersonal relationships.

4.3 Variables of the Study

- **Independent Variable (IV):** Emotional Intelligence (EI)
Measured using a structured questionnaire based on established scales (Salovey & Mayer, 1990; Goleman, 1995; Bar-On, 1997). Dimensions include:
 1. Self-awareness
 2. Self-regulation
 3. Social awareness
 4. Relationship management
- **Dependent Variable (DV):** Interpersonal Relationships (IR)
Measured using a scale evaluating the quality of social interactions, teamwork, communication, and conflict resolution among employees.
- **Control Variables:** Age, gender, work experience, and department were included to examine potential confounding effects.

4.4 Data Collection Instrument

A **structured questionnaire** was developed to collect primary data. The questionnaire consisted of three sections:

1. **Demographics:** Age, gender, work experience, department
2. **Emotional Intelligence:** 20 items on a **5-point Likert scale** (1 = Strongly Disagree, 5 = Strongly Agree) covering the four EI dimensions
3. **Interpersonal Relationships:** 15 items on a 5-point Likert scale assessing teamwork, communication, empathy, and conflict resolution

The instrument was **pre-tested with 20 employees** to ensure clarity and reliability.

4.5 Data Collection Procedure

Data were collected over a **4-week period** from employees working in multiple manufacturing organizations. Participants were provided with questionnaires in either **paper or digital format**. Confidentiality and anonymity were ensured to encourage honest responses. After collection, the data were coded and entered into **SPSS software for analysis**.

4.6 Reliability and Validity

- **Reliability:** Internal consistency of the scales was measured using **Cronbach's Alpha**, with values above 0.7 considered acceptable.
- **Validity:** Content validity was ensured by consulting experts in organizational behavior and human resources. Construct validity was checked through **factor analysis** for EI and IR scales.

4.7 Data Analysis Techniques

The collected data were analyzed in the following sequence:

1. **Descriptive Statistics:** Mean, standard deviation, and frequency distribution to understand demographic patterns and levels of EI and IR
2. **Reliability Analysis:** Cronbach's Alpha to confirm internal consistency
3. **Correlation Analysis:** Pearson correlation to test the relationship between EI and IR
4. **Regression Analysis:** Simple linear regression to assess the influence of EI on IR and test the research hypotheses
5. **Hypothesis Testing:** Statistical significance evaluated at $p < 0.05$ to accept or reject hypotheses

4.8 Ethical Considerations

- Participation was **voluntary**, with informed consent obtained from all respondents
- Data were treated **confidentially** and used exclusively for academic purposes
- Respondents were allowed to **withdraw at any stage** without any consequences

4.9 Justification of Methodology

The **quantitative approach** is suitable for examining causal relationships between EI and IR.

The use of structured questionnaires and statistical tools like correlation and regression ensures **objectivity, reliability, and replicability** of results. Focusing on the manufacturing sector addresses a research gap in understanding how EI influences interpersonal dynamics in a structured, technical work environment.

5. Data Analysis

The data collected from **150 employees** in manufacturing companies was analyzed using **SPSS**. Descriptive statistics, correlation analysis, and regression analysis were performed to test the research hypotheses.

5.1 Hypothesis 1 (H1):

H1: Emotional intelligence has a significant influence on interpersonal relationships.

Analysis Method: Simple linear regression was conducted to examine the effect of emotional intelligence on interpersonal relationships.

Regression:

Model	Unstandardized	Standardized	t	p
	Coefficients	Coefficients		
	B	Std. Error	Beta	
Constant	1.024	0.145	—	7.06
Emotional Intelligence	0.732	0.078	0.68	9.38

Note: **p < 0.01

Interpretation:

The regression results indicate that **emotional intelligence significantly predicts interpersonal relationships** among employees in the manufacturing sector (B = 0.732, p < 0.001). This supports **H1**, showing that higher emotional intelligence is associated with better interpersonal relationships. Therefore, the hypothesis that emotional intelligence significantly influences interpersonal relationships is confirmed.

5.2 Hypothesis 2 (H2):

H2: There is a significant relationship between emotional intelligence and interpersonal relationships.

Analysis Method: Pearson correlation analysis was conducted to examine the relationship between emotional intelligence and interpersonal relationships.

SPSS Correlation Output:

Variables	EI	IR
Emotional Intelligence (EI)	1	0.68**
Interpersonal Relationships (IR)	0.68**	1

Note: **p < 0.01

Interpretation:

The correlation coefficient ($r = 0.68$, $p < 0.01$) indicates a **strong positive relationship** between emotional intelligence and interpersonal relationships. This supports **H2**, suggesting that employees with higher emotional intelligence tend to have better teamwork, communication, empathy, and conflict resolution skills. Therefore, the hypothesis that, *there is a significant relationship between emotional intelligence and interpersonal relationships is confirmed.*

6. Overall Finding

The percentage analysis strongly indicates that emotional intelligence plays a crucial role in shaping interpersonal relationships in the manufacturing sector. A majority of employees with higher EI demonstrate better communication, teamwork, empathy, and conflict resolution abilities. Conversely, lower EI is associated with weaker interpersonal dynamics.

These findings align with the statistical results (correlation and regression), reinforcing that emotional intelligence is a significant predictor of positive workplace relationships.

7. Conclusion of the Study

The study concludes that emotional intelligence has a significant and positive influence on interpersonal relationships among employees in the manufacturing sector. The results from both statistical analysis and percentage findings show that employees with higher emotional intelligence tend to have better communication, stronger teamwork, greater empathy, and more effective conflict resolution skills.

The correlation and regression results confirm a strong relationship between emotional intelligence and interpersonal relationships, indicating that EI is an important predictor of workplace social interactions. The percentage analysis also supports this, showing that most employees with high EI report strong interpersonal relationships, while those with lower EI experience weaker workplace interactions.

Overall, the study highlights that emotional intelligence is an important factor in improving workplace relationships in the manufacturing sector. Organizations should focus on developing EI through training and development programs to enhance teamwork, reduce conflicts, and improve overall workplace harmony.

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Customization in Manufacturing: Impact on Customer Buying Experience and Brand Positioning in the Market

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Abstract:

Customization in manufacturing has become an important strategy in today's competitive market, as customers increasingly prefer personalized and unique products rather than standardized mass-produced goods. Traditional manufacturing methods focus on producing identical products in large quantities, but they often fail to meet the modern customer's demand for individuality, emotional value, and self-expression. As a result, many businesses are shifting towards customization and made-to-order production to satisfy these changing expectations.

This study aims to examine the impact of customization on customer buying experience and brand positioning in the market. The research focuses on understanding how customized products influence customer satisfaction, emotional attachment, involvement, and willingness to pay. Primary data was collected through a structured questionnaire survey from 147 respondents. The collected data was analysed using percentage analysis, charts, and chi-square test.

The findings of the study reveal that customization improves customer engagement and emotional connection, making the buying process more meaningful. Customers associate customization with premium, innovative, and creative brand images, which strengthens brand positioning. However, challenges such as longer delivery time and difficulty in using online customization tools were also identified. The study concludes that customization is an effective approach for improving customer experience, strengthening brand perception, and achieving market differentiation.

Keywords: *Customization, Made-to-order production, Mass customization, Customer experience, Brand positioning, Consumer perception.*

I. INTRODUCTION

The modern marketplace is highly competitive due to globalization, technological advancement, and changing customer expectations. Customers today seek products that reflect their individuality, lifestyle, and personal preferences. Traditional mass production focuses on producing identical products in large quantities at low cost. Although mass production provides affordability and availability, it fails to satisfy customers who demand

uniqueness and personal identity.

Customization in manufacturing has emerged as a strong solution to meet these changing expectations. Customization, also known as made-to-order production or mass customization, allows customers to modify product features such as design, colour, material, size, or personal text. With the growth of e-commerce platforms and digital design tools, customization has become more accessible.

Customization plays an important role in improving the customer buying experience. The buying experience includes customer satisfaction, involvement, engagement, and emotional attachment during the purchase process. Customized products create a sense of ownership because customers become co-creators of the product. This increases perceived value and customer loyalty.

Customization also impacts brand positioning. Brand positioning refers to how customers perceive a brand in the market. Companies offering customization are often seen as premium, innovative, and customer-focused. This strengthens the company's competitive position and helps differentiate it from competitors.

This research study analyses the impact of customization in manufacturing on customer buying experience and brand positioning using customer responses and statistical testing.

1.2 Objectives of the study:

1. To understand the concept of customization in manufacturing and made-to-order production.
2. To analyse how personalized products influence the customer buying experience.
3. To identify the benefits of customization for both businesses and customers.
4. To explore how offering customized products affects brand positioning in the market.

1.3 Hypothesis of the study:

1. Customization in manufacturing and made-to-order production plays an important role in fulfilling modern customer demands for personalized products.
2. Personalized products significantly improve the customer buying experience by increasing satisfaction, involvement, and emotional attachment.
3. Customization provides major benefits for both businesses and customers by improving product value, customer satisfaction, and business growth.
4. Offering customized products strengthens brand positioning by creating a premium, innovative, and customer-focused image in the market.

1.4 Significance of research:

The aim of the study is to help private coaching classes to improve the marketing strategy which is useful to increase their profitability index. The study may be guideline for aspiring students to choose correct options by effective advertising and promotions.

1.5 Scope of Research:

The scope of this research is limited to studying customization in manufacturing and its impact on customer buying experience and brand positioning. It focuses on customized products like T-shirts, footwear, and personalized gifts, based on survey responses from 147 respondents. The study mainly covers customer satisfaction, emotional attachment, involvement, and brand perception.

1.6 Research Methodology

Sr.no	Contents	Description
1	Universe	Customers interested in customized products
2	Population	Consumers who are aware of or have experience with customization
3	Sample frame	Students, working professionals, business owners, homemakers, general consumers
4	Sample size	147 Respondents
5	Type of Research	Descriptive Research
6	Research tools	Structured Questionnaire (Google Forms Survey)
7	Data sources	Primary and Secondary Data Sources
8	Primary Sources	Online Questionnaire Survey
9	Secondary Sources	Journals, Articles, Research Papers, Company Websites, Books
10	Question type	Multiple Choice Questions
11	Data interpretation	Tables, Charts, Graphs, Percentage Analysis
12	Statistic tools	Percentage Method and Chi-square Test

(Source: Researchers' Compilation)

II. REVIEW OF LITERATURE

1. **Pine (1993):** Introduced the concept of mass customization, which combines the low-cost efficiency of mass production with the flexibility of personalized products. The study explains that companies can produce customized products without losing productivity. It also highlights that customization improves customer satisfaction by meeting individual

preferences. Pine further states that customization is not only a manufacturing strategy but also a marketing advantage, as it helps build stronger customer relationships and competitive value.¹

2. Gilmore & Pine (1997); Explained that customization improves customer experience by increasing interaction between customers and companies. When customers participate in designing products, they feel ownership and emotional value. The study highlights that customization improves the buying journey and creates competitive advantage because customers perceive customized products as more valuable.²

3. Franke & Piller (2004); Found that customer participation in product design increases perceived value. Customers are willing to pay more because customized products feel unique and satisfying. The study also highlights the importance of easy customization tools and states that customization helps firms differentiate in competitive markets.³

4. Schreier (2006); Stated that customized products create uniqueness and self-expression. Customers value customized products because they reflect personal identity and create emotional connection. The study explains that perceived uniqueness increases willingness to pay and improves satisfaction, making customization valuable in manufacturing markets.⁴

5. Fogliatto, da Silveira & Borenstein (2008); Explained that mass customization helps companies offer unique products while maintaining efficiency. It provides competitive advantage through product differentiation. The study also discusses challenges like complexity and planning, and concludes that flexible systems and technology are necessary for successful customization.⁵

6. Salvador, de Holan & Piller (2009); Explained that customization succeeds only when companies manage flexibility properly. Firms must balance product variety with efficiency and cost control. The study highlights that digital design platforms and customer interaction systems are essential, and too many options can create operational failure.⁶

7. Merle, Chandon & Roux (2010); Found that customers gain satisfaction not only from the final customized product but also from the customization process. It increases emotional attachment, perceived quality, and trust.

The study concludes that customization improves loyalty and repeat purchase behaviour.⁷

8. Fuchs, Prandelli & Schreier (2010); Explained that customer involvement in product design strengthens customer-company relationships. Customization creates empowerment and increases satisfaction, trust, and loyalty. The study also states that customization encourages positive word-of-mouth and improves brand perception as customer-focused.⁸

9. Coelho & Henseler (2012); Studied how customization affects customer loyalty. They found that personalized products make customers feel valued, increase satisfaction, and build trust. The study also explains that customization encourages repeat purchases and strengthens long-term customer relationships.⁹

10. Kumar (2007); Explained the shift from mass customization to mass personalization, where companies use customer data to offer more personalized products. The study highlights that personalization improves customer satisfaction, product fit, and loyalty. It also states that flexible technology and supply chain systems are required for successful personalization.¹⁰

Research Gap

Most previous studies focus on the technical side of customization like production and supply chain, but limited research is available on how customization affects customer buying experience, emotional attachment, and brand positioning. Also, very few studies combine customized products like T-shirts, footwear, and gifts together in one research. Therefore, this study fills the gap by analysing customer perceptions of customization and its impact on brand image and satisfaction.

III. SOURCES OF DATA COLLECTION

a) Primary data: Collected from a questionnaire survey. Questionnaire for this study was developed based upon the concepts, theories, and past research information.

b) Secondary data: Collected by the researcher from several National and International research agencies. Further, the researcher had also utilized the government reports, textbooks, Magazines, previous researches, newspapers, journals, and world-wide-web pages to collect the relevant secondary data for the study

IV. DATA ANALYSIS AND INTERPRETATION

Collected data framed in statistical format analysed with help of SPSS software.

Hypothesis Testing

Findings, conclusion and Recommendations as per the hypothesis testing

H01. Customization in manufacturing and made-to-order production plays an important role in fulfilling modern customer demands for personalized products.

Table 2:

Sr.no	Options	Observed Frequency (O)	Percentage
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1.	Customized T-shirts/Apparel	18	12.2%
2.	Customized Footwear	10	6.8%
3.	Personalized Gifts	24	16.3%
4.	All of the above	95	64.6%
	Total	147	100%

(Source: Researchers' Compilation)

The table shows that 64.6% respondents are aware of all types of customized products, which indicates high awareness of customization in the market. 16.3% respondents are mainly aware of personalized gifts, while 12.2% are aware of customized apparel. Only 6.8% respondents are aware of customized footwear, showing comparatively low awareness in this category. Since 0% respondents selected "Not aware," it proves that all respondents have some knowledge of customized products. Therefore, the results support the hypothesis that customization is an important concept fulfilling modern customer demand, and hence the Null Hypothesis is rejected and the Alternative Hypothesis is accepted.

Table No.2.1: Calculations of Pearson Chi square test

Category	O	E	O - E	(O - E) ²	(O - E) ² / E
Customized T-shirts/Apparel	18	36.75	-18.75	351.56	9.57
Customized Footwear	10	36.75	-26.75	715.56	19.47
Personalized Gifts	24	36.75	-12.75	162.56	4.42
All of the above	95	36.75	58.25	3393.06	92.33
Total χ^2					125.79

(Source: Researchers' Compilation)

Since the calculated Chi-square value 125.79 is greater than the table value 7.815, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted. Hence, it is concluded that customers have significant awareness regarding customized products and customization in manufacturing.

H02. Personalized products significantly improve the customer buying experience by increasing satisfaction, involvement, and emotional attachment.

Table 3:

Sr.no	Options	Observed Frequency (O)	Percentage
1.	Happy	38	25.6%
2.	Emotionally connected	80	54.7%
3.	Normal	29	19.7%
4.	Disappointed	0	0%
	Total	147	100%

(Source: Researchers' Compilation)

The table shows that 54.7% (80 respondents) feel emotionally connected after purchasing customized products, indicating strong emotional attachment. 25.6% (38 respondents) feel happy, showing a positive buying experience, while 19.7% (29 respondents) feel normal. Importantly, 0% respondents feel disappointed, proving customization creates satisfaction and positive feelings. Therefore, personalized products significantly improve customer buying experience. Hence, Null Hypothesis is rejected and Alternative Hypothesis is accepted.

Table No.3.1: Calculations of Pearson Chi square test

Category	O	E	O – E	(O – E) ²	(O – E) ² / E
Happy	38	36.75	1.25	1.56	0.04
Emotionally connected	80	36.75	43.25	1870.56	50.89
Normal	29	36.75	-7.75	60.06	1.63
Disappointed	0	36.75	-36.75	1350.56	36.75
Total χ^2					89.31

(Source: Researchers' Compilation)

Since the calculated Chi-square value 89.31 is greater than the table value 7.815 at 0.05 significance level, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted. Hence, it is proved that personalized products significantly improve the customer buying experience by increasing satisfaction and emotional attachment.

H03. Customization provides major benefits for both businesses and customers by improving product value, customer satisfaction, and business growth.

Table 4:

Sr.no	Options	Observed Frequency (O)	Percentage
1.	Unique product	15	10.3%
2.	Emotional satisfaction	44	29.9%
3.	Better design choice	53	35.9%
4.	Better fit/comfort	25	17.1%
5.	Personal identity	10	6.8%
	Total	147	100%

(Source: Researchers' Compilation)

The table shows that the main benefit of customization is better design choice 35.9%, (53 respondents), indicating customers value flexibility in selecting designs. 29.9% (44 respondents) feel customization gives emotional satisfaction, showing personalization adds emotional value. 17.1% (25 respondents) consider better fit and comfort as an important benefit. Very few respondents selected uniqueness (10.3%) and personal identity (6.8%). Overall, the results prove that customization provides significant customer benefits. Therefore, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted.

Table No.4.1: Calculations of Pearson Chi square test

Category	O	E	O - E	(O - E) ²	(O - E) ² / E
Unique product	15	29.4	-14.4	207.36	7.05
Emotional satisfaction	44	29.4	14.6	213.16	7.25
Better design choice	53	29.4	23.6	556.96	18.95
Better fit/comfort	25	29.4	-4.4	19.36	0.66
Personal identity	10	29.4	-19.4	376.36	12.80
Total χ^2					46.71

(Source: Researchers' Compilation)

Since the calculated chi-square value 46.71 is greater than the table value 9.488, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted. Therefore, it is proved that customization provides significant benefits to customers.

H04.Offering customized products strengthens brand positioning by creating a premium, innovative, and customer-focused image in the market.

Table 5:

Sr.no	Options	Observed Frequency (O)	Percentage
1.	Premium brand	55	37.6%
2.	Innovative brand	48	32.5%
3.	Creative brand	39	26.5%
4.	Emotional brand	5	3.4%
	Total	147	100%

(Source: Researchers' Compilation)

The table shows that 37.6% (55 respondents) associate companies offering customization with a premium brand image, indicating higher perceived value. 32.5% (48 respondents) view them as innovative, showing customization creates a modern perception. 26.5% (39 respondents) associate customization with a creative brand image, reflecting uniqueness in the market. Only 3.4% (5 respondents) relate it with an emotional brand image. Overall, the results prove customization strengthens brand positioning as premium, innovative, and creative. Therefore, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted.

Table No.5.1: Calculations of Pearson Chi square test

Category	O	E	O – E	(O – E) ²	(O – E) ² / E
Premium brand	55	36.75	18.25	333.06	9.06
Innovative brand	48	36.75	11.25	126.56	3.44
Creative brand	39	36.75	2.25	5.06	0.14
Emotional brand	5	36.75	-31.75	1008.06	27.43
Total χ^2					40.07

(Source: Researchers' Compilation)

Since the calculated Chi-square value (40.07) is greater than the table value (7.815) at 0.05 significance level, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted. Hence, it is proved that offering customized products strengthens brand positioning by creating a premium, innovative, and creative image in the market.

V. CONCLUSION

Customization in manufacturing has become an important trend because customers increasingly prefer unique and personalized products. This study concludes that customization improves customer buying experience by increasing satisfaction, involvement, and emotional attachment. It also strengthens brand positioning by creating a premium and innovative image in the market. However, issues like delivery delays and website/app difficulty reduce customer convenience. Chi-square test results confirm that customization has a significant positive impact on customer perception and brand image. Therefore, customization is an effective strategy for gaining competitive advantage and long-term market success.

Suggestion:

- 1. Improve Delivery Speed:** Many customers face delays in receiving customized products. Companies should improve their production planning and delivery system so that customers get products on time and feel more satisfied.
- 2. Make Customization Platforms User-Friendly:** Customers often face difficulty while using websites or apps for customization. It is suggested that companies should make the customization process simple, smooth, and easy to understand with clear steps and preview options.
- 3. Increase Design Variety:** Some customers feel that the design options available are limited. Businesses should provide more design templates, colour combinations, and creative features to make customization more attractive.
- 4. Control Pricing of Customized Products:** Customized products are sometimes expensive, which can reduce customer interest. Companies should offer reasonable pricing, discounts, and budget-friendly customization options to attract more customers.
- 5. Maintain Consistent Product Quality:** Quality plays an important role in customer satisfaction. It is recommended that companies should maintain strict quality control so that customized products meet customer expectations.

6. **Promote Customization through Marketing:** Many customers still do not purchase customized products regularly. Companies should increase awareness through social media marketing, online advertisements, and promotional campaigns to encourage more customers to try customization

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“A Study on the Economic Impact of the Iran–Israel Conflict on the Indian Economy”

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Abstract

The on-going geopolitical tensions between Iran and Israel have created significant economic uncertainty at the global level, particularly affecting emerging economies such as India. This study examines the economic impact of the Iran–Israel conflict on the Indian economy, focusing on key macroeconomic indicators including oil prices, inflation, trade balance, currency stability, and financial market performance. The research adopts a qualitative approach based on secondary data obtained from international economic reports and institutional publications covering the period 2020–2026 [5][6]. The analysis identifies multiple transmission channels through which the conflict influences India’s economy, particularly through disruptions in energy supply chains and volatility in global oil prices. The strategic importance of routes such as the Strait of Hormuz further intensifies these effects [8]. The findings indicate that rising crude oil prices increase import costs, generate inflationary pressures, widen trade deficits, and contribute to currency depreciation and financial market volatility. However, the study also highlights the role of policy responses and economic resilience strategies, including energy diversification, monetary policy interventions, and the use of strategic reserves, in mitigating these adverse impacts. The paper concludes that while geopolitical conflicts pose significant short-term economic challenges, proactive policy measures and structural adjustments can enhance long-term stability. Overall, the study underscores the importance of adaptive economic frameworks in managing external shocks within a globalized economic environment.

Keywords: *Iran–Israel Conflict, Indian Economy, Strait of Hormuz, Oil Prices, Inflation, Trade Deficit, Geopolitical Risk*

1. Introduction

Geopolitical conflicts have consistently shaped global economic systems, particularly when they involve regions that are critical to energy supply [1]. The on-going tensions between Iran and Israel have intensified uncertainty in the Middle East, a region that plays a vital role in global oil production and trade [6]. As a result, such instability has far-reaching consequences for the global economy. India, being one of the largest importers of crude oil, is especially vulnerable to these disruptions [11]. Fluctuations in oil prices, uncertainty in

energy supply chains, and disturbances in key trade routes directly influence India's economic performance, leading to rising inflation, currency fluctuations, and instability in financial markets [10]. The economic impact of the Iran–Israel conflict operates through multiple transmission channels rather than a single factor. One of the most critical channels is energy dependence. India imports more than 80% of its crude oil requirements,[12] making it highly sensitive to geopolitical disruptions in the Middle East. Any escalation involving Iran raises concerns over supply security, particularly through strategic routes such as the Strait of Hormuz, through which a significant portion of global oil trade flows. Even the possibility of disruption increases freight costs, insurance premiums, and global oil prices. Another key channel is inflation transmission, where rising crude oil prices increase fuel costs, which then affect transportation, manufacturing, and food prices, resulting in cost-push inflation and reduced purchasing power [2].

The external sector is also significantly affected. Higher oil import bills widen the current account deficit and put pressure on foreign exchange reserves, leading to depreciation of the Indian Rupee. This further increases import costs and intensifies inflationary pressure. At the same time, global uncertainty often leads to capital outflows from emerging markets, weakening financial stability. Financial markets represent another important transmission mechanism, as investors tend to shift towards safer assets such as gold and the US dollar during geopolitical tensions, resulting in stock market volatility and reduced foreign investment inflows in India.

From a policy perspective, government and central bank responses play a crucial role in mitigating these economic shocks. The Reserve Bank of India may adopt monetary tightening policies to control inflation, while the government can adjust fuel taxes or provide subsidies to stabilize domestic prices. Additionally, India has increasingly focused on energy diversification strategies, including sourcing crude oil from multiple countries and investing in renewable energy. The use of strategic petroleum reserves further helps manage short-term supply disruptions, thereby enhancing economic resilience.

The Iran–Israel conflict highlights the structural vulnerability of import-dependent economies like India within a globalized system. It demonstrates how external geopolitical shocks can quickly translate into domestic macroeconomic instability. However, it also underscores the growing importance of economic resilience, policy adaptability, and diversification strategies. In the long run, reducing dependence on imported fossil fuels, strengthening domestic

production, and expanding regional trade partnerships will be essential for sustaining economic stability. Thus, geopolitical conflicts not only create immediate economic disruptions but also shape long-term economic planning and policy frameworks in developing economies like India.

2. Literature Review

Several studies have examined the economic impact of geopolitical conflicts, particularly in relation to energy markets and macroeconomic stability. James D. Hamilton (2009) found that oil price shocks resulting from geopolitical tensions significantly reduce economic growth in oil-importing countries [1]. Lutz Kilian (2014) argued that supply-side disruptions in oil markets lead to inflationary pressures and economic instability, especially in emerging economies [2].

Mehmet Balcilar et al. (2018) analysed geopolitical risk and concluded that increased tensions lead to higher volatility in financial markets and reduced investor confidence [3]. Similarly, Dario Caldara and Matteo Iacoviello (2018) developed a geopolitical risk index and found that rising geopolitical uncertainty negatively impacts investment and economic activity [4]. Recent institutional studies also support these findings. The World Bank (2023) reports that conflicts in the Middle East disrupt global energy supply chains and increase transportation costs [6]. The International Monetary Fund (2024) highlights that oil price volatility contributes to inflation, trade imbalances, and slower economic growth in developing countries [5].

In the Indian context, the Reserve Bank of India (2024) notes that rising crude oil prices significantly influence inflation, exchange rate depreciation, and financial stability [10]. The Ministry of Finance Government of India (2024) further emphasizes that higher energy import costs lead to widening trade deficits and fiscal pressure [11].

3. Research Methodology

3.1 Research Design

This study adopts a qualitative research approach to examine the economic impact of the conflict between Iran and Israel on India. The approach enables an in-depth understanding of macroeconomic trends and policy implications.

3.2 Research Framework

The geopolitical conflict is treated as the primary independent variable that generates external economic shocks in the global environment. These shocks are mainly transmitted through fluctuations in international crude oil prices and disruptions in global trade and supply chains. The dependent variables identified in the study include key macroeconomic indicators such as inflation rate, trade deficit, exchange rate volatility, and financial market performance. The framework further incorporates intervening variables such as energy dependency and global economic uncertainty, which act as transmission channels linking the external shock to domestic economic outcomes.

In addition, moderating variables such as government policy interventions, energy diversification strategies, and broader economic resilience mechanisms are included to assess their role in mitigating adverse effects. The framework thus establishes a structured cause-and-effect relationship, wherein geopolitical instability leads to economic disturbances, which are subsequently influenced by policy responses and adaptive economic strategies.

3.3 Data Sources

The study is based on secondary data collected from various reliable and authoritative sources, including international economic and financial reports, government publications and policy documents, peer-reviewed academic journals and research articles, as well as official trade and market statistics. These sources provide comprehensive insights into macroeconomic trends, enabling a systematic analysis of the economic impact of the Iran–Israel conflict on the Indian economy [5][6][10].

3.4 Analytical Method

A thematic analysis technique is used to identify patterns related to:

- Oil price fluctuations
- Inflation trends
- Trade deficits
- Currency movements
- Financial market performance

4. Data Analysis

4.1 Impact on Oil Prices and Energy Sector (India)

Year	Indian Basket (\$/barrel)	Approx. ₹/barrel	Approx. ₹/litre (crude)
2023	~82	~₹6,800	~₹43
2024	~84	~₹7,000	~₹44
2025	~90	~₹7,500	~₹47
2026	~95	~₹7,900	~₹49

Analysis:

The table shows a consistent rise in crude oil prices over the years. Since India imports nearly 85% of its crude oil, any increase in global oil prices directly raises the country's import bill. This leads to higher fuel costs, increased transportation expenses, and rising production costs across industries. As a result, economic pressure builds on both consumers and businesses.

Source: Petroleum Planning & Analysis Cell (PPAC), Ministry of Petroleum and Natural Gas [12].

4.2 Inflation Trends (India)

Factor	Effect
Fuel Price Increase	Higher transportation cost
Food Prices	Rise due to logistics expenses
Manufacturing Cost	Increased production cost
Overall Inflation	Cost-push inflation

Analysis:

Fuel price increases act as a base driver of inflation in India. As transportation becomes

expensive, the cost of essential goods like food and raw materials rises. This leads to cost-push inflation, reducing purchasing power and affecting middle- and lower-income households the most. **Source:** Reserve Bank of India (RBI) – Inflation Reports[10].

4.3 Trade Deficit Analysis (India)

Indicator	Before Conflict	After Conflict
Oil Import Bill	Moderate	High
Export Growth	Stable	Slower
Trade Balance	Manageable	Increasing deficit

Analysis:

The rise in oil prices significantly increases India's import expenditure, while exports do not grow at the same pace. This creates a widening trade deficit. A persistent deficit weakens the current account balance and increases dependence on foreign capital inflows.

Source: Ministry of Commerce & Industry, Government of India[14].

4.4 Currency Impact

Factor	Effect on Indian Rupee
Oil Imports	Higher demand for US dollar
Capital Outflow	Rupee depreciation
Global Uncertainty	Exchange rate volatility

Analysis:

Higher oil imports require more payments in US dollars, increasing demand for foreign

currency. At the same time, global uncertainty causes investors to withdraw funds from emerging markets like India. These factors together weaken the Indian Rupee and create exchange rate instability. **Source:** Reserve Bank of India (RBI)[10].

4.5 Financial Market Impact

Sector	Impact
Stock Market	High volatility
Foreign Investment	Decline
Investor Confidence	Reduced

Analysis:

Geopolitical tensions create uncertainty among investors, leading to fluctuations in stock markets. Foreign investors tend to move towards safer assets, reducing capital inflows into India. This affects overall market stability and slows economic growth. **Source:** NSE, BSE Market Reports[15][16].

4.6 Supply Chain Disruptions

Area	Impact
Shipping Routes	Disruptions (Strait of Hormuz)
Logistics Cost	Increased
Delivery Time	Delays

Analysis:

The Strait of Hormuz is a key global oil transport route. Any disruption increases shipping risks and insurance costs. This raises logistics expenses and delays deliveries, affecting both imports and exports. Consequently, industries face production slowdowns and higher operational costs. **Source:** UNCTAD, Global Trade Reports[8].

Overall Interpretation

The conflict between Iran and Israel creates a chain reaction affecting oil prices, inflation, trade balance, currency stability, and financial markets in India. These interconnected factors highlight the vulnerability of import-dependent economies to geopolitical risks.

5. Findings

1. Oil Price Volatility as Key Driver – Fluctuations in global crude oil prices act as the primary channel through which the Iran–Israel conflict affects the Indian economy.
2. Rising Inflationary Pressure – Increased fuel and transportation costs lead to cost-push inflation, raising the overall price level and reducing consumer purchasing power.
3. Widening Trade Deficit – Higher oil import bills significantly increase total imports, while exports grow at a slower pace, resulting in a growing trade imbalance.
4. Currency Depreciation – Increased demand for the US dollar for oil imports, along with capital outflows, leads to depreciation of the Indian Rupee and exchange rate instability.
5. Financial Market Volatility – Geopolitical uncertainty reduces investor confidence, leading to stock market fluctuations and a decline in foreign investment inflows.
6. Supply Chain Disruptions – Disturbances in global trade routes increase logistics costs, delay deliveries, and reduce efficiency in production and trade activities.
7. Economic Resilience and Policy Response – India demonstrates resilience through policy measures such as monetary tightening, fiscal adjustments, energy diversification, and the use of strategic reserves.

6. Conclusion

The analysis of the Iran–Israel conflict demonstrates that geopolitical tensions have profound and multidimensional effects on the Indian economy. The study reveals that the primary impact is transmitted through rising global oil prices, which increase import costs and generate widespread inflationary pressures. These effects are further amplified through interconnected channels, including widening trade deficits, depreciation of the Indian Rupee, and heightened volatility in financial markets. The findings also indicate that India's structural dependence on imported crude oil makes it particularly vulnerable to external geopolitical shocks. Disruptions or uncertainties in key energy supply routes, especially the Strait of Hormuz, significantly affect supply security and cost structures. As a result, the

economy experiences both short-term instability and long-term strategic challenges. However, the study also highlights that effective policy interventions can play a critical role in mitigating these adverse effects. Measures undertaken by institutions such as the Reserve Bank of India, along with government initiatives in fuel price regulation, energy diversification, and strategic reserves, contribute to enhancing economic resilience. These responses demonstrate the importance of coordinated fiscal and monetary strategies in managing external shocks. From a broader perspective, the research underscores that geopolitical conflicts not only create immediate economic disruptions but also influence long-term economic planning and policy frameworks. The need for reducing dependence on imported fossil fuels, strengthening domestic production, and promoting renewable energy has become increasingly important for sustainable economic growth. The Iran–Israel conflict poses significant challenges to India’s economic stability, it also provides an opportunity to strengthen resilience and strategic preparedness. A proactive approach that integrates policy adaptability, technological advancement, and diversified energy strategies will be essential for ensuring long-term economic stability in an increasingly uncertain global environment.

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