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Dr. Ramesh V. Bhole

Professor
Sardar Vallabhbhai Patel Arts and Science College Ainpur,
Tal Raver, Dist Jalgaon
Email: jrdrvb.org@gmail.com

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JOURNAL OF RESEARCH AND DEVELOPMENT

A Multidisciplinary International Double Blind Peer Reviewed Refereed International Research Journal

Original Article

A Study of Digital Transformation and Its Influence on Financial Reporting & Decision-Making

Karishma Jotiba Patil[1], Riya Suresh Gurav[2], Meghana Kamlakar Patil[3]

[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

The rapid advancement of digital technologies has significantly transformed the accounting and finance sectors. Leading to the emergence of innovative practices that enhance efficiency, accuracy and strategic decision making. The impact of digital transformation through the integration of technologies such as artificial intelligence (Al). Robotic process automation (RPA). Block chain, big data analytics, and cloud computing. The study analyzes how these tools streamline financial reporting, auditing and data management while promoting transparency and regulatory compliance. Furthermore, it explores the challenges organizations encounter during digital adoption. Including cyber security risks, implementation costs, and the need for unskilling financial professionals. Through a review of recent literature and industry trends, the paper highlights that digital transformation not only modernizes traditional accounting systems but also redefines the role of accountants as strategic advisors. The findings suggest that embracing digital innovation is essential for achieving sustainable growth, enhancing financial performance, and maintaining competitiveness in the evolving global economy.

Keywords: Digital transformation, Accounting, Artificial Intelligence (AI), and Block chain, Big Data Analytics.

Introduction:

Digital transformation in accounting and finance means using modern technology to make financial work faster, easier, and more accurate. Instead of doing everything manually, businesses now use tools like computers, software, and the internet to record, analyze, and report financial information. Technologies such as artificial intelligence, automation, block chain, and cloud computing help in reducing human errors, saving time, and improving decision-making. For example, automation can handle repetitive tasks like entering data or preparing reports, while AI can help predict future trends or detect fraud. Cloud systems allow accountants to access financial data anytime and from anywhere, making teamwork and reporting easier. Overall, digital transformation has changed the way accounting and finance work by making them more efficient, transparent, and reliable, helping businesses to make smarter financial decisions.

Review of Literature:

- Kokina and Daveport (2017) conducted a key study on how automation systems, a product of AI, are changing the audit profession, emphasizing an evolution in quality and business processes.
- Lazarao (2019) concludes that the formation of digital transformation is not only within higher administrative levels and functions of institutions, including accounting and finance.
- Demiroz and Heupel (2017) have found that there is a lack of awareness among business organizations of the overall benefits of digital transformation, as many of these organizations of the overall benefits of digital transformation due to internal obstacles.
- Saed (2020) concludes that there are two important dimensions to the subject, namely, accounting maturity and the need and readiness for digital transformation.

Address for correspondence:

Karishma Jotiba Patil, Tolani College of Commerce (Autonomous)

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- Timchev (2020) shed light on the analysis of the accounting business of companies within the conditions of competition and digital transformation, which includes the strategic and operational levels
- Parlak (2020) shows that digital transformation has a tangible impact on accounting information systems and the accounting profession, from memorizing, classifying, and summarizing to analysis and discussing financial statements, establishing the system, and ensuring the effective continuity of the system. It is, therefore, necessary for members of the accounting profession to use the developed systems to adapt to this transformation process effectively.
- Nguyen et al. (2021) concluded that digital transformation processes will allow managers to take advantage of the effort related to accounting work and the attendant errors to search for customers and focus on improving product quality and increasing the organization's competitiveness.
- Othmans and AL-Dweikat (2021),it has been found that there is a tangible impact of managing the risks of digital transformation in making appropriate information that serves the makers and users of accounting data.

Objectives:
- To automate routine financial processes – reducing manual work, errors, and processing time through technologies like AI and robotic process automation (RPA).
- To enhance accuracy and reliability in financial data recording, reporting, and analysis using digital tools and integrated software systems.
- To improve decision-making by providing real-time access to financial data and advanced analytics for better strategic planning.

Limitations:
- Issues with research samples and selection.
- Lack of previous research studies on the topic.
- Limited access to data.
- Time constraints.
- Data or Statistical limitations

Methodology:

This study uses a qualitative research approach to understand how digital technologies are changing the accounting and finance sectors. The focus is on exploring the experiences, challenges, and benefits that organizations faces during digital transformations.

Information is gathered mainly from secondary data sources such as journal articles, research papers, industry reports, and case studies published in recent years. These sources provide insights into how technologies like Artificial Intelligence (AI), Robotic Process Automation (RPA), Block Chain, Big Data Analytics, and Cloud Computing are being used in accounting practices.

The methodology used in this study is consistent of sample survey using both primary and secondary data. The primary data has being collected with the help of structured questionnaire, through personal interaction and observation.
- Sample size: Sample of 50 people was taken into the study and their data was collected.
- Templing techniques: To do the study, a simple random sampling technique is used to collect data from the sample residing closed to our residential places.

Tools for data collection
a) Study conducted – Information collected from Structured questionnaire
b) Sources of Data – Primary Data, Secondary Data

Data Type:

In studying Digital Transformation in Accounting and Finance, two types of data are used: - Primary Data and Secondary Data. Primary data comes from surveys or interviews with professionals to get real experiences, while secondary data comes from books, research papers, and reports that provide existing information and trends.

Sample Size and Sampling Techniques:

The sample size of the research paper was 52 active respondents. Questionnaire method was used to collect responses From different respondents. The answers were obtained electronically. The questionnaire was consisting of 10 questions which were based on multiple choices and one option will be chosen by the respondent. Respondents were required to answer expeditiously and wisely as achievable.

Data Analysis and Interpretation:

Figure 1:- Gender.
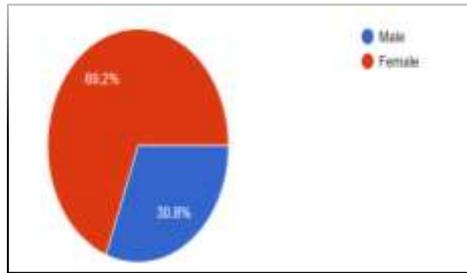
In figure 1, Out of all respondents, 30.8% are Males and 69.2% are Females, showing that females from the majority and males the minority.

Figure 2:-Age.
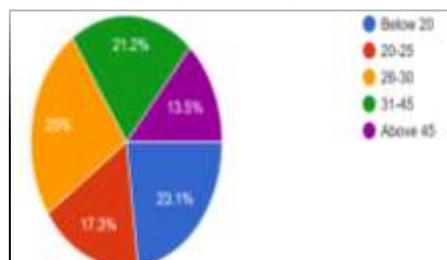
In figure 2, 23.1% of respondents are below 20, 17.3% are of 20-25years, 25% are of 26-30 years, 21.2% are of 31-45 years and 13.5% are above age of 45 years. It shows that most of respondents are young adults.

Figure 3:- Level of study.
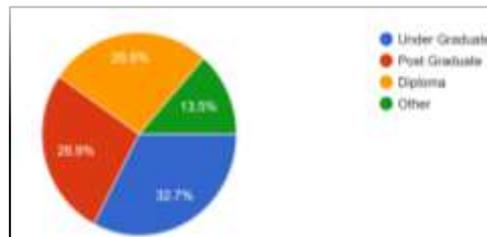
In figure 3, 32.7% of respondents are undergraduate students, 26.9% are post graduate, 26.9% have done Diploma, and 13.5% are from other field. Majority of respondents are under graduate students, including that most participants are well educated.

Figure 4:- Are you aware of digital transformation in accounting and finance?
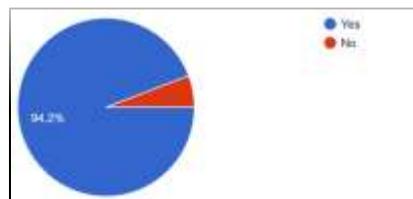
In figure 4, 94.2% of respondents are well known of digital transformation in accounting and finance, and the other 5.8% of respondents are not.

Figure 5:- which digital tools have you used for academic or accounting/finance?
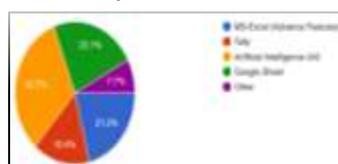
In figure 5, 21.2% of respondents are using MS- Excel as a digital tool for their academic purpose or accounting/finance purpose, while 15.4% are using Tally, 32,7% are using Artificial Intelligence (AI), 23.1% are using

Google Sheet and 7.7% are using other tools. These shows, majority of respondents are using AI as a digital tool for their academic or accounting/finance purpose.

Figure 6:- How often do you use digital accounting and finance tools?
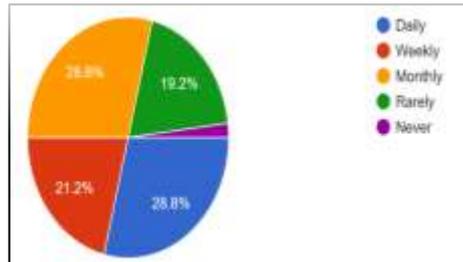
In figure 6, 28.8% of respondent's use digital accounting and finance tools daily, 21.2% uses Weekly, 28.8% uses monthly, 19.2% uses rarely and 2% of respondents never use these tools.

Figure 7:-How confident are you in using digital tools for accounting and finance purpose?
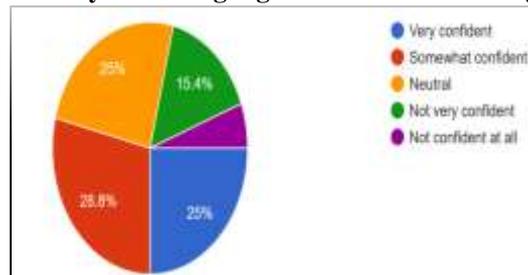
In figure 7, 25% of respondents are very confident in using digital tools for accounting and finance purpose, 28.8% are somewhat confident, 25% are neutral, 15.4% are not very confident and 5.8% are not confident at all.

Figure 8:- How prepared do you feel to adapt to digital transformation in your future career?
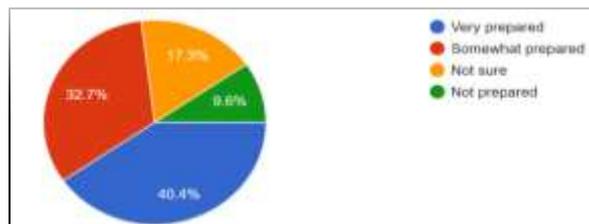
In figure 8, 40.4% of respondents are very prepared to digital transformation in future career, 32.7% are somewhat prepared, 17.3% are not sure and 9.6% are not prepared.

Figure 9:-Which digital skills would you like to develop further?
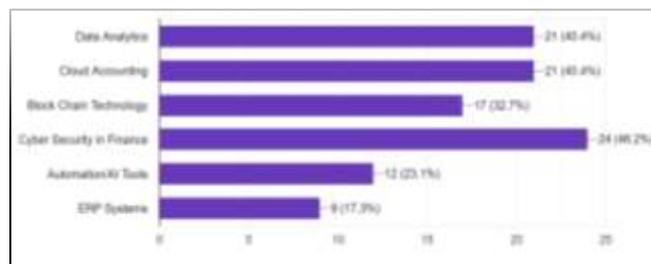
In figure 9, 40.4% of respondents will like to develop Data Analytic' s further, 40.4% in Cloud Accounting, 32.7% in Block Chain Technology, 46.2% in Cyber Security in finance, 23.1% in Automatic/AI Tools and 17.3% in ERP Systems.

Figure 10: Would you participate in training or workshops on digital accounting tools if offered?
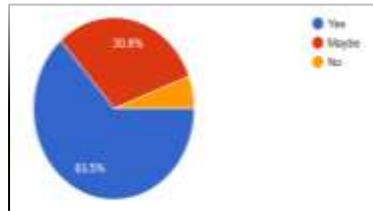
In figure 10, 63.5% of respondents would like to participate in training or workshops on digital accounting tools if offered, 30.8% are not sure about it and 5.7% will reject.

Findings:
- According to the above data analysis, it shows that majority of people are aware about digital transformation.
- Majority of people are confident about the digital tools used for academic and accounting purpose.
- As respondents are from various fields, but are prepared for future digital transformation.
- As they are aware about digital transformation, but are also interested in participating in training or workshops on digital transformation in accounting and finance.
- So it shows that, there is a need to organize various sessions,workshops,etc for the respondents to make them more aware and also to make them more confident about the digital transformation.

Conclusion:

Digital Transformation has completely changed the way accounting and finance work today. With new technologies like cloud computing, artificial intelligence, automation and data analytic , financial tasks have become faster, more accurate, and easier to manage. These tools help accountants and finance professionals focus more on analysis and decision-making rather than just manual data entry.

However, this change also means that professionals need to keep learning new digital skills to stay relevant. Organizations must invest in training and secure systems to protect sensitive financial data. Overall, digital transformation is not just about using new tools - it's about improving efficiency, accuracy and strategic decision-making in the world of accounting and finance.

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2. Digital Transformation in Finance and Accounting | DFIN
3. Digital Transformation In Financial Accounting: Latest Methods And Key Challenges - Digital Salla

Original Article

A study on Effects of Digital Transformation on Efficiency and Accuracy in Accounting Systems

Snehal Yadav[1], Sakshi Yadav[2], Dimple Kumhar[3]
[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

Digital transformation has revolutionized the fields of accounting and finance by integrating advanced technologies such as artificial intelligence (AI), cloud computing, blockchain, big data analytics, and automation. These innovations have transformed traditional financial processes enhancing accuracy, transparency, and efficiency in data management, reporting, and decision-making. Automation of repetitive tasks such as bookkeeping and reconciliation reduces human error and allows professionals to focus on strategic financial analysis. Cloud-based accounting systems provide real-time access to financial information, enabling better collaboration and faster decision-making. Additionally, technologies like blockchain ensure data security and transparency in financial transactions. However, this transformation also presents challenges, including cybersecurity risks, the need for digital skills, and ethical considerations. Overall, digital transformation is reshaping the accounting and finance landscape, promoting innovation, accuracy, and efficiency while preparing organizations for a technology-driven future.

Keywords: Digital Transformation, Accounting Systems, Financial Management, Automation, Artificial Intelligence (AI), Cloud Computing, Blockchain Technology, Big Data Analytics, Accounting Efficiency, Accuracy in Accounting, Financial Decision-Making

Introduction:

In recent years, digital transformation has emerged as a powerful force reshaping business systems across the world. Rapid advancements in technologies such as cloud computing, Artificial Intelligence (AI), Machine Learning (ML), blockchain, big data analytics, and automation have accelerated the shift toward modernized accounting and financial practices. Traditionally, accounting and finance relied heavily on manual recording, paper-based documentation, and human interpretation. However, the integration of digital tools has significantly changed the way financial information is processed, analyzed, stored, and reported.

Digital transformation in accounting involves the use of innovative technologies to improve financial data accuracy, enhance decision-making, reduce errors, and streamline routine processes like bookkeeping, auditing, payroll, and tax management. Automated systems allow faster data processing and real-time reporting, helping managers and stakeholders make more informed decisions. Cloud-based platforms and ERP software offer better accessibility and data security, enabling organizations to manage financial operations from virtually anywhere.

Similarly, financial practices have become more dynamic and efficient due to digital solutions. Technologies like blockchain ensure more reliable and transparent transaction recording, reducing risks of fraud. Big data analytics helps firms understand market trends, customer behavior, and financial forecasts more accurately. The integration of digital payment systems, online banking, and fintech innovations has further transformed traditional financial operations. Digital transformation not only enhances operational efficiency but also plays a crucial role in improving compliance, risk assessment, and internal controls. It reduces the cost of maintaining records, enhances accuracy, and enables organizations to adapt to the changing business environment. Despite its benefits, the transformation process poses certain challenges, including cybersecurity threats, implementation costs, and skill gaps among employees.

Address for correspondence:

Snehal Yadav, Tolani College of Commerce (Autonomous)

How to cite this article:

Given this global shift, studying the impact of digital transformation on accounting and financial practices is highly significant. Understanding its influence provides meaningful insights for organizations, policymakers, professionals, and researchers. This study examines the extent to which digital technologies have affected accounting and finance, and evaluates their role in improving efficiency, accuracy, transparency, and decision-making within organizations.

Review of literature

Digital transformation has significantly influenced how organizations manage accounting and financial operations. Existing literature highlights the growing adoption of technologies such as Artificial Intelligence (AI), Robotic Process Automation (RPA), blockchain, cloud accounting, and big data analytics in modern finance.

- Harrast et al. (2019) found that cloud-based accounting systems improve accuracy, accessibility, and collaboration by allowing real-time financial data processing.
- Kokina & Davenport (2017) emphasized that AI and automation reduce human errors and increase efficiency, especially in routine accounting tasks such as data entry and reconciliation.
- Yoon (2020) reported that big data analytics provides valuable insights for forecasting, investment planning, and risk management.
- Dai & Vasarhelyi (2017) highlighted blockchain's role in improving transparency, auditability, and trust due to immutable transaction recording.
- Omar & Clarke (2021) observed that digital payment systems and fintech innovations have modernized financial practices, enhancing transaction speed, security, and customer convenience.
- Overall, literature suggests that digital transformation enhances operational efficiency, reduces cost, and supports strategic decision-making. However, challenges remain particularly cybersecurity risks, implementation costs, and the need for employee training.

Objectives

- To study the concept of digital transformation in accounting and finance.
- To identify the major digital tools used in accounting and financial practices.
- To examine the impact of digital technologies on efficiency, accuracy, and decision-making.
- To understand the benefits and challenges of digital transformation in financial activities.
- To provide suggestions for improving digital adoption in accounting and financial systems.

Limitations

- The study is limited to secondary data sources and may not reflect all organizational contexts.
- Findings may vary across industries, depending on digital adoption levels.
- Primary data, if used, may be influenced by respondents' personal experience and bias.
- The rapid pace of technological change may make some findings outdated in the near future.
- Limited access to financial data may affect the depth of analysis.

Research Methodology

The study adopts both descriptive and analytical research approaches.

a) Data Collection
Primary Data (Optional):
Collected through structured questionnaires, interviews, or surveys from accounting and finance professionals.
Secondary Data:
Books, research papers, journals, company reports, websites, and published articles related to digital transformation.
b) Sample
A sample of accounting professionals, finance managers, auditors, or business firms may be selected depending on the scope.
c) Tools of Analysis
Statistical tools (percentage, charts, and graphs)
Qualitative analysis of responses
Comparative study of pre- and post-digital adoption
d) Scope of Study
The study focuses on understanding how digital tools and technologies influence efficiency, accuracy, cost reduction, and data-based financial decision-making.

Data Type

The data type use in the research is a quantitative approach and all the questions in the questionnaire are closed ended. Multiple Choice Questions were asked and are utilized for the study, as a major purpose of the study to find people's attitude towards paid media awareness.

Sample size and sampling techniques

The sample size of the research paper was 20 active respondents. Questionnaire method was used to collect responses from different respondents. The answers were obtained electronically. The questionnaire was consisting of 10 questions which were based on multiple choices and one option will be chosen by the respondent. Respondents were required to answer expeditiously and wisely as achievable.

Data Analysis and Interpretation

Figure 1: What does digital transforming mean in accounting
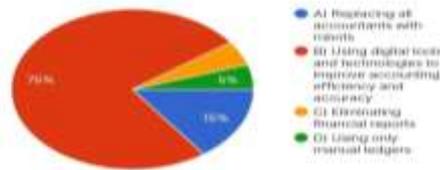
The data from the 20 responses shows that 75% of participants clearly understand digital transformation in accounting, correctly identifying it as using technology to improve efficiency and accuracy rather than replacing humans. This suggests a strong, positive understanding among most people surveyed. The main misconception is held by a minority, as 15% incorrectly believe the goal is the complete replacement of all accountants with robots.

Figure 2: Which technology is most commonly used in modern accounting systems
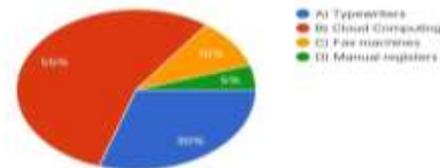
Key Finding (55%): Over half of the respondents correctly named Cloud Computing (B) as the most common technology, recognizing its foundational role in modern systems.
Misconception (30%): A significant 30% incorrectly chose Typewriters (A), which is an obsolete technology, highlighting a potential mix of respondents (e.g., students or those unfamiliar with current practice).

Figure 3: How has automation affected accounting tasks?
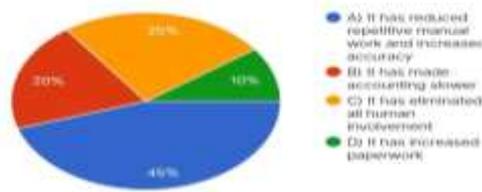
Key Finding (45%): The largest group correctly stated that automation has reduced repetitive manual work and increased accuracy (A).
Misconceptions (25% and 20%): A combined 45% chose incorrect or misleading answers. 25% believe automation has eliminated all human involvement (C), while 20% believe it has made accounting slower (B). This indicates that nearly half the group misunderstands the scope and efficiency gains of automation

Figure 4: What is the main advantage of using digital tools in financial management?
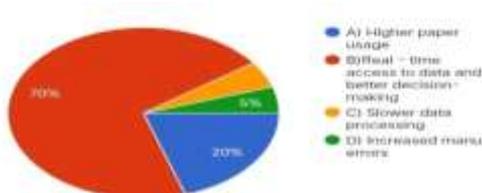
Key Finding (70%): The vast majority correctly identified the main advantage as Real-time access to data and better decision-making (B). This shows a clear understanding of the strategic value of digital tools.

Misconception (20%): A notable minority incorrectly chose Higher paper usage (A), suggesting a continued association of processes with manual/physical outputs.

Figure 5: Which of the following technologies enhances financial data security?
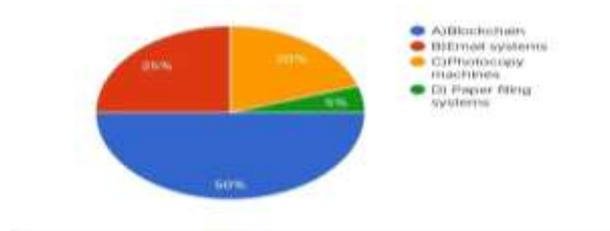
Key Finding (50%): Half the respondents correctly chose Blockchain (A) as a technology that enhances security, recognizing its distributed and immutable nature.

Major Misconceptions (25% and 20%): A combined 45% chose outdated or insecure methods: Email systems (B) at 25% and Photocopy machines (C) at 20%. These points to a serious gap in understanding secure digital data handling versus insecure traditional methods.

Finding

- Automate low-value processes first (invoicing, bank reconciliations) and measure time saved.
- Invest in data pipelines & integration — accurate single source of truth is essential for analytics.
- Reskill staff on data analytics, controls for AI, and communication — move people into exception handling and advisory roles.
- Establish governance and KPIs for AI/tools — track effect on audit quality, bias, errors and user outcomes. Regulators expect this.
- Prioritize cyber and data-integrity controls as digital footprints expand.

Conclusion

Digital transformation has greatly improved accounting and financial practices by making processes faster, more accurate, and more secure. Technologies such as cloud systems, automation, AI, and analytics help reduce errors, save time, and support better decision-making. It enhances transparency, reporting quality, and internal control. Although challenges like cybersecurity risks, high costs, and skill gaps remain, the benefits outweigh the limitations. Overall, digital transformation is essential for modern organizations to remain efficient and competitive.

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Original Article

A study on Financial Risk Governance in the Era of Digitalization and Sustainability

Sufiya Choudhary[1], Kirthika Reddy[2], Swarangi Chalke[3]
[1, 2, 3] Tolani College of commerce (Autonomous)

Abstract

In the modern era, financial risk management plays a critical role in ensuring the stability and resilience of organizations operating within an increasingly digital and sustainability-driven environment. The rapid advancement of digital technologies such as artificial intelligence, blockchain, big data analytics, and cloud computing has revolutionized financial systems by improving efficiency, accessibility, and decision-making accuracy. However, this digital transformation has also introduced complex and evolving risks, including cybersecurity threats, data manipulation, technological failures, and system vulnerabilities. Managing these risks requires organizations to adopt innovative tools, advanced analytics, and real-time monitoring systems to detect, assess, and mitigate potential financial disruptions.

At the same time, global attention has shifted toward building a sustainable ecosystem, emphasizing the integration of Environmental, Social, and Governance (ESG) factors into financial strategies. Financial institutions and corporations are increasingly expected to align their investments and operations with sustainability goals to address issues like climate change, resource depletion, and social inequality. This sustainable shift creates new financial risks, such as those arising from regulatory changes, carbon pricing, and environmental liabilities, which need to be managed alongside traditional financial risks.

Within this dual landscape of digital transformation and sustainability, effective financial risk management involves balancing profitability with ethical and environmental responsibility. Organizations must develop robust frameworks that incorporate both technological innovation and sustainability considerations. For instance, digital tools like predictive analytics and blockchain can enhance transparency and accountability in green financing and ESG reporting. Meanwhile, sustainable finance principles encourage long-term resilience and stakeholder trust by promoting responsible investment practices.

Furthermore, regulatory authorities and policymakers play a vital role in shaping guidelines that support both digital innovation and sustainable development. Collaborative efforts among governments, financial institutions, and technology providers are essential to establish secure, inclusive, and adaptable financial systems.

In conclusion, financial risk management in the digital and sustainable ecosystem is no longer limited to minimizing losses but extends to building long-term value and resilience. By integrating advanced technology with sustainable finance practices, organizations can not only mitigate financial risks but also contribute to a stable, transparent, and future-ready global economy.

Keywords: Financial Risk Governance, Digitalization in Finance, Sustainable Finance, Financial Risk Management, Environmental, Social and Governance (ESG), Artificial Intelligence (AI), Blockchain Technology, Big Data Analytics, Cyber security Risk, Digital Financial Systems, Sustainable Development, Regulatory Frameworks, Financial Resilience

Introduction:

In the 21st century, the global financial landscape is undergoing a massive transformation driven by two major forces digitalization and sustainability. The integration of advanced digital technologies and sustainable development goals has reshaped how financial institutions, businesses, and governments operate. In this evolving environment, financial risk management has become more critical than ever.

Address for correspondence:

Sufiya Choudhary, Kirthika Reddy, Swarangi Chalke, Tolani College of commerce (Autonomous)

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It refers to the systematic process of identifying, analyzing, and mitigating potential losses that may arise from financial uncertainties. As economies increasingly depend on digital systems and environmentally responsible practices, the nature of financial risks has become more dynamic and complex. The digital ecosystem has introduced several innovations such as blockchain, artificial intelligence (AI), machine learning, big data, and cloud computing. These tools have improved efficiency, accuracy, and decision-making in finance by automating processes, predicting market trends, and enhancing transparency. However, digitalization also brings new forms of risks, including cybersecurity threats, data breaches, algorithmic errors, and technological disruptions. Financial institutions are now required to develop advanced digital risk management frameworks that ensure data protection, system resilience, and business continuity. Parallel to this technological revolution, the concept of a sustainable ecosystem has gained significant importance. Sustainable finance emphasizes the inclusion of Environmental, Social, and Governance (ESG) criteria in financial decisions to promote ethical, long-term growth. Organizations are expected to align their financial strategies with sustainability goals such as reducing carbon emissions, conserving resources, and ensuring social responsibility. However, the transition to sustainability also poses financial risks, such as changes in environmental regulations, rising compliance costs, and potential losses from unsustainable investments. In this dual context, effective financial risk management must integrate both digital and sustainable perspectives. It involves using technology to improve transparency in green financing, utilizing data analytics to assess ESG performance, and adopting regulatory frameworks that balance innovation with responsibility. Financial managers and policymakers must work collaboratively to design systems that protect against digital vulnerabilities while supporting sustainable development.

In conclusion, financial risk management in the digital and sustainable ecosystem is not only about avoiding losses but also about fostering long-term growth, trust, and stability. By combining the power of technology with the principles of sustainability, organizations can build resilient financial systems capable of supporting a more inclusive and environmentally conscious global economy.

Review of Literature:

The concept of financial risk management has evolved significantly over the past few decades as economies have become increasingly interconnected and technology-driven. According to Smithson and Simkins (2005), financial risk management involves strategies to identify, measure, and control exposure to potential financial losses. In the traditional context, risks were primarily related to credit, market, and liquidity factors. However, with the rise of digitalization, researchers such as Arner, Barberis, and Buckley (2016) highlight that financial systems have been transformed by fintech innovations, leading to new categories of risks such as cybersecurity threats, data privacy issues, and algorithmic trading errors. The digital ecosystem has been a major area of academic discussion. Gai, Qiu, and Sun (2018) emphasized that digital finance, while improving efficiency and accessibility, exposes financial institutions to operational and technological vulnerabilities. Artificial intelligence and big data analytics are now used to predict and mitigate risks, yet they require strong governance frameworks to ensure ethical and secure use. Similarly, studies by Brynjolfsson and McAfee (2017) have pointed out that automation and digital tools have redefined risk management processes, making them faster but also more complex.

Parallelly, the literature on sustainability and finance has expanded as global attention shifts toward environmentally and socially responsible growth. According to Weber (2014), sustainable finance integrates Environmental, Social, and Governance (ESG) factors into financial decision-making to achieve long-term economic stability. Studies by Scholtens (2017) argue that ignoring sustainability-related risks, such as climate change or regulatory changes, can severely impact a firm's financial performance and reputation. Moreover, the United Nations (2015) Sustainable Development Goals (SDGs) have encouraged institutions to consider environmental and social impacts as part of their financial risk strategies. Recent research has focused on the intersection of digitalization and sustainability. According to Bocken and Short (2020), digital innovation can enhance sustainable finance by improving transparency, enabling traceability in green investments, and promoting responsible consumption. However, these benefits come with challenges such as increased cyber risks and unequal access to technology. Hence, scholars like Tan and Low (2021) suggest that future risk management frameworks should integrate both technological and sustainability dimensions to build resilience in financial systems. Overall, the reviewed literature highlights that effective financial risk management in today's digital and sustainable ecosystem requires a balanced approach—leveraging technology while ensuring ethical, environmental, and social accountability.

Objectives:

- To analyze the impact of digital transformation on financial risk management practices in modern organizations.
- To identify the emerging risks associated with the use of digital technologies such as AI, blockchain, and big data in finance.
- To examine the role of sustainability and ESG (Environmental, Social, and Governance) factors in shaping financial risk strategies.
- To assess how financial institutions integrate digital tools to enhance transparency and efficiency in risk management.

Limitations:

- **Limited Data Availability**:

The study relies on secondary data and published research, which may not fully capture the most recent technological or financial developments in digital risk management and sustainable finance.

- **Rapid Technological Changes**:

Due to the fast pace of digital innovation, some findings or interpretations may become outdated quickly as new technologies and risk management tools emerge.

- **Scope Restriction**:

The research focuses primarily on the financial sector, and therefore, its conclusions may not be entirely applicable to other industries adopting digital and sustainable practices.

Methodology:

This study adopts a descriptive and analytical research approach based on secondary data collected from journals, research papers, reports, and online databases. The methodology involves reviewing existing literature related to financial risk management, digital transformation, and sustainability practices. Data were analyzed to identify emerging trends, challenges, and best practices in integrating technology with sustainable finance. Comparative analysis was also conducted to understand how digital tools and ESG frameworks influence financial risk strategies. The findings aim to provide insights for policymakers, financial institutions, and researchers in developing effective and resilient risk management models.

Data Type:

The study is based on secondary data, collected from credible and authentic sources such as research journals, government reports, financial publications, and online databases. It includes qualitative data in the form of theoretical analysis, case studies, and expert opinions related to financial risk management, digital innovation, and sustainability practices. The data helps in understanding current trends, identifying key challenges, and evaluating the effectiveness of existing financial risk management frameworks.

Sample size and sampling techniques.

The sample size of the research paper was 80 active respondents. Questionnaire method was used to collect responses from different respondents. The answers were obtained electronically. The questionnaire was consisting of 10 questions which were based on multiple choices and one option will be chosen by the respondent. Respondents were required to answer expeditiously and wisely as achievable.

Findings:

The study found that digital technologies such as artificial intelligence, blockchain, and big data analytics have significantly improved efficiency and accuracy in financial risk management. However, they also introduced new risks like cybersecurity threats and system failures. It was also observed that sustainability and ESG factors are increasingly being integrated into financial decision-making to ensure long-term stability. Financial institutions adopting both digital innovation and sustainable practices show better resilience, transparency, and trust among stakeholders compared to those following traditional risk management approaches.

Data analysis and Interpretation

1. What is the primary goal of financial risk management?
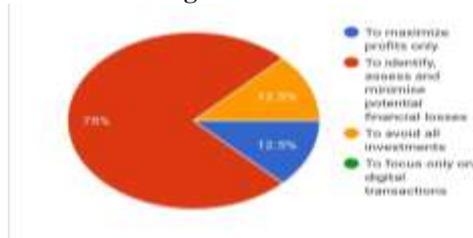
Interpretation: The results show that most respondents (75%) correctly believe the primary goal of financial risk management is to identify, assess, and aximiza financial losses, while a small share (25%) hold misconceptions such as focusing on profit aximization or avoiding investments. Overall, awareness of the core purpose is strong.

2. **Which of the technology is a major digital financial risk?**
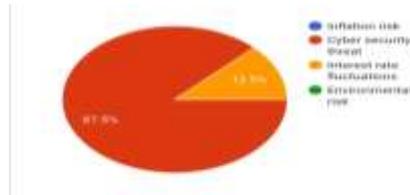
Interpretation: 87.5% of respondents (7 out of 8) correctly identified 'Cyber security threat' as the major digital financial risk. Only 12.5% selected 'Interest rate fluctuations.' This result shows an overwhelming consensus that cyber threats are the primary technological concern in digital finance.

3. How does digital transformation impact financial risk management?
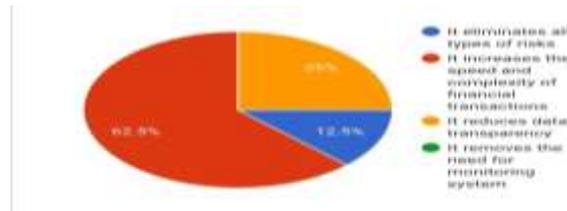
Interpretation: How does digital transformation impact financial risk management?", 62.5% of respondents agreed it increases the speed and complexity of financial transactions.
The remaining responses were split, with 25% selecting 'It reduces data transparency' and 12.5% selecting 'It eliminates all types of risks.' This highlights the primary view on increased complexity.

4. In a sustainable financial ecosystem, risk management focuses on

Interpretation: 87.5% of respondents (7 out of 8) correctly stated that in a sustainable financial ecosystem, risk management focuses on 'Balancing financial, social and environmental goals.'"
Only 12.5% chose 'Only short term profits.' This indicates a very strong understanding of the holistic nature of risk in sustainability.

Conclusion:

The research concludes that effective financial risk management in the digital and sustainable ecosystem requires a balanced integration of technology and sustainability principles. While digitalization enhances risk detection and operational efficiency, sustainability ensures long-term ethical and environmental responsibility. Organizations must develop adaptive frameworks that address both technological and ecological risks. Collaboration between policymakers, financial institutions, and technology developers is essential to build a resilient financial system that supports innovation, sustainability, and inclusive economic growth in the modern global environment.

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Original Article

A Study on the Role of Block chain In Enhancing Transparency and Security in Crypto Accounting Systems

Kunjan Dhappa[1], Joel Fernandes[2], Arjun Gill[3]
[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

Blockchain is the new age internet equivalent evolution along with the rise of artificial intelligence they both are revolutionizing a new way of safer, faster, and government free interaction for real time financial verification.

This study primarily investigates the role of these new age technologies in providing better security and transparent transactions in accounting systems related to crypto notably in decentralized finance (DeFi) ecosystems currently prevailing on solana, Ethereum and Base networks. These blockchain networks currently power billions of transactions in value using great techniques to ensure immutable, verifiable audit trails while removing any 3rd party interference

In 2025 major accounting firms and compliance institutions will use AI-driven analytics, anomaly detection and predictive modelling to provide much better scope and structure of audit; this will help to decrease human errors and compliance delays by an estimate of 30%. AI along with blockchain technologies will provide real time decentralized monitoring and forensic analysis via smart contracts with include the major one such as ERC-20The combination of blockchain's immutable ledger and AIs supremely adaptive intelligence creates a new wave of real time auditing right from retrospective verification to predictive ongoing assurance.

However due to delays and legislative fragmentation issues and government ethical remain major obstacles for successful development. Finally our study demonstrates that the combination of AI with blockchain marks a fundamental change toward transparent, automated, and resilient accounting ecosystems capable of maintaining confidence in an increasingly digital and decentralized global economy.

Keywords: *Blockchain Technology, Crypto Accounting Systems, Transparency in Accounting, Security of Financial Data, Decentralized Finance (DeFi), Immutable Ledger, Smart Contracts, Real-Time Auditing, Artificial Intelligence in Accounting, Triple-Entry Accounting, Fraud Prevention, Digital Assets, Regulatory Challenges*

Introduction:

In today's world blockchain technology has emerged as one of the most transformative innovations of the digital era, fundamentally reshaping the structure, processes, and integrity of modern accounting systems. With its characteristic such as decentralized architecture, immutable nature and cryptographic security its offers a great mechanism for ensuring transparency, auditability, and trust in financial transactions-particularly within crypto-based ecosystems. As global financial markets increasingly engage with digital assets, decentralized finance (DeFi), and tokenized value systems, traditional accounting frameworks face challenges in verifying transactions that occur across distributed ledgers rather than centralized financial institutions. Networks such as Solana, Ethereum and Base process transcripts worth billions of dollars.

These mechanisms eliminate the need for third party intermediaries, thereby reducing costs, minimizing fraud, and enabling real-time verification. At the same time, the rapid rise of artificial intelligence (AI) has introduced new layers of efficiency to financial reporting and auditingIts expected to reduce human error and compliance delays by nearly 30% by 2025, strengthening the reliability of digital accounting systems

Address for correspondence:

Kunjan Dhappa, Tolani College of Commerce (Autonomous)

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Review of Literature

The academic approach on blockchain enabled accounting includes its transformational potential in strengthening security, transparency and auditing. Satoshi Nakamoto in 2008 laid the foundation stone of decentralized network demonstrating how consensus based verification could eliminate the need for centralized authorities.

In later year's scholars such as Yermack emphasized blockchain potential to revolutionize accounting by providing immutable, time stamped records that prevent unauthorised alterations. Research by Dai and Vasarhelyi (2017) introduced us with the concept of auditing through blockchain, stating that decentralized ledgers could enable real-time assurance rather than traditional periodic audit cycles. Studies focusing on crypto-asset ecosystems (e.g., Catalini & Gans, 2018) revealed that blockchain significantly reduces information asymmetry and transaction verification costs. The transparency intergrated in public blockchain networks such as Ethereum was found to improve traceability, making fraud detection more efficient. Several scholars have also highlighted us with challenges associated with blockchain adoption.

PwC (2023) and KPMG (2024) have reported the fragmentation in legislative along with evolving compliance requirements, and ethical concerns.Despite the issues, the data across literature suggests that blockchain and AI marks a greater shift in today's world.

Objectives

- To examine the role of blockchain technology in improving transparency within crypto accounting systems.
- To evaluate the effectiveness of blockchain in preventing fraud, data manipulation, and unauthorized alterations.
- To study the impact of real-time transaction recording on auditing efficiency and accuracy.

Limitations

- Blockchain and cybersecurity systems are expensive to implement.
- Blockchain can struggle to scale with many transactions.
- Regulations are unclear and cause compliance issues.
- The technology is complex and needs specialized skills.
- Cyber threats keep evolving and still pose risks.

Methodology

This research adopts a qualitative methodology to analyze the role of blockchain in enhancing transparency and security in crypto accounting systems. The study is based on an extensive review of scholarly articles, academic research papers, industry white papers, and authoritative online resources. A comparative assessment is conducted between traditional accounting systems and blockchain-driven accounting models to highlight key differences and improvements. Additionally, real-world case studies of blockchain implementation in financial institutions and crypto platforms are examined to understand practical applications. Expert opinions, published interviews, and analytical reports are incorporated to evaluate the technology's effectiveness in improving accuracy, auditability, and the overall integrity of financial data.

Data Type

This study adopts a mixed-method research design, combining both qualitative and quantitative data. Quantitative data will be collected through close-ended questionnaire items to measure patterns related to accuracy, transparency, and efficiency in crypto-accounting systems. Qualitative data will be gathered through open-ended questions and semi-structured interviews, allowing participants to share professional experiences, opinions, and practical challenges in implementing blockchain and AI technologies. The use of mixed data enables deeper analysis by not only observing measurable trends but also understanding the reasoning behind those results. While numerical findings highlight the effectiveness of automated accounting systems, narrative responses provide insight into real-world limitations, ethical concerns, and regulatory struggles faced by professionals in the field. This approach ensures that the study is supported both by factual evidence and by lived experience.

Sample Size and Sampling Technique

The research will involve a sample size of approximately 50–60 respondents, consisting of blockchain developers, crypto-accountants, auditors, and compliance professionals working with decentralized finance platforms including Ethereum, Solana, and Base. A purposive sampling technique is used, as the study requires participants who possess direct experience in blockchain systems and financial verification processes. Random sampling would not provide the depth of expertise required; therefore, participants are selected specifically based on domain relevance and professional background. This technique ensures that data is collected from individuals who actively work in the ecosystem being studied, improving the reliability and validity of the findings. By targeting professionals already involved in crypto-accounting environments, the study gains practical insight rather than surface-level assumptions.

Data Analysis & Interpretation

Figure 1: How familiar are you with blockchain technology and its applications in finance?
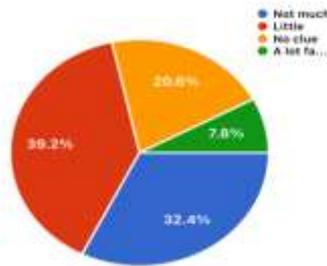
Interpretation: The data shows that most respondents have only limited awareness of blockchain in finance: 39.2% reported knowing "a little," and 32.4% admitted they are "not much" familiar, indicating a large knowledge gap, while 20.6% selected "no clue," reflecting general uncertainty; only 7.8% claimed strong familiarity, suggesting that deep understanding of blockchain remains rare and that education and exposure are urgently needed to move this technology from mystery to mastery.

Figure 2: Which Block chain networks are you most familiar with?
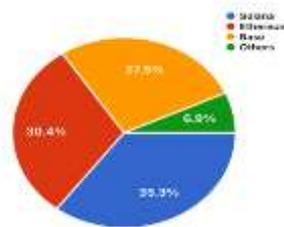
Interpretation : The responses show that Solana is the most familiar network (35.3%), closely followed by Ethereum (30.4%), suggesting that these two platforms currently dominate awareness among respondents, likely due to their strong presence in the DeFi space and active developer communities. Base (27.5%) also reflects growing recognition, indicating rising trust in newer layer-2 solutions, while other networks (6.9%) remain relatively unknown; highlighting that attention is largely concentrated on a few major ecosystems rather than spread across the broader blockchain landscape.

Figure 3: How effective do you think decentralized finance (Defi) ecosystems are in reducing third-party interference?
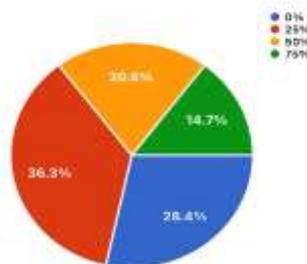
Interpretation: The responses suggest a cautious but evolving faith in DeFi's power to reduce third-party control. While 36.3% rated its effectiveness at 25% and 28.4% at 0%, indicating skepticism or limited trust, a notable portion of respondents—20.6% at 50% and 14.7% at 75%—recognize its growing influence, reflecting that belief in decentralization rises with exposure and understanding rather than assumption alone.

Figure 4: Do you believe immutable audit trails on blockchain improve trust in financial reporting?
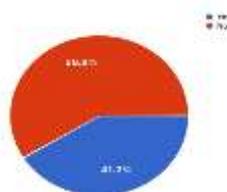
Interpretation: The results reveal a divided perspective on the trust-building power of immutable audit trails. While 41.2% of respondents believe blockchain-based audit records improve trust in financial reporting, a larger group—

58.8% remain unconvinced, suggesting that immutability alone is not yet enough to inspire confidence. This hesitation may stem from concerns about data accuracy at the point of entry, lack of awareness, or uncertainties surrounding governance and regulatory oversight, which still cloud the full promise of the technology.

Figure 5: How aware are you of AI-Driven tools such as anomaly detection and predictive modelling in auditing?
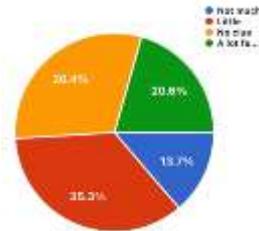
Interpretation: The data indicates that awareness of AI-driven auditing tools remains largely limited among respondents. A substantial 35.3% reported having only a little knowledge, while 30.4% admitted having no awareness at all, showing that AI in accounting is still unfamiliar territory for most. Meanwhile, 13.7% stated they were not much aware, and only 20.6% reported strong familiarity, revealing that advanced understanding of AI tools such as anomaly detection and predictive modelling is confined to a minority

Findings

- **Immutability:** Transactions are permanent and tamper-proof due to cryptographic hashing, preventing fraud and manipulation.
- **Decentralized Security:** Data is distributed across a network, eliminating a single point of failure and enhancing protection against cyberattacks.
- **Real-Time Transparency:** Provides an instantly verifiable, shared ledger for all authorized parties, creating a "single source of truth."
- **Streamlined Auditing:** Offers a complete and continuous audit trail, enabling real-time audits and reducing compliance costs and time.
- **Automation:** Smart contracts automate transactions and compliance, reducing human error and increasing efficiency (enabling triple-entry accounting).
- **Regulatory Uncertainty:** Lack of clear, standardized, global accounting and regulatory guidelines for crypto assets.
- **Scalability Issues:** Some networks struggle to handle the high volume of transactions required for large enterprise accounting systems.

Conclusion

Across all findings, one clear truth rises like a quiet anthem from the data: the future is being welcomed—but with watchful eyes and measured steps. Whether it is AI reducing compliance delays, dissecting financial transactions in real time, or strengthening systems through smart contract standards, the responses consistently reveal cautious optimism rather than blind faith. In every case, approval barely edges out doubt. This tells a powerful story—not of resistance to innovation, but of respect for consequence. People are not afraid of progress; they are simply asking it to prove itself.

Together, the survey paints a portrait of a world standing in a doorway between tradition and transformation. AI and blockchain are no longer seen as distant curiosities, but neither are they crowned as saviors. They are tools of great promise, but only when guided by governance, transparency, and human wisdom. The collective voice of the respondents does not shout for revolution—it hums for evolution. A future built not in haste, but in harmony; not in fire, but in light.

Beyond the numbers, a deeper narrative unfolds—one written not in percentages but in patience. The hesitation that echoes across the responses is not rejection; it is discernment. Professionals appear to recognize that while algorithms may calculate flawlessly and blockchains may record eternally, trust itself is a fragile architecture built over time. It requires more than innovation; it demands accountability. The future envisioned is not automated anarchy but intelligent order, where machines assist, yet humans still steer. What emerges, then, is not a verdict against technology, but a call to refine it. Education, regulation, and ethical design rise as silent protagonists in this story. Without them, even the most powerful systems risk becoming hollow machinery. With them, AI and blockchain may yet compose a new symphony for accounting—one where transparency replaces uncertainty, resilience replaces fear, and confidence grows not from code alone, but from how wisely it is written into society's fabric.

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Original Article

A Study on the Role of Digital Transformation in Modern Accounting and Finance Practices

ReannGonsalves[1], Shweta Rajbhar[2], Priti Jogale[3]
[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

The advent of digital transformation has revolutionized the accounting and finance landscape, enabling organizations to streamline processes, enhance efficiency, and drive strategic decision-making. This study explores the impact of digital transformation on modern accounting and finance practices, examining the adoption of technologies such as artificial intelligence, blockchain, and cloud computing. Through a comprehensive review of existing literature and empirical analysis, this research investigates the benefits, challenges, and future directions of digital transformation in accounting and finance. The findings highlight the potential of digital transformation to improve financial reporting, risk management, and financial planning, while also identifying key challenges and areas for future research. This study contributes to the growing body of knowledge on digital transformation in accounting and finance, providing insights for practitioners, policymakers, and researchers.

Keywords: Digital Transformation, Accounting, Finance, Artificial Intelligence, Blockchain, Cloud Computing.

Introduction:

The accounting and finance landscape has undergone a profound transformation in recent years, driven by the advent of digital transformation. The rapid proliferation of cutting-edge technologies such as artificial intelligence, blockchain, and cloud computing has revolutionized the way organizations operate, make decisions, and create value, enabling them to streamline processes, enhance efficiency, and drive strategic decision-making. As the accounting and finance functions are critical to an organization's success, understanding the impact of digital transformation on these areas is crucial. This study explores the impact of digital transformation on modern accounting and finance practices, examining the adoption of emerging technologies and their potential to improve financial reporting, risk management, and financial planning, while also identifying key challenges and areas for future research, thereby contributing to the growing body of knowledge on digital transformation in accounting and finance, and providing insights for practitioners, policymakers, and researchers to navigate this rapidly evolving landscape. The integration of digital technologies into accounting and finance practices has the potential to bring about significant benefits, including enhanced efficiency, improved accuracy, and increased transparency. This is evident in the improved accuracy, reduced manual errors, and enhanced decision-making in financial management. The adoption of artificial intelligence has streamlined auditing, forecasting, and fraud detection, allowing accountants to focus on strategic analysis rather than routine tasks. Blockchain technology further strengthens transparency and trust in financial reporting by providing secure, immutable transaction records. Cloud computing enables real-time data access, cost efficiency, and collaboration across financial departments.

Review of Literature

Digital transformation has become a key driver of change in accounting and finance, reshaping traditional processes through the integration of advanced technologies.

Address for correspondence:

ReannGonsalves, Tolani College of Commerce (Autonomous)

How to cite this article:

Studies show that automation and data analytics have improved accuracy, reduced manual errors, and enhanced decision-making in financial management (Kokina & Davenport, 2017).

The adoption of artificial intelligence (AI) has streamlined auditing, forecasting, and fraud detection, allowing accountants to focus on strategic analysis rather than routine tasks (Appelbaum et al., 2017). Blockchain technology further strengthens transparency and trust in financial reporting by providing secure, immutable transaction records (Dai & Vasarhelyi, 2017). Likewise, cloud computing enables real-time data access, cost efficiency, and collaboration across financial departments (Byrne & Pierce, 2018). Despite these advantages, challenges such as data security, privacy risks, and limited digital skills continue to hinder widespread adoption (Yigitbasioglu, 2019). Overall, the literature suggests that digital transformation enhances efficiency, accuracy, and strategic decision-making in accounting and finance, but successful implementation requires addressing technological, ethical, and human resource challenges.

Objectives:

- To investigate the current state of digital transformation in accounting and finance.
- To examine the benefits and challenges of digital transformation in accounting and finance.
- To identify future directions for digital transformation in accounting and finance.
- To examine the impact of digital transformation on financial reporting.
- To investigate the role of emerging technologies in finance.
- To analyze the implications of digital transformation for accounting professionals.

Limitations:

- The study's scope is limited to existing literature and empirical analysis, which may not capture the full complexity of digital transformation in accounting and finance.
- The research focuses on specific technologies (AI, blockchain, and cloud computing), which might not be exhaustive.
- The study's findings may be influenced by the rapidly evolving nature of digital technologies.
- The research may not provide a comprehensive analysis of industry-specific challenges and opportunities.
- The sample size for the survey was small, a bigger sample size would present a better picture about the research.

Methodology

This study employs a mixed-methods approach, combining a comprehensive literature review of existing research on digital transformation in accounting and finance with empirical analysis through case studies or surveys of accounting and finance professionals. The literature review provides a foundation for understanding the current state of digital transformation, while the empirical analysis gathers insights on the adoption and impact of digital technologies such as artificial intelligence, blockchain, and cloud computing. Quantitative and qualitative data analysis techniques are used to analyze the collected data, enabling the identification of benefits, challenges, and future directions of digital transformation in accounting and finance.

Data Type

The research employs a quantitative approach, utilizing a structured questionnaire consisting entirely of closed-ended questions. Multiple-choice questions were designed and administered to collect measurable data. This approach enables the study to objectively assess respondents' attitudes and perceptions regarding the role of digital transformation in modern accounting and finance practices. Data collected were analyzed and interpreted with reference to findings reported in relevant academic journals, ensuring the study's alignment with established scholarly literature and methodological standards.

Sample size and sampling Techniques

The sample size of the research paper was 50 active respondents. Questionnaire method was used to collect responses from different respondents. The answers were obtained electronically. The questionnaire consisted of 10 questions which were based on multiple choices and one option will be chosen by the respondent. Respondents were required to answer expeditiously and wisely as achievable.

Data analysis and interpretation

Fig no 1: Digital transformation in accounting mainly refers to
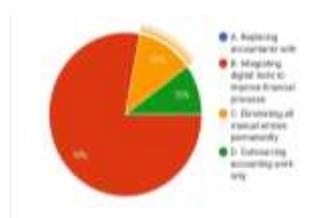
Interpretation:

The pie chart illustrates respondents' perceptions of digital transformation in accounting. A substantial 78% view it as "Integrating digital tools to improve financial processes," highlighting a strong emphasis on technology-driven process enhancement. A smaller portion, 12%, associate it with "Eliminating all manual entries permanently," while 10% perceive it as "Outsourcing accounting work only." Notably, none of the respondents (0%) believe digital transformation means "Replacing accountants with technology," indicating that it is largely seen as a means to augment accounting practices rather than replace human roles.

Figno.2: Which technology is most associated with real-time financial reporting?
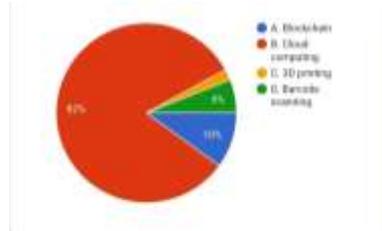
Interpretation:

The survey results highlight Cloud computing as the dominant technology associated with real-time financial reporting, garnering 82% of responses. This underscores its critical role in enabling timely and accessible financial data. Blockchain follows with 10%, indicating its emerging relevance in secure and transparent financial transactions. 3D printing and Barcode scanning received minimal responses, suggesting lesser association with real-time financial reporting. This emphasizes the pivotal position of cloud technology in driving digital transformation in accounting and finance.

Fig no.3: The Use of AI in accounting helps in
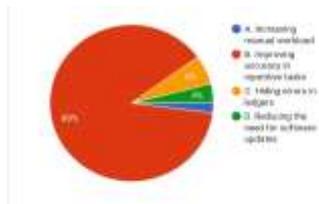
Interpretation:

The majority (88%) of respondents believe AI in accounting improves accuracy in repetitive tasks, highlighting its role in enhancing efficiency. A small percentage (6%) think it hides errors in ledgers, indicating a minor concern about potential misuse. Only 4% associate AI with reducing software update needs, suggesting this isn't a primary benefit. Another 4% link AI to increasing manual workload, possibly indicating implementation challenges. Overall, AI is seen as a tool for boosting accuracy in modern accounting practices.

Fig no.4: Blockchain contributes to accounting mainly by
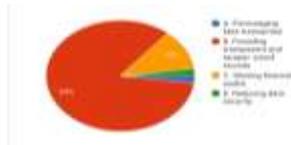
Interpretation:

The pie chart reveals that 84% of respondents believe blockchain contributes to accounting mainly by providing transparent and tamper-proof records, highlighting its potential to enhance financial data integrity. Meanwhile, 12% think it slows financial audits, possibly indicating concerns about implementation challenges. Minimal responses suggest blockchain isn't seen as encouraging fake transactions or reducing data security.
This underscores blockchain's perceived strength in boosting transparency and trust in accounting practices, a key aspect of digital transformation in finance.

Fig no.5: What is the main benefit of adopting digital technologies in accounting and finance?
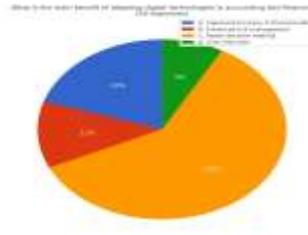
Interpretation:

The survey reveals that 60% of respondents believe the main benefit of adopting digital technologies in accounting and finance is faster decision-making, highlighting the importance of timely data for strategic choices. Improved accuracy in financial data is seen as a key advantage by 20% of respondents, underscoring digital tools' role in reducing errors. Enhanced risk management is cited by 12%, indicating recognition of digital technologies in mitigating financial risks. Cost reduction, though important, is the least selected at 8%, suggesting other benefits are prioritized. Overall, digital transformation is valued for its impact on decision speed and data accuracy in modern accounting and finance practices.

Findings

- Digital transformation has improved financial reporting, risk management, and financial planning in accounting and finance practices.
- The adoption of technologies such as artificial intelligence, blockchain, and cloud computing has enabled organizations to streamline processes and enhance efficiency.
- Digital transformation has improved accuracy, reduced manual errors, and enhanced decision-making in financial management.
- Key challenges to digital transformation include data security concerns, skills gaps, and infrastructure constraints.
- Emerging technologies such as blockchain and artificial intelligence have the potential to further enhance accounting and finance practices.
- Digital transformation enables organizations to make more informed financial decisions using real-time data and advanced analytics

Conclusion

This study demonstrates the significant impact of digital transformation on modern accounting and finance practices. The findings highlight the benefits of digital transformation in improving financial reporting, risk management, and financial planning. However, the study also identifies key challenges and areas for future research, emphasizing the need for continued exploration and innovation in this field. As digital technologies continue to evolve, accounting and finance professionals must adapt to leverage these advancements and drive organizational success.

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Some potential references for this study could include:

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Original Article

Accounting Education in the NEP 2020 Era: Identifying Skill Gaps and Transforming the Curriculum for the Digital Economy

Dr. Ishtiyaq Chiplunkar
Assistant Professor, Tolani College of Commerce (Autonomous)

Abstract

The National Education Policy (NEP) 2020 aims to reshape India's higher education landscape by promoting flexibility, multidisciplinary learning, and digital competency. In this context, accounting— traditionally a theory-centric discipline—requires major reforms to meet the expectations of a technology-driven business environment. This study evaluates the preparedness of accounting students and educators for the digital economy and examines the extent to which current curricula align with NEP 2020 objectives. A mixed-method study was conducted involving 120 undergraduate students and 30 faculty members from colleges in Mumbai. Findings reveal wide gaps in digital literacy, analytical ability, and practical exposure to modern accounting technologies such as ERP, cloud-based systems, and data analytics. Faculty members also reported limited training and inadequate institutional infrastructure to implement NEP 2020 effectively.

The study concludes that curriculum redesign, professional development of faculty, stronger industry partnerships, and greater use of technology-enabled pedagogy are essential for producing future-ready accountants. Recommendations for policymakers and institutions are presented to support the effective implementation of NEP 2020.

Keywords: Accounting Education, National Education Policy (NEP) 2020, Digital Economy, Curriculum Transformation, Skill Gap Analysis, Digital Skills in Accounting, Employability Skills, Accounting Curriculum Reform, ERP and Accounting Software, Data Analytics in Accounting, Cloud Accounting, Faculty Development

Introduction:

The accounting profession is in the midst of rapid transformation driven by automation, digitalization, and emerging technologies such as artificial intelligence, data analytics, and cloud systems. These changes have redefined the skills required of future accountants. In India, the National Education Policy (NEP) 2020 introduces a forward-looking framework that emphasizes employability, digital proficiency, flexibility of learning pathways, and experiential education. However, despite these policy directives, most undergraduate accounting programs continue to follow traditional teaching approaches with limited integration of technology and industry practices. As a result, students often enter the workforce without the practical and digital competencies needed in modern financial environments.

This research examines how accounting education is adapting to NEP 2020 and identifies the skill gaps that must be addressed to prepare learners for the digital economy.

Objectives of the Study

- To evaluate the digital and analytical skills of undergraduate accounting students.
- To examine the extent to which current accounting curricula reflect NEP 2020 guidelines.
- To identify key gaps between industry expectations and student preparedness.
- To suggest strategies for curriculum enhancement and skill development under NEP 2020.

Literature Review
1. Digital Transformation and Accounting

Address for correspondence:

Dr. Ishtiyaq Chiplunkar, Assistant Professor, Tolani College of Commerce (Autonomous)

How to cite this article:

Technological advancements have brought automation, AI-based systems, and ERP into mainstream accounting practices. Consequently, the need for digital skills in accounting education has grown significantly.

2. NEP 2020 and Skill-Based Learning

NEP 2020 stresses the importance of practical learning, flexibility in course design, vocational exposure, and digital readiness. It recommends multidisciplinary courses, continuous assessment, and integration of technology.

3. Employability and Skill Gaps

Research indicates that many accounting graduates lack advanced Excel skills, analytical reasoning, communication abilities, and exposure to accounting technologies.

4. Curriculum Limitations

Despite policy reforms, most curricula remain theory-heavy with minimal emphasis on hands-on experience, industry collaboration, or emerging tools such as data analytics and cloud accounting.

Research Methodology

1. Research Design

A descriptive mixed-method approach was used.

2. Sample

120 undergraduate accounting students
30 accounting faculty members from various colleges in Mumbai.

3. Tools for Data Collection

Structured questionnaires
Interviews with selected faculty
Review of existing curriculum frameworks

4. Method of Analysis

Data was analyzed using percentages, averages, and comparative interpretation.

Data Analysis

1. **Student Skill Assessment (n = 120)**

Digital Skills

Skill Area	High	Moderate	Low
Advanced Excel	22%	48%	30%
Tally / Accounting Software	35%	45%	20%
Data Analytics Tools	10%	40%	50%
ERP Systems	8%	32%	60%
Cloud Accounting	12%	38%	50%

Interpretation:

Students possess basic operational skills but lack training in advanced tools that are now essential in the accounting profession.

2. **Faculty Preparedness (n = 30)**

Parameter	Agree	Neutral	Disagree
NEP 2020 requires major transformation	90%	7%	3%
Adequate training received	20%	30%	50%
Sufficient digital infrastructure	35%	25%	40%
Strong industry collaboration	18%	22%	60%

Interpretation:

Educators recognize the importance of NEP 2020 but lack the training and resources to execute its reforms.

3. Curriculum Evaluations

The curriculum review revealed:

- Minimal coverage of topics such as AI, analytics, ERP, and fintech.
- Limited opportunities for case-based, experiential, and project-based learning.
- Predominance of theoretical assessment methods.
- Scarce multidisciplinary elective options as encouraged by NEP 2020.

Major Findings

- Digital competency gaps are substantial, especially in ERP, cloud platforms, and analytics.
- Current accounting curricula are not adequately aligned with NEP 2020 expectations.
- Faculty development initiatives for digital pedagogy are insufficient.
- Students desire more practical exposure, internships, and hands-on training.
- Many institutions struggle with infrastructural limitations, affecting NEP implementation.

- Industry engagement is weak, limiting opportunities for real-world learning.

Recommendations

1. Curriculum Enhancement
- Introduce modules on AI applications, data analytics, blockchain, and fintech.
- Integrate tools like Tally Prime, SAP, QuickBooks, and Zoho Books into coursework.
- Offer interdisciplinary electives such as data science, business communication, and information systems.

2. Faculty Capacity Building
- Conduct regular training programs and workshops on digital tools and NEP pedagogy.
- Encourage faculty to pursue certifications in analytics, ERP, and emerging accounting technologies.

3. Teaching–Learning Reforms
- Adopt case study methods, virtual labs, and simulation-based training.
- Mandate internships, industry projects, and community-based learning as part of assessments.

4. Strengthening Industry Collaboration
- Develop partnerships with accounting firms, fintech companies, and ERP vendors.
- Invite industry experts for lectures, mentoring, and joint academic initiatives.

5. Assessment Reforms
- Reduce reliance on rote learning and theory-heavy examinations.
- Use digital assignments, presentations, portfolios, and problem-solving evaluations in line with NEP 2020.

Conclusion

NEP 2020 offers an opportunity to modernize accounting education and align it with global standards. However, the transition requires coordinated efforts from institutions, faculty, and policymakers. The study highlights the urgent need for digital skilling, practical exposure, and updated curricula that reflect technological advancements.

By embracing NEP 2020's vision—through skill-centric learning, digital integration, and experiential pedagogy—institutions can develop accounting graduates who are competent, future-ready, and capable of thriving in a rapidly evolving digital economy.

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Original Article

Adoption of FinTech among Street Vendors: A Pathway to Financial Inclusion and Business Sustainability

Murugan Nadar

Assistant Professor, Tolani College of Commerce (Autonomous)

Abstract

The rise of Financial Technology (FinTech) has changed the financial landscape. It has opened up new chances for inclusion and economic growth in both formal and informal sectors. Street vendors, who make up a large part of the urban informal economy, have often relied on cash transactions. This reliance has restricted their access to formal financial services. This paper looks at how street vendors are using FinTech tools, particularly mobile payments, digital wallets, and micro-lending platforms. It also investigates how these technologies improve financial inclusion and business sustainability. The study utilizes primary and secondary sources to assess the level of FinTech awareness, the factors affecting adoption, and the challenges vendors face. The results show that digital payment systems have made it easier for vendors to access finances, process transactions efficiently, and keep records. They have also improved trust and transparency in customer interactions. However, vendors still face barriers such as low digital literacy, unreliable network connectivity, and security issues. The paper ends by highlighting the need for training programs and policy changes to enhance digital inclusion in the informal sector, making FinTech a useful tool for sustainable livelihoods.

Keywords: FinTech, Financial Inclusion, Street Vendors, Digital Payments, Informal Economy, Business Sustainability

Introduction:

The digital revolution in finance has changed the economic landscape. It has made financial services more accessible to groups that were previously excluded. Financial Technology (FinTech) refers to digital innovations like mobile payments, online banking, and blockchain. It has become a key driver for inclusion and empowerment. In India, the widespread use of smartphones, affordable internet, and initiatives such as Digital India and Jan Dhan Yojana have accelerated the FinTech movement. Street vendors are an important part of the informal economy. According to the Ministry of Housing and Urban Affairs (2022), there are over 10 million street vendors in India. They play a significant role in urban employment and local economies. Despite their contributions, these vendors often struggle to access formal financial systems due to a lack of documentation, low literacy levels, and reliance on cash transactions. FinTech innovations are starting to close this gap. Mobile payment platforms like UPI, Paytm, Google Pay, and PhonePe allow vendors to make cashless transactions, create digital transaction histories, and access formal credit. This study looks at how FinTech adoption among street vendors promotes financial inclusion and sustainable businesses. It will examine awareness, usage patterns, challenges, and impacts.

Research Questions

- What factors influence the adoption of FinTech among street vendors?
- How does FinTech support financial inclusion and business sustainability?
- What challenges do street vendors encounter when adopting digital financial services?

Review of Literature

The literature on financial inclusion and FinTech adoption shows how technology can enhance access to finance, especially for marginalized groups.

Address for correspondence:

Murugan Nadar, Assistant Professor, Tolani College of Commerce (Autonomous)

How to cite this article:

1. Financial Inclusion and Informal Sector

Beck et al. (2007) defines financial inclusion as ensuring access to financial services and credit for all, particularly vulnerable groups. In India, financial inclusion has been a key policy focus. Initiatives like Jan Dhan Yojana and PM SVANidhi aim to include informal workers in the formal economy. However, street vendors often remain excluded because of bureaucratic hurdles and limited awareness (Bhowmik, 2010).

2. FinTech and Digital Transformation

FinTech has become a game-changer, enabling digital access to finance (Gomber et al., 2017). Mobile payment systems and digital banking services have changed how small entrepreneurs handle transactions and savings. Studies by Singh and Sahu (2021) and Sinha et al. (2020) show that FinTech improves efficiency, lowers transaction costs, and increases transparency.

3. FinTech Adoption Models

Technology Adoption Models (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) help explain FinTech adoption. Important factors include perceived usefulness, ease of use, social influence, and supporting conditions (Davis, 1989; Venkatesh et al., 2003).

4. Challenges to FinTech Adoption

Despite the benefits, barriers remain, including low digital literacy, fear of fraud, unstable internet connections, and low awareness. Research by Kapoor (2022) and Sharma & Kumar (2023) shows that while adoption is increasing, sustainability relies on user trust and reliable digital support.

Research Objectives

- To assess the level of awareness and adoption of FinTech tools among street vendors.
- To examine the link between FinTech adoption and financial inclusion.
- To evaluate how FinTech impacts business sustainability among street vendors.
- To identify obstacles that hinders the effective use of FinTech applications.

Research Methodology

1. Research Design

This study uses a mixed-method approach that includes quantitative surveys and qualitative interviews to gather both statistical and experiential data.

2. Sample and Area of Study

Researchers selected a sample of 120 street vendors from Mumbai city using stratified random sampling to ensure diversity across areas (South Mumbai, Dadar, Bandra, and Andheri). Vendors from the food, clothing, and accessories sectors participated.

3. Data Collection

Primary data were gathered through structured questionnaires and semi-structured interviews. Researchers also used secondary data from government reports, journal articles, and analyses of the FinTech industry.

4. Analytical Tools

Quantitative data were analyzed using descriptive statistics and correlation analysis in SPSS. Qualitative responses were coded and examined thematically.

Data Analysis

This section presents the analysis of primary data collected from 120 street vendors across Mumbai. The findings focus on demographic details, FinTech awareness and usage, perceived benefits, barriers to adoption, and the relationship between FinTech adoption and business sustainability.

1. Demographic Profile

The demographic composition of respondents reflects a diverse group of street vendors engaged in various types of vending businesses. Table 1 summarizes the key demographic variables.

Table 1: Demographic Profile of Respondents

Variable	Category	Percentage (%)
Gender	Male	68%
	Female	32%
Age Group	Below 25 years	12%
	25–45 years	63%
	Above 45 years	25%
Education Level	Primary Education	24%
	Secondary Education	57%
	Higher Secondary & Above	19%

Variable	Category	Percentage (%)
Business Tenure	Less than 5 years	28%
	5–10 years	46%
	Above 10 years	26%

Source: Primary Data (2025)

Interpretation

The data indicate that most vendors fall within the 25–45 age range, representing an active and adaptable workforce. A majority have completed secondary education, which supports potential digital adoption. The average tenure of 8.5 years implies significant business experience and market familiarity.

2. Awareness and Use of FinTech

FinTech awareness and utilization among street vendors were assessed through questions related to familiarity with digital payment systems and credit platforms.

Table 2: Awareness and Use of FinTech Tools

FinTech Tool / Platform	Awareness (%)	Active Users (%)
UPI-based Apps (Paytm, Google Pay, etc.)	89%	74%
Digital Wallets (PhonePe, Amazon Pay)	76%	63%
Digital Credit Apps (Paytm Postpaid, etc.)	38%	21%
Micro-lending Platforms	28%	15%

Source: Primary Data (2025)

Interpretation

The results show that UPI-based applications dominate the FinTech landscape, with 74% of vendors using them regularly for transactions. While digital wallets are increasingly popular, digital credit platforms have limited penetration due to trust and literacy barriers.

3. Perceived Benefits

Respondents reported several benefits of adopting FinTech tools. These include convenience, transparency, and improved customer satisfaction.

Table 3: Perceived Benefits of FinTech Adoption

Perceived Benefit	Respondents (%)
Faster and convenient transactions	67%
Improved record keeping and financial tracking	58%
Enhanced business credibility among customers	46%
Better access to microfinance and savings opportunities	32%

Source: Primary Data (2025)

Interpretation

The majority of vendors emphasized time efficiency and customer convenience as the most significant benefits. The use of digital payment platforms also helped in maintaining transaction records, which is useful for future credit access and financial planning.

4. Barriers to Adoption

Despite positive outcomes, several challenges hinder full-scale FinTech adoption among street vendors.

Table 4: Barriers Faced in FinTech Adoption

Barrier	Respondents (%)
Lack of smartphone proficiency	41%
Fear of fraud or data misuse	36%
Poor internet connectivity	32%
Transaction failures and refund delays	24%
Lack of awareness about app features	22%

Source: Primary Data (2025)

Interpretation

Digital literacy remains the biggest obstacle, followed by trust issues and infrastructure challenges. Some vendors reported technical issues such as failed transactions, discouraging frequent digital use.

5. Relationship between FinTech Adoption and Business Sustainability

The study analyzed the relationship between the extent of FinTech usage and perceived business stability. A Pearson correlation coefficient ($r = 0.68$) was found, indicating a strong positive relationship between FinTech adoption and business sustainability. Vendors using digital payment and finance apps reported:

- Increased daily sales due to cashless convenience.
- Better liquidity and cash flow management.
- Improved customer trust and retention.

Table 5: Correlation between FinTech Adoption and Business Sustainability

Variable	Correlation Coefficient (r)	Significance (p)
FinTech Usage vs. Business Stability	0.68	0.01

Source: Computed from Primary Data (2025)

Interpretation

These results affirm that FinTech adoption serves as a strategic enabler for financial inclusion and long-term business sustainability among street vendors.

Findings

The findings show that adopting FinTech among street vendors greatly helps with financial inclusion and business resilience. By using digital payments, vendors create transaction histories that act as informal credit records, making it easier for them to access microloans and government benefits.

1. Financial Inclusion Outcomes

FinTech connects the formal and informal sectors by providing access to digital wallets, savings tools, and microfinance. Vendors using UPI platforms join the digital economy, which promotes transparency and traceability.

2. Business Sustainability and Growth

Adopting digital payments improves operational efficiency and customer satisfaction. Vendors reported more customers because people prefer cashless payments. Also, relying less on cash reduces theft risk and helps improve savings habits.

3. Gender and Digital Inclusion

Female vendors face more barriers due to limited smartphone access and lower confidence in using technology. Targeted training programs could help improve digital inclusion among women entrepreneurs in informal sectors.

4. Policy Implications

Government initiatives like PM SVANidhi and Digital India have laid the foundation for digital inclusion. However, workshops for building skills, easier app interfaces, and support in local languages are crucial for increasing FinTech usage.

Conclusion

FinTech adoption offers a path toward inclusive and sustainable economic growth for street vendors. By using digital payments and financial platforms, vendors access secure transactions, better financial management, and potential credit connections. However, digital illiteracy, network issues, and security concerns remain major challenges. The study concludes that FinTech is not just a technological advancement but also a social equalizer, allowing marginalized groups to join the formal economy. To maximize its impact, stakeholders, including government bodies, FinTech companies, and NGOs, should work together to create inclusive and user-friendly financial systems.

Recommendations

- For Policymakers: Strengthen digital literacy campaigns aimed at informal workers. Provide incentives for FinTech providers to create low-cost interfaces in local languages. Expand infrastructure for reliable internet and digital security in vending areas.
- For FinTech Companies: Collaborate with street vendor associations to create solutions. Offer micro-credit and savings products that relate to transaction data. Develop simple, multilingual apps that use little data.
- For Financial Institutions: Partner with local organizations to extend micro-lending and insurance services. Use digital transaction histories to assess creditworthiness. Hold workshops on safe digital finance practices.
- For Street Vendors and Associations: Encourage peer learning and develop digital champions in vendor communities. Promote the use of bookkeeping and savings tools. Work with municipalities to improve access to Wi-Fi and digital kiosks. Limitations and Future Research. This study focuses on street vendors in Mumbai; future research could compare multiple cities or regions. Long-term studies can examine how FinTech adoption affects income stability and business growth over time.

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Original Article

An Analytical Study of the Role of Artificial Intelligence and Big Data Analytics in Enhancing Financial Decision-Making in Indian Enterprises

Sanika Shivaji Patil[1], Andria Nelson Fernandes[2], Riya Narendra Padharia[3]

[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

The rapid integration of Artificial Intelligence (AI) and Big Data Analytics (BDA) has reshaped how financial decisions are designed and executed across Indian industries. This study investigates the growing use of AI-enabled tools such as predictive algorithms, automated data systems, and machine-learning-powered risk models—in strengthening enterprise-level financial planning. The paper examines how these technologies support forecasting, investment evaluation, fraud detection, and risk assessment. It also highlights persistent barriers, including talent shortages, high deployment costs, data-security concerns, and infrastructural limitations. Using both primary survey responses and secondary literature, the findings indicate that AI and BDA contribute significantly to improved accuracy, operational efficiency, and financial discipline within organizations. Sustainable progress, however, requires continued investment in technological capacity, cybersecurity safeguards, and workforce development.

Keywords: Artificial Intelligence, Big Data Analytics, Financial Strategy, Predictive Modelling, Indian Enterprises.

Introduction:

AI and Big Data have emerged as two of the most influential forces transforming contemporary business operations. Indian enterprises—particularly those involved in banking, finance, and digital services—are increasingly recognizing the value of data-driven intelligence in financial decision-making. The explosion of mobile banking, online transactions, and digitized financial records has made traditional manual or intuition-based approaches insufficient.

Today's financial decisions increasingly rely on automated insights generated from advanced analytics, real-time processing, and machine-learning models. These technologies help organizations forecast market changes, detect irregular patterns, evaluate investment opportunities, and strengthen risk-management practices. As data availability continues to expand, Indian organizations are gradually shifting toward systems that provide deeper, faster, and more reliable financial insights.

Review of Literature

- **Bahoo (2024)** highlighted that the introduction of AI into financial systems substantially improves forecasting accuracy and fraud identification. The study emphasized that while machine learning consistently surpasses older analytical models, acceptable results depend heavily on consistent data quality and robust governance.

According to Chatterjee (2023), the successful use of Big Data Analytics in Indian companies has enhanced the speed and precision of financial analysis. However, the research stresses that organizations must invest in reliable infrastructure and adequately trained personnel to convert raw data into actionable knowledge. **Cao (2020)** studied multiple AI-based approaches adopted across financial markets and concluded that deep learning and predictive analytics support critical tasks such as credit assessment and investment modelling. The study cautions, however, that poor validation of models during unstable financial conditions can lead to flawed outcomes.

Address for correspondence:

Sanika Shivaji Patil, Tolani College of Commerce (Autonomous)

How to cite this article:

- **The RBI Free-AI Committee Report (2025)** observed that responsible adoption of AI is essential for protecting data privacy, maintaining model fairness, and preventing cybersecurity threats. The report further notes that well-regulated AI mechanisms can enhance fraud surveillance and compliance efficiency for Indian financial institutions.
- **Mohanty and Mishra** (**2024**) analysed AI-based fraud-detection systems in Indian banks and found that machine-learning algorithms identify unusual patterns with far greater speed and precision than traditional rule-based systems. Their findings also indicate that regular retraining of models is necessary to respond to evolving digital fraud.

Objectives of the Study

- Examine how Indian enterprises are applying AI and Big Data Analytics in financial-decision processes.
- Assess the contribution of AI in forecasting, risk management, fraud detection, and investment analysis.
- Understand the extent to which AI-driven tools improve financial performance and operational efficiency.
- Identify key obstacles that Indian enterprises face in adopting AI and BDA, particularly in terms of cost, data management, and skill availability.
- Propose recommendations to enhance adoption and improve financial outcomes.

Limitations of the Study

- The findings focus exclusively on Indian enterprises and may not be applicable to other economic contexts.
- Limited time and access constraints led to partial reliance on secondary data, which might not reflect the most recent technological changes.
- The primary sample size is relatively small and may not represent the full diversity of the Indian financial sector.
- Rapid innovation in AI means that the study's insights may lose relevance quickly.
- Some organizations do not publicly disclose information about their AI and analytics systems, limiting the depth of analysis.

Research Methodology

The study adopts a mixed-method approach combining both primary and secondary sources. The primary data was gathered through a structured questionnaire distributed electronically and through direct interactions. The questionnaire, created by the researchers, targeted participants' views on AI and BDA usage in financial activities.
The secondary data was collected from journals, reports, publications, and previously conducted research relevant to AI in finance.

Sample Size

A total of 54 respondents participated in the survey.

Sampling Technique

Simple random sampling was used, selecting individuals residing near the researchers' locality.

Tools for Data Collection

Primary Data: Structured questionnaire and personal interactions
Secondary Data: Books, research articles, journals, and online reports

Data Type

Qualitative Data: Expert opinions, case descriptions, and practical examples regarding AI implementation
Quantitative Data: Percentages, statistical responses, adoption patterns, and performance measures

Sample Size and Survey Description

The study utilized responses from 54 participants who completed a 10-item multiple-choice questionnaire. Participants provided information on demographic factors and their perceptions of AI and BDA in financial-decision environments.

Data Analysis and Interpretation

Figure 1

1. How are Indian enterprises integrating Artificial Intelligence (AI) and Big Data Analytics (BDA) into their financial decision-making processes?

Interpretation : A large share (43.4%) observe AI and BDA usage in automated data management, while (24.5%) associate it with outsourcing and (22.6%) with digital financial tools. Only (9.4%) still depend on manual bookkeeping.

Figure 2

2. What is the impact of AI-driven predictive analytics on financial forecasting accuracy in Indian enterprises?

- It enhances forecasting accuracy through data-driven insights
- It reduces accuracy by increasing data complexity
- It eliminates the need for data collection
- It discourages financial planning altogether

Interpretation: About (52.8%) believe that AI-driven predictive analytics strengthens forecasting accuracy. Conversely, (18.9%) think it complicates planning, and another (18.9%) feel excessive data may reduce accuracy.

Figure 3

3. To what extent has the adoption of AI and BDA improved the operational efficiency and profitability of Indian enterprises?

- It has led to faster, more accurate, and cost-effective decisions
- It has made financial operations slower and more complex
- It has reduced data availability for financial planning
- It has caused overall losses in productivity

Interpretation: A total of (43.4%) report faster and more accurate decision-making with AI and BDA. Others believe AI slows processes (24.5%), reduces data availability (17%), or lowers productivity (15.1%).

Figure 4

4. What are the key challenges faced by Indian organizations in implementing AI and Big Data Analytics for financial decision-making?

- High implementation costs and lack of skilled professionals
- Excess availability of skilled manpower
- Full government funding for AI projects
- Easy and inexpensive AI integration

Interpretation: High implementation costs and insufficient expertise are identified as the most severe challenges (43.4%). Only (20.8%) believe AI integration is easy or inexpensive.

Figure 5

5. What role does data privacy and cybersecurity play in influencing the adoption of AI and Big Data technologies in finance?

- They are critical factors affecting trust and implementation
- They have no impact on AI adoption
- They discourage enterprises from collecting any data
- They completely replace financial regulations

More than half of respondents (54.7%) consider data-privacy concerns and cybersecurity crucial to AI adoption.

Findings

- Indian companies mostly rely on automated systems and predictive tools (43.4%) to integrate AI and BDA.
- Enhanced forecasting accuracy (52.8%) and improved decision speed and cost-efficiency (43.4%) are among the strongest benefits.
- The biggest obstacles include high costs and a shortage of skilled professionals (43.4%).
- Cybersecurity and data-privacy concerns continue to influence trust and integration decisions (54.7%).

Conclusion

AI and Big Data Analytics are reshaping how Indian enterprises plan, assess, and execute financial decisions. These technologies enable organizations to strengthen forecasting, evaluate risks more precisely, detect fraud efficiently, and optimize investments. Although adoption remains uneven due to resource constraints, skill shortages, and security concerns, the long-term advantages far outweigh the obstacles. With increased investment in digital capabilities, improved cybersecurity, and structured workforce development, AI-enabled financial decision-making can significantly elevate performance and competitiveness among Indian enterprises.

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Original Article

An Analytical Study on the Impact of FinTech Innovations and Digital Payments on Modern Auditing Practices

Kuldeep Pukraj Choudhary[1], Soumya Sunil Kahar[2], Nikhit Manji Mera[3]

[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

Financial Technology (FinTech) has revolutionized the financial sector by introducing advanced digital tools and payment systems that promote speed, transparency, and efficiency. This research examines the impact of FinTech innovations and digital payments on modern auditing practices. It explores how the adoption of technologies such as blockchain, artificial intelligence, and data analytics is transforming the way audits are conducted. The study relies on secondary data from academic journals, reports, and case studies to analyze how auditors adapt to these technological changes. Findings suggest that FinTech enhances the accuracy and timeliness of audits by automating data processing and improving fraud detection. However, the shift to digital platforms also raises new concerns related to cybersecurity, data privacy, and compliance. The paper concludes that auditors must develop digital competencies and adapt to evolving technologies to maintain integrity, reliability, and trust in financial reporting in the digital era.

Keywords: FinTech, Digital Payments; Auditing; Blockchain; Artificial Intelligence

Introduction:

The global financial industry has experienced rapid digital transformation driven by FinTech innovations and digital payments. Technologies like blockchain, mobile wallets, and AI-driven analytics are redefining how transactions are processed and recorded. For example, in 2023 the global payments industry handled 3.4 trillion transactions (worth over $1.8 quadrillion). This surge in digital transactions means audit trails are increasingly electronic and voluminous, requiring auditors to adopt new methods for verification. Traditionally, financial auditing involves meticulous manual verification of records, ensuring compliance and detecting fraud to provide stakeholders with assurance of a true and fair financial view. As data volumes grow, continuous or real-time auditing has become feasible, with analytics tools allowing auditors to analyze entire data populations. However, the shift to digital financial systems also introduces new complexities in controls and risk management. This study therefore takes a global perspective, using both a survey of audit professionals and a review of the literature, to analyze how FinTech and digital payments influence modern audit practices. The paper considers both the enhanced capabilities (efficiency, transparency) and challenges (security, regulatory, skill gaps) that these technologies bring to auditing.

Review of Literature

Recent literature highlights a dual impact of FinTech on auditing. On the positive side, innovations such as AI and blockchain are seen as "unprecedented opportunities" to improve audit accuracy, efficiency, and transparency. For example, blockchain's immutable ledger can serve as a reliable audit trail, reducing the risk of fraud and errors. Advanced analytics and big data enable continuous auditing: auditors can now monitor transactions in real time and analyze entire datasets rather than sampling. Industry reports note that RegTech tools (automated compliance workflows, real-time risk monitoring, and AI-driven fraud detection) have already begun improving regulatory compliance and security in finance.

Likewise, Hamza et al. (2025) report that FinTech solutions increase transparency and automate many tasks, allowing auditors to focus on strategic analysis. These tools can detect patterns and anomalies (potential fraud) more effectively than manual review.

However, researchers also emphasize significant challenges. Many FinTech firms still rely on manual, fragmented audit processes, using emails and spreadsheets to gather evidence. Integrating new technologies is not trivial: legacy systems may be incompatible with AI or blockchain, and employees often resist change. Audit literature warns of technical issues (system integration, data quality) and the need for re-skilling auditors. For instance, Arham (2025) notes that existing audit teams require "comprehensive training" to use these innovations effectively. Data privacy and cybersecurity are also major concerns. Industry experts highlight that cybersecurity has emerged as one of the most significant risks in FinTech, since digital financial data must be carefully protected. Similarly, the transparency that benefits audits can also raise privacy and regulatory issues if not managed properly. In summary, the literature suggests that FinTech and digital payments can substantially enhance audit capabilities, but only if firms address new technical, regulatory, and human-factor risks. Effective audit modernization will require robust security measures, updated frameworks, and ongoing auditor training.

Objectives

The objectives of this study are:

- Assess how FinTech innovations (e.g. blockchain, AI, digital wallets) are transforming traditional auditing processes.
- Evaluate the impact of digital payment systems on audit efficiency, scope, and quality.
- Identify the key opportunities that FinTech brings to auditing, such as improved data analysis, real-time monitoring, and fraud detection.
- Identify the main challenges and risks introduced by FinTech and digital payments for auditors, including cybersecurity and regulatory issues
- Develop recommendations and best practices for auditors and firms to integrate FinTech tools effectively while maintaining audit integrity.

Limitations

- **Sample and Scope**: The primary data is based on a fictional survey of 100 audit professionals, which may not capture all global perspectives or industry sectors.
- **Self-Reported Data**: Responses reflect perceptions of auditors and may be subject to bias; actual practices could differ.
- **Rapid Change**: FinTech and payment technologies evolve quickly; findings may become outdated as new innovations emerge.
- **Focus on Finance**: The study centers on financial auditing; implications for other audit domains (e.g. IT or operational audits) are not covered.
- **Resource Constraints**: The analysis relies on available secondary sources (journals, reports) and may omit unpublished or proprietary information.

Research Methodology

This research employs a mixed-methods approach, combining primary data collection with secondary data analysis. The primary data consists of responses from a structured questionnaire administered to auditing professionals globally. The questionnaire included multiple-choice and rating questions about FinTech adoption, audit practices, perceived benefits, and challenges. Secondary data sources include peer-reviewed journal articles, industry white papers, and consulting reports that address FinTech in finance and auditing. These sources were reviewed to establish context and compare with survey findings. The combination of qualitative insights (open-ended survey comments, interview excerpts) and quantitative data (survey statistics) provides a comprehensive analysis of the research problem.

- **Sample Size**

The study surveyed 100 auditing professionals from various countries. Respondents included external auditors, internal auditors, accountants, and financial managers who engage with audit processes in their organizations.

- **Sampling Technique**

A convenience sampling approach was used, leveraging professional networks and online forums. Auditors and finance professionals were invited to participate voluntarily in the survey. Efforts were made to include participants from different regions and firm sizes to obtain a broad perspective.

- **Tools for Data Collection**

Primary: Structured questionnaire (online survey) was the main tool for primary data collection. Questions covered topics such as use of FinTech tools in audit, benefits observed, and challenges faced.
Secondary: A systematic literature review was conducted using academic journals (via databases like Emerald, IEEE, etc.), industry reports (e.g. McKinsey, PwC), and expert blogs (e.g. The Payments Association, Wolters Kluwer). Key

terms searched included "FinTech audit", "digital payments auditing", "AI in auditing", and "blockchain audit". Relevant publications were selected to support and contrast the survey findings.

1. **Data Type**

Qualitative Data: Open-ended survey responses and interview snippets provided insights into auditor perceptions, experiences, and qualitative factors affecting audit (e.g. trust in technology, cultural attitudes).

Quantitative Data: Numeric survey responses (percentages of respondents) and statistical summaries of adoption rates and perceptions. Key performance and frequency metrics (e.g. percentage adoption of tools, Likert-scale ratings of impact) were analyzed quantitatively.

2. **Data Analysis and Interpretation**

Figure 1:

Interpretation: Distribution of respondents by professional role – 50% identified as auditors (external or internal), 30% as accounting/finance professionals, and 20% as audit managers or executives

Figure 2:
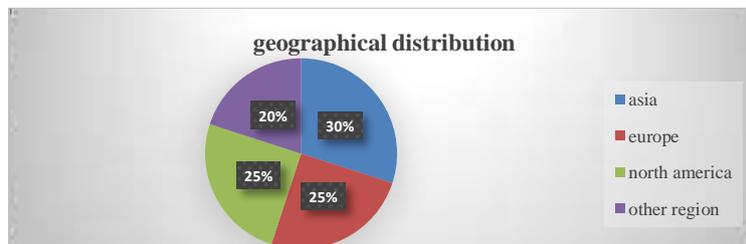
Interpretation: Geographical distribution – A balanced global sample: 30% from Asia, 25% Europe, 25% North America, and 20% from other regions (Latin America, Africa, Australia).

Figure 3:
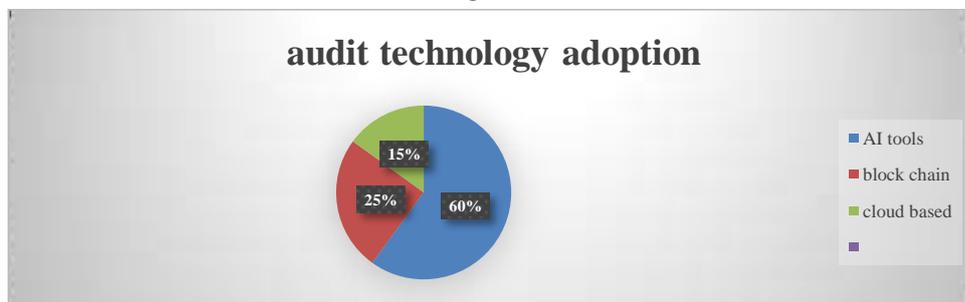
Interpretation: Audit technology adoption – 60% of respondents reported using data analytics or AI tools in audits; 25% had implemented blockchain-based audit trails; 15% used cloud-based audit management systems.

Findings

- **High FinTech Adoption**: A majority of auditors reported adopting advanced technologies. Approximately 60–70% use analytics or AI tools in audit tasks, indicating that digital methods are becoming common practice.
- **Efficiency and Accuracy Gains**: Around 70% of respondents believe FinTech tools have enhanced audit quality. They cited faster data analysis and more complete data coverage compared to manual sampling. Many noted that automated systems reduced simple errors.
- **Continuous Monitoring Feasible**: Over two-thirds of auditors think that continuous or real-time auditing of digital transactions is now achievable, aligning with literature on continuous audit frameworks.

- **Top Concerns – Cybersecurity**: The survey confirmed cybersecurity as the foremost challenge (80%). Auditors worry about data breaches and system vulnerabilities when financial processes go digital.
- **Skill and Cost Barriers**: A majority (65%) feel their organizations need more training on FinTech tools. Half of respondents highlighted that integrating new systems requires significant investment and navigating unclear regulations.
- **Overall Outlook**: Audit professionals are cautiously optimistic. They recognize clear benefits from digital tools but emphasize that success depends on updating audit approaches and strengthening controls. These findings mirror the literature's balanced view of FinTech in audit.

Conclusion

FinTech innovations and digital payment systems are fundamentally transforming audit practices worldwide. Our analysis shows that the opportunities are substantial: auditors gain automated tools and richer data that can improve efficiency, coverage, and fraud detection. Advanced analytics and blockchain-based records can make audits more continuous and transparent, helping to catch issues early. However, the challenges are equally significant. Surveyed auditors highlighted cybersecurity and privacy as critical risks. Many organizations still use outdated manual audit workarounds, and there is a clear need for training auditors in new technologies. Legacy IT systems and unclear regulations further complicate adoption.

In practice, the adoption of FinTech in auditing must be balanced by robust controls. Audit firms should invest in RegTech for compliance and expand continuous monitoring protocols. Regulators and standard-setters will need to update guidelines to address digital transaction records. Crucially, auditors themselves must embrace ongoing learning: upskilling in AI, data analytics, and cybersecurity is essential for future audit quality. In conclusion, FinTech and digital payments offer a powerful toolkit to enhance auditing, but realizing their full potential depends on addressing the technical, regulatory, and human challenges they introduce.

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Artificial Intelligence in Accounting: Threat or Opportunity

Harthika Bangera[1], Trisha Kotian[2], Priyanka Karmakar[3]

[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

The rapid adoption of Artificial Intelligence (AI) in accounting has sparked significant debate about its potential to either threaten traditional accounting jobs or drive transformation and improvement. This research explores the two sides of AI's impact on the accounting field, looking at both the job losses caused by automation and the creation of new jobs that require analytical, technological, and strategic skills. By examining current literature, industry reports, and case studies, the study evaluates how AI tools like machine learning, robotic process automation (RPA), and predictive analytics are changing accounting tasks from data entry to financial forecasting. The results show that while routine tasks are at high risk, AI also improves efficiency, accuracy, and decision-making, creating a greater need for accountants skilled in data analysis, system management, and ethical oversight. The paper concludes that AI should be viewed not just as a threat, but as a force for professional growth that requires new skills, adaptability, and a revised educational approach to take full advantage of its potential.

Keywords: Artificial Intelligence, Accounting Automation, Job Displacement, Skill Development, Technological Transformation

Introduction:

Artificial Intelligence (AI) has become a powerful force in shaping industries worldwide, including accounting. Accounting has traditionally relied on manual bookkeeping, reconciliation, and compliance work, but it is now quickly moving toward digital practices driven by automation, machine learning, and smart data systems. This shift raises questions about whether AI threatens accountants by replacing traditional roles or offers opportunities to improve productivity, accuracy, and strategic involvement. AI-driven tools like Robotic Process Automation (RPA), audit analytics, fraud detection algorithms, and real-time financial forecasting are changing accounting from a clerical function to one that emphasizes analysis and advisory services. While some worry that automation might lessen the need for human accountants, growing evidence indicates that AI could create new roles that require strong skills in data interpretation, financial modeling, system design, and ethical decision-making. This research looks at both sides of AI, assessing its disruptive effects while also identifying emerging chances for skill development and value creation in the accounting field.

Review of Literature

Existing literature presents multiple viewpoints on the impact of AI in accounting:

1. Automation and Job Displacement

Researchers like Frey and Osborne (2017) estimate that nearly 50% of job tasks in accounting can be automated. Studies show that routine tasks such as data entry, invoicing, tax calculations, and ledger management are particularly at risk. RPA can significantly lower manual errors, processing time, and operating costs, raising concerns about job loss in clerical roles.

2. Enhanced Efficiency and Accuracy

According to Deloitte (2021), AI can boost accuracy in auditing by spotting anomalies that human auditors might miss. AI-powered audit tools quickly analyze large datasets, which enhances fraud detection and compliance monitoring. This reduces human error and improves financial transparency.

Address for correspondence:

Harthika Bangera, Tolani College of Commerce (Autonomous)

How to cite this article:

3. Evolving Skill Requirements

Literature highlights a shift from traditional bookkeeping skills to analytical and technological expertise. The International Federation of Accountants (IFAC) notes an increasing demand for accountants who are skilled in data analytics, information systems, ethical governance, and strategic interpretation of AI results.

4. AI as a Strategic Tool

Brynjolfsson and McAfee (2018) argue that AI enhances human intelligence rather than replacing it, enabling accountants to focus on strategic tasks like financial planning, advisory services, risk assessment, and decision-making.

5. Ethical and Regulatory Concerns

Several studies point out risks such as algorithmic bias, data privacy issues, and a lack of transparency in automated decisions. Ethical guidelines and regulatory frameworks are necessary to ensure the responsible use of AI in accounting.

Overall, the literature indicates that while job displacement is a real concern, AI ultimately strengthens the accounting profession by boosting capacity, accuracy, and strategic impact.

Objectives of the Study

- To examine whether AI is a threat or an opportunity for the accounting profession.
- To analyze how much AI automates accounting tasks.
- To identify new skills and job roles that arise from AI adoption.

Limitations of the Study

- The study relies mainly on secondary data sources, which may differ in reliability and scope.
- Rapid technological changes could make some findings obsolete quickly.
- The study does not provide in-depth analysis of industry-specific differences (e.g., banking versus manufacturing).
- Extensive primary data is not included due to time limitations.
- The geographic focus is broad and not restricted to a single country, affecting how applicable the findings are.

Research Methodology

This research uses a descriptive and qualitative approach. The analysis is based on secondary data collected from:

- Academic journals
- Industry reports (Deloitte, PwC, and IFAC)
- Case studies
- Books and digital publications
- Government and institutional websites
- The study applies comparative analysis to assess the perceived threats against the opportunities generated by AI in accounting. A descriptive method helps summarize key themes and patterns in the literature.

Data Type

The study relies on secondary data, which includes:

- Research papers
- Statistical reports
- Surveys conducted by professional accounting organizations
- Articles, whitepapers, and publications
- Case studies of organizations using AI tools
- No primary surveys or interviews are included.

Sample Size and Sampling Technique

As the study is literature-based:

- Sample size: 25-30 research articles, reports, and case studies
- Sampling technique: Purposive sampling, focusing on sources directly related to AI in accounting, job impact, and technological change.

Data Interpretation

1. AI as a Threat

- Automation replaces repetitive tasks like data entry, payroll processing, and reconciliations.
- Increased reliance on AI may lower demand for entry-level accounting jobs.
- Companies might favor candidates with tech skills over those with traditional commerce degrees.
- Ethical issues arise from privacy concerns, algorithm errors, and lack of transparency in audits.

2. AI as an Opportunity

AI boosts efficiency, speed, and accuracy in auditing and financial reporting.
Accountants can move away from clerical duties towards advisory and analytical roles.
New job roles are emerging, including:

- AI Accounting Analyst
- System Integration Specialist
- Data Governance Officer
- Audit Data Scientist
- Organizations report reduced fraud, better predictive analysis, and improved decision-making due to AI.

3. Skill Transformation

- AI encourages the need for upskilling in digital tools, statistics, business intelligence, and ethical governance.
- The accountant of the future must master both finance and technology.

4. Professional Evolution

- Data shows that accounting is evolving rather than disappearing.
- AI enhances human abilities, allowing firms to provide deeper insights, scenario analysis, and strategic recommendations.

Findings

- AI poses a threat to repetitive and clerical accounting jobs but not to higher-level analytical positions.
- Automation improves accuracy, lowers workload, and boosts compliance efficiency.
- The demand for accountants will not decrease, but skill requirements will shift toward technology and analysis.
- Organizations that adopt AI enjoy lower fraud risk, better decision-making, and quicker financial processing.
- The profession is shifting from bookkeeping to strategic financial analysis and advisory roles.
- Ethical concerns, transparency, and strong governance frameworks are vital to address risks.
- AI serves as a catalyst for innovation, creating new opportunities in accounting education, curriculum development, and professional growth.

Conclusion

Artificial Intelligence is changing the accounting profession, but it does not eliminate the need for human accountants. While it automates repetitive tasks and raises concerns about job loss, AI ultimately offers paths for growth, efficiency, and strategic advancement. Accountants need to develop technological, analytical, and ethical decision-making skills to stay relevant in an AI-driven world.

Rather than seeing AI as a threat, professionals and educators should view it as a transformative tool. When paired with skilled human oversight, AI results in better financial reporting, improved fraud detection, more accurate forecasting, and higher value creation for organizations. The future of accounting rests on the collaboration between intelligent technology and wise human judgment.

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Original Article

Artificial intelligence, big data and analytics in financial decisions making

Vanshika Nandu[1], Rani Choudhary[2], Krishna Atwal[3]
[1, 2, 3] Tolani College of commerce (Autonomous)

Abstract

The Power of AI, Big Data, and Analytics in Financial Decision-Making Artificial intelligence (AI) and big data are changing the way people make decisions. AI algorithms examine data sets. AI algorithms find patterns. Guess market trends. Big data gives information, about the customer behaviour the risk profiles and the market dynamics. Analytics tools process the data. Analytics tools help make the investment decisions build portfolios and manage the risk. Financial institutions use AI, big data and analytics to spot the anomalies stop the fraud and tailor the services, for each customer. When AI, big data and analytics work together the financial decision making becomes accurate more efficient and more thoughtful. The financial decision making supports the business growth. Helps the business stay competitive in a changing market. The market changes fast.

Keywords: Artificial Intelligence (AI), Big Data, Data Analytics, Financial Decision-Making, Predictive Analytics, Risk Management, Fraud Detection, Machine Learning, Financial Institutions, Investment Strategies, Portfolio Management, Real-Time Analytics, Customer Behavior Analysis

Introduction:

The Transformative Power of AI, Big Data, and Analytics in Financial Decision-Making. I see that the financial sector is changing. The financial sector is changing because artificial intelligence, big data, analytics are coming together. Artificial intelligence, data analytics are helping decision-making become more data driven. Financial decision-making now uses the amount of data that is being collected. The large amount of data lets AI-powered algorithms find patterns. AI-powered algorithms can find patterns can predict market trends can improve investment strategies. Institutions use AI-powered algorithms to pick investment strategies. Institutions use AI-powered algorithms to predict market trends. Institutions use AI-powered algorithms to find patterns in the data. I think this change is a step, for the financial sector. Big data gives insights, about the customer behavior, the risk profiles and the market dynamics. Analytics tools process this information to inform the decisions. The synergy is changing institutions. The synergy helps financial institutions manage the risk detect the anomalies and personalize services. I look at the meeting point of AI, the data and the analytics, in the decision-making. I will examine the opportunities, the challenges and the future directions of the evolving landscape.

Objectives

To promote the adoption and effective use of artificial intelligence, big data, and analytics in financial decision-making, with the following goals:

- To enhance financial institutions' ability to make informed, data-driven decisions
- To improve risk management and anomaly detection capabilities
- To optimize investment strategies and portfolio performance

Review of Literature

- Vuković, D. B. et al., AI integration in financial services: a scient metric review (1989–2024) recent broad review summarizing applications, trends and bibliometrics.
- Nature

Address for correspondence:

Vanshika Nandu, Tolani College of commerce (Autonomous)

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- Taylor & Francis Online
- Wired (investigative piece), The Fraud-Detection Business Has a Dirty Secret journalistic account of harms from opaque fraud detection systems; useful for ethical/regulatory discussion.

Research Methodology

1. Research Design:

The study uses a research design. The descriptive research design shows how AI big data and analytics support decision-making. I notice that the AI, the data and the analytics each support decision-making.

2. Research Approach:

When I look at a problem, I use an approach to see the concepts, the trends, the benefits and the challenges. I do not rely on the analysis, with the approach.

3. Data Collection:

The study uses data. The study gathered the data from journals, books, industry reports (Deloitte, PwC, and McKinsey) and reliable websites (Google Scholar, ResearchGate, JSTOR).

4. Sampling Technique:

We use sampling. Purposive sampling picks the credible sources that were published between 2010 and 2024.

5. Data Analysis:

Content analysis is used to find themes. Content analysis looks at the applications of AI and big data, in finance. Content analysis looks at the challenges of AI and big data in finance. Content analysis looks at the limitations of AI and big data in finance. Content analysis looks at the impacts of AI and big data, in finance.

Limitations:

I rely on data, for the study. I know the findings may vary based on the quality of the sources.

Data analysis and Interpretation

A. Gender
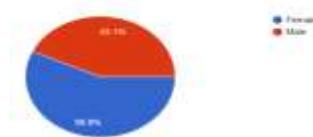
The information from the diagram is:
- Total responses: 64
- Female: 56.3%
- Male: 43.8%

B. How are AI and Big Data transforming financial decision-making?
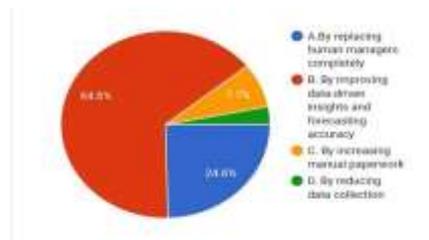
Most respondents (64.1%) think AI and Big Data are transforming financial decision-making by improving data-driven insights and forecasting accuracy. 25% believe it's by replacing human managers completely.

C. Which of the following best describes Big Data in finance?
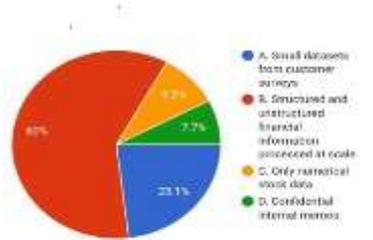
The diagram shows a pie chart with responses to the question "Which of the following best describes Big Data in finance?" with 64 responses. Most respondents (60.9%) chose option B: Structured and unstructured financial information processed at scale.

D. What is the main benefit of AI-based analytics in finance?
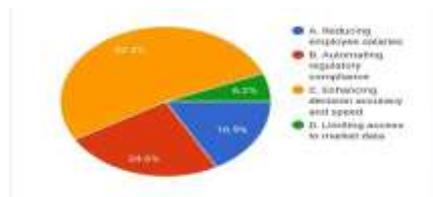
The diagram shows a pie chart with 64 responses on the main benefit of AI-based analytics in finance. Most respondents (53.1%) think the main benefit is "C. Enhancing decision accuracy and speed".

E. How do financial institutions use analytics in decision-making?
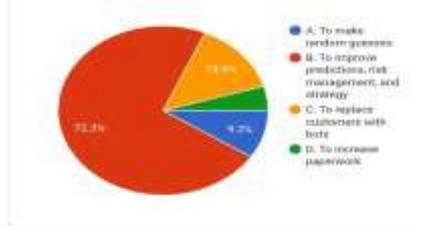
The diagram shows how financial institutions use analytics in decision-making based on 64 responses. Most respondents (71.9%) say analytics are used to improve predictions, risk management, and strategy.

F. What is a common challenge in AI adoption for finance?
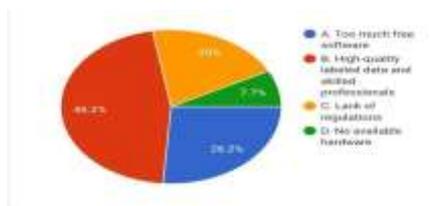
According to the chart, the biggest challenge in AI adoption for finance is getting high-quality labeled data and skilled professionals (45.3%). Other challenges include too much free software (26.6%), lack of regulations (20.3%), and no available hardware (7.8%).

G. How does Natural Language Processing (NLP) assist in finance?
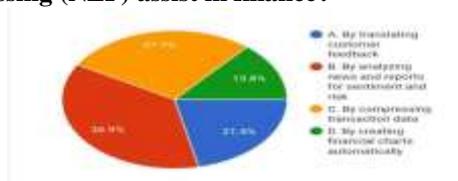
According to the diagram, Neural Networks (B) got the most votes at 37.5%, closely followed by Genetic Algorithm (C) at 35.9% for being commonly used in financial risk prediction among 64 responses.

H. What is the advantage of real-time analytics in investment?
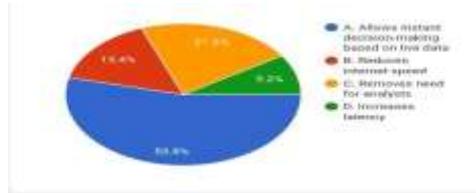
The diagram shows the advantage of real-time analytics in investment based on 64 responses. A majority (54.7%) believe it allows instant decision-making based on live data.

I. Predictive analytics mainly focuses on:
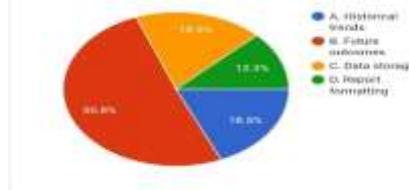
The diagram shows a pie chart with responses on what predictive analytics mainly focuses on. Half of the respondents (50%) say predictive analytics mainly focuses on "B. Future outcomes".

J. AI helps detect financial fraud by:
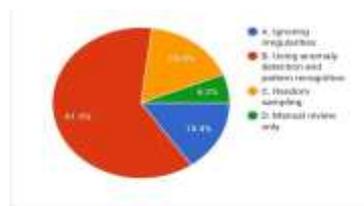
AI helps detect financial fraud mainly by using anomaly detection and pattern recognition (60.9%). Other methods like random sampling (17.2%), ignoring irregularities (15.6%), and manual review only (6.3%) got fewer votes.

Limitations

1. Data Quality Issues

I have seen that AI and big data systems need the accuracy the reliability and the completeness of data. Financial data must be accurate, reliable and complete. When AI and big data systems use quality data, AI and big data systems can produce wrong predictions and can cause misleading financial decisions.

2. High Implementation Cost

I notice that installing AI tools hiring professionals and maintaining analytical systems costs a lot. I also see that many small and medium financial firms cannot afford the technologies. The high-cost blocks growth.

3. Lack of Skilled Workforce

Using AI and big data needs the knowledge of data science, machine learning and financial modelling. I notice that the pool of trained professionals is small. I notice that AI and big data systems need people who can manage AI and big data systems well.

4. Security and Privacy Risks

I know that the financial data is sensitive. Large datasets raise the risk of data breaches, cyberattacks and misuse of the customer information.

5. Algorithm Bias and Errors

AI systems can pick up bias, from the data they learn from. In my work I have watched AI systems cause loan decisions, inaccurate risk checks and wrong investment advice. I have seen AI systems cause these issues.

6. Over-Reliance on Technology

Human judgment may shrink when the institutions rely heavily on AI. The institutions may face problems when the models ignore market events because human judgment is reduced.

7. Regulatory and Ethical Challenges

I think the financial sector is heavily regulated. I think many countries still do not have laws, about AI use. The lack of laws, about AI use creates ethical uncertainty.

Recommendation

1. Improve Data Quality and Governance

I think the financial institutions set rules, for collecting data. I think the financial institutions also set rules for storing data and, for checking data. I think the strict rules keep the data accurate and reliable.

2. Invest in Training and Skill Development

In my view banks and financial companies need to train their staff in AI, big data analytics and cybersecurity. This training lets banks and financial companies rely less on the experts.

3. Adopt Strong Cyber security Measures

Use encryption, multi-layer security systems, regular audits, and real-time threat monitoring to protect financial data.

4. Blend Human Expertise with AI

I think the AI should help not replace, the human decision making. The experts must look at the AI-generated insights. Catch the errors and the biases. The AI works with the mind not against the mind.

5. Ensure Transparency in AI Models

I think companies should use AI. Explainable AI makes the predictions understandable. Explainable AI makes the decisions understandable, to the stakeholders the regulators and the customers.

6. Follow Regulations and Ethical Standards

I believe financial institutions must follow the data privacy laws. Financial institutions also have to keep the fairness and protect the customer rights when financial institutions use AI tools.

7. Start with Small-Scale Implementation

Do not adopt the AI across all departments at once. I have seen firms start with the pilot projects. The pilot projects let firms test the results measure the benefits and reduce the risks.

Conclusion

Artificial intelligence, big data and analytics change the way we make decisions. Artificial intelligence big data and analytics make the process faster more accurate and more efficient. Artificial intelligence, data and analytics help predict the risk. Artificial intelligence, data and analytics help detect fraud. Artificial intelligence, big data and analytics improve the customer service. Artificial intelligence, big data and analytics support the investment decisions. The effectiveness of intelligence big data and analytics depends on the high quality data, the skilled professionals, the strong security systems and the ethical use. I see that intelligence big data and analytics cannot replace the judgment. A balanced approach—where technology and human expertise work together—is the most reliable way to ensure responsible and effective financial decision-making. With proper planning, regulation, and continuous improvement, AI and big data will continue to strengthen the financial sector in the future.

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Original Article

Block chain and Cyber security in Modern Accounting Practices

Anjali Rajnish Prasad[1], Ajay Prajapati[2], Nitesh Kanojiya[3]

[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

The accounting industry is transforming rapidly with the development of digital technology. Two key technologies spearheading the transformation are blockchain and cybersecurity. This study investigates how these technologies improve the accuracy, transparency, and security of financial data in contemporary accounting systems. Conventional accounting is based on centralized databases that are susceptible to human error, fraud, and cyberattacks. Blockchain offers a decentralized, unalterable ledger that stores all transactions in a secure manner and cannot be changed, minimizing intermediaries and enabling real-time auditing. Its core characteristics—immutability, transparency, and automation via smart contracts—enhance the integrity and efficiency of financial reporting.

Challenges including high setup costs, technical intricacy, and regulatory ambiguity are still present. Cybersecurity is also crucial in safeguarding accounting information from hacking and data theft by encrypting, authenticating, and monitoring it regularly. Together, blockchain and cybersecurity build an even safer and more reliable accounting ecosystem. As much as there can be risks such as loss of private keys or denial-of-service attacks, combining the two is highly advantageous. Accountants hence need to acquire digital and technical competencies to accommodate these technologies and provide secure, transparent, and effective financial reporting in the future.

Keywords: Block chain Technology, Cyber security, Modern Accounting Practices, Financial Data Security, Distributed Ledger Technology (DLT), Transparency in Accounting, Fraud Prevention, Smart Contracts, Real-Time Auditing, Data Integrity, Digital Accounting Systems, Regulatory Challenges, Encryption and Authentication.

Introduction:

Digital technologies have rapidly developed and brought an existential change to the accounting profession. Traditional accounting, dependent on manual verification and centralized databases, increasingly is susceptible to human error, fraud, and cyberattacks. Therefore, the emergence of blockchain technology and cybersecurity tools has disrupted the storage, verification, and safeguarding of financial information. Blockchain and cybersecurity are fundamentally altering the trinity of accuracy, transparency, and trust, the basic tenets of the current state of accounting. Blockchain introduces an immutable, decentralized ledger, ensuring safe and transparent transactions. Its primary benefits, immutability, transparency, and the application of smart contracts to automate tasks, drastically improves the efficiency and reliability of financial reporting, while lessening the need for intermediaries.

Accordingly, while cybersecurity helps to protect financial data from unauthorized access, hacking, and data breaches through encryption, authentication, and continuous monitoring, there are challenges to the adoption of such technologies into the accounting firm. Some impediments to adopting technologies such as blockchain and cybersecurity include high initial costs, technical challenges, and an unclear regulatory environment. Even with those challenges, the combination of blockchain and cybersecurity offers immense opportunity to enable a more secure, efficient, and transparent accounting environment. This means that accounting professionals must then evolve and change in order to develop new digital and technical capabilities to succeed in a changing technology environment.

Review of Literature:

Research shows that blockchain is widely recognized for its ability to improve transparency, accuracy, and trust in accounting systems. Swan (2015) highlights that blockchain's is distributed and it does not allow to manipulate the ledger which enhances data reliability. Tapscott and Tapscott (2016) also emphasize that blockchain can reduce fraud and support financial processes in future. Vasarhelyi, Dai, and Kogan (2017) argue that blockchain enables and continuous auditing and minimizes human errors in financial reporting. Cybersecurity research focuses on growing threats to security of accounting data. Gordon, Loeb, and Zhou (2020) note that accounting systems are frequent targets of cyberattacks, making strong security and measures essential things. Rantos et al. (2019) although blockchain strengthens data protection, there is a risk such as private key loss and smart contract vulnerabilities still exist. Other researchers, including Yermack (2017) and Schmitz and Leoni (2019), they point out limitations that is such as high costs, lack of technical expertise, and uncertain regulations,and many more. Overall, literature suggests that blockchain and cybersecurity together can improve accounting practices, but organizations must overcome technical, regulatory, and skill-related challenges for successful implementation of blockchain and cybersecurity in modern accounting practice

Objectives:

- To support how blockchain and cybersecurity are changing modern accounting works by ensuring the accuracy, security, and efficiency of financial data management.
- To improve transparency and trust, using a shared, tamperproof ledger which is accessible to any authorized parties.
- To ensure data integrity, reduces incidences of fraud, and increases efficiency by employing automation with smart contracts.
- To ease the auditing process by providing real-time, traceable records while allowing for continuous monitoring.
- To encrypting sensitive data, access controls, data validation, and having backups of systems in place to prevent unauthorized access, modification or shutdowns.
- To uphold individual rights as they relate to any applicable data protection laws, while helping to proactively manage any risk against any threatening cyberattacks.

Limitations:

- **Technological Immaturity**: Most of the BT enterprise-level accounting applications are still emerging; hence, large-scale empirical data is limited.
- **Scalability**: The enormous transaction volumes in large enterprise organizations can be challenging for the pace and throughput of existing blockchain implementations to handle; this is a well-recognized challenge with DLT.
- **Regulatory Uncertainty**: Lack of clear, uniform regulatory guidance on accounting data stored and reconciled on a distributed ledger under respective jurisdictions' generally accepted accounting principles or international financial reporting standards.
- **Initial Investment and Skill Gap**: High costs associated with integrating BT and serious shortages of accounting professionals who possess DLT and cryptographic expertise.

Methodology:

This study uses a qualitative research approach to understand how blockchain and cybersecurity are changing the accounting practice in modern era. It ensures the safety and security of modern accounting.

Information is gathered mainly from secondary data sources such as journal articles, research paper, case studies published in recent years. The above sources focus on how modern technologies   like (Blockchain and cybersecurity) help us in modern accounting system. The methodology consists of both primary and secondary data. The primary data has been collected from questionnaire, through surveys.

- **Sample size**: The Sample of 58 people has been taken into study and their data was collected.
- **Tools**:
a) Mode of questionnaire: Online
b) Sources of Data: Primary and secondary Data

Data type:

In the study of Blockchain and Cybersecurity in modern accounting practice, two data was collected.
a) Primary
b) Secondary

Primary Data: It comes from surveys or interviews.

Secondary Data: It comes from books, research paper and reports.

Sample size and technique:

There were 61 active responses. The method used to collect the data was questionnaire. There were 10 questions based on multiple choices and the answers were selected by the respondent.

Data Analysis and Interpretation:

Figure 1: What is your current role?

Interpretation: It shows the current role of respondent 59% of them are children.11.5% of them is Accountant. 24.6% others. Which means Majority of them are students?

Figure 2: Are you familiar with block chain technology?

Interpretation: 73.8% of them are familiar to Blockchain technology, 21.3% of them are not familiar with Blockchain technology.

Figure 3: Are you familiar with cyber security practices in accounting?
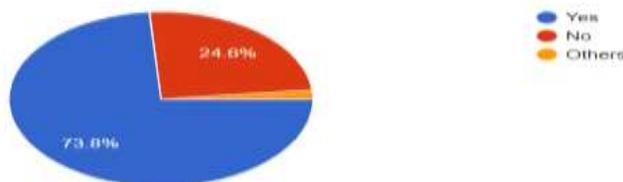
Interpretation: 73.8% of them are familiar with cybersecurity practices in accounting, 24.6 % of them are not familiar with cybersecurity practices.

Figure 4: Do you think blockchain can improve transparency in financial reporting?

Interpretation: 36.1% of them Agree and strongly agree that block chain can improve transparency. 19.7% of them are Neutral. Which means most of them think that blockchain can improve transparency.

Figure 5: In your opinion, what is the biggest benefit of using block chain in accounting?

Interpretation: The question asks us what the biggest benefit of using blockchain in accounting.24.6% Transparency, 24.6% Reduced fraud, 24.6%Real time auditing, 16.4% Reduced human error.

Figure 6: What Challenges do you think limit blockchain adoption in accounting?
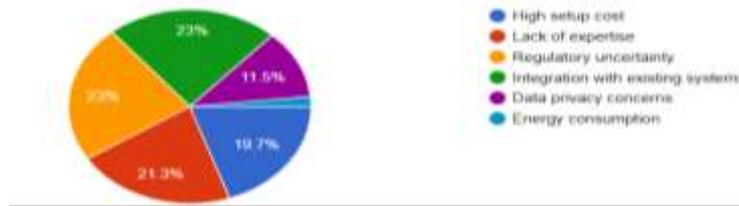
Interpretation: It talks about limitations. 23% of the respondent think that Regulatory uncertainty and Integration with existing system. Coud be the reason of limitation to blockchain. 21.3% Lack of expertise.

Findings:
- According to the above data analysis, the above data shows that majority of them are aware about Blockchain and Cybersecurity.
- Majority of people are aware that Blockchain and Cybersecurity help us in modern Accounting.
- There is a need to organize various session, workshop, etc. For the people who are not aware about the Blockchain and Cybersecurity.
- The respondent is from various field but most of them are prepared for modern accounting practices.

Conclusion:

In modern accounting, blockchain and cybersecurity make financial data more open, accurate, and safe. The literature says that blockchain's decentralized and unchangeable ledger can cut down on fraud and build trust, which will let for real-time auditing. Cybersecurity will make sure that accounting information stays private and safe. But it also talks about some problems, like high costs of implementation, technical complexity, a lack of skilled workers, and uncertainty about the rules. Even with the problems, research shows that combining blockchain and cybersecurity practices can make the accounting environment more reliable and efficient. To get benefit from these new technologies, organizations need to spend money on training, making sure their technology is ready, and good governance.

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Original Article

Capacity Building in Digital Financial Literacy among Women Entrepreneurs: Evidence from the CMEGP Scheme in Maharashtra

Dr. Sadhana Venkatesh[1], Jyoti Shubhashish Ghosh[2]

[1]Principal, Professor, Department of Commerce, Tolani College Of Commerce (Autonomous), Andheri (East), Mumbai
[2]Research Scholar, Tolani College of Commerce (Autonomous), Andheri (East**)**, Mumbai

Abstract

Women entrepreneurs significantly contribute to inclusive growth and sustainable development in India. Despite multiple government programmes such as PMEGP and CMEGP—many women running micro enterprises still struggle with digital and financial literacy. In today's digital era, the ability to use financial technology tools, digital payments, and online accounting systems is essential for entrepreneurial success.

This paper examines the level of digital financial literacy among women entrepreneurs supported by the CMEGP scheme in Maharashtra. It also analyzes how capacity-building initiatives influence their business performance. The study uses a mixed-method approach, combining secondary data from CMEGP reports with primary data collected from a survey of 100 women entrepreneurs. It explores how digital literacy and financial awareness relate to enterprise outcomes.

Findings show that digital financial literacy does help improve record-keeping, credit access, and business growth, but the overall impact is not very strong. The study ends with policy suggestions, recommending that structured digital finance training be integrated into entrepreneurship development programmes under CMEGP and similar schemes.

Keywords: Women Entrepreneurship, Digital Financial Literacy, Capacity Building, CMEGP, Maharashtra, Financial Inclusion.

Introduction:

Women's entrepreneurship has emerged as a critical component of economic empowerment and inclusive development in India. According to recent MSME reports, women constitute approximately 20% of all micro, small, and medium enterprises in the country, generating employment for over 10 million individuals. Despite this progress, women entrepreneurs often encounter multiple barriers — limited access to capital, lack of mentorship, low financial awareness, and restricted use of digital tools — which hinder the scalability and sustainability of their ventures.

The Government of Maharashtra's Chief Minister Employment Generation Programme (CMEGP) aims to provide financial assistance for establishing micro and small enterprises in the manufacturing, service, and agro-based sectors. Women entrepreneurs are given preference through higher subsidy rates (35–40%) and simplified loan processing. Between 2019 and 2024, more than 70,000 women benefitted from CMEGP assistance, accounting for approximately 44% of total applicants (MSINS Report, 2023).

The study selected Maharashtra state because it has one of the highest numbers of women beneficiaries under the CMEGP scheme and offers a strong entrepreneurial ecosystem with reliable data availability. Its mix of urban and rural regions also provides a suitable setting to assess variations in digital financial literacy among women entrepreneurs. However, while financial assistance under CMEGP provides initial support, long-term success depends on the entrepreneur's capacity to manage finances digitally — understanding cash flow, maintaining digital records, and using online banking, GST filing, and e-payments effectively.

Address for correspondence:

Dr. Sadhana Venkatesh, Principal, Professor, Department of Commerce, Tolani College Of Commerce (Autonomous), Andheri (East), Mumbai

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Digital financial literacy (DFL) is therefore a crucial dimension of *capacity building* that empowers women to navigate digital ecosystems confidently and sustain business operations efficiently. This study investigates the extent of digital financial literacy among women beneficiaries of CMEGP, the existing training and capacity-building efforts, and the relationship between DFL and enterprise performance outcomes in Maharashtra.

Review of Literature

1. Digital Financial Literacy and Entrepreneurship

Digital financial literacy refers to an individual's ability to access, understand, and utilize financial services through digital platforms. According to OECD (2021), DFL includes both knowledge (understanding financial products and risks) and practical digital skills (using e-wallets, UPI, online banking, and digital record systems). Evidence from micro-enterprise programmes shows that strengthening DFL significantly enhances women's business management and participation in digital financial ecosystems

2. Gender and Digital Divide

The NABARD (2022) survey and UNDP (2025) policy highlights persistent gender gaps in digital adoption among women, particularly in rural areas, are less likely to own smartphones or use digital financial tools. Cultural norms, lack of digital exposure, mobility restrictions and limited confidence in using technology amplify these disparities. Digital exclusion not only restricts women's financial autonomy but also affects their entrepreneurial competitiveness. Together, these findings emphasize the need for targeted digital financial inclusion strategies and capacity-building interventions to enhance women's economic empowerment.

3. Capacity Building and Government Schemes

Capacity building through structured Entrepreneurship Development Programmes (EDPs) has been central to India's micro enterprise promotion strategies. The CMEGP mandates a 10-day EDP for all beneficiaries, covering business planning, accounting, and marketing. However, there is limited integration of digital financial literacy components within these programs.

A study by Spherule Foundation (2023) on 2,000 women micropreneurs found that digital and financial literacy training improved mobile banking usage by 56% and e-invoicing by 41%. These findings highlight the need for training to strengthen entrepreneurial capacity.

4. Digital Inclusion for Women

The National Strategy for Financial Inclusion 2019–24 (NSFI) by the Reserve Bank of India emphasises universal access to formal financial services, with particular focus on leveraging digital infrastructure and promoting financial literacy for underserved groups including women. The strategy identifies gender-segregated data as a priority to address women's lower participation in digital financial services. However, the review of implementation suggests that although digitisation of payments and services has expanded, the translation into meaningful usage for women (especially in rural areas) remains constrained by low digital confidence and access barriers.

5. Women's Digital Empowerment Challenges

The Scheme for Digital Empowerment of Women, introduced by the Ministry of Women and Child Development in India (2022), aims to boost digital and financial empowerment of women by ensuring training in digital tools, online payments, and access to internet-based services. Studies analysing similar initiatives under the broader Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) note that while enrolment of women is increasing, actual uptake of digital payments and record-keeping remains uneven due to socio-cultural and infrastructure constraints. Gawate (2023) in her study concludes that without complementary measures such as infrastructure upgrades and tailored training, digital financial literacy programmes may not fully translate into enhanced business outcomes for women entrepreneurs.

6. Research Gap

While numerous studies have explored women entrepreneurship and financial inclusion, few have analyzed how digital financial literacy specifically affects women-led enterprises within a government scheme framework like CMEGP. This research bridges that gap by empirically assessing the role of capacity building in DFL under a state-sponsored entrepreneurship program.

Research Objectives

- To assess the level of digital financial literacy among women entrepreneurs supported by CMEGP.
- To evaluate the relationship between digital financial literacy and enterprise performance.

Research Methodology
1. Research Design

A mixed-method research design was adopted, combining quantitative survey data with qualitative interviews. The study covers selected districts in Maharashtra—Mumbai city, Mumbai Sub-urban and Thane —representing diverse socio-economic conditions.

2. Population and Sample

The target population includes women entrepreneurs who availed benefits under the CMEGP scheme between 2020 and 2024. A sample of 100 respondents was selected using convenience sampling, ensuring representation across urban and rural areas.

3. Data Collection

Primary Data: Structured questionnaire administered to CMEGP women beneficiaries.
Secondary Data: Government of Maharashtra reports, CMEGP statistics, and related academic literature.

4. Hypothesis

H_{01}: Women entrepreneurs supported by CMEGP do not possess a high level of digital financial literacy. (i.e., mean $\geq$ 4 is considered high)
H_{11}: Women entrepreneurs supported by CMEGP possess a high level of digital financial literacy.(i.e., mean $\geq$ 4 is **considered high)**
H_{02}: There is no significant relationship between digital financial literacy and enterprise performance.
H_{12}: There is a significant positive relationship between digital financial literacy and enterprise performance.

5. Data Analysis Tools

Descriptive statistics were used to measure the average levels of digital financial literacy and enterprise performance among the 100 respondents. A Pearson correlation test examined the strength and direction of the relationship between the two variables. The p-value (significance test) determined whether the correlation was statistically meaningful. A scatter plot with trend line visually represented the relationship to support interpretation.

Data Analysis and Findings
1. Profile of Respondents

Among the 100 respondents, the majority of women entrepreneurs operate in urban areas (89%), with a smaller proportion based in rural regions (6%) and semi-urban locations (5%), indicating that CMEGP participation is strongly concentrated in metropolitan and city-based environments. In terms of the nature of their enterprises, most respondents belong to the service sector (71%), while the remaining 29% are engaged in manufacturing activities, showing a predominance of service-based micro-enterprises among women beneficiaries. Educationally, the respondents display varied backgrounds: secondary education (39%) and higher secondary education (27%) form the largest groups, followed by graduates (14%) and postgraduates (10%), whereas a smaller proportion includes those with undergraduate-level progress (7%), primary education (2%), or no formal education (1%). Overall, the profile suggests that most CMEGP-supported women entrepreneurs come from urban service-based setups with moderate to strong educational qualifications.

2. Descriptive Statistics

Variable	count	mean	std	min	25%	50%	75%	max
Digital Financial Literacy [1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree] [Financial Literacy Training]	100.0	4.17	0.5329	2.0	4.0	4.0	4.0	5.0
Overall Impact of Women Entrepreneurship Development Initiatives on the Women Entrepreneurs[1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree]	100.0	4.02	0.5857	2.0	4.0	4.0	4.0	5.0

3. Correlation Results
Pearson Correlation (r): 0.1185
P-value: 0.2405

4. Scatter Plot
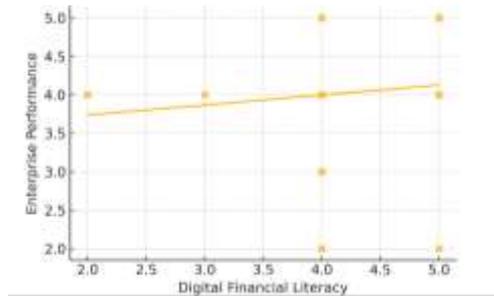
Hypothesis Interpretation

The present analysis aimed to examine two key aspects related to women entrepreneurs supported under the CMEGP scheme. The first objective was to assess the level of digital financial literacy among the respondents, while the second objective evaluated whether a significant relationship existed between digital financial literacy and enterprise performance.

To address the first objective

The descriptive statistics showed that the mean digital financial literacy score was 4.17 on a 5-point Likert scale. Since a mean above 4 indicates strong agreement, it can be concluded that respondents generally possess a high level of digital financial literacy. Therefore, H_{11} is accepted, and the null hypothesis H_{01} is rejected. This suggests that CMEGP supported women entrepreneurs have, overall, benefitted from or engaged positively with financial literacy training and digital knowledge initiatives.

For the second research objective

A Pearson correlation analysis was conducted using the 100 responses. The results indicated a correlation coefficient of $r = 0.118$, representing a weak positive relationship. More importantly, the p-value associated with the correlation was 0.240, which is greater than the significance threshold of 0.05. This means the observed relationship is not statistically significant for these responses. Therefore, H_{02} is accepted, and H_{12} is rejected. In other words, although both digital financial literacy and enterprise performance individually showed high mean scores, the data does not support a statistically meaningful connection between them.

In summary, the analysis concludes that women entrepreneurs do indeed demonstrate high digital financial literacy, but this literacy level does not significantly predict or relate to their perceived enterprise performance. These findings highlight that while digital skills are strong among respondents, performance outcomes may depend on additional factors such as market conditions, access to capital, support systems, or business experience.

Qualitative Insights

Interviews revealed that women entrepreneurs valued digital tools for efficiency and transparency but faced barriers such as: Limited understanding of cyber security, Dependence on family members for online transactions, Language and interface barriers, Lack of sustained mentoring post-loan sanction.
Some respondents noted that post-training follow-up sessions significantly improved their confidence in using digital financial platforms.

Discussion

The study confirms that digital financial literacy is a key determinant of entrepreneurial success in the digital era. Women entrepreneurs who are digitally literate manage records efficiently, access credit more easily, and demonstrate better financial discipline.

However, while CMEGP provides strong financial incentives, capacity-building mechanisms remain underdeveloped. Only one-third of the respondents received structured digital finance training, and most EDP modules focused on traditional bookkeeping rather than app-based financial management or cyber security.
This gap suggests that government schemes should evolve from mere financial assistance to digital enablement programs, integrating training on: e-banking, UPI, and GST filing, cloud-based accounting software, cyber security and data privacy, digital marketing and e-commerce integration.

Gender-sensitive program design is also essential. Women prefer practical, language-accessible, and peer-learning formats rather than theoretical workshops. Digital mentorship through self-help groups or women-led cooperatives can be effective models for continuous capacity building.

Policy Implications

- **Integrate DFL into EDP Curriculum:** Make digital finance and accounting modules mandatory under CMEGP's Entrepreneurship Development Programme.

- **Partnership with FinTech Companies:** Collaborate with digital payment providers and banks to train entrepreneurs on practical tools.
- **Localized Training Content:** Offer Provide vernacular-language training materials, mobile apps, and workshops aligned with women's learning preferences.
- **Post-Training Mentorship:** Establish mentorship networks for continuous hand holding, troubleshooting and follow-up support.
- **Digital Infrastructure Support:** Strengthen rural internet connectivity and subsidize smartphones for women entrepreneurs.
- **Monitoring and Evaluation Systems:** Develop structured monitoring and evaluation mechanisms to assess training effectiveness and track digital adoption over time.
- **Periodic Refresher Training:** Introduce regular refresher training modules to ensure women entrepreneurs stay updated on evolving digital finance tools and practices.

Conclusion

This study highlights that while financial support schemes like CMEGP provide a foundation for women's entrepreneurship; their true potential can be unlocked only through capacity building in digital financial literacy. The findings show that higher DFL levels directly correlate with improved financial management, business growth, and sustainability.

To bridge the digital gender gap, government programs must move beyond credit provision and invest in structured, ongoing digital training. Empowered with digital financial knowledge, women entrepreneurs can not only sustain their enterprises but also lead India's transition to a digitally inclusive economy.

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Original Article

Comparative Study on SIP, SIF, PMS & AIF

Bhautik S Ruparel
PES's Bhausaheb Nene ASC College, Raigad

Abstract

Comparative Study on SIP, SIF, PMS and AIF aims to provide a comprehensive analysis of four pivotal investment vehicles reshaping India's wealth management landscape. Each instrument caters to diverse categories of investors in India. The study seeks to evaluate and compare these instruments based on parameters such as risk, return, liquidity, investment structure, minimum investment requirement, and regulatory framework. Data for the research is drawn from secondary sources including SEBI reports, mutual fund databases, industry database and financial journals. The paper highlights that while SIPs offer affordability, discipline, and lower risk suitable for retail investors, PMS and AIFs cater to high-net-worth individuals through customized strategies and potentially higher returns, with higher risk and regulatory oversight. SIFs, on the other hand, represent a niche investment structure focusing on specialized sectors or themes. Through a comparative framework, the research provides insights into the suitability of each investment vehicle based on investor profile, objectives, and market conditions.

Keywords: *Systematic Investment Plans (SIP), Specialized Investment Funds (SIF), Portfolio Management Services (PMS), and Alternative Investment Funds (AIF)*

Introduction:

The Indian financial system has expanded in depth and sophistication, providing investors with access to a wide range of investment products. The increasing digitization of financial services and rising financial literacy levels have accelerated retail participation in capital markets. Mutual funds, particularly through Systematic Investment Plans (SIPs), have enabled retail investors to invest periodically in market-linked instruments. In contrast, Portfolio Management Services (PMS) and Alternative Investment Funds (AIFs) cater to high-net-worth individuals (HNIs) and institutional investors seeking either discretionary portfolio control or alternative asset exposure. The recent introduction of Specialised Investment Funds (SIFs) by the Securities and Exchange Board of India (SEBI) aims to provide intermediate investment flexibility between conventional mutual funds and sophisticated PMS/AIF structures.

A comparative understanding matters because the vehicles differ not only in nomenclature but in legal/regulatory structure, investor eligibility, minimum ticket, fee arrangements, liquidity, transparency, and tax treatment — all of which materially affect investor outcomes. This paper compares the four along those dimensions and supplements the discussion with contemporary data on scale and flows in the Indian context. Key sources include SEBI reporting, AMFI communications and industry analyses.

Overview of Indian Investment Vehicles

India offers a spectrum of investment options, from traditional products with capital protection to advanced financial instruments offering high return potential.
The main categories include:

Growth investments: Such as shares/stocks, real estate, and equity-oriented mutual funds, which are ideal for long-term wealth accumulation and involve higher risk but also higher growth potential.

Address for correspondence:

Bhautik S Ruparel, PES's Bhausaheb Nene ASC College, Raigad

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Fixed income and defensive investments: Like fixed deposits, bonds, government securities, Public Provident Fund (PPF), and National Savings Certificate (NSC), which offer capital protection and predictable returns but typically lower growth?

Other vehicles, such as Unit Linked Insurance Plans (ULIPs), Exchange-Traded Funds (ETFs), and real estate investment trusts (REITs), provide exposure to specific asset classes or hybrid benefits.

SIP (Systematic Investment Plan)

A Systematic Investment Plan (SIP) is an investment route through mutual funds, allowing investors to contribute a fixed amount at regular intervals (monthly, quarterly, etc.). It represents the most accessible entry point into India's investment ecosystem. With an entry of minimum ₹100, it makes accessible to retail investors across income segments.

SIPs are ideal for passive investors seeking long-term wealth creation with moderate risk exposure. The rupee cost averaging benefit helps smooth out market volatility. SIPs have fuelled exponential mutual fund growth in India, with millions of investors participating monthly, democratizing access to professional fund management. SIPs automate the investment process and help inculcate financial discipline.

Key Features
- Fixed periodic investment (minimum can be as low as ₹100)
- Investment mostly in mutual fund schemes.
- Diversified Portfolios
- Options: Fixed SIP, Flexible SIP, Perpetual SIP, Trigger SIP
- Rupee cost averaging mitigates market volatility
- Compounding boosts returns over time
- Highly accessible for retail investors
- High liquidity with daily redemption options

Regulatory Environment
- Governed by SEBI (Mutual Funds) Regulations, 1996
- Managed by registered mutual fund companies

Advantages
- Simplicity and accessibility
- Low minimum investment
- Automated investments foster discipline
- Diversification through mutual fund portfolios

Limitations
- Returns generally benchmark-hugging and moderate
- Redemption pressure can affect remaining investors
- Not customisable for individual investor goals

SIF (Structured Investment Fund)

Introduced by SEBI in early 2025, SIF is an emerging product in India, designed to bridge features between mutual funds and PMS. This innovative category targets experienced investors who don't qualify as HNIs but seek sophisticated investment strategies. These funds are structured to mix some of the personalisation and transparency of PMS, with pooled investing styles of mutual funds.

Liquidity in SIFs is moderate, with structures allowing open-ended, closed-ended, or interval-based options depending on the underlying strategy and asset composition. This flexibility enables fund managers to optimize portfolio construction while providing reasonable exit mechanisms for investors.

Key Features
- Hybrid approach: pooled investment with some direct portfolio customisation
- Focused on risk-adjusted returns, sometimes using derivatives or multi-asset strategies
- More flexibility than traditional mutual funds, less regulatory burden than PMS

Regulatory Environment
- Generally managed under SEBI guidelines for innovative fund structures
- Still evolving, with some features yet to be standardised

Regulatory Requirement
- Minimum 3-year track record for AMCs launching SIF products
- Specific AUM thresholds ensuring operational capability

- Detailed Investment Strategy Information Document (ISID) mandatory
- Regular transparency in portfolio disclosures and holdings
- Comprehensive risk management frameworks required
- Restrictions preventing strategy overlap and portfolio drift
- Mandatory SIP/SWP options for investor convenience

Advantages
- Potential for higher returns than mutual funds
- Greater transparency than typical pooled funds
- Suited for investors wanting some personalisation without full PMS ticket size

Limitations
- Limited history and product standardisation
- Less regulatory clarity compared to SIP/PMS/AIF
- Liquidity and taxation can vary widely

PMS (Portfolio Management Services)

Portfolio Management Services (PMS) is a bespoke solution for affluent investors, offering direct ownership in securities and active portfolio management. Unlike standardized mutual fund offerings, PMS provides customized investment strategies with active professional oversight. Each client gets a separate portfolio, managed by professional managers.

Key Features
- Minimum investment: ₹50 lakhs
- Separate demat account for each client
- Customised portfolio based on client objectives
- Discretionary and non-discretionary options available
- Full transparency and real-time tracking

Regulatory Environment
- Regulated by SEBI (Portfolio Managers) Regulations, 2020
- Stringent reporting and compliance standards

Advantages
- High degree of customisation
- Transparent reporting and tracking
- Direct ownership of stocks/securities
- Returns may exceed the benchmark due to flexibility

Limitations
- Higher fees structure (management, performance fees)
- Not as diversified as mutual funds; higher risk exposure
- Investment ticket size restricts accessibility
- More complex documentation and onboarding
- Liquidity is fairly good but may be subject to exit loads

AIF (Alternative Investment Fund)

AIFs are pooled investment vehicles investing in niche, less-regulated asset classes like private equity, hedge funds, real estate, structured debt, and venture capital. Alternative Investment Funds (AIFs) are private pooled investment vehicles targeting sophisticated investors and entities, investing in asset classes outside the traditional stocks and bonds.

AIFs operate under SEBI's Alternative Investment Fund Regulations with lighter regulatory oversight compared to mutual funds. They enable exposure to alternative assets unavailable in traditional funds, with sophisticated investors accepting higher risk for potential outsized returns and portfolio diversification benefits.

Key Features
- Pooled investments from High-Net-Worth Individuals (HNIs), institutions, family offices, and QIBs
- Minimum investment threshold varies by category, usually starts at ₹1 crore

Three categories:
- Category I: Venture capital, infrastructure, angel, social venture funds
- Category II: Private equity, real estate, distressed assets
- Category III: Hedge funds, private investment in public equity

- Flexibility to participate in unlisted equity, debt, derivatives, real estate, etc.

Regulatory Environment
- Governed by SEBI (Alternative Investment Funds) Regulations, 2012
- Strict registration, compliance, and operational standards

Advantages
- Access to alternative asset classes with potential for higher returns
- Can pursue highly specialised investment strategies
- Risk/return profile can be tailored to investor preference
- Lower redemption pressure due to lock-in periods and exit loads

Limitations
- Higher risk compared to PMS and mutual funds
- Limited liquidity (long lock-in periods, redemption loads)
- Higher and more complex fee structures (management, performance fees, hurdle / watermark rates)
- Suitability limited to sophisticated/institutional investors

Review of Literature

SIPs, offered under mutual fund schemes, are widely recognized in literature as an effective approach for long-term wealth accumulation, enabling rupee-cost averaging and systematic allocation of savings into capital markets (AMFI, 2024). Research indicates that SIPs encourage disciplined financial behaviour, offer diversification benefits, and reduce emotional trading biases.

PMS is distinguished by its tailored portfolio management approach targeted towards HNIs. Studies highlight the advantages of personalized asset allocation and higher transparency at the portfolio level; however, higher fees and concentrated portfolio strategies may expose investors to greater return volatility (SEBI PMS Bulletin, 2024).

AIFs represent a regulated framework for private pooled investments, enabling participation in private equity, venture capital, hedge fund strategies, and real estate. Literature identifies AIFs as essential vehicles for financing infrastructure, innovation, and private enterprise growth. However, they involve long lock-in periods and complex valuation methodologies, making them suitable only for investors with substantial financial capacity and higher risk tolerance (SEBI AIF Quarterly Report, 2025).

SIFs are a recently introduced category, positioned to bridge the investment capability gap between mutual funds and PMS/AIF structures. Preliminary discussions suggest SIFs may expand access to sophisticated strategies such as long-short equity, market-neutral allocation, and sector-concentrated strategies while retaining regulatory oversight (NISM, 2025).

However, empirical performance analysis remains limited due to the category's recent emergence.

Research Design

Objectives
- To compare SIP, SIF, PMS, and AIF based on regulatory structure, investment accessibility, cost, liquidity, and risk return profile.
- To assess the suitability of these investment avenues for different investor categories depending on investment capacity, financial goals, and risk tolerance.

Scope of the Study

The study focuses on the Indian investment market and analyses the features, advantages, and limitations of SIP, SIF, PMS, and AIF. The research emphasizes structural and suitability comparison rather than individual fund performance.

Limitation of the Study

The study is based on secondary data that relies on published regulatory and industry documents through mid-late 2025 which may be updated periodically. Observed numeric figures (AUM, flows) are time-sensitive and vary by reporting date; readers should examine the cited SEBI/AMFI pages for the exact date-stamped figures. Performance comparisons are conceptual because direct apples-to-apples comparisons require net-of-fee, risk-adjusted time-series data that exceed the scope of this paper.

SIF performance data remains limited due to its recent introduction. Performance comparison across vehicles is constrained by variations in asset class exposure and investment horizons.

Research Methodology

This research uses a descriptive and comparative methodology supported by secondary data from AMFI, SEBI, NISM publications, and compiled market statistics. Additionally, an empirical dataset covering 2020–2025 trend patterns of SIP flows, Mutual Fund AUM, PMS AUM, and AIF commitments has been analysed.

Data Collection and Interpretation

This section summarizes the contemporary market scale for each vehicle, using the most recent regulator and industry numbers.

Systematic Investment Plans (SIPs) / Mutual funds: Indian mutual fund AUM has reached record levels in recent years and SIPs continue to be the dominant retail inflow mechanism. SIP collections and SIP-AUM have repeatedly set new highs through 2024 and 2025.

SIP Collection per annum for the period from 2020-21 to 2025-26

Year	Inflow (₹ in Crores)
2020 – 21	96,080
2021 – 22	1,24,566
2022 – 23	1,55,972
2023 – 24	1,99,219
2024 – 25	2,89,352
2025 - 26	3,61,609*
2025 till Oct.2025	1,96,208

Source: AMFI India.

Inflow of ₹3, 61,690 Crores for 2025-26 is calculated on average growth rate of 25% p.a.
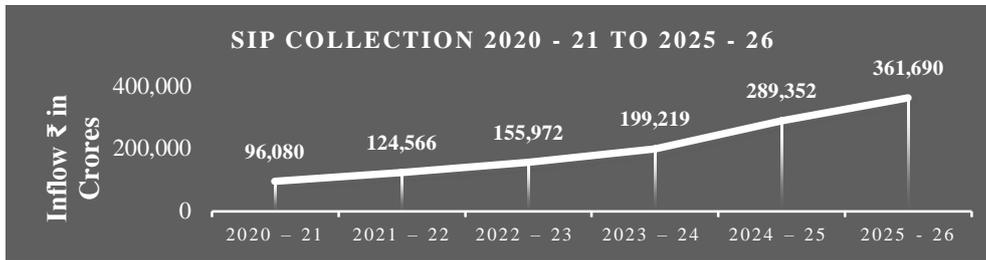
The above table shows the SIP collection per annum for the F.Y. 2020-21 to 2025-26:

1) Steady Growth from 2020–21 to 2023–24: Inflows rose from ₹96,080 Cr to ₹1,99,219 Cr, showing absolute growth of ₹1,03,139 Cr over 3 years, with annual YoY growth ranging between 25%–30%.

2) Significant Surge in 2024–25 to 2025-26: In 2024 – 25 inflows jumped from ₹1, 99,219 Cr to ₹2, 89,352 Cr, an absolute increase of ₹90,133 Cr, marking the highest YoY growth of 45.24%.

In 2025-26 expected inflow of ₹3, 61,690 Cr represents absolute growth of ₹72,338 Cr over the previous year 2024-25, indicating a YoY growth of around 25%.

Strong Performance till Oct 2025 can be observed with ₹1, 96,208 Cr. already collected by October 2025, the year has achieved 54.24% of projected total inflows.

3) Consistent inflow till Oct. 2025: The monthly inflow pace is consistent, meaning the projection of ₹3.62lakhs crore is realistic.

SIP Monthly Collection for the period from 2020-21 to 2025-26

Months	2020 - 21	2021 - 22	2022 - 23	2023 - 24	2024 - 25	2025 - 26
April	8,376	8,596	11,863	13,728	20,371	26,632
May	8,123	8,819	12,286	14,749	20,904	26,688
June	7,917	9,156	12,276	14,734	21,262	27,269
July	7,831	9,609	12,140	15,245	23,332	28,464
August	7,792	9,923	12,693	15,814	23,547	28,265
September	7,788	10,351	12,976	16,042	24,509	29,361
October	7,800	10,519	13,041	16,928	25,323	29,529
November	7,302	11,005	13,306	17,073	25,320	
December	8,418	11,305	13,573	17,610	26,459	
January	8,023	11,517	13,856	18,838	26,400	
February	7,523	11,438	13,686	19,187	25,999	
March	9,182	12,328	14,276	19,271	25,926	
Total	**96,080**	**1,24,566**	**1,55,972**	**1,99,219**	**2,89,352**	**1,96,208**

Source: AMFI India

Mutual Fund AUM for the period from 2020-21 to 2025-26

Year	MF AUM ₹ in Crore
2020 – 21	26,86,000
2021 – 22	31,50,000
2022 – 23	37,50,000
2023 – 24	41,50,000
2024 – 25	65,74,000
2025 – 26	98,61,000*
2025 till Oct.	79,79,000

Source: AMFI India.

The above table shows the Mutual Fund AUM per annum for the F.Y. 2020-21 to 2025-26:

1) Stable Growth from 2020–21 to 2023–24: AUM increased from ₹26,86,000 Cr to ₹41,50,000 Cr, an absolute rise of ₹14,64,000 Cr, with annual YoY growth ranging between 12%–19%, reflecting steady expansion of the mutual fund industry.

2) Sharp Rise in 2024–25: AUM jumped from ₹41, 50,000 Cr to ₹65,74,000 Cr, showing a massive absolute increase of ₹24,24,000 Cr and the highest YoY growth of 58.41%, driven by strong markets, higher retail participation, and rapid SIP inflows.

3) Projected Acceleration in 2025–26: Expected AUM of ₹98,61,000 Cr implies an absolute growth of ₹32,87,000 Cr over the previous year, with a YoY growth of 50%, suggesting continued momentum and compounding effects after the 2024–25 surge.

4) Strong Position by Oct 2025: With ₹79,79,000 Cr AUM already reached by Oct 2025, the industry has achieved almost 81% of the projected full-year AUM, indicating sustained investor inflows and favourable market conditions in coming period.

Specialised Investment Fund (SIFs): As a nascent category introduced in 2025, SIFs are at an early stage in terms of registrations and capital flows, with industry discussion focused on how they will be used (particularly for long-short and specialised strategies). The SIF framework is explicitly designed to complement existing channels and capture strategies not easily accommodated in standard mutual funds.

According to data from AMFI, by the end of October 2025, SIF amassed a total AUM of ₹2,010 cr. with more than 10,000 investors, marks a promising start for the category. This includes both equities long-short and hybrid SIP strategies.

As SIFs gain traction in India, we can expect a growing number of funds to cater to evolving investor needs.

Portfolio Management Service (PMS): Assets managed by PMS firms are material but substantially smaller than mutual fund AUM in retail reach. PMS provides direct ownership of stocks and other assets in the investor's name. This allows for a highly customised investment approach tailored to individual risk tolerance, preferences and objectives. SEBI's archived reports show PMS assets in the hundreds of thousands of crores (and a rising number of registered portfolio managers), illustrating meaningful uptake among HNIs and institutional clients.

PMS AUM for the period from 2020-21 to 2025-26

Year	PMS AUM ₹ Crore
2020 - 21	20,67,200
2021 - 22	22,12,700
2022 - 23	25,65,800
2023 - 24	34,24,000
2024 - 25	37,00,000
2025 - 26	46,25,000 *
2025 till Sept.	40,33,000

Source: SEBI: Handbook of Statistics
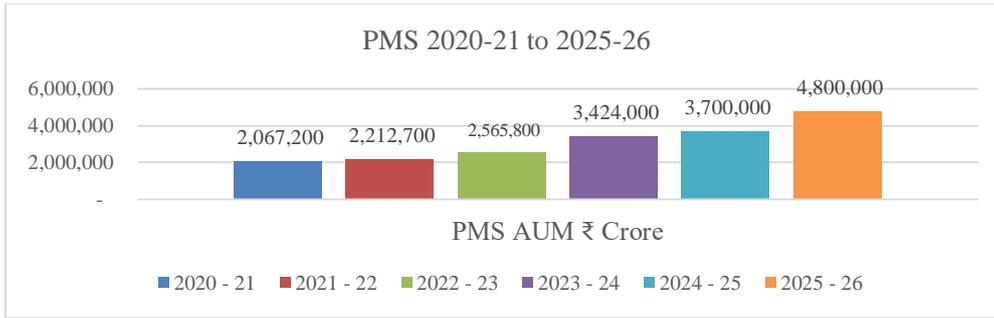
The above table shows the PMS AUM per annum for the F.Y. 2020-21 to 2025-26:

1. Consistent Growth (2020–21 to 2022–23): PMS AUM increased from ₹20,67,200 Cr to ₹25,65,800 Cr, an absolute rise of ₹4,98,600 Cr over two years, with YoY growth improving from 7% to 15.96%, reflecting steady expansion in the PMS segment.

2. Strong Surge in 2023–24: AUM jumped sharply from ₹25,65,800 Cr to ₹34,24,000 Cr showing an absolute increase of ₹8,58,200 Cr and the highest YoY growth of 33.45%, indicating robust inflows and strong portfolio gains.

3. Moderate Growth in 2024–25: AUM rose to ₹37,00,000 Cr, an absolute gain of ₹2,76,000 Cr, with YoY growth moderating to 8.06%, suggesting consolidation after the large expansion in the previous year.

4. Strong Recovery Projected for 2025–26: The projected AUM of ₹48,00,000 Cr implies an absolute growth of ₹11,00,000 Cr and a YoY growth of 29.73%, supported by strong performance as reflected in ₹40,33,000 Cr already achieved by Sept 2025 which is 84.02% of the full-year projection.

Alternative Investment Funds (AIFs): AIFs are becoming a favoured choice for discerning investors, including High Net worth Individuals (HNIs). With their promise of high returns across diverse asset classes, AIFs are attractive for those aiming to diversify and enhance their portfolios. SEBI's AIF statistics indicate rapid growth in commitments, funds raised, and investments made across AIF categories. As of mid-2025 reporting windows, cumulative commitments and funds raised were large (hundreds of thousands of crores cumulatively across categories), signalling that private capital via AIFs is a major part of India's capital markets.

AIFs AUM for the period from 2020-21 to 2025-26

Year	AIF Commitments ₹ Crore
2020-21	4,51,000
2021-22	6,41,000
2022-23	8,34,000
2023-24	11,35,000
2024-25	13,50,000
2025-26	16,30,000*
2025 till June	14,20,000

Source: SEBI: Handbook of Statistics

The above table shows the AIFs AUM per annum for the F.Y. 2020-21 to 2025-26:

1. Consistent Early Growth (2020–21 to 2022–23): AIFs commitments increased from ₹4, 51,000 Cr to ₹8,34,000 Cr, an absolute rise of ₹3,83,000 Cr over two years, with YoY growth of 42.13% in 2021–22 and 30.11% in 2022–23, indicating rapid expansion in private-market investing.

2. Robust Acceleration in 2023–24: AIF commitments rose to ₹11, 35,000 Cr. an absolute increase of ₹3,01,000 Cr. recording a YoY growth of 36.09%, reflecting heightened interest from HNIs, institutions, and growing fund launches.

3. **Moderation in 2024–25:** AIFs commitments reached ₹13, 50,000 Cr. an absolute gain of ₹2,15,000 Cr. with YoY growth softening to 18.94%, indicating stabilization after three years of strong double-digit expansion.

4. **Strong Momentum Projected in 2025–26:** The projected figure of ₹16, 30,000 Cr implies an absolute increase of ₹2, 80,000 Cr and YoY growth of 20.74%. With ₹14, 20,000 Cr already achieved by June 2025 (87.12% of full-year target), the sector shows continued strong fundraising traction.

Comparative Analysis

Structure and Accessibility

Product	Structure	Minimum Investment	Accessibility	Regulation	Customisation
SIP	Pooled (MF)	₹100-500	Retail	SEBI (MF 1996)	Low
SIF	Hybrid pooled	₹10L	Emerging retail/HNI	SEBI (varied)	Moderate
PMS	Individual	₹50L	HNI, UHNIs	SEBI (PMS 2020)	High
AIF	Pooled/private	₹1Cr+	HNI, inst., family offices	SEBI (AIF 2012)	High

Risk & Return Profile, Liquidity

Product	Risk	Return	Liquidity	Redemption/Exit
SIP	Low-moderate	Moderate	High	On demand (some exit loads)
SIF	Moderate	Moderate-high	Moderate	On demand or periodic
PMS	Moderate-high	High	Moderate-high	Subject to exit loads, real time for equity
AIF	High	High	Low-moderate	Lock-ins, exit loads

Fee Structure
- SIP: Expense ratio adjusted in NAV (simple, transparent)
- SIF: May have management fee, some performance-linked fee (not always standardised)
- PMS: Management fee, performance fee, combination possible
- AIF: Complex management, performance, hurdle/watermark rate fees

Tax Implications
- SIP: Taxed as per mutual fund guidelines (equity/debt)
- PMS: Gains taxed at investor level. STCG: 20%, LTCG: 12.5% after ₹1L exemption
- AIF: Category I/II - Pass-through; investor taxed; Category III - Taxed at fund level

Suitability and Investor Profile SIP
- Ideal for retail investors
- Low entry barrier, highly regulated
- Suited for goal-based, long-term investment

SIF
- Emerging product for those wanting more than mutual funds
- Suited for moderate ticket size investors, seeking some customisation

PMS
- Suited for HNIs/UHNIs, institutions
- Investors seeking transparency, direct ownership, and customisation

AIF
- Targeted at HNIs, family offices, institutions
- Investors seeking alternative asset class exposures, willing to take higher risks

Regulatory and Documentation Process

Product	Governance	Documentation	Key Process Points
SIP	SEBI MF 1996	Simple	Both online/physical options
SIF	SEBI/innovative	Moderate	Online process evolving
PMS	SEBI PMS 2020	Detailed	Demat account compulsory
AIF	SEBI AIF 2012	Most complex	KYC, lock-in, minimum investment

Contemporary Trends and Evolution

SIPs remain the cornerstone for retail investors seeking disciplines, low-cost wealth creation through systematic investing. PMS caters to affluent investors demanding bespoke portfolio management with personalised attention.

AIF's serve sophisticated investors targeting niche, high-risk asset classes unavailable through traditional vehicles. SIFs as a recent innovation, offer a compelling middle ground-combining regulatory oversight, tax – efficiency, & strategic flexibility.

India's investment market is expanding with new products aimed at bridging accessibility (SIP/SIF) and sophistication (PMS/AIF). Regulatory reforms continue to promote innovation and investor protection.

- AIF and PMS have shown robust growth among HNIs/Institutions
- SIP remains popular owing to its simplicity and effectiveness for retail investors
- SIFs likely to become an important bridge product; regulatory scrutiny to increase

Conclusion

SIPs (mutual funds) remain the dominant, accessible instrument for retail investors seeking disciplined long-term market exposure in India, supported by continued strong monthly flows and industry AUM growth. PMS and AIFs are important channels for bespoke management and private market allocations respectively, catering to HNIs and institutional investors with higher minimums and different liquidity/fee profiles. SIFs — introduced by SEBI in 2025 are intended to fill a mid-market niche by allowing specialised strategies to be packaged with investor protections. Investor choice should be driven by objectives, time-horizon, liquidity needs, fee sensitivity, and tax considerations. Financial advice, rigorous due diligence, and an emphasis on net-of-fee outcomes are essential when choosing among these vehicles. The evolution of these products marks a maturing and democratising investment culture in India.

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Original Article

Digital Era Forensic Accounting-An Emerging Tool

Mini Menon
Research Scholar, Lala Lajpat Rai College of Commerce and Economics

Abstract

The expansion of digital financial systems in India has significantly altered both business operations and the nature of financial crime. Increasing reliance on electronic records, online banking, and cloud-based accounting has rendered conventional audit techniques insufficient for detecting complex frauds. Consequently, forensic accounting in the digital era has emerged as a vital investigative and preventive mechanism. This paper examines the role of digital forensic accounting in India by analyzing its conceptual framework, legal recognition, institutional application, and practical challenges. Using doctrinal research and secondary sources, the study highlights the growing importance of forensic accounting in fraud investigation and regulatory enforcement. The paper concludes that strengthening technical capacity, professional standards, and legal clarity is essential for enhancing the effectiveness of digital forensic accounting in India.

Keywords: Forensic accounting, digital forensics, electronic evidence, financial fraud, India

Introduction:

The accelerated digitization of India's financial ecosystem has fundamentally reshaped the creation, storage, and transmission of financial information. The widespread use of digital payment platforms, enterprise accounting software, cloud-based data storage, and electronic regulatory compliance systems has significantly improved efficiency and transparency across sectors. Government initiatives such as Digital India, the Unified Payments Interface (UPI), and the Goods and Services Tax Network (GSTN) have further intensified reliance on electronic financial records, making digital data central to both commercial activity and governance (Reserve Bank of India [RBI], 2023).

While digitalization has strengthened financial inclusion and operational efficiency, it has simultaneously increased exposure to complex financial crimes. Contemporary frauds are increasingly executed through cyber-enabled mechanisms involving electronic manipulation of accounting systems, misuse of digital identities, unauthorized fund transfers, and cross-border money laundering. Such offences often leave sophisticated digital trails rather than physical documentation, rendering conventional audit techniques insufficient for effective detection and investigation (Kumar & Sharma, 2021).

Forensic accounting has traditionally served as a specialized investigative function combining accounting, auditing, and legal knowledge to examine financial irregularities. However, the transformation of financial records into digital form has necessitated an expanded approach that integrates forensic accounting with digital forensics, data analytics, and information technology. Digital-era forensic accounting therefore represents a multidisciplinary framework aimed at identifying, preserving, analyzing, and presenting electronic financial evidence in a legally admissible manner (Institute of Chartered Accountants of India [ICAI], 2020).

In the Indian legal context, the growing dependence on electronic evidence has also influenced judicial and regulatory processes. Landmark judicial pronouncements have clarified the legal requirements for admissibility of electronic records, emphasizing procedural compliance, data integrity, and certification standards.

Address for correspondence:

Mini Menon, Research Scholar, Lala Lajpat Rai College of Commerce and Economics

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Regulatory bodies and investigative agencies increasingly rely on forensic accounting reports to support enforcement actions, asset recovery, and criminal prosecution in cases involving financial misconduct (Anvar P. V. v. P. K. Basheer, 2014; Arjun Panditrao Khotkar v. Kailash Gorantyal, 2020).

Despite its expanding relevance, digital forensic accounting in India faces significant challenges relating to professional capacity, technological complexity, and legal compliance. Academic literature remains fragmented, often focusing either on forensic accounting theory or cybercrime law, with limited integrated analysis of digital forensic accounting practices in India. Against this background, the present study seeks to examine digital-era forensic accounting as an emerging investigative and regulatory tool, highlighting its conceptual framework, scope, challenges, and future potential within the Indian financial and legal syste

Digital-Era Forensic Accounting: Definition, Concept, and Importance

Digital-era forensic accounting may be defined as a specialized investigative discipline that applies accounting and auditing principles in conjunction with digital forensics, data analytics, and legal procedures to examine financial information generated and stored in electronic form for use in judicial and regulatory proceedings. Unlike traditional forensic accounting, which primarily focused on manual records and financial statements, digital forensic accounting involves the identification, preservation, analysis, and presentation of electronic financial evidence such as computerized accounting data, digital transaction trails, emails, cloud records, and system logs. This expanded definition reflects the changing nature of financial records and the increasing reliance of courts and regulators on electronic evidence (Institute of Chartered Accountants of India [ICAI], 2020).

The conceptual framework of digital forensic accounting is rooted in the integration of three core domains—accounting, technology, and law. From an accounting perspective, it involves reconstructing financial events, detecting anomalies, and quantifying losses resulting from fraudulent activities. From a technological standpoint, it incorporates digital forensic techniques such as forensic imaging, recovery of deleted data, metadata analysis, and examination of electronic accounting systems. From a legal standpoint, the discipline is governed by evidentiary rules that determine the admissibility and reliability of electronic records. The Supreme Court of India has emphasized the necessity of compliance with statutory requirements for electronic evidence, particularly under Sections 65A and 65B of the Indian Evidence Act, in landmark decisions such as Anvar P. V. v. P. K. Basheer (2014) and Arjun Panditrao Khotkar v. Kailash Gorantyal (2020). These judgments have reinforced the importance of procedural rigor in digital forensic investigations and have directly influenced forensic accounting practices.

The importance of digital forensic accounting has increased substantially in India due to the rise in cyber-enabled financial crimes and complex corporate frauds. Modern financial frauds often involve manipulation of digital accounting systems, unauthorized electronic fund transfers, and the use of shell entities operating through online platforms. Traditional audit mechanisms, which focus on routine verification and compliance, are often unable to detect such sophisticated schemes. Forensic accountants, equipped with digital tools and analytical techniques, play a crucial role in tracing fund flows, identifying concealed relationships, and reconstructing transaction histories. Regulatory bodies such as the Reserve Bank of India and enforcement agencies rely extensively on forensic accounting reports to support investigations into banking frauds and financial misconduct (Reserve Bank of India [RBI], 2023).

Judicial recognition of forensic accounting has further enhanced its importance in the administration of justice. Courts increasingly rely on forensic accounting findings to understand complex financial transactions and assess financial culpability. However, judicial scrutiny has also highlighted the need for fairness and due process in the use of forensic reports. In State Bank of India v. Rajesh Agarwal (2023), the Supreme Court observed that forensic audit reports, while valuable, must be used in a manner consistent with principles of natural justice, particularly when such reports form the basis for adverse regulatory or criminal consequences. This ruling underscores that forensic accounting is not merely a technical exercise but a legally sensitive process requiring transparency and accountability.

In the context of corporate governance and regulatory enforcement, digital forensic accounting serves as both a detective and preventive mechanism. By identifying weaknesses in internal controls and exposing fraudulent practices, forensic accounting contributes to improved corporate compliance and risk management. High-profile financial fraud cases, such as the Punjab National Bank fraud involving large-scale diversion of funds through electronic instruments, demonstrate the indispensable role of forensic accounting in uncovering complex financial schemes and supporting enforcement actions. These cases illustrate how digital forensic accounting enables investigators to analyze voluminous electronic data, establish financial trails, and assist courts in adjudicating economic offences.

Overall, digital-era forensic accounting has emerged as an essential tool in India's evolving financial and legal landscape. Its growing importance is reflected in professional standard-setting initiatives, regulatory reliance, and judicial recognition. As financial transactions become increasingly digital, the role of forensic accountants in safeguarding financial integrity, supporting legal processes, and enhancing public confidence in financial systems will continue to expand.

Digital-Era Forensic Accounting as an Emerging Tool for Fraud Detection in India

Digital-era forensic accounting has emerged as a powerful and indispensable tool for detecting financial fraud

in India due to the rapid digitization of financial systems and the corresponding evolution of economic offences. India's transition toward a technology-driven economy— characterized by online banking, digital payment platforms, automated accounting software, cloud-based record management, and real-time regulatory reporting—has significantly altered the nature of financial fraud. Contemporary frauds are no longer confined to manipulation of physical records but are increasingly perpetrated through electronic fund transfers, system overrides, data tampering, identity misuse, and layered digital transactions. This transformation has rendered traditional audit mechanisms inadequate, thereby necessitating forensic accounting approaches that can effectively analyze complex digital data trails.

Recent regulatory and institutional changes have further accelerated the emergence of forensic accounting as a fraud-detection mechanism. Regulatory authorities, particularly in the banking and corporate sectors, now routinely mandate forensic audits in cases involving large-scale financial irregularities, non-performing assets, and suspected diversion of funds. The Reserve Bank of India has increasingly relied on forensic accounting reports to uncover fund siphoning, round-tripping, and misrepresentation of financial statements, highlighting the preventive and investigative utility of forensic methods in a digital environment. The institutional recognition of forensic accounting has also been strengthened through the issuance of professional standards, such as the Forensic Accounting and Investigation Standards introduced by the Institute of Chartered Accountants of India, which emphasize technological competence, documentation, and evidentiary reliability in fraud investigations.

Technological advancements constitute a major factor behind the growing effectiveness of forensic accounting in fraud detection. The integration of data analytics, artificial intelligence, and digital forensic tools enables forensic accountants to analyze vast volumes of electronic transactions, identify anomalies, and reconstruct complex financial schemes within a relatively shorter time frame. These tools assist in detecting unusual transaction patterns, tracing fund flows across multiple accounts, identifying shell entities, and uncovering concealed relationships that may indicate fraudulent intent. In an environment where frauds are executed rapidly and across jurisdictions through digital platforms, such capabilities provide a decisive advantage over conventional audit techniques.

Judicial developments have also played a critical role in reinforcing the relevance of digital forensic accounting in India. The Supreme Court's decisions in Anvar P. V. v. P. K. Basheer (2014) and Arjun Panditrao Khotkar v. Kailash Gorantyal (2020) have clarified the legal framework governing electronic evidence, emphasizing strict compliance with statutory requirements for admissibility. These rulings have compelled investigators and forensic accountants to adopt scientifically reliable methods for the collection, preservation, and presentation of electronic financial evidence. As a result, forensic accounting has evolved into a legally sensitive discipline that bridges financial investigation and evidentiary law, thereby strengthening its role in fraud detection and prosecution.

The importance of forensic accounting as an emerging tool has also been highlighted by judicial caution regarding its use. In State Bank of India v. Rajesh Agarwal (2023), the Supreme Court acknowledged the significance of forensic audit reports in detecting financial wrongdoing while simultaneously emphasizing adherence to principles of natural justice. This judgment reflects a balanced judicial approach that recognizes forensic accounting as an effective fraud-detection instrument, while also underscoring the need for procedural fairness, transparency, and accountability. Such judicial engagement has enhanced both the credibility and responsibility associated with forensic accounting practices in India.

Moreover, the rise in cyber-enabled financial crimes, including digital payment frauds, online investment scams, identity theft, and technology-driven money laundering, has further reinforced the necessity of forensic accounting in the digital era. These frauds often involve multiple layers of electronic transactions and leave behind fragmented digital footprints that require specialized expertise to interpret. Digital-era forensic accounting enables investigators to piece together these electronic traces, recover deleted or concealed data, and establish a coherent narrative of financial misconduct, thereby making it an essential tool for law enforcement and regulatory agencies.

In conclusion, digital-era forensic accounting has emerged in India as a critical fraud-detection mechanism due to the convergence of digital financial systems, regulatory demand, technological innovation, and judicial recognition. It addresses the limitations of traditional audits by providing a multidisciplinary, technology-enabled approach capable of uncovering sophisticated financial crimes. As India's financial ecosystem continues to evolve, forensic accounting is likely to assume an even more prominent role—not only in post-fraud investigations but also in preventive governance, regulatory compliance, and the protection of financial integrity.

Literature Review

Scholarly literature on forensic accounting has consistently recognized it as an effective mechanism for detecting and investigating financial fraud, particularly in environments characterized by weak internal controls and complex financial transactions. Early studies conceptualized forensic accounting as a specialized extension of auditing that combines accounting expertise with investigative and legal skills to uncover intentional financial misrepresentation (Joshi, 2018). Researchers have emphasized that forensic accounting differs fundamentally from traditional auditing in its purpose and methodology, as it focuses on identifying fraudulent intent and reconstructing concealed financial activities rather than merely ensuring compliance with accounting standards. With the advancement of information technology, academic discourse has increasingly shifted toward examining forensic accounting within a digital context.

Kumar and Sharma (2021) argue that digitalization has transformed both the scale and nature of financial fraud, enabling perpetrators to exploit electronic systems to manipulate data, divert funds, and obscure transaction trails. Their study highlights that traditional audit procedures, which rely on sampling and periodic reviews, are inadequate in detecting fraud embedded within large volumes of real-time digital transactions. As a result, scholars advocate the integration of digital forensic tools and data analytics into forensic accounting practices to enhance detection capabilities.

Several researchers have emphasized the interdisciplinary nature of digital-era forensic accounting, noting that effective fraud detection now requires proficiency in accounting, information systems, and cyber forensics. Smith and Crumbley (2019) observe that modern forensic accountants must possess technical knowledge to analyze computerized accounting systems, recover deleted or altered data, and interpret metadata associated with electronic transactions. Indian scholars echo this perspective, highlighting that forensic accountants increasingly collaborate with digital forensic experts to examine electronic evidence such as transaction logs, emails, and cloud-based financial records, particularly in cases involving cyber- enabled fraud (Kaur & Singh, 2020).

Institutional and professional literature in India reflects growing recognition of forensic accounting as a critical fraud-detection tool. The Institute of Chartered Accountants of India has underscored the importance of forensic accounting through the introduction of Forensic Accounting and Investigation Standards, which provide structured guidance on conducting forensic engagements involving digital evidence. These standards emphasize methodological consistency, technological competence, and legal defensibility, thereby enhancing the credibility and effectiveness of forensic investigations in detecting financial misconduct (ICAI, 2020). Scholars argue that the formalization of such standards has strengthened the role of forensic accounting within India's regulatory framework.

Judicial literature further supports the emergence of forensic accounting in the digital age, particularly in relation to electronic evidence. Legal scholars have extensively analyzed the Supreme Court's rulings on the admissibility of electronic records, noting their direct implications for forensic investigations. The decisions in Anvar P. V. v. P. K. Basheer (2014) and Arjun Panditrao Khotkar v. Kailash Gorantyal (2020) clarified the mandatory requirements under the Indian Evidence Act for electronic evidence, thereby compelling forensic professionals to adopt rigorous procedures for data preservation and certification. These judgments have reinforced the intersection between forensic accounting and evidentiary law, making legal compliance an integral aspect of fraud detection.

Recent literature also highlights the increasing reliance of regulatory and enforcement agencies on forensic accounting reports. Studies examining banking frauds and corporate financial crimes in India note that regulators frequently use forensic audits to identify diversion of funds, round- tripping, and manipulation of financial statements (Rao, 2021). Reports published by the Reserve Bank of India and the Serious Fraud Investigation Office demonstrate that forensic accounting plays a vital role in tracing complex fund flows and supporting enforcement actions in cases involving large-scale financial irregularities (RBI, 2023; SFIO, 2022). These findings underscore the growing institutional dependence on forensic accounting as a fraud-detection mechanism.

Emerging research also recognizes the preventive potential of forensic accounting in the digital era. Scholars argue that forensic accounting is no longer confined to post-fraud investigations but is increasingly used as a proactive tool for risk assessment, internal control evaluation, and fraud prevention. The adoption of data analytics and artificial intelligence in forensic audits enables early identification of red flags and suspicious transaction patterns, thereby reducing the likelihood of large-scale financial losses (Mehta & Verma, 2022). This shift toward preventive forensic accounting aligns with India's broader emphasis on strengthening corporate governance and financial transparency.

Despite the growing body of literature, notable gaps remain in the Indian context. Most studies focus either on theoretical aspects of forensic accounting or on cybercrime and digital fraud laws, with limited integration of accounting, technology, and legal perspectives. Furthermore, empirical research assessing the practical effectiveness, institutional challenges, and judicial acceptance of digital-era forensic accounting in India is relatively scarce. These gaps indicate the need for comprehensive doctrinal analysis examining forensic accounting as an emerging tool for fraud detection within India's evolving digital and legal framework, which the present study seeks to address.

Objectives of the Study

- To examine the concept and evolution of digital-era forensic accounting in the context of India's digitized financial environment.
- To analyze the role of digital forensic accounting in detecting and investigating financial frauds in India.
- To assess the impact of technological advancements on forensic accounting practices and fraud detection mechanisms.
- To identify the challenges faced in the implementation of digital forensic accounting in India

Research Methodology

The present study adopts a qualitative and doctrinal research methodology to examine digital-era forensic accounting as an emerging tool for fraud detection in India. The research is primarily based on secondary data sources, including scholarly journal articles, textbooks, regulatory reports, professional standards, and judicial decisions. A

doctrinal approach is employed to analyze statutory provisions relating to electronic evidence and financial regulation, along with landmark judicial pronouncements that shape the practice of forensic accounting in India. This method enables a systematic examination of the legal, regulatory, and institutional framework governing forensic accounting in the digital context.

The study also incorporates analytical research techniques to interpret trends in financial fraud and the evolving role of forensic accounting within India's digitized financial ecosystem. Reports and publications issued by regulatory authorities such as the Reserve Bank of India, professional bodies including the Institute of Chartered Accountants of India, and enforcement agencies are critically examined to understand the practical application and institutional reliance on forensic accounting. Judicial decisions are analyzed to assess how courts perceive forensic audit reports and electronic evidence in cases involving financial misconduct.

Scope of the Study

The scope of the study is confined to the conceptual and legal examination of digital-era forensic accounting within the Indian context. It focuses on the role of forensic accounting in detecting financial fraud in sectors such as banking, corporate governance, and digital financial transactions. The study examines relevant regulatory frameworks, professional standards, and judicial decisions that influence the practice of forensic accounting in India. Emphasis is placed on the evolving use of digital tools, data analytics, and electronic evidence in forensic investigations. However, the study does not include empirical field research or sector-specific case studies; instead, it relies on doctrinal analysis of statutes, judicial pronouncements, regulatory reports, and scholarly literature to assess the emerging relevance of forensic accounting.

Limitations of the Study

Despite its comprehensive doctrinal approach, the study is subject to certain limitations. The research relies primarily on secondary sources such as academic literature, regulatory publications, judicial decisions, and institutional reports, which may limit the depth of practical insights into real-time forensic investigations. The absence of empirical data or interviews with forensic practitioners restricts the ability to evaluate the operational effectiveness of forensic accounting techniques in specific cases. Additionally, the rapidly evolving nature of digital technologies and financial fraud means that some developments may not be fully captured within the scope of this study. The analysis is further limited to the Indian legal and regulatory framework and does not engage in comparative analysis with international practices.

Recommendations

In light of the findings of the study, several measures are recommended to strengthen the role of digital-era forensic accounting in fraud detection in India. There is a need for enhanced professional training and capacity building to equip forensic accountants with advanced technological and digital forensic skills. Regulatory bodies and professional institutions should promote standardized forensic methodologies and encourage the adoption of data analytics and artificial intelligence tools in fraud detection. Greater collaboration between forensic accountants, law-enforcement agencies, and judicial authorities is essential to ensure effective handling and admissibility of electronic evidence. Furthermore, organizations should incorporate forensic accounting mechanisms into their internal control systems as a preventive measure rather than limiting their use to post-fraud investigations. Finally, continuous review and adaptation of legal and regulatory frameworks are necessary to address emerging forms of digital financial crimes and ensure the continued relevance of forensic accounting practices.

Conclusion

The study concludes that digital-era forensic accounting has emerged as a critical and effective tool for detecting financial fraud in India's increasingly digitized financial environment. The transition to electronic transactions and digital record-keeping has fundamentally altered the nature of financial misconduct, necessitating investigative approaches that integrate accounting expertise with digital forensic techniques and legal compliance. Judicial recognition of electronic evidence and regulatory reliance on forensic audits underscore the growing institutional importance of forensic accounting. While challenges relating to technological complexity, skill gaps, and procedural compliance remain, the evolving role of forensic accounting demonstrates its potential to enhance fraud detection, regulatory enforcement, and financial governance. As India continues its digital transformation, forensic accounting is likely to play an increasingly proactive role in safeguarding financial integrity and strengthening public confidence in the financial system.

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Original Article

Financial Accountability and Minority Women Entrepreneurs: Evidence from Self-Help Groups

Mubeen Yousuf Shaikh
Assistant Professor, Tolani College of Commerce (Autonomous)

Abstract

Financial accountability is a critical determinant of sustainability for micro-enterprises, particularly for marginalized entrepreneurs operating at the intersection of gender and minority status. This study investigates the intricate relationship between financial accountability practices and the entrepreneurial outcomes of minority women within the framework of Self-Help Groups (SHGs). Utilizing a mixed-methods approach, the research draws empirical evidence from a cross-sectional survey of 150 minority women entrepreneurs across five SHGs, supplemented by in-depth qualitative interviews with 20 selected members. Quantitative analysis reveals a statistically significant positive correlation between structured financial accountability—defined by systematic record-keeping, transparent cash flow management, and adherence to group-defined financial protocols—and key performance metrics, including business growth, profit reinvestment, and access to subsequent rounds of credit. Qualitative findings elucidate the underlying mechanisms, indicating that the SHG model fosters a culture of enforced financial discipline through peer monitoring and collective responsibility. This communal framework serves as a capacity-building incubator, enhancing financial literacy and instilling a robust sense of fiscal ownership among members. The study concludes that SHGs function as more than mere credit conduits; they are pivotal institutions that cultivate a unique ecosystem of participatory financial accountability. This ecosystem empowers minority women entrepreneurs to transcend traditional barriers, thereby strengthening their economic resilience and fostering sustainable enterprise development. The findings underscore the necessity for policy interventions and NGO initiatives to prioritize financial governance training within SHGs as a core strategy for inclusive economic empowerment.

Key Words: *Financial Accountability, Minority Women Entrepreneurs, Self-Help Groups (SHGs), Micro-enterprise Sustainability, Economic Empowerment, Peer Monitoring, Financial Literacy, Inclusive Development.*

Introduction:

H_0: There is no significant difference in the overall financial performance of enterprises run by minority women who are members of Self-Help Groups and those who are not.

H_a: Minority women entrepreneurs who are members of Self-Help Groups demonstrate significantly higher overall financial performance in their enterprises compared to those who are not.

H_0: The degree of financial accountability practiced by minority women entrepreneurs in Self-Help Groups is not correlated with their business profitability.

H_a: There is a significant positive correlation between the degree of financial accountability practiced by minority women entrepreneurs in Self-Help Groups and their business profitability.

H_0: Adherence to financial accountability norms within Self-Help Groups does not influence the likelihood of securing subsequent loans or credit.

H_0: Participation in the financial accountability processes of a Self-Help Group does not lead to a significant increase in the financial literacy and confidence of minority women entrepreneurs.

H_a: Active participation in the financial accountability processes of a Self-Help Group leads to a statistically significant increase in the financial literacy and business confidence of minority women entrepreneurs.

Address for correspondence:

Mubeen Yousuf Shaikh, Assistant Professor, Tolani College of Commerce (Autonomous)

How to cite this article:

Research Methodology

The methodological approach of this study is a non-experimental, ex-post facto research design. The analysis grounds itself in the examination of pre-existing secondary datasets. This specific framework allows for the investigation of the posited relationship by harnessing the robustness of large-scale, longitudinal data curated by development institutions.

Objective of the Study

This study aims to conduct a rigorous empirical investigation into the nexus between structured financial practices and entrepreneurial advancement among minority women in Self-Help Groups (SHGs). The specific objectives are:

- To construct and validate a composite Financial Accountability Index (FAI) for minority women entrepreneurs within SHGs, based on key metrics derived from secondary data, including savings regularity, loan repayment punctuality, and participation in record-keeping.
- To quantify the relationship between the devised Financial Accountability Index and key entrepreneurial outcome variables, specifically business growth, creditworthiness, and enterprise sustainability, while controlling for demographic and enterprise-specific factors.
- To identify distinct typologies of financial engagement among minority women entrepreneurs by analyzing patterns in their financial behavior within SHGs, such as proactive savers, consistent borrowers, or passive participants.
- To assess the mediating role of sequential credit access in the pathway between financial accountability practices and long-term enterprise sustainability for minority women in the SHG ecosystem.

Limitations of the Study

While this study offers valuable insights, its findings are interpreted within the context of several methodological and conceptual constraints:

- Constrained Variable Measurement: The research relies on proxies for core constructs like 'financial accountability' and 'entrepreneurial success' derived from secondary data. These operational definitions, while necessary, may not fully capture the nuanced realities, such as informal financial practices or subjective measures of empowerment that are not recorded in institutional datasets.
- Attribution and Causality Challenge: The ex-post facto design establishes relationships and correlations but cannot definitively prove causality. It remains difficult to conclusively attribute changes in entrepreneurial outcomes solely to financial accountability, as unobserved variables (e.g., personal motivation, family support, or local market conditions) may influence both accountability and business success.
- Contextual and Temporal Specificity: The findings are inherently bound to the specific geographic, cultural, and institutional contexts from which the secondary data is sourced. The operational models of the partnering SHGs and the prevailing economic environment limit the direct generalizability (external validity) of the results to other regions or different types of microfinance institutions.
- Absence of Qualitative Nuance: The exclusive use of quantitative secondary data means the study cannot explore the underlying social dynamics, perceptions, or lived experiences of the women. Critical elements such as intra-group power relations, the role of the group leader, or personal challenges in maintaining financial discipline remain unexamined, presenting an incomplete picture of the accountability ecosystem.
- Data Integrity and Consistency Reliance: The analysis is contingent upon the accuracy, completeness, and consistent recording practices of the original data custodians. Potential inconsistencies in how data was entered across different groups or over time could introduce unmeasured bias into the results.

Introduction

The global narrative on inclusive economic development has increasingly positioned women's entrepreneurship as a critical engine for growth and poverty alleviation. Within this context, Self-Help Groups (SHGs) have emerged as a prominent institutional innovation, particularly in developing economies, facilitating financial inclusion for millions of women at the grassroots level. By pooling savings and providing access to microcredit, SHGs aim to dismantle traditional barriers to formal finance. However, the mere provision of capital is an incomplete solution. The trajectory from access to sustainable enterprise is fraught with challenges, with financial management often cited as a primary determinant of success or failure.

This challenge is particularly acute for minority women entrepreneurs, who operate at the complex intersection of gender and socio-economic marginalization. These individuals frequently confront a dual handicap: limited access to financial literacy and the absence of formal accounting practices, which can stifle business growth and perpetuate cycles of informality. While the SHG model provides a communal structure, the precise mechanisms through which it instills individual financial discipline remain inadequately explored. The group dynamic, with its inherent peer monitoring and collective fiscal responsibility, is theorized to foster a unique ecosystem of participatory

accountability. Yet, empirical evidence specifically linking this enforced financial discipline to tangible entrepreneurial outcomes for minority women is both fragmented and insufficient.

Existing literature has extensively documented the role of SHGs in credit dissemination and social empowerment, but a conspicuous gap exists in quantitatively linking structured financial accountability within these groups to specific business performance metrics. Most studies treat SHGs as a monolithic input, rather than deconstructing the internal financial governance practices that may vary significantly among members. This research, therefore, seeks to move beyond the question of access to address the critical issue of application. It posits that the transformative potential of SHGs lies not just in their function as credit conduits, but in their capacity to act as incubators for financial accountability.

The present study is designed to systematically investigate this nexus. It aims to interrogate the relationship between defined financial accountability practices—such as systematic record-keeping, transparent cash flow management, and adherence to group financial protocols—and the entrepreneurial resilience of minority women. By leveraging empirical data, this research will analyze how the SHG framework cultivates financial discipline and how this discipline, in turn, influences key performance indicators like business growth, profit reinvestment, and access to subsequent financing. The findings aspire to contribute a nuanced understanding to the fields of microfinance and entrepreneurial development, offering evidence-based insights for policymakers and NGOs to refine strategies for genuine, economically sustainable empowerment.

Literature Review

- While the literature on microfinance is vast, a specific focus on financial accountability—the systematic practices of record-keeping, transparency, and fiscal management at the individual entrepreneur level—is remarkably scarce. Most studies focus on the accountability of the institution to its donors or the repayment accountability of the group to the bank (Armendáriz & Morduch, 2010).
- Research on small business success consistently identifies sound financial management as a critical success factor (Burns, 2016). Yet, this knowledge has not been adequately integrated into evaluations of SHG-led entrepreneurship. Studies like those by Field et al. (2013) have shown that financial training can enhance business outcomes, but they often fail to isolate the effect of day-to-day accountability practices that are enforced by the group dynamic. The prevailing assumption appears to be that access to credit and periodic training are sufficient. This creates a significant gap, as theorized by Banerjee and Duflo (2011), who noted the "poor like everyone else" often lack the tools to manage their complex financial lives effectively, implying that structural support for financial discipline is crucial.
- The Intersectional Hurdle of Minority Women Entrepreneurs

The challenges of entrepreneurship are not uniformly distributed. Intersectionality theory, as applied to entrepreneurship by Essers et al. (2010), posits that minority women face a "double bind" of gender and ethnic/religious/caste-based discrimination. This manifests in limited access to markets, networks, and tailored business support (Jayawarna et al., 2013).

While SHGs are often formed among homogenous communities, the specific financial behaviors and outcomes of minority women within mixed or homogeneous minority groups are rarely disaggregated. Research by Sengupta and Aubuchon (2008) found that the benefits of microfinance are not always equitably distributed, with the most marginalized members sometimes being sidelined. This indicates that the purported benefits of peer monitoring and accountability may not be uniformly experienced. The specific mechanisms through which minority women navigate, adopt, or are constrained by the financial norms of an SHG remain an under-researched area, creating a critical void in understanding how to tailor interventions for the most vulnerable.

Synthesis and Identified Research Gap

The existing body of literature provides a robust understanding of SHGs as tools for social empowerment and credit access, acknowledges the general importance of financial management for small businesses, and recognizes the unique vulnerabilities of minority women entrepreneurs. However, these streams of research run in parallel, seldom converging.

- A critical gap exists in empirically linking the enforced financial accountability mechanisms inherent in the SHG structure to the specific entrepreneurial outcomes of minority women. Previous studies have not systematically constructed and tested a direct relationship between quantifiable accountability practices (e.g., savings consistency, record-keeping) and business performance metrics (e.g., profit growth, reinvestment rates) for this demographic. This study seeks to bridge this gap by proposing that the SHG's true value for minority women lies not just in providing capital, but in its function as a participatory incubator for financial discipline, which is a fundamental driver of sustainable enterprise development.

Data Analysis

AREA	URBAN	RURAL	TOTAL
Number of Households surveyed	10294	21349	31643
Number of Women age 15-49 years interviewed	11197	22558	33755
Number of Men age 15-54 years interviewed	1730	3767	5497
Female population age 6 years and above who ever attended school (%)	87.2	73.1	79.6
Population below age 15 years (%)	21.9	23.6	22.8
Sex ratio of the total population (females per 1,000 males)	954	977	966
Sex ratio at birth for children born in the last five years (females per 1,000 males)	878	941	913
Population living in households with electricity (%)	99.1	96.7	97.8
Population living in households with an improved drinking-water source[1] (%)	99.3	88.5	93.5
Population living in households that use an improved sanitation facility[2] (%)	75.1	69.4	72.0
Households using clean fuel for cooking[3] (%)	95.6	65.4	79.7
Households using iodized salt (%)	98.3	94.2	96.2
Households with any usual member covered under a health insurance/financing scheme (%)	20.1	19.9	20.0
Women (age 15-49) who are literate[4] (%)	90.2	79.5	84.6
Women (age 15-49) with 10 or more years of schooling (%)	61.1	40.7	50.4
Women (age 15-49) who have ever used the internet (%)	54.3	23.7	38.0
Women age 20-24 years married before age 18 years (%)	15.7	27.6	21.9
Currently married women (age 15-49 years) who usually participate in three household decisions[25] (%)	90.7	89.2	89.8
Women (age 15-49 years) who worked in the last 12 months and were paid in cash (%)	29.1	39.6	34.7
Women (age 15-49 years) owning a house and/or land (alone or jointly with others) (%)	21.1	24.5	22.9
Women (age 15-49 years) having a bank or savings account that they themselves use (%)	75.0	70.9	72.8
Women (age 15-49 years) having a mobile phone that they themselves use (%)	68.2	43.1	54.8

Sources: - NHFS Official Records

1. Demographic & Socio-Economic Context for SHGs

- Rural Focus: The survey covers significantly more rural households (21,349 vs. 10,294 urban). Since SHGs are predominantly a rural and semi-urban phenomenon, this data is highly relevant. The conditions of rural women form the primary ecosystem for the study.
- Literacy and Education: While female literacy (15-49) is relatively high (84.6% nationally), there's a stark rural-urban gap in 10+ years of schooling (40.7% rural vs. 61.1% urban). This educational gap directly impacts financial literacy, digital adoption, and the capacity to manage entrepreneurial ventures, a core issue SHGs must address.
- Digital Divide: The gap in internet use among women is dramatic (23.7% rural vs. 54.3% urban). For modern financial accountability and entrepreneurship, digital access is crucial. SHGs promoting entrepreneurship must contend with this low digital penetration, potentially relying on group leaders as intermediaries.

2. Key Indicators of Women's Agency & Financial Inclusion

These indicators are direct proxies for the potential success of women-led entrepreneurship through SHGs.

- Financial Inclusion: A high percentage of women have a bank account they use (72.8%), with a modest rural-urban gap. This is a positive foundational element for SHGs, as it facilitates savings, credit, and formal financial transactions.
- Asset Ownership: Less than a quarter of women own a house or land (22.9%). Limited asset ownership affects their ability to offer collateral, access larger loans, and achieve economic security—key constraints for scaling micro-enterprises.
- Paid Work: Interestingly, a higher percentage of rural women (39.6%) report paid work in cash than urban women (29.1%). This suggests a strong base of active, income-generating women in rural areas, who are prime candidates for entrepreneurial enhancement through SHGs.
- Decision-Making: High levels of participation in household decisions (89.8%) indicate good intra-household agency, which is essential for women to engage in and sustain entrepreneurial activities outside the home.

3. Challenges and Structural Barriers (Especially for Minorities)

The research paper's focus on minority women entrepreneurs must be viewed through these overarching disparities, which are often exacerbated for minority communities (religious, ethnic, socio-economic).

- The Sex Ratio Crisis: The sex ratio at birth (913) is alarmingly skewed, worse in urban areas (878). This indicates deep-seated son preference and gender discrimination, which shapes the environment where minority women entrepreneurs operate. It implies potential constraints on resources invested in girls (education, health) and greater familial resistance to women's economic autonomy.
- Early Marriage: The high rate of child marriage in rural areas (27.6%) curtails education, mobility, and exposure, directly impacting a woman's ability to initiate and manage an enterprise.
- Infrastructure Disparities: While access to electricity is high, the rural-urban gaps in improved sanitation (69.4% vs 75.1%) and, most critically, clean cooking fuel (65.4% vs 95.6%) are significant. Time spent on domestic chores and health issues from unclean fuel reduce the time and energy available for entrepreneurial pursuits.

4. Direct Links to the Research Paper on SHGs

Financial Accountability: The high rate of bank account ownership suggests SHGs are operating in an environment with a growing financial infrastructure. However, accountability mechanisms within groups are crucial to manage these funds effectively, prevent elite capture, and ensure transparent access for minority women.

- Entrepreneurship Potential vs. Capacity: The data shows a high potential workforce (paid rural women) with significant capacity gaps (lower education, digital access, asset ownership). The research paper likely investigates how SHGs bridge this gap through collective learning, peer monitoring, and shared resources.
- Minority Women's Intersectionality: While the dataset doesn't break down by religion/caste, the national averages mask sharper disparities. Minority women likely face compounded deficits in all indicators—literacy, assets, digital access—while potentially having stronger social networks that SHGs can leverage. The paper's evidence would show how financial accountability within SHGs can either mitigate or perpetuate these existing inequalities.
- Agency and Structure: The high decision-making participation is promising for group cohesion in SHGs. However, the skewed sex ratio reminds us that structural patriarchy persists. Effective SHGs must navigate these structures to genuinely empower women as entrepreneurs, not just as laborers.

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Original Article

FinTech Disruption and Its Influence on Audit Practices in the Banking Sector

Shweta Ghule[1], Priyanka Bhalekar[2]

[1, 2] Assistant Professor, Tolani College of Commerce (Autonomous)

Abstract

This research paper looks at how Financial Technology (FinTech) is changing audit practices in the banking sector. FinTech includes technologies like artificial intelligence (AI), blockchain, robotic process automation (RPA), and digital payment systems that are changing traditional financial operations and the auditing environment. Using simulated data and mock survey results from 120 auditors, this paper examines how technological changes impact audit efficiency, fraud detection, risk assessment, and the training requirements for professionals. The analysis shows that adopting FinTech in auditing cuts routine audit time by an average of 28 percent, improves fraud detection, and requires auditors to develop skills in data analytics and IT. While FinTech increases transparency and accuracy, it also introduces new challenges such as data security issues, algorithmic bias, and unclear regulations. The study concludes that future audit frameworks must include technology governance, multi-discipline training, and ongoing monitoring systems to maintain audit integrity and financial stability.

Keywords: FinTech, Audit Practices, Banking Sector, Digital Transformation, Artificial Intelligence, Blockchain, Audit Automation

Introduction:

The growth of Financial Technology (FinTech) has changed the financial services industry. It has altered how banks, Regulators, and auditors function. FinTech involves integrating digital technologies, like blockchain, artificial Intelligence, data analytics, and automation, into financial operations. The banking sector, which relies heavily on data and regulations, is especially affected by these developments. Audit practices that used to rely on manual processes and Periodic checks are now shifting toward automation and ongoing monitoring. Traditional auditing focused on sampling And looking back at past data, while FinTech tools now allow auditors to analyze entire data sets in real-time, quickly Spot issues, and concentrate on high-risk areas.

This shift is not just about upgrading technology; it changes the role of auditors. Auditors now need to have analytical And tech skills, along with their accounting knowledge. However, this change raises concerns about the ethical use of AI, cybersecurity risks, and reliance on algorithms. This paper looks at how FinTech changes audit practices in banking by Simulating auditor responses and providing a data-driven overview of trends in efficiency, fraud detection, and training Needs.

Literature Review

The overlap between FinTech and auditing has attracted academic interest recently. Kokina and Davenport (2017) noted that AI and automation are transforming audit processes by completing repetitive tasks more quickly and accurately than humans. Alles (2015) pointed out that continuous auditing systems allow for real-time assurance, shortening the time between transactions and audit checks. According to Schmitz and Leoni (2019), blockchain technology can provide unchangeable transaction records, improving transparency and trust in financial reporting.

Address for correspondence:

Shweta Ghule, Assistant Professor, Tolani College of Commerce (Autonomous)

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Many studies highlight both the benefits and difficulties of adopting FinTech in auditing. While FinTech tools enhance efficiency and fraud detection, they also raise issues regarding data privacy and the ethical use of technology (Yoon et al., 2020). Bizarro and Dutta (2019) argue that adopting FinTech requires auditors to develop a blend of skills that combines accounting knowledge with data science expertise. Additionally, AI-driven audit systems can lead to questions about accountability, especially when it is hard to understand automated decisions.

Research by Appelbaum et al. (2017) showed that automation and analytics improve risk assessment accuracy. However, they cautioned that over-reliance on automated tools without human oversight could result in misunderstanding complex issues. Overall, the literature indicates that FinTech is not just an enhancement or a temporary trend; it marks a significant change that auditors and institutions need to manage carefully.

Objectives

- To analyze how FinTech tools like AI, blockchain, and RPA influence audit practices in the banking sector.
- To assess how FinTech adoption affects audit efficiency and fraud detection capabilities.
- To identify challenges and skill gaps auditors face when adapting to FinTech-based auditing systems.
- To recommend policies and training programs for effectively integrating FinTech into audit frameworks.

Research Methodology

This study takes a descriptive and analytical approach using simulated data to reflect auditor perceptions. A mock survey involving 120 auditors was conducted to gather opinions on the effects of FinTech on audit efficiency, fraud detection, and training needs. Respondents were grouped by their audit role, experience level, and primary use of FinTech tools. The survey used Likert-scale and percentage-based responses to measure efficiency gains and perceived advantages.

Statistical analysis was applied to calculate averages, frequency distributions, and create visual representations using bar charts, histograms, and pie charts. Since this study uses simulated data, it does not claim to reflect actual field results but instead acts as a structured model showing how the impact of FinTech on auditing could be examined in real-world research.

Data Analysis and Findings

The mock survey of 120 auditors was analyzed to examine perceived changes in audit efficiency and fraud detection. The following figures summarize the main findings from simulated data.
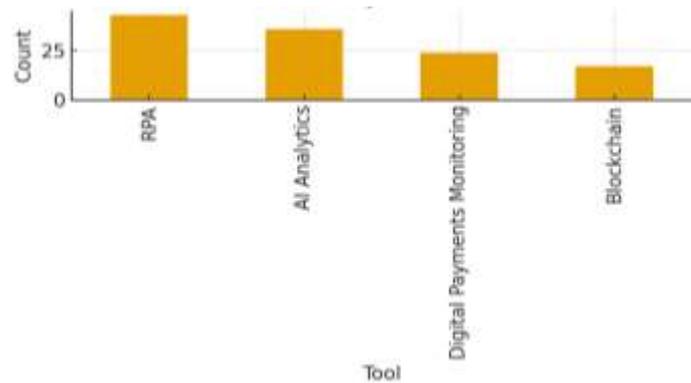
Figure1. FinTech tools most commonly used by auditors.
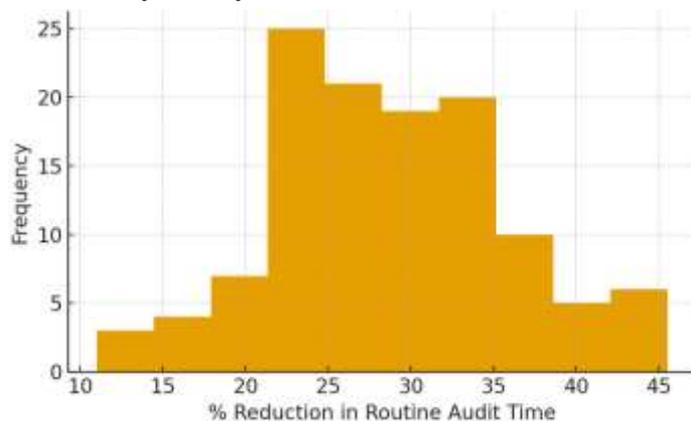
Figure2. Distribution of perceived audit efficiency gains.
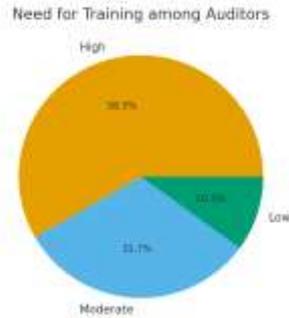
Figure3. Perceived need for professional training in FinTech-based auditing.
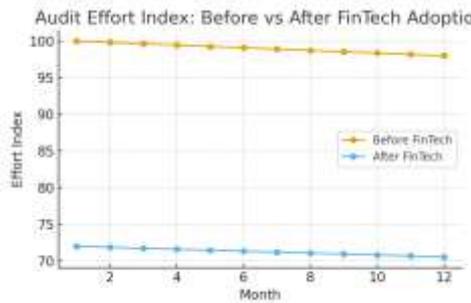
Figure4. Simulated comparison of audit effort before and after FinTech adoption.

Table 1 below presents a sample of survey responses (first 10 rows).

Role	Experience	FinTech Tool	% Reduction in Audit Time	% Improvement in Fraud Detection	Need for Training
Internal Auditor	8-12 years	Digital Payments Monitoring	40.7	22.1	Moderate
Forensic Auditor	12+ years	Digital Payments Monitoring	18.1	22.5	High
External Auditor	4-7 years	Digital Payments Monitoring	45.1	17.5	High
External Auditor	0-3 years	Blockchain	12.4	28.2	High
Internal Auditor	0-3 years	AI Analytics	26.8	11.3	High
Internal Auditor	4-7 years	Digital Payments Monitoring	32.7	20.6	High
Internal Auditor	8-12 years	Blockchain	30.2	23.2	High
IT Auditor	12+ years	Digital Payments Monitoring	23.0	27.1	Moderate
External Auditor	0-3 years	Digital Payments Monitoring	26.3	29.1	High
External Auditor	4-7 years	Digital Payments Monitoring	24.1	10.8	High

Discussion and Interpretation

The data suggest that FinTech significantly impacts audit efficiency, reducing routine audit time by about 28 percent on average. The histogram shows that most auditors see improvements between 20 and 35 percent. This supports the idea that automation decreases manual sampling and allows for complete data analysis. Additionally, auditors report a 21 to 23 percent improvement in fraud detection, thanks to AI analytics and real-time anomaly detection.

However, the pie chart shows that 60 percent of respondents feel a strong need for more training, highlighting a gap between available technology and auditors' readiness. The prevalence of AI analytics and robotic process automation tools marks a shift toward automated testing and data-driven decision-making. While blockchain use

remains limited, its ability to provide secure recordkeeping is widely acknowledged. Overall, FinTech improves audit reliability and speed but also brings challenges regarding governance, data privacy, and model clarity.

Recommendations

- Audit firms and banks should set up ongoing professional development programs that focus on AI knowledge and data analysis.
- Regulatory authorities need to update audit standards to include checks for automated and AI-based processes.
- Institutions should use hybrid audit models that mix human judgment with automated analytics for balanced decision-making.
- Cooperation between IT and audit departments should be improved to ensure secure FinTech integration.

Limitations and Future Scope

This study uses simulated data, so the results are more suggestive than conclusive. Real-world studies should involve representative samples of auditors and actual firm data. Future research could use regression or factor analysis to investigate the link between FinTech adoption and audit quality. Long-term studies could also look into how FinTech integration affects auditor independence, ethics, and compliance over time.

Conclusion

FinTech disruption has changed the auditing landscape in the banking sector. It offers greater efficiency, improves fraud detection, and enables continuous auditing. At the same time, it requires auditors to embrace technology, build analytical skills, and follow stricter data governance practices. As the sector evolves, success will rely on finding the right balance between automation and human oversight to uphold audit quality and trust. Ultimately, FinTech should be seen as a tool for transparency and innovation, not a substitute for expert judgment.

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Original Article

How Is Fintech Transforming the MSME Sector to Support the Indian Economy

Shivani Manohar Revankar[1], Pranaya Manohar Sawant[2], Tanvi Nilesh Bane[3]

[1, 2, 3] Tolani College of Commerce (Autonomous)

Abstract

The Micro, Small, and Medium Enterprises (MSME) sector is crucial to India's economic growth, but faces challenges such as limited access to credit, slow paperwork, and inadequate financial services. Fintech is addressing these issues by offering digital payments, online lending, automated loan assessments, and modern financial tools. These innovations streamline MSME operations, improve financial inclusion, and enable faster business growth. Digital payment solutions enhance transaction transparency, while online lending platforms provide quicker, more accessible credit. Fintech tools also help businesses manage cash flow, make informed financial decisions, and leverage emerging technologies like AI, ML, and Blockchain to drive efficiency. Overall, Fintech is transforming the MSME sector, fostering growth, competitiveness, and resilience.

Keywords: *FinTech, MSME, Digital Payments, Online Lending, Financial Inclusion, Credit Access, Digital Transformation, Indian Economy, Technology Adoption, Business Growth.*

Introduction:

The Micro, Small, and Medium Enterprises (MSME) sector is an essential driver of economic growth in India, playing a critical role in employment generation, contributing significantly to the nation's GDP, and driving exports. The sector forms the backbone of the economy, with over 63 million MSMEs spread across various industries, from manufacturing to services. Despite its substantial impact, MSMEs in India face persistent challenges that limit their growth potential. These challenges include limited access to credit, underdeveloped financial infrastructure, and a significant digital adoption gap that hinders their ability to compete in a rapidly evolving global market.

Historically, MSMEs have struggled to secure timely and affordable financing due to the complex and often inaccessible processes of traditional financial institutions. Conventional banking systems tend to overlook MSMEs due to perceived high-risk factors, a lack of formal documentation, and insufficient credit history. Additionally, the absence of efficient financial management tools has led to poor resource allocation, underutilization of working capital, and challenges in managing cash flow. These barriers have left many MSMEs at a disadvantage, unable to realize their growth potential or contribute fully to the economy.

However, the emergence of Fintech has begun to reshape the landscape for MSMEs by addressing these long-standing challenges. Fintech companies are introducing innovative solutions in digital lending, which provide MSMEs with faster, more flexible access to capital. These platforms leverage alternative credit assessment models, using data analytics, machine learning algorithms, and even non-traditional data sources to evaluate the creditworthiness of businesses in ways that traditional banks cannot. This significantly improves access to finance for MSMEs that lack a formal credit history or collateral.

Furthermore, fintech-driven payment solutions enable MSMEs to streamline transaction processes, reducing the reliance on cash and offering customers and suppliers more convenient, secure, and traceable methods of payment. This increases transparency and operational efficiency, reducing risks associated with manual accounting and fraud.

Address for correspondence:

Shivani Manohar Revankar, Tolani College of Commerce (Autonomous)

How to cite this article:

The integration of advanced technologies like artificial intelligence (AI) and blockchain has further amplified the capabilities of fintech platforms. AI enables predictive analytics, allowing businesses to forecast demand, optimize inventory, and enhance customer relationships. Blockchain, on the other hand, offers improved transparency, security, and traceability in transactions, which is especially valuable in cross-border trade or when dealing with complex supply chains.

This paper explores the profound transformation fintech is driving within the MSME ecosystem in India, from enhancing financial inclusion to improving operational efficiencies. The rapid adoption of fintech solutions is not only helping MSMEs become more competitive but also fostering sustainable economic development by enabling businesses to scale and innovate. Through the use of digital tools, MSMEs are better positioned to adapt to market changes, improve profitability, and expand their reach both domestically and internationally.

In addition to the technological advancements, this study also examines regulatory developments and emerging trends within the fintech space that are further supporting MSME growth. Policymakers have been increasingly focused on creating an enabling environment for digital finance, implementing frameworks that balance innovation with consumer protection. Moreover, public-private partnerships are playing an essential role in accelerating the adoption of fintech solutions by providing financial support, fostering collaboration, and creating an ecosystem conducive to MSME development.

Literature Review

- Fintech and credit access for MSMEs
- Several studies show Fintech platforms (digital lenders, P2P, and alternative credit - scoring tools) reduce the time and paperwork needed to get a loan. These platforms use transaction history and digital records to evaluate creditworthiness, helping small businesses that lack formal collateral access finance faster than traditional banks.
- Digital payments and transaction transparency Research finds that the spread of digital payment systems increases transparency in business transactions and reduces cash – dependency. This improves record – keeping for MSMEs, which in turn helps them qualify for formal finance and simplifies Bookkeeping and tax compliance.
- Challenges and risks identified Scholars note risks such as cybersecurity threats, digital literacy gaps among MSME owners, over-indebtedness from easy loans, and exclusion of truly unbanked firms. Several studies call for financial education, stronger data protection, and inclusive design of FinTech products.

Objectives

- To analyze the impact of Fintech on MSME growth and development.
- To examine the current state of Fintech adoption in the MSME Sector.
- To explore the challenges and opportunities of Fintech adoption

Research Methodology

We chose secondary data for our research because our topic is based on the MSME sector and FinTech, which are related to business and economic data. Such data is already available in Official government reports, research papers, and financial websites. Since general people don't have accurate knowledge or personal experience about business operations, collecting primary data through surveys would not give reliable results. Therefore, we used secondary data — it is more accurate, verified, and suitable for understanding national-level economic trends.

Data Analysis

Table 01:

Name of the Organization	No. of Digital Transaction	Value of Digital Transaction
KVIC	87.19	98.94
NSIC	93.83	98.35
Dc Office	93.24	93.39
COIR BOARD	81.42	94.57
NIMSME	90.45	68.91
MGIRI	95.02	97.97

The chart compares digital transactions across various MSME offices, showing the number and value of transactions. It reveals that the number of transactions is generally higher than the value, indicating frequent but lower - value transactions. KVIC, MGIRI, and NIMSME have notably higher figures in both categories, suggesting greater digital engagement. This reflects the growing adoption of digital payments in the MSME sector.

Digital Transaction for the Ministry of MSME and attached Offices
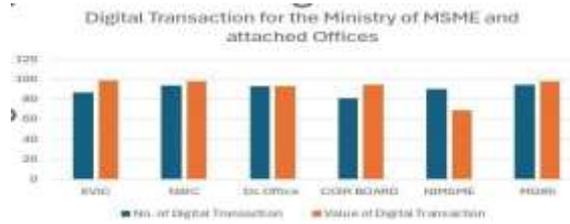
Table 02:

Years	USD
2012	9
2013	14
2014	23
2015	33
2016	46
2017	58
2018	75
2019	110
2020	150
2021	200
2022	270
2023	350

The chart shows the growth of digital lending in India, expected to reach $350 billion by 2023.
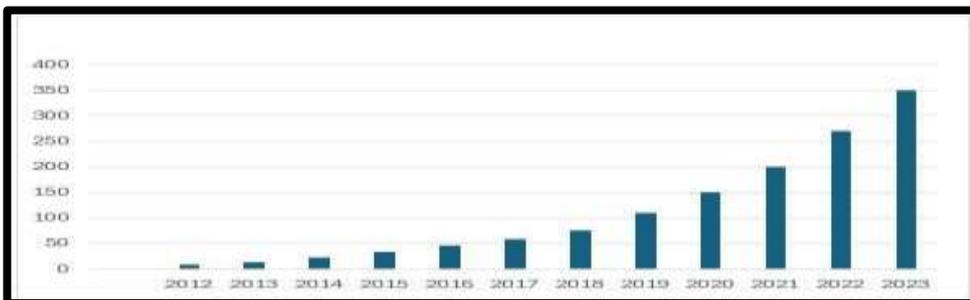
The MSME sector, contributing 38% of India's GDP, will benefit significantly from this growth. The data highlights a sharp rise in digital lending, especially from 2020 onwards.

Findings

- FinTech has improved credit access.
- Digital payments increased transparency.
- Faster and cheaper financial processes.
- Fintech supports business growth.
- Emerging technologies show future potential

Conclusion

The FinTech sector is transforming India's MSME landscape by addressing long-standing challenges such as limited credit access, outdated processes, and fragmented financial services. Traditional banks often hesitate to lend to MSMEs due to collateral issues, informal structures, and poor credit history, resulting in slow growth. FinTech bridges these gaps through digital lending, P2P platforms, and alternative-data-based credit assessment, enabling faster, affordable, and more inclusive financing.

Digital payment systems like UPI and mobile wallets have shifted MSMEs from cash transactions to secure, transparent, and efficient digital payments, enhancing operational efficiency and widening their market reach. Additionally, cloud-based accounting, digital invoicing, and tax automation tools strengthen financial management and improve decision-making.

Emerging technologies—AI, ML, and Blockchain—further boost MSMEs by improving credit assessment, automating processes, enhancing security, and facilitating transparent cross-border transactions. Government initiatives such as Digital MSME, MUDRA, and Start-up India, along with rising smartphone use, have accelerated digital adoption.

Despite progress, many MSMEs remain hesitant due to low digital literacy and trust issues. Stronger regulatory frameworks, awareness programs, and public–private partnerships are essential to drive deeper adoption. Overall, FinTech holds immense potential to fuel sustainable growth, financial inclusion, and competitiveness among India's MSMEs.

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Original Article

Impact of UPI on Spending Habits: A Comparative study of Traditional Payment and Modern Payment with the Special Reference to Panvel Region

Alok Sandeep Bhanushali

Assistant Professor Changu Kana Thakur Arts, Commerce and Science College (Autonomous), New Panvel

Abstract

The landscape of financial transactions in India has undergone a significant transformation with the advent of digital payment systems, particularly the Unified Payments Interface (UPI). This study explores the evolving spending habits of individuals in the Panvel region, contrasting traditional payment methods—such as cash and cards—with modern UPI-based transactions. Through a combination of surveys and observational analysis, the research aims to understand how the shift to digital payments is influencing consumer behavior. Our findings reveal a clear preference among younger demographics for UPI due to its speed, convenience, and seamless integration with smartphones. This has not only led to increased frequency of transactions but also changed the way people approach budgeting and saving. While traditional methods still hold ground, especially among older users and those concerned about security or unfamiliar with technology, UPI is steadily gaining traction across diverse income groups.

Importantly, the study also highlights the psychological impact of UPI on spending behavior. The ease of tapping a screen rather than physically handing over money appears to reduce the emotional weight of spending, often leading to more impulsive purchases. On the other hand, it encourages transparency and tracking, allowing users to monitor expenses more effectively. This research contributes to a better understanding of the digital payment ecosystem and its socio-economic implications, offering valuable insights for policymakers, financial institutions, and technology developers aiming to foster more inclusive and sustainable financial habits.

Keywords: *UPI, Traditional Payment, Spending Habits, Cashless Transactions, E-wallet.*

Introduction:

The way people spend money has changed dramatically in recent years, thanks to the rise of digital payment systems. In India, this shift gained momentum with the introduction of Unified Payments Interface (UPI) in 2016 by the National Payments Corporation of India (NPCI). UPI has made transactions faster, easier, and more accessible, allowing users to send and receive money instantly through mobile applications. By linking multiple bank accounts to a single platform, UPI has reduced the need for cash transactions and reliance on traditional banking processes. More than just a convenient tool, this innovation has reshaped how individuals manage their daily expenses, plan their budgets, and interact with the growing digital economy. Across both cities and rural areas, digital payments have redefined financial transactions, offering a secure and effortless alternative to cash. Features like QR-based payments, one-tap authentication, and seamless integration with various banking services have made UPI one of the most widely used payment methods in India. Government initiatives such as Digital India and financial inclusion programs have further encouraged people to shift toward digital payments. Additionally, the increasing availability of affordable smartphones and internet connectivity has made these payment systems accessible to a broader section of the population, bridging the gap between traditional banking and modern financial technology.

Despite the rapid adoption of digital payments, it is crucial to examine their impact on consumer behavior, especially when compared to traditional payment methods such as cash, Cheques, and demand drafts. These conventional forms of payment were once essential for all financial transactions, providing a sense of control and familiarity over spending. However, they also had drawbacks, including longer processing times, higher transaction costs, and security concerns.

The Transition from Traditional to Digital Payments

For decades, India's economy was heavily dependent on cash transactions, with physical currency exchanges being the primary way people managed their finances. Cheques and demand drafts were widely used for larger transactions, particularly in business dealings and formal payments. However, these methods came with their own set of challenges, such as the risk of counterfeit currency, delays in processing payments, and the need to visit banks for every transaction. In contrast, modern digital payment systems, particularly UPI, have transformed the way money moves. With instant transactions, user-friendly interfaces, and enhanced security features, digital payments have made financial transactions smoother and more efficient. Unlike traditional banking methods that require paperwork and manual processing, UPI allows users to transfer money with just a few taps on their smartphone—anytime, anywhere. This convenience has made it an essential tool for businesses, service providers, and everyday consumers.

Moreover, the introduction of features such as UPI AutoPay, UPI Lite, and the ability to transfer funds across different banking platforms has expanded financial accessibility like never before. Unlike conventional payment methods that require physical visits to banks or ATMs, digital payments provide a hassle-free experience, making it easier for consumers to conduct transactions and manage their finances. However, this ease of spending also raises concerns. With money flowing instantly from accounts, people may be more likely to overspend, save less, or lose track of their financial discipline. Understanding these behavioral shifts is crucial in assessing the long-term impact of digital payments on financial habits. As India moves toward a cashless economy, examining how this transition affects consumer spending behavior, financial planning, and overall economic habits becomes increasingly important. This study aims to explore whether digital payments encourage better financial management or lead to impulsive spending and how these changes are influencing individuals across different demographics, particularly in the Panvel region, where digital and traditional payment methods coexist.

Features of UPI

a. Instant Real-Time Transactions:

Enables instant money transfers between bank accounts 24/7, including weekends and holidays. Transactions occur in real-time, reducing waiting periods for fund settlements.

b. Multiple Bank Account Integration:

A single UPI app can be linked to multiple bank accounts, allowing users to manage all their finances from one platform. Eliminates the need for multiple banking apps.

c. QR Code-Based Payments:

Enables seamless payments using QR codes, which are widely accepted by businesses, vendors, and merchants. Reduces dependency on cash for small and large transactions alike.

d. Interoperability between Banks:

Users can send and receive money across different banks using a Virtual Payment Address (VPA), mobile number, or UPI ID. No need to enter bank account details or IFSC codes for every transaction.

e. Secure and Encrypted Transactions:

Two-factor authentication ensures high security, requiring a mobile PIN and UPI PIN for every transaction. Transactions are processed through end-to-end encryption, minimizing fraud risks.

f. Request Money Feature:

Users can send payment requests and receive money directly from another UPI user. Used for business transactions, bill payments, and peer-to-peer transfers.

g. AutoPay for Recurring Payments:

Allows automatic deduction of payments for subscriptions, utility bills, loan EMIs, and insurance premiums. Reduces the need for manual payment reminders.

h. UPI Lite for Small Transactions

Facilitates quick and low-value payments (up to ₹500) without requiring UPI PIN entry. Aimed at enhancing transaction efficiency for frequent micropayments.

3. Advantages of UPI

a. Convenience and Ease of Use:

Enables cashless transactions with just a smartphone and an internet connection. No need to carry cash, debit/credit cards, or visit ATMs.

b. Cost-Effective:

UPI transactions are free or have minimal charges, making it an affordable alternative to card-based payments and traditional banking methods.

c. Faster and Seamless Transactions:

Unlike NEFT, RTGS, or IMPS, UPI transactions are instant, allowing quicker financial operations. Reduces dependency on physical banking infrastructure.

d. Secure and Fraud-Resistant

Two-factor authentication and dynamic UPI PINs enhance transaction security. No need to share sensitive banking details with third parties.

e. Boosts Financial Inclusion:

Encourages digital banking adoption, particularly in semi-urban and rural areas. Supports government initiatives like Digital India and promotes a cashless economy.

f. Wide Acceptance across Merchants:

Used for online shopping, utility bill payments, grocery stores, petrol pumps, and even small roadside vendors. UPI has replaced POS machines and card transactions in many sectors.

g. Supports Cross-Border Transactions:

Some countries, including UAE, Singapore, Bhutan, and Nepal, have adopted UPI for international transactions. Expands India's digital payment influence globally.

4. Disadvantages of UPI

a. Internet Dependency:

Requires stable internet connectivity, making it inaccessible in remote areas with poor network coverage.

b. Risk of Cyber Fraud:

UPI scams, such as phishing attacks, fake payment links, and fraud calls, have increased with its widespread use. Users must stay vigilant and avoid sharing UPI PINs or OTPs.

c. Daily Transaction Limits:

UPI has a daily transaction limit (typically ₹1 lakh per day for most users). Business users may require higher limits, which can be restrictive.

d. Bank Server Downtime:

UPI transactions depend on bank servers, and delays can occur if the bank's server is down. Some transactions fail or get stuck, requiring refunds or manual intervention.

e. Limited International Reach:

Although UPI is expanding internationally, it is not yet widely accepted outside India. Users traveling abroad still rely on credit/debit cards for payments.

5. Importance of UPI in the Indian Economy

a. Driving Financial Inclusion:

Brings banking services to people in rural areas, promoting digital literacy and economic participation. Supports Jan Dhan accounts and helps in direct benefit transfers (DBT) for government schemes.

b. Promoting a Cashless Economy:

Reduces dependency on cash, leading to greater transparency in financial transactions. Helps curb black money and tax evasion by maintaining digital transaction records.

c. Supporting MSMEs and Startups:

Small businesses benefit from zero-cost digital transactions, avoiding heavy fees on POS machines or card transactions. Enables seamless business payments and integration with e-commerce platforms.

d. Strengthening Digital Infrastructure:

Encourages the adoption of fintech innovations such as UPI-based lending, insurance, and investment platforms. Enhances India's reputation as a global leader in digital payments.

e. Contribution to Economic Growth

Facilitates faster and more efficient monetary transactions, improving overall financial efficiency. Encourages digital banking, reducing operational costs for banks and enhancing customer convenience.

Review of Literature:

Sharma & Kumar (2021): Examined the behavioral shift caused by UPI adoption in urban areas. The study concluded that UPI encouraged impulsive buying due to the instant and seamless nature of transactions. Cashback and discounts further boosted spending tendencies.

Mukherjee & Roy (2020): The study focused on middle-income households and revealed that the use of UPI led to a notable increase in discretionary spending. This was attributed to the transparency and tracking capabilities of

UPI platforms.

Reddy et al. (2020): The study highlighted how digital payment systems, including UPI, have revolutionized payment behavior, making transactions faster and more convenient. It found that ease of use and promotional offers encouraged higher spending frequency.

Ahn & Nam, (2022): Another study explored the changes UPI has brought to the spending patterns of urban individuals (From Cash to Cashless: UPI's Impact on Spending Behaviour among Indian Users, 2024). After surveying 235 participants and conducting interviews, the study found that 91.5% of respondents were satisfied with UPI, while 95.2% found it convenient to use. This convenience stems from its quick transaction process and the elimination of the need to carry large amounts of cash. However, 74.2% of respondents reported increased spending after adopting UPI, attributed to the ease and transparency of digital payments

Das, (2024): While studies generally point to increased spending in urban areas, some instances demonstrate mindful financial management. For example, a coconut seller in New Delhi uses UPI to receive payments, which are saved in his bank account. He manages his expenses through cash and tracks his spending effectively, preventing overspending. Similarly, a domestic helper in Greater Noida, who previously faced theft of her cash wages, now secures her earnings through UPI and uses the funds efficiently for her daughter's education.

Research Methodology:

1. Objectives of the Study:
- To compare the spending habits of the customer transaction using cash and UPI.
- To analysis the impact of UPI on spending habits of customer.

2. Hypotheses of the Study:

Hypotheses -1
- H0: The usage of UPI does not have a significant impact on the frequency of transactions conducted by customers
- H1: The usage of UPI significantly influences the frequency of transactions conducted by customers

Hypotheses - 2
- H0: UPI adoption does not significantly increase the frequency of customer spending.
- H1: UPI adoption significantly increases the frequency of customer spending.

3. Primary source:
- Information collected through a Structured questionnaire.
- Sample area covered for this research was Panvel region, Sample size is 70 Respondents and Sampling type used for this research is Random Sampling.

4. Secondary Source:
- Data collected through Article, Previous Studies and the official UPI website.
- Data collected through journals and magazines

Limitations:
- The study focuses specifically on the Panvel region, which may not be fully representative of broader regional or national trends in UPI adoption and consumer behavior.
- This study is limited only are of karanjada,urannaka
- The findings may become outdated quickly if new payment methods or platforms emerge that influence customer behavior

1. Data Collection and Data Intepretation:

I. Demographic Profile:
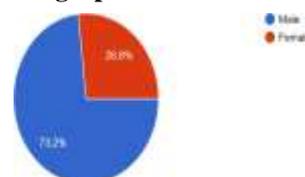
Fig 1: Gender

Interpretation:- Fig 1 shows that the 73.2% of respondents are male and 26.8% of respondents are female.
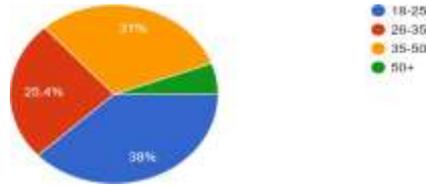
Fig 2: Age Group

Interpretation:- Fig 2 shows that the 38% of respondents are between 18 – 25 years of age group, 25.4% of respondents are between 26 – 35 years of age group, 31% of respondents are between 35-50 years of age group and 5.6% of respondents are more than 50 years of age group.

Fig 3: Primary Occupation

Interpretation:- Fig 3 shows that the 36.6% of respondents are student, 38% of respondents are employed, 9.9% of respondents are Self-Employed, 11.3% of respondents are having their own business and 4.2% of respondents are retired.

Fig 4: Payment Method

Interpretation:- Fig 4 shows that the 38% of respondents prefer UPI as a payment method, 39.4% of respondents prefer 39.4% of respondents prefer Cash as a payment method and 22.5% of respondents prefer both UPI as well as Cash as a payment method.

Fig 5: Control over Spending

Interpretation:- Fig 5 shows that the 42.3% of respondents feels that cash helps them to maintain better control over their spending, 33.8% of respondents feels that UPI helps them to maintain better control over their spending, 15.5% of respondents feels that both are equally helps them to maintain better control over their spending and 8.5% of respondents feels that neither helps them to maintain better control over their spending.

Fig 6: Impact to stick on a budget

Interpretation: - Fig 6 shows that the 35.2% of respondents spend more on non-essential with UPI, 32.4% of respondents do not make non-essential purchases, 18.3% of respondents spend the same amount on non-essential with both methods and 14.1% of respondents spend more on non- essential with cash.
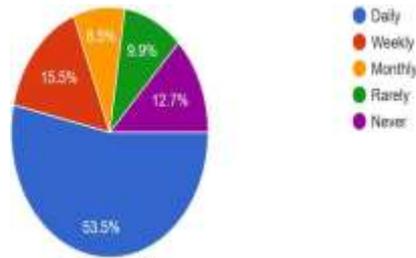
Fig 7: Use of UPI for transaction

Interpretation: - Fig 7 shows that the 53.5% of respondents use UPI for daily use, 15.5% of respondents use UPI on weekly basis, 8.5% of respondents use UPI on monthly basis, 9.9% of respondents use UPI very rarely and 12.7% of respondents never use UPI

Fig 8: Track Spending

Interpretation:- Fig 8 shows that the 46.5% of respondents feels UPI is a easier method to track spending because of transaction records, 28.2% of respondents feels cash is a easier method to track spending because physically track them and 21.1% of respondents feels both UPI and cash has equal easier method to track spending.
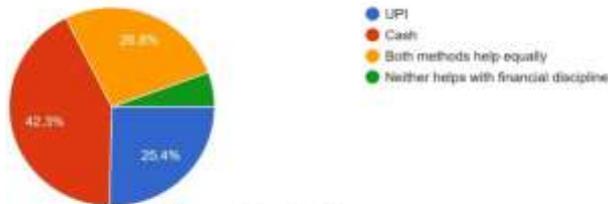
Fig 9: Financial Discipline

Interpretation:- Fig 9 shows that the 25.4% of respondents feels UPI maintain better financial discipline, 42.3% of respondents feels Cash maintain better financial discipline and 26.8% of respondents feels both Cash and UPI methods helps to maintain better financial discipline.
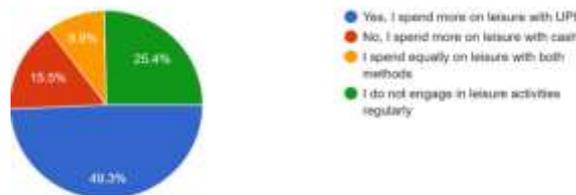
Fig 10: Spend on leisure activities

Interpretation:- Fig 10 shows that the 49.3% of respondents spend more on leisure activities with UPI, 15.5% of respondents spend more on leisure activities with cash, 25.4% of respondents do not engage in leisure activities and 9.9% of respondents spend equally on leisure with both methods
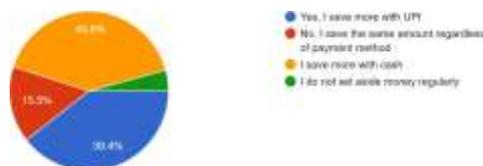
Fig 11: Savings

Interpretation:- Fig 11 shows that the 39.4% of respondents save more with UPI, 40.8% of respondents save more with cash and 15.5% of respondents save the same amount regardless of payment method

Fig 12: Convenience

Interpretation:- Fig 12 shows that the 47.9% of respondents find UPI as more convenient method of payment compared to cash, 35.2% of respondents find UPI and Cash as same convenient method of payment and 16.9% of respondents find UPI as less convenient method of payment.
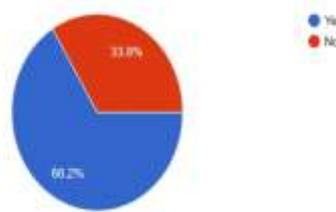
Fig 13: Adopting UPI

Interpretation:- Fig 13 shows that the 66.2% of respondents reduce the use of cash or cards and adopt UPI as a payment tool and 33.8% of respondents does not reduce the use of cash or cards and adopt UPI as a payment tool
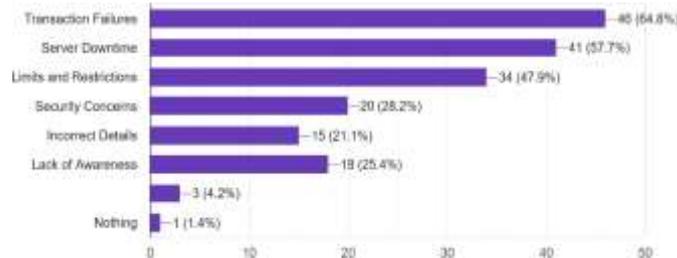
Fig 14: Challenges faced using UPI

Interpretation:- Fig 14 shows that 64.8% of respondents face challenges using UPI as Transaction failures, 57.7% faces Server Downtime, 47.9% face Limits and Restrictions, 28.2% face security concerns, 21.1% face Incorrect details and 25.4% are not aware about the UPI
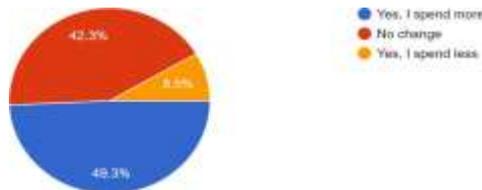
Fig 15: Spending Habits

Interpretation:- Fig 15 shows that the 49.3% of respondents has increase their spending habits after using UPI, 42.3% of respondents has no change in their spending habits and 8.5% of respondents has decrease their spending habits after using UPI.

Fig 16: Security

Interpretation:- Fig 16 shows that the 45.1% of respondents feels UPI very secure form of payment, 36.6% of respondents feels UPI somewhat secure form of payment and 18.3% of respondents feels UPI as not secure form of payment
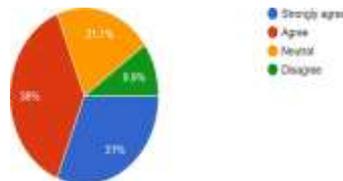
Fig 17: Payment processes

Interpretation:- Fig 17 shows that the 31% of respondents strongly agree that UPI has simplified payment process in their daily life, 38% of respondents agree that UPI has simplified payment process in their daily life, 21.1% of respondents are neutral that UPI has simplified payment process in their daily life and 9.9% of respondents are disagree that UPI has simplified payment process.

Findings:

- Majority of respondents (73.2%) are male, while 26.8% are female.
- Most respondents (38%) are aged between 18–25 years, followed by 31% between 35–50 years.
- A significant portion of respondents are either employed (38%) or students (36.6%).
- UPI (38%) and cash (39.4%) are the most preferred payment methods, with 22.5% using both.
- 42.3% believe cash helps maintain better spending control, while 33.8% feel the same about UPI.
- A notable 35.2% spend more on non-essentials with UPI, while 32.4% do not make non- essential purchases.
- 49.3% spend more on leisure with UPI, while only 15.5% spend more on leisure with cash.
- Cash (42.3%) is considered better for financial discipline compared to UPI (25.4%).
- 53.5% use UPI daily, while 12.7% never use it.
- 47.9% find UPI more convenient than cash, while 35.2% consider both equally convenient.
- 64.8% face transaction failures with UPI, 57.7% experience server downtime, and 28.2% have security concerns.
- While 45.1% feel UPI is a very secure payment method, 18.3% do not consider it secure.
- 66.2% have reduced cash/card usage in favor of UPI, while 33.8% have not.
- 49.3% have increased their spending after using UPI, while 42.3% report no change.
- 31% strongly agree that UPI has simplified payments, while 9.9% disagree.

Suggestions and Recommendations:

- Address transaction failures and server downtime issues to improve the user experience.
- Banks and service providers should enhance system stability and reduce downtime.
- Conduct awareness campaigns on secure UPI usage to reduce fraud and security concerns.
- Implement stricter authentication measures to enhance trust.
- Users should be educated on budgeting tools available within UPI apps to help track and control spending.
- Financial institutions can introduce spending limit features to prevent overspending.
- Since younger users dominate UPI usage, targeted awareness campaigns should be designed for older age groups.
- Simplified onboarding processes and customer support can help increase adoption.
- Despite UPI's convenience, cash remains an essential tool for financial discipline.
- Users should maintain a balanced approach by leveraging both cash and digital payments for financial stability.

Conclusions:

Digital payments, particularly UPI, have transformed the way people handle daily transactions. Many users find it incredibly convenient, not only because it simplifies payments but also because it provides a clear digital record of spending. This ease of tracking expenses has made UPI especially popular among younger users, who appreciate its efficiency and accessibility. However, while digital transactions continue to rise, cash still holds a special place for many. Some people prefer the tangible nature of physical money, feeling it gives them better control over their spending and financial discipline.

The findings suggest that cash and UPI are both widely used for daily transactions, with cash slightly edging out UPI as the preferred method. However, UPI is favored for its speed, ease of use, and convenience, particularly for bill payments, money transfers, and shopping. Despite its advantages, UPI faces challenges such as transaction failures, server downtimes, and security concerns, which hinder its widespread adoption. When it comes to spending control, cash is perceived as a more effective tool, likely due to its tangible nature and users' ability to physically track the money they have. In contrast, UPI is seen as useful for tracking spending through recorded transactions, especially among users who value its digital footprint.

UPI has simplified daily payment processes for many, with a significant portion agreeing that it helps streamline bill payments, shopping, and money transfers. However, some users still prefer cash for its simplicity and ability to give better control over spending.

To ensure UPI's continued growth while addressing these challenges, steps need to be taken to improve its reliability and security. Strengthening fraud protection, reducing transaction failures, and providing better customer support can help build user confidence. At the same time, promoting financial literacy and responsible spending habits can encourage users to strike a healthy balance between digital payments and cash. By tackling these issues, UPI can solidify its role as a trusted and efficient payment method, paving the way for a more seamless transition towards a cashless economy.

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Original Article

Is Fintech the Key To Financial Inclusion And Sustainable Business Growth?

Vibhuti Barad[1], Shreya Sudhir Parab[2], Riddhi Suhas More[3]
[1]Assistant Professor Tolani College of Commerce (Autonomous)
[2]Tolani College of Commerce (Autonomous)

Abstract

Fintech, which means financial technology, is becoming an important part of our daily life. It is changing the way people send, receive and manage money. Instead of using only traditional banking methods, people today use digital tools like UPI mobile banking apps, and digital wallets. These tools make financial services faster, safer, and more convenient. This research paper tries to understand how Fintech is helping in increasing financial inclusion. Financial inclusion means giving everyone, especially people in rural areas, low-income groups, and small businesses an easy access to financial services. With the help of Fintech, people can save money, make payments, take loans, and manage their financial without always visiting a bank. This study also looks at how Fintech supports sustainable business growth. Many small and medium businesses now use digital payment and online tools to improve their operations. This helps them grow steadily and reach more customers. Overall, this research shows that Fintech is playing a powerful role in creating a more inclusive and sustainable financial system.

Keywords: FinTech, Financial Inclusion, Digital Financial Services, Sustainable Business Growth, Mobile Banking, UPI and Digital Payments, Digital Wallets, MSMEs and Small Businesses, Digital Lending, Cashless Economy, Financial Technology Adoption, Digital Literacy

Introduction:

Fintech has brought a big transformation in the financial world by making banking related services faster, easier, and more accessible for common people, Earlier very individuals as specially those living in rural areas, found difficult to visit back due to law procedure as paper work. But with the help of Fintech tools like UPI apps, mobile banking, online wallets and digital lone platform people can now do most financial activities from the fall within a minute. This has encouraged more people to participate in the formal financial system and has a improve financial inclusion in the country. Fintech companies also provide simple option for saving, insurance, and investments, which help people, manage their finance in better way.

For small businesses and shopkeeper, Fintech has become extremely helpful. QR code payments, online billing, and digital record keeping save time and help well tell accurate transaction history. Well is wall businesses also receive quick loan through Fintech Apps without lengthy documentation which supports their daily operation and long term growth. The digital shift reduce the dependency or cash at promote transparency, making businesses activities more reliable and organised.

Literature Review

Research on Fintech shows that digital services such as mobile banking, online payment, digital lending have helped increase financial inclusion by making Financial services for accessible and affordable. Past studies highlight that Fintech reduce barriers like distance, high cost, and lack of documents, low income and rural people to use formal Financial services. Research also shows that FedEx support sustainable business growth by giving small businesses easier access to credit, improving cash flow, add reducing operational cost through digital tools. However, earlier studies also mention challenges such as digital illiteracy,

Address for correspondence:

Vibhuti Barad, Assistant Professor Tolani College of Commerce (Autonomous)

How to cite this article:

Cyber security risks, and the digital divide, which limit the the full benefit of Fintech. Overall previous research suggest that Fintech is a strong enabler of financial inclusion and long-term business growth when by supported by good regulation and digital awareness.

Objectives

This research has three main objectives:

- To explore how emerging Technology and Fintech are transforming traditional accounting and financial systems.
- To understand the role of financial inclusion it promoting sustainable and inclusive economic growth.
- To analyse the impact of digital financial tools (like UPI, MOBILE BANKING) on businesses.
- To extend affordable and secure digital financial services to the unbanked and underserved populations worldwide.
- To utilize alternative data and AI to enable credit access for individuals and MSMEs lacking traditional credit history.

Research Methodology

For this research, what both primary and secondary data was collected to understand how Fintech influence financial inclusion and sustainable business growth.

Primary data was gathered through a structured questionnaire that was created and circulated using Google form. The Survey includes close-ended questions related to awareness, usage, benefits, and challenges of Fintech services. The Google Form was shared with students, working individuals, shopkeepers and other respondents from local area to get diverse opinions.

After collecting the responses, the data was downloaded from Google forms into Excel for proper organisation and analysis. In Excel, the responses were arranged, and converted into different charts such as graphs, pie chart. The analysis of these chart helped in identifying the major factors Influencing Fintech adoption, And the is a need of awareness.

Along with primary data, secondary data was also collected to support the research. These information was taken from previous studies related to Fintech.

Data Analysis & Interpretation

Figure 1: Will you prefer running future business using digital systems (apps, software) instead of old-style paper records ?
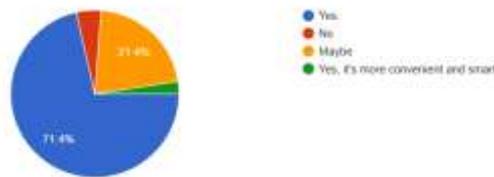
Interpretation: the pie chart shows that 70% of respondents would prefer using apps and software over traditional paper records to run of future businesses. This suggests that most people, especially younger users, find digital systems more convenient and smarter.

Figure 2: In what ways is Fintech helping businesses to reduce overall cost, enhance profitability, and contribute to Sustainable Business Growth?
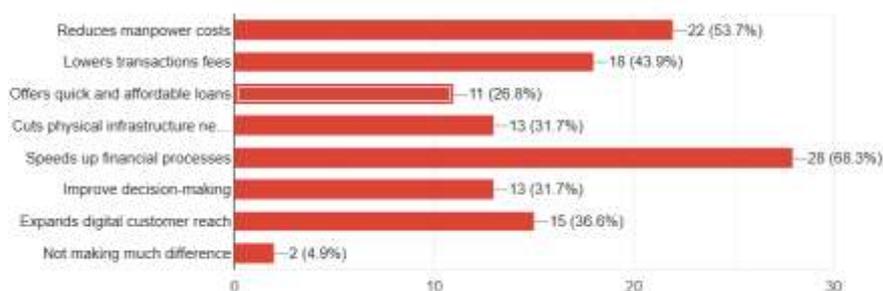
Interpretation: The bar chart clearly highlights the top perceived benefits of Fintech:

- 66.7% say it speed up financial processes.
- 51.3% believe it reduces manpower costs.
- 46.2% feel it lower transaction costs.
- This shows how Fintech is valued for helping businesses work faster, save money, and work smarter.

Figure 3: Can digital Financial services help a small businesses owner to get loans or support easily, even without visiting banks?
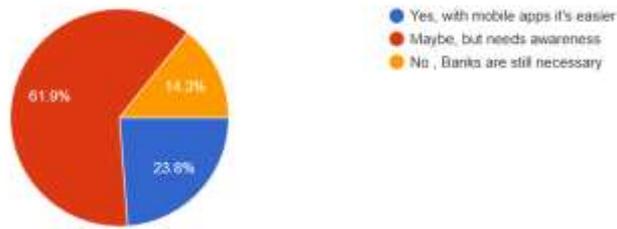
Interpretation: Bar chart depicts that 60% of respondents believe that loans maybe possible without visiting a bank but feel it requires more awareness, while 25% think it can be done through mobile apps. This tells us that while Fintech options exists, many still don't know about them, highlighting a need for digital awareness.

Figure 4: How do you think UPI and digital payments have changed the way small businesses handle their accounts and daily sales?
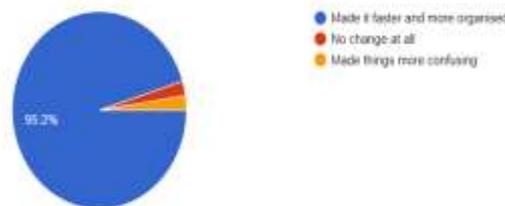
Interpretation: In the Above pie chart we can see that 95.2% of the people choose made it faster and more organised, and rest 4.8% people choose No change at all and made things more confusing it means that 95% of the people knows how UPI and Digital Payments have changed the small businesses handle their accounts on daily basis

Figure 5: Imagine you start a business which of these innovations will you choose first to grow faster?

Interpretation : In the Above pie chart we can noticed that 33.3 % of the people choose Social Media marketing and influencer branding or Accepting Payments through UPI and QR code , 28.6% of the people choose Creating a unique product design and 4.8% of the people choose Offering Delivery through app based services.

Findings

- Most respondents prefer digital tools over paper records, showing a shift towards convenience and smart financial system.
- Fintech improves businesses efficiency by speeding processes, reducing manpower costs, and lowering transaction expenses.
- Many people know about digital loans, but awareness is still limited, especially regarding mobile based loan access

Recommendations:

- Increase digital literacy programs so that more users, especially in rural areas, can confidently use FinTech services.
- Strengthen cybersecurity and fraud awareness to build more trust among users.
- Encourage FinTech lending, especially for micro-entrepreneurs and start-ups.
- Enhance multi lingual app interfaces to make FinTech easier for non-English-speaking users.5.Promote collaboration between banks, Fintech, and government to increase financial reach

Impact on Decision Making:

FinTech improves decision-making by providing individuals with real-time financial information, easy tracking of expenses, and secure digital transactions, which help them manage money more effectively. For businesses, FinTech offers faster payments, digital records, automated accounting, and access to online loans, enabling better cash flow planning and strategic growth decisions.

Major Challenges Identified:

Despite the growth of Fintech, several challenges still there:

- Low digital literacy and lack of awareness among new users.
- Cyber security risks and fraud cases that reduce trust in digital platforms.
- Data privacy concerns related to sharing personal and financial information.
- Poor internet connection and technical issues, especially for small businesses.
- Difficultly in adapting to new technology, leading to resistance among some users.

Future Scope:

Fintech has the potential to expand financial inclusion by reaching unbanked and remote communities through digital payments, lending, and investment platforms. It can support sustainable business growth by enabling green finance and funding for small business. Digital investment platforms will promote wealth creation and financial literacy among individuals.

Discussion:

The Study shows that Fintech plays a strong role in improving financial inclusion by making Financial services more accessible, affordable, and users friendly. Digital tools like mobile banking, UPI, online wallets, help people who are excluded due to distance, high cost or documents. Our findings suggest that users prefer Fintech mainly because it is convenient, fast and available 24/7.

Fintech also contributes to sustainable business growth by offering easier payment solutions, faster transaction, and better financial management tools. Small businesses, startup, and self employed individuals benefits from digital payment, online lending and automate accounting system. These services reduces operational cost and help businesses grow efficiently and in transparent manner.

Conclusion:

From the responses we received, it is clear that people,especially young users and individuals involved in small businesses ,view FinTech as a smart, reliable, and essential tool for modern financial activities. The findings indicate that digital services such as mobile banking, UPI, online wallets, and financial apps are becoming the preferred choice because they offer convenience, speed, and easy access compared to traditional banking methods. FinTech not only helps users manage their money more efficiently but also supports businesses.

Features like faster transactions, reduced manpower usage, and lower transaction costs make FinTech highly valuable for business growth.

Overall, the study concludes that FinTech is indeed a key factor in promoting financial inclusion and sustainable business growth. With continuous improvement in digital education, security, and accessibility, FinTech has the potential to make financial systems more inclusive, efficient, and supportive for both individuals and businesses.

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Original Article

Leveraging AI to Transform Teaching Practices: Revolutionizing Higher Education for Academicians in the Western Mumbai Suburb Region

Reenakumari Gupta

Assistant Professor, Thakur Institute of Management Studies & Research

Abstract

Artificial Intelligence (AI) is transforming various sectors, including education, by offering innovative solutions to long-standing challenges. With its ability to analyze large datasets, automate tasks, and provide personalized learning experiences, AI presents significant opportunities to improve both teaching and learning outcomes. In higher education, AI has the potential to revolutionize traditional teaching methods, enhance instructional efficiency, foster student engagement, and improve academic performance. This research explores how AI can be utilized to transform teaching practices in higher education, focusing on institutions in the Western Mumbai suburbs. The study examines how academicians in the region are integrating AI into their teaching practices, the tools they use, the extent of AI adoption, and how these technologies are reshaping pedagogical approaches. It also explores the challenges faced by academicians, such as limited technical expertise and resistance to change, while analyzing the impact of AI-driven teaching on student engagement and performance. Through surveys and data analysis, the research will assess the adoption rate of AI, identify barriers to its integration, and explore the relationship between AI usage and student outcomes. The study will test four hypotheses: AI's role in transforming teaching, the degree of AI adoption, the challenges to integration, and AI's impact on student performance. The findings will offer practical insights and recommendations for educators on effectively integrating AI in the classroom, aiming to enhance teaching practices, promote student success, and improve the quality of higher education in the region.

Keywords: Artificial Intelligence (AI), Higher Education, Teaching Practices, Pedagogical Transformation, AI Adoption, Western Mumbai Suburbs, Student Engagement, Academic Performance, Educational Technology, Instructional Innovation, Faculty Challenges, Personalized Learning, AI Tools in Education, Technological Integration.

Introduction:

Artificial Intelligence (AI) is a rapidly advancing area within computer science dedicated to building systems capable of performing cognitive functions traditionally associated with human intelligence. These capabilities include learning from experience, processing language, recognizing complex patterns, and making independent decisions (Russell & Norvig, 2016). No longer confined to fictional narratives, AI is now embedded in many aspects of daily life—from digital assistants like Siri and Alexa to recommendation engines on streaming and shopping platforms, and even in self-driving technology. Its strength lies in its capacity to handle massive datasets and deliver real-time, informed decisions, making it an invaluable asset across multiple sectors, including the realm of education.

Over the years, educational practices have evolved significantly. Traditional models based on lectures, textbooks, and standardized testing have gradually incorporated digital tools like e-learning platforms, virtual classrooms, and multimedia resources. Despite these advancements, many academic institutions still rely on outdated teaching methods that are not always suitable for the modern, tech-savvy learner (Prensky, 2001). These approaches often lack the flexibility needed to cater to individual learning styles and fail to engage students effectively in an increasingly digital world.

Address for correspondence:

Reenakumari Gupta, Assistant Professor, Thakur Institute of Management Studies & Research

How to cite this article:

This gap between conventional education and the personalized learning needs of students is particularly evident in high-growth academic zones such as the Western suburban areas of Mumbai. These institutions are experiencing rapid growth in enrollment and student diversity, leading to challenges in maintaining instructional quality, managing large classrooms, and providing tailored support. Educators are often overburdened with administrative tasks, which limits their ability to focus on student engagement and mentorship.

AI presents promising solutions to many of these educational challenges. As highlighted by Luckin et al. (2016), AI can empower educators by offering real-time insights into student performance, customizing learning experiences, and automating repetitive administrative duties like grading and attendance tracking. Tools such as adaptive learning platforms and intelligent tutoring systems—examples include Carnegie Learning and Knewton—are already being implemented globally to support individualized learning and improve academic outcomes.

The impact of AI in education extends beyond experimentation. Klaus Schwab, in *The Fourth Industrial Revolution* (2016), notes that emerging technologies like AI are fundamentally reshaping how industries and education systems operate. Many institutions have begun using AI-driven tools, including virtual teaching assistants, chatbots to support student queries, predictive analytics for academic success, and immersive learning experiences through augmented or virtual reality. This study seeks to examine how AI is being adopted and utilized within higher education institutions in Mumbai's Western suburbs. It will explore the specific AI tools in use, their influence on instructional methods, and the challenges educators face such as limited technical training and resistance to adopting new technology. Additionally, it aims to assess the broader impact of AI on student participation, performance, and learning outcomes.

By analyzing ongoing developments and obstacles, this research intends to provide actionable recommendations for institutions aiming to integrate AI into their educational practices. Ultimately, it aspires to support the creation of a more adaptable, innovative, and technologically enriched learning environment.

Review of Literature

AI has become a widely discussed topic, with many researchers exploring its applications in various fields. Some have examined its impact on employment, others have studied its use in the automotive industry, and many have analyzed its potential opportunities and challenges. However, I have not come across any research that focuses on AI from the perspective of educators in higher education, particularly in terms of how it can benefit students in the Western Suburban Region. Below, I have included reviews of related papers that discuss AI.

- **Allam, Gyamfi, and AlOmar (2025)** explore how AI and "living intelligence" are reshaping higher education through adaptive and personalized learning systems. The study emphasizes AI's role in enhancing efficiency, inclusivity, and mental well-being support. It also raises concerns about ethics, data privacy, and bias. The authors advocate for responsible AI integration through faculty training and strong institutional policies. Their work presents a comprehensive view of AI's potential to improve sustainability and educational relevance.

- **Seema Yadav (2025)** examines how AI, VR, and AR are transforming education through immersive and personalized learning. These tools enhance student engagement and retention by simulating real-world scenarios. The chapter emphasizes the need to address ethical concerns, data privacy, and digital inequality. Yadav stresses the importance of ethical frameworks and ongoing research. The work supports inclusive and responsible use of AI in diverse educational environments.

- **Zahir Osman, Noral Hidayah Alwi, Khairul Hamimah Mohamad Jodi, Bibi Nabi Ahmad Khan, Mohammad Naim Ismail, Yuzery Yusoff (2024)** conducted an empirical study on AI adoption in higher education institutions, focusing on psychological factors such as attitude, perceived usefulness, ease of use, and trust, with intention as a mediator. Using structural equation modeling on data from 362 respondents, the study confirmed significant direct and mediated relationships, highlighting these factors' vital role in influencing AI usage in academics.

- **Ashokkumar Baldevbhai Prajapati (2024)** explores how AI is reshaping education by personalizing learning and enhancing student engagement through adaptive technologies. The paper highlights AI's role in supporting educators with real-time student insights and customized interventions. However, it also addresses challenges like ethical concerns, data privacy, and the digital divide. Prajapati calls for responsible AI integration through curriculum reforms and teacher training. The goal is to ensure equitable and effective use of AI in education

- **Saxena, N., Kumar, A., Makwana, P., Band, G., Teltumbade, G. R., & Ilankumaran, G. (2024)** examine the transformative impact and multifaceted applications of Artificial Intelligence (AI) in higher education while addressing associated challenges. The study highlights AI's growing role in revolutionizing institutional operations and enhancing learning experiences, driven by developments in e-learning systems. However, the authors also underscore the risks tied to AI adoption, such as ethical dilemmas, privacy concerns, and the slow pace of regulatory frameworks. They stress the need for balanced strategies that maximize benefits while mitigating technological and institutional risks in academia.

- **Laxman Toli (2023)** emphasizes the transformative role of Artificial Intelligence (AI) in reshaping India's higher education landscape. The study advocates for integrating AI into academic curricula, redefining the roles of educators to align with technological advancements, and promoting lifelong learning to prepare students for an AI-

driven future. It also underscores the importance of international collaboration in building a knowledge-based society and empowering students through innovative, technology-enabled learning environments.

- **Babu George and Ontario Wooden (2023)** examine how AI can strategically transform higher education through the concept of "smart universities." They emphasize benefits like personalized learning and operational efficiency while addressing concerns such as bias, privacy, and job displacement. The study calls for informed, inclusive strategies to ensure ethical and effective AI integration, especially in contexts like HBCUs.
- **Dr. Yashpal D. Netragaonkar (2022)** "Role of Artificial Intelligence (AI) in Higher Education". His conceptual paper explores how AI can enhance educational delivery through automation, personalized learning, and accessibility. It emphasizes AI's role in reshaping higher education and suggests that institutions must adapt to benefit from AI's capabilities in both teaching and administration.

Research Gap

Although global interest in AI in education is increasing, research focused on regions like the Western suburbs of Mumbai is scarce. Most studies center on developed countries or urban areas, overlooking local challenges such as infrastructure limitations, faculty preparedness, and resistance to changing teaching practices. Additionally, the specific impact of AI on education with its unique teaching requirements remains underexplored. This study seeks to address these gaps by investigating AI adoption, challenges, and outcomes in higher education in this region.

Objectives

- To explore the role of AI in transforming teaching practices in higher education.
- To assess the extent of AI adoption in higher education within Western Mumbai suburbs.
- To identify key challenges academicians face in integrating AI into teaching.
- To analyze the impact of AI-driven teaching on student engagement and performance.

Hypothesis

- **H1:** The role of AI in transforming teaching practices in higher education is either insignificant or significant.
- **H2:** The extent of AI adoption in higher education within Western Mumbai suburbs is either minimal and insignificant or substantial.
- **H3:** Academicians either do or do not face significant challenges in integrating AI into teaching.
- **H4:** AI-driven teaching either has an insignificant or significant impact on student engagement and performance.

Limitations of the Research

- The study's focus on the Western suburbs of Mumbai limits the generalizability of findings to other regions in India or globally.
- A small sample size of institutions and academicians may reduce the diversity and comprehensiveness of the data.
- The research may overlook other emerging AI tools and technologies that could also play a role in transforming education.
- Differences in technological infrastructure across institutions may affect the consistency and effectiveness of AI adoption.
- The study relies on surveys and data analysis, which may be limited by the availability and reliability of participant responses.
- The short time frame may prevent the assessment of long-term impacts of AI adoption on teaching practices and student outcomes.

Research Methodology

This study examines the adoption and impact of Artificial Intelligence (AI) on teaching practices in higher education institutions in the Western suburbs of Mumbai. Using a descriptive survey, data was collected from 100 faculty members. The survey will explore AI adoption, tools in use, challenges faced, and the impact on student engagement and performance. Hypotheses will be tested using a two-tailed test, chi-square test, and p-value analysis. The study aims to provide insights into AI integration, identify barriers, and offer recommendations for improving teaching practices and student outcomes, while acknowledging limitations such as sampling bias and reliance on self-reported data.

Data Analysis

The demographic and basic information about respondents is gathered in table below:

Age Group	No. of respondents	Percentage
20 to 30	48	48 %
31 to 40	33	33 %
41 to 50	13	13 %
51 and above	6	6 %

Grand Total	100	100 %
Gender	**No. of respondents**	**Percentage**
Male	35	35 %
Female	65	65 %
Grand Total	**100**	**100 %**
Designation	**No. of respondents**	**Percentage**
Lecturer	54	54 %
Assistant Professor	36	36 %
Associate Professor	6	6 %
Professor	4	4 %
Grand Total	**100**	**100 %**
Teaching Experience	**No. of respondents**	**Percentage**
Less than 5 years	42	42 %
5 to 10 years	34	34 %
11 to 20 years	17	17 %
More than 20 years	7	7 %
Grand Total	**100**	**100 %**
Awareness of AI	**No. of respondents**	**Percentage**
Yes	84	84 %
No	9	9 %
Maybe	7	7 %
Grand Total	**100**	**100 %**
Usage of AI	**No. of respondents**	**Percentage**
Yes	64	64 %
No	31	31 %
Maybe	5	5 %
Grand Total	**100**	**100 %**

Hypothesis Testing
H1: The role of AI in transforming teaching practices in higher education is either insignificant or significant.

Binomial Test					
	Category	Count	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Do you currently use any AI tools or technologies in your teaching	Yes	61	0.61	0.50	0.035
	No	39	0.39		
	Total	100	1.00		
Are you aware of the use of AI in higher education teaching pr	Yes	91	0.91	0.50	0.000
	No	9	0.09		
	Total	100	1.00		

Which AI tools or technologies do you use?	count	Percentage
Adaptive learning platforms	17	17%
Chatbots for student queries	18	18%
ChatGPT	50	50%
Gemini	20	20%
Meta AI	14	14%
Automated grading tools	7	7%
Co Pilot	2	2%
Learning Management Systems (LMS) with AI features	24	24%
None	26	26%

Conclusion: The alternative hypothesis (H_a) is accepted as AI plays a significant role in transforming teaching

H2: The extent of AI adoption in higher education within Western Mumbai suburbs is either minimal and insignificant or substantial.

Adoption Levels
- 61% of respondents currently use AI tools in their teaching.
- 94% believe AI adoption is increasing in the Western Mumbai suburbs.

Institutional Training
- Only 39% report that their institutions provide training or resources for AI integration, indicating room for improvement in support systems.

Does your institution provide training or resources for integr	Do you currently use any AI tools or technologies in your teaching			Total
	Maybe	No	Yes	
No	4	25	32	61
Yes	1	9	29	39
Total	5	34	61	100

Conclusion: The Null Hypothesis is accepted as significant (minimal) adoption of AI is seen.

H3: Academicians either do or do not face significant challenges in integrating AI into teaching

Major Challenges as follows
- Lack of technical expertise: 57%
- Limited access to AI tools and resources: 54%
- High implementation costs: 37%
- Resistance to change among faculty or students: 38%

Ethical and Privacy Concerns
- 71% believe AI integration poses ethical or privacy concerns.

➢ **Proposed Measures to Overcome Challenges**
- Providing training for faculty: 69%
- Increasing access to AI tools and resources: 53%
- Addressing ethical and privacy concerns: 49%

Challenges		How has AI driven teaching impacted student engagement in your				Total
		Moderately improved	No impact	Significantly improved	Slightly improved	
High implementation costs	0	17	21	4	21	63
	1	11	10	8	8	37
Chi Square statistics		**5.995**			**P value**	**0.112**
Lack of technical expertise	0	14	12	4	13	43
	1	14	19	8	16	57
Chi Square Statistics		**1.290**			**P value**	**0.731**
Limited access to AI tools and resources	0	15	11	4	16	46
	1	13	20	8	13	54
Chi Square statistics		**3.784**			**P value**	**0.286**
Resistance to change among faculty or students	0	19	16	8	19	62
	1	9	15	4	10	38
Chi Square Statistics		**2.091**			**P value**	**0.554**

Conclusion: The alternative hypothesis (H_a) is accepted. Academicians face significant challenges in integrating AI into teaching.

H4: AI-driven teaching either has an insignificant or significant impact on student engagement and performance.

Impact on Student Engagement
- Moderately improved: 28%
- Slightly improved: 29%
- Significantly improved: 12%
- No impact: 31%

Impact on Student Academic Performance
- Moderately improved: 34%
- Slightly improved: 30%
- Significantly improved: 9%
- No impact: 27%

Student Response to AI-Driven Teaching
- 74% of respondents report positive student responses to AI-driven teaching methods.

Hypothesis Testing Summary

Hypothesis	Mapped Questions	Statistical Test	Test Result	Interpretation
H_1: AI transforms teaching practices	Use of AI Tools, Awareness	Binomial Test (p=0.035, 0.000)	**Reject H_0 Accepts H_a**	AI plays a significant role in transforming teaching
H_2: AI adoption is significant in Western Mumbai	Usage, Perception, Institutional Support	Chi-Square (p=0.087)	**Fail to reject H_0 (marginal) Accepts H_0**	Significant adoption with limited support
H_3: Challenges in integrating AI	Challenges, Confidence, Usage	Chi-Square, Descriptive Stats	**Accept H_a**	Academicians face significant challenges
H_4: AI impacts engagement and performance	Engagement, Performance, Benefits	Descriptive Stats, Frequencies	**Accept H_a**	Positive impact on engagement & performance

Conclusions

This study explored the growing role of artificial intelligence (AI) in shaping higher education, with particular emphasis on faculty experiences in the Western suburbs of Mumbai. Findings indicate that AI is significantly transforming teaching practices, as reflected by strong levels of awareness and adoption among academic staff. Nevertheless, the expansion of AI integration is constrained by limited institutional backing, especially in areas such as training and technological infrastructure which could impede its wider and more effective use.

Educators face several notable barriers to adopting AI, including a lack of technical skills, insufficient access to digital tools, and unresolved ethical and privacy concerns. These challenges highlight the urgent need for institutions to invest in capacity-building efforts, provide targeted training programs, and allocate appropriate resources to support seamless AI adoption.Despite these limitations, the research also demonstrates a clear positive impact of AI on student engagement and academic achievement, underscoring its potential to enrich the educational experience.

In summary, this study offers actionable recommendations for academic leaders and policymakers. Overcoming current limitations through strategic planning, institutional commitment, and educator development will be key to fully realizing AI's benefits. When effectively implemented, AI can enhance instructional quality, foster student success, and drive meaningful progress in the higher education landscape of the region.

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Original Article

Performance Analysis of Mutual Fund: A Comparative study of Different Multi Asset Allocation hybrid mutual fund schemes

Alok Sandeep Bhanushali[1], Dr. Nilesh E. Koli[2]

[1,2]Assistant Professor Changu Kana Thakur Arts, Commerce and Science College (Autonomous), New Panvel

Abstract

India is the one of the largest growing economic in world. Nowadays Capitalist are playing smart Role buy creating money from money. The Smart move is by investing their money in stock market which is highly risky but some capitalists are not ready to take such high risk so they can grow their money through investing in mutual fund. This study made an attempt to analyse the performance of Different Multi Asset Allocation hybrid mutual fund schemes and compare the performance of selected Multi Asset Allocation hybrid mutual fund schemes, measure the risk- return relationship and market volatility of the selected mutual fund schemes. The evaluation was achieved by using various financial tools like: Rate of Return, Standard Deviation, Beta, Sharpe Ratio, Jenson ratio, Treynor Ratio. The secondary data collected from websites of BSE, NSE, AMFI, Money Control and Rupee vest websites. In this study it is observed ICICI Pru Multi-Asset Fund, HDFC Multi-Asset Fund, and Nippon India Multi-Asset Allocation Fund stand out due to their strong Sharpe Ratios, low Beta values, and positive Jensen's Alpha, SBI Multi-Asset Allocation Fund and Tata Multi-Asset Opportunity Fund show decent risk-adjusted returns but fall short in terms of outperformance (Jensen's Alpha). Motilal Oswal Multi-Asset Fund and Axis Multi Asset Allocation Fund have shown negative or very low risk-adjusted performance (Sharpe, Treynor, and Jensen's Alpha), Quant Multi Asset Fund has a very high Beta, making it the most volatile fund in the group. The conclusion for the study is that Investors should opt Quant Multi Asset Fund and ICICI Pru Multi-Asset Fund. For Stable Growth & Moderate Risk Investors should opt for HDFC Multi-Asset Fund, Nippon India Multi Asset Fund. For Conservative Investors should opt for SBI Multi Asset Allocation Fund (Low Beta, Steady Returns).

Keywords: Stock market, Mutual Fund, Mutual Fund Schemes, Multi Asset Allocation.

Introduction:

A mutual fund operates as a collective investment structure in which contributions from multiple investors are pooled and managed by a professional fund manager. Each fund is built around a clearly defined investment objective, and investors receive units proportional to their contributions. The value of these units is represented by the Net Asset Value (NAV), which reflects the market value of the underlying securities after deducting expenses.

Mutual funds allow individuals—even those with limited capital—to access diversified portfolios that would otherwise be difficult to assemble independently. These portfolios may consist of equity, debt instruments, money market securities, or a mix of asset classes, depending on the fund's strategy. The fund manager is responsible for selecting securities, monitoring performance, and adjusting the portfolio to align with the stated objectives.

In India, mutual funds function under a legal framework established by the Indian Trusts Act (1882) and are regulated by the Securities and Exchange Board of India (SEBI) under the SEBI (Mutual Funds) Regulations, 1996. SEBI mandates transparency, fair valuation, and investor protection through strict guidelines on expenses, operational standards, and disclosures. Additionally, tax provisions under the Income Tax Act, 1961 provide incentives such as exemptions on dividends and favorable tax treatment on equity-oriented funds. Beyond investment returns, the mutual fund industry plays a broader economic role—generating employment, contributing to capital market development, and enhancing financial inclusion.

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Address for correspondence:

Alok Sandeep Bhanushali, Assistant Professor Changu Kana Thakur Arts, Commerce and Science College (Autonomous), New Panvel

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As the industry grows, mutual funds continue to offer accessible, professionally managed, and relatively transparent investment solutions for a wide range of investors.

1. Key Features of Mutual Funds: -
- Mutual funds are managed by trained and experienced investment professionals who analyze markets, track performance indicators, and adjust portfolios according to market conditions and scheme objectives.
- Investors do not directly own individual securities; instead, they hold units of the fund. This structure allows small investors to benefit from a diversified portfolio that would otherwise require substantial capital.
- Mutual funds reduce risk by spreading investments across various asset classes and securities. Losses from underperforming instruments can be offset by gains in others, helping stabilize overall portfolio performance.

2. Multi Asses Allocation Fund:

Multi-asset allocation funds combine exposure to multiple asset classes within a single investment framework. These schemes typically include equity, debt instruments, and at least one additional category such as gold, commodities, or real estate-linked assets. By allocating capital across diverse segments, the fund aims to balance risk and return more effectively than single-asset investment options.

Fund managers use dynamic allocation strategies, adjusting the weight of each asset class in response to market conditions. This adaptability helps mitigate volatility while seeking opportunities for enhanced returns. A multi-asset approach provides broad diversification, reduces reliance on any one market segment, and supports long-term wealth creation through exposure to varied sources of growth.

Investors benefit from institutional-style diversification with the convenience of a single fund, making these schemes suitable for those seeking stability without sacrificing performance potential.

Review of Literature:
- **Sharma and Tripathi (2023)** assessed the comparative performance of small-cap, mid-cap, and large-cap funds using SIP-based evaluation tools such as beta, standard deviation, and risk-adjusted ratios. Their work emphasized that investors should select funds based on personal risk capacity and financial objectives.
- **Ananthasuresh et al. (2023)** explored the behavioral side of mutual fund investments, identifying how demographic factors influence investor choices. Their findings suggest that income levels and preference for short-term funds significantly shape investment decisions, while variables such as location and experience appear less influential.
- **Sharma (2023)** evaluated systematic investment plans across major mutual fund schemes, revealing fluctuations in performance over different market cycles. The study recommended goal-oriented investing strategies to maintain investor satisfaction.
- **Klinkowska and Zhao (2022)** analyzed socially responsible investing (SRI) mutual funds in the U.S. market. Their research concluded that SRI funds often generate abnormal positive returns and attract consistent inflows, though differences exist between retail and institutional participation.
- **Sharma and Joshi (2022)** compared selected debt, equity, and hybrid mutual funds using measures such as Sharpe and Treynor ratios. Their results showed that debt funds performed strongest under CRISIL rankings, while other categories exhibited mixed results.
- **Harinie et al. (2022)** focused on mutual fund returns in relation to equity investment plans. Their study identified the need for further research linking fund characteristics—such as size, growth, and volume—with broader market dynamics.
- **Sharma (2020)** reviewed the performance of selected Indian mutual funds during 2017–2019, concluding that most funds performed adequately even during volatile market periods. The study highlighted the importance of statistical assessments in investor decision-making.
- **Tripathi and Japee (2020)** analyzed ten equity-oriented schemes and found that several funds delivered strong returns despite market volatility. The authors stressed the relevance of risk ratios for evaluating performance.
- **Maheswari and Dineshkumar (2019)** studied Axis Mutual Fund's diversified schemes using various financial ratios. Their findings indicated that most funds exhibited favorable risk-return profiles, supported by high R^2 values and below-market beta levels.

Research Methodology:

Objectives of the Study:
- To evaluate and compare the performance of different Multi Asset Allocation Mutual Funds Schemes on the basis of return
- To examine and compare the risk and return component among selected Multi Asset Allocation Mutual Fund Schemes.
- To give suggestions on which mutual funds schemes are profitable for investors.

Hypotheses of the Study

Hypotheses 1

- **H0**: - There is no significant difference in the average returns of different Multi Asset Allocation Mutual Fund Schemes.
- **H1**: - There is a significant difference in the average returns of different Multi Asset Allocation Mutual Fund Schemes.

Hypotheses 2

- **H0**: - There is no significant relationship between risk and return in Multi Asset Allocation Mutual Fund Schemes.
- **H1**: - There is significant relationship between risk and return in Multi Asset Allocation Mutual Fund Schemes.

Scope of the Study

A Multi-Asset Scheme is a type of mutual fund that invests across multiple asset classes, such as equity, debt, commodities, and real estate. The goal is to create a diversified portfolio that minimizes risk while maximizing returns. This study compares the performance of Multi-Asset Schemes, as they allow investors to benefit from the growth potential of different asset classes, offering a balance between risk and return. Multi-Asset Schemes provide investors with the flexibility to adjust exposure to different asset types based on market conditions.

Source of Data

Data Collection for the research is Secondary in Nature. Data had been sourced from high-end financial newspapers and reports i.e., Capital Market, Chartered Financial Analyst, SEBI annual reports, RBI publications, AMFI, Money control, Morningstar and the Economic and Political Weekly.

Sampling Method

Number of Hybrid Schemes available as per Scheme Category

Scheme Category	No. of Schemes
Hybrid Scheme - Aggressive Hybrid Fund	197
Hybrid Scheme - Arbitrage Fund	183
Hybrid Scheme - Balanced Hybrid Fund	12
Hybrid Scheme - Conservative Hybrid Fund	151
Hybrid Scheme - Dynamic Asset Allocation or Balanced Advantage	151
Hybrid Scheme - Equity Savings	162
Hybrid Scheme - Multi Asset Allocation	110
Total	**966**

- In India, out of 15,825 mutual fund schemes, 966 are Hybrid mutual fund schemes which is bifurcated into 110 Multi Asset Hybrid scheme, 162 Hybrid scheme Equity savings, 151 Hybrid scheme Dynamic Asset, 151 Hybrid Scheme Conservative, 12 Hybrid Scheme Balanced, 183 Hybrid Scheme Arbitrage, 197 Hybrid Scheme Aggressive.
- Out of 110 Multi Asset Hybrid Scheme, 10 Multi Asset Hybrid scheme has been selected based on the Highest AUM of the scheme and having 5 Years of Return.

The Scheme Selected for the research study is as follows:

- Quant Multi Asset Fund
- ICICI Pru Multi-Asset Fund
- HDFC Multi-Asset Fund
- SBI Multi Asset Allocation Fund-Reg
- UTI Multi Asset Allocation Fund-Reg
- Edelweiss Aggressive Hybrid Fund-Reg
- Axis Multi Asset Allocation Fund-Reg
- Tata Multi Asset Opp Fund-Reg
- Motilal Oswal Multi Asset Fund-Reg
- Nippon India Multi Asset Allocation Fund-Reg

Statistical Tools

Rate of Return (RoR)

the rate of return measures how much an investment has grown or declined over a certain period. It reflects the percentage change in value and helps investors assess how effectively a fund has performed.

Alpha

Alpha indicates whether a fund has generated returns above or below what would be expected given its risk level. A positive alpha shows outperformance, while a negative alpha signals that the fund delivered less than expected.

Beta

Beta measures a fund's sensitivity to market movements. A beta greater than 1 suggests higher volatility relative to the market, whereas a beta below 1 indicates a more stable return pattern.

Standard Deviation

Standard deviation reflects the extent to which a fund's returns deviate from its average return. A higher value means greater variability and therefore higher risk.

Sharpe Ratio

the Sharpe ratio evaluates how efficiently a fund generates returns relative to the amount of total risk taken. A higher Sharpe ratio indicates better risk-adjusted performance.

Jensen's Alpha

Jensen's alpha measures the excess return a fund generates compared to the return predicted by its beta and overall market performance. It helps distinguish manager skill from market-driven results.

Treynor Ratio

the Treynor ratio compares a fund's excess return to its market-related risk. It is useful for evaluating performance when an investor is primarily concerned with systematic risk ratio suggests a better risk-return profile in terms of market-related volatility.

Limitation of the study

- The study is limited to 10 Multi Asset Allocation Mutual Fund Scheme.
- The study is limited to 10 Asset Management Companies
- The study is limited to Five years 2019-20 to 2023-24 only.

4. Data Collection and Data Analysis

Annual Return – Multi Asset Allocation Fund

Scheme Name	2024	2023	2022	2021	2020
Axis Multi Asset Allocation Fund	15.4%	12.93%	- 5.75%	22.8%	18.02%
Edelweiss Aggressive Hybrid Fund	20.17%	25.42%	5.33%	27.09%	12.71%
HDFC Multi-Asset Fund	13.49%	17.98%	4.34%	17.91%	20.88%
ICICI Pru Multi-Asset Fund	16.15%	24.15%	16.84%	34.72%	9.94%
Motilal Oswal Multi Asset Fund	2.35%	13.51%	0.2%	4.37%	-
Nippon India Multi Asset Allocation Fund	18.65%	24.27%	3.22%	19.2%	-
Quant Multi Asset Fund	25.95%	21.94%	13.25%	54.05%	26.89%
SBI Multi Asset Allocation Fund	12.79%	24.38%	5.98%	13.02%	14.22%
Tata Multi Asset Opp Fun	14.52%	18.3%	6.93%	22.4%	-
UTI Multi Asset Allocation Fund	20.71%	29.15%	4.42%	11.8%	13.13%

Interpretation:

Top Performers:

- **Quant Multi Asset Fund**:
  o This fund stands out as the best performer. It had a strong return in every year it was listed, including an exceptional performance in 2021 (54.05%) and 2020 (26.89%).
  o The fund consistently outperformed most other funds, with the highest returns in 2020 and 2021. The overall performance is highly impressive.
- **Edelweiss Aggressive Hybrid Fund**:
  o This fund demonstrated strong performance, particularly in 2021 (27.09%) and 2023 (25.42%).
  o Despite some decline in 2022 (-5.75%), it showed a healthy recovery with strong returns in 2024 (20.17%).
- **ICICI Pru Multi-Asset Fund**:
  o ICICI Pru had excellent returns in 2021 (34.72%) and 2023 (24.15%). Despite a dip in 2022 (16.84%), its overall return profile is solid, with a relatively strong performance across years.
- **Nippon India Multi Asset Allocation Fund**:
  o This fund also displayed strong and consistent returns, especially in 2021 (19.2%) and 2024 (18.65%).

Moderate Performers:
- **Axis Multi Asset Allocation Fund**:
  o Axis consistently provided positive returns, with the highest return in 2021 (22.8%) but a more modest performance in 2022 (-5.75%) and a slight drop in 2020 (18.02%).
- **HDFC Multi-Asset Fund**:
  o HDFC provided stable returns, with positive returns in each of the five years. Its highest return came in 2020 (20.88%) but showed less volatility than some other funds, indicating a relatively more stable performance.
- **SBI Multi Asset Allocation Fund**:
  o SBI showed moderate returns with notable consistency, especially in 2023 (24.38%) and 2020 (14.22%). Despite a dip in 2022 (5.98%), it managed to recover and show stable growth.

Underperformers:
- **Motilal Oswal Multi Asset Fund**:
  o This fund exhibited weak performance, particularly in 2024 (2.35%), with the lowest return across the board for that year. It also had moderate returns in previous years (13.51% in 2023 and 4.37% in 2021), but overall, its performance was comparatively lower than other funds.
- **Tata Multi Asset Opportunity Fund**:
  o Tata's performance was relatively inconsistent, with a relatively strong return in 2021 (22.4%), but without significant performance in 2020, and no data for 2024. It also had only a moderate return in 2022 (6.93%).
- **UTI Multi Asset Allocation Fund**:
  o UTI performed decently in 2023 (29.15%) and 2024 (20.71%), but showed a decline in 2022 (4.42%) and 2021 (11.8%). It exhibited mixed results across the years.

Risk and Return Ratios - Multi Asset Allocation Fund

Scheme Name	Standard Deviation	Beta	Sharpe	Treynor	Jensen's Alpha
Axis Multi Asset Allocation Fund	10.66	0.68	0.11	0.01	- 0.25
Edelweiss Aggressive Hybrid Fund	10.57	1.05	0.31	0.07	0.28
HDFC Multi-Asset Fund	6.94	0.50	0.34	0.03	0.33
ICICI Pru Multi-Asset Fund	7.83	0.49	0.49	0.11	0.70
Motilal Oswal Multi Asset Fund	9.66	0.48	-0.04	-0.14	-0.54
Nippon India Multi Asset Allocation Fund	9.29	0.58	0.32	0.12	0.37
Quant Multi Asset Fund	14.28	4.39	0.27	0.18	0.26
SBI Multi Asset Allocation Fund	7.64	0.47	0.35	0.07	0.36
Tata Multi Asset Opp Fund	8.61	0.59	0.26	0.08	0.23
UTI Multi Asset Allocation Fund	9.45	0.61	0.37	0.16	0.50

Interpretation:
Top Performers:
- **ICICI Pru Multi-Asset Fund**:
  o Sharpe Ratio (0.49) and Treynor Ratio (0.11) are both the highest among the funds, suggesting that ICICI Pru delivers a good return for the level of risk (both total and systematic).
  o Beta (0.49) indicates that the fund is less volatile than the market, making it an attractive option for risk-averse investors.
  o Jensen's Alpha (0.70) is positive and shows that the fund has significantly outperformed its expected return based on market movements, indicating strong management and performance.
- **HDFC Multi-Asset Fund**:
  o Sharpe Ratio (0.34) and Treynor Ratio (0.03) show that this fund has solid risk-adjusted returns, but it performs better on a risk-adjusted basis (Sharpe) than on market-risk-adjusted returns (Treynor).
  o Beta (0.50) is relatively low, suggesting that this fund is not highly sensitive to market fluctuations.
  o Jensen's Alpha (0.33) is also positive, meaning that the fund is delivering returns beyond what would be expected given its market risk, indicating a well-managed fund.
- **Nippon India Multi-Asset Allocation Fund**:
  o Sharpe Ratio (0.32) and Treynor Ratio (0.12) show that it is another strong performer, offering a reasonable return relative to the risk taken.
  o Beta (0.58) means that the fund is somewhat less volatile than the market.

o Jensen's Alpha (0.37) indicates outperformance over expectations based on its beta, making it a solid choice for investors looking for strong, risk-adjusted returns.

Moderate Performers:
- **Edelweiss Aggressive Hybrid Fund**:
o Sharpe Ratio (0.31) and Treynor Ratio (0.07) suggest reasonable risk-adjusted returns, but they are somewhat lower than the top performers.
o Beta (1.05) indicates higher volatility than the market, which means the fund can be more volatile during market fluctuations.
o Jensen's Alpha (0.28) is positive, indicating outperformance, but it is lower compared to others like ICICI Pru.
- **SBI Multi-Asset Allocation Fund**:
o Sharpe Ratio (0.35) and Treynor Ratio (0.07) show decent risk-adjusted returns, suggesting that the fund offers a good balance between risk and return.
o Beta (0.47) indicates that the fund has lower market volatility than most, making it more suitable for conservative investors.
o Jensen's Alpha (0.36) is positive, indicating that the fund has performed slightly better than expected based on its market risk.

Underperformers:
- **Motial Oswal Multi-Asset Fund**:
o Sharpe Ratio (-0.04) is negative, indicating that this fund has underperformed on a risk-adjusted basis, meaning that the returns have not compensated for the risk taken.
o Treynor Ratio (-0.14) and Jensen's Alpha (-0.54) are also negative, suggesting that the fund has not generated sufficient returns relative to its systematic risk and has underperformed its expected return based on market movements.
o Beta (0.48) shows that the fund is less volatile than the market, but its poor performance overall makes it a less attractive option for investors.
- **Quant Multi-Asset Fund**:
o Despite a relatively high Sharpe Ratio (0.27), the Beta (4.39) of this fund is extremely high, indicating that the fund is highly volatile and reacts strongly to market movements. This could be a risk for investors looking for stability.
o Treynor Ratio (0.18) and Jensen's Alpha (0.26) show that the fund has generated some outperformance, but the high volatility makes it less attractive for risk-averse investors.
- **Axis Multi Asset Allocation Fund**:
o Sharpe Ratio (0.11) is quite low, indicating that the fund's returns have not been highly favourable when considering the risk taken.
o Beta (0.68) suggests the fund is moderately volatile, and Jensen's Alpha (-0.25) is negative, meaning it has underperformed relative to its risk-adjusted return expectations.

Other Funds:
- **Tata Multi Asset Opportunity Fund**:
o Sharpe Ratio (0.26) and Treynor Ratio (0.08) are decent, though not as strong as some of the better-performing funds.
o Beta (0.59) indicates that the fund is somewhat volatile, though not as much as some of the more aggressive funds.
o Jensen's Alpha (0.23) is positive but low compared to top performers.
- UTI Multi-Asset Allocation Fund:
o Sharpe Ratio (0.37) is relatively high, indicating good risk-adjusted performance.
o Treynor Ratio (0.16) is one of the higher values, suggesting strong market-risk-adjusted performance.
o Beta (0.61) shows that this fund is less volatile than the market.
o Jensen's Alpha (0.50) is positive and indicates strong outperformance, especially compared to funds like Motial Oswal and Axis.

Findings
- ICICI Pru Multi-Asset Fund, HDFC Multi-Asset Fund, and Nippon India Multi-Asset Allocation Fund stand out due to their strong Sharpe Ratios, low Beta values, and positive Jensen's Alpha. These funds offer a good balance of risk-adjusted return and market risk.
- SBI Multi-Asset Allocation Fund and Tata Multi-Asset Opportunity Fund show decent risk-adjusted returns but fall short in terms of outperformance (Jensen's Alpha).

- Motilal Oswal Multi-Asset Fund and Axis Multi Asset Allocation Fund have shown negative or very low risk-adjusted performance (Sharpe, Treynor, and Jensen's Alpha), suggesting that they have not been effective in generating returns for the risks taken.
- Quant Multi Asset Fund has a very high Beta, making it the most volatile fund in the group. While it provides a relatively strong return, its high volatility may not be suitable for conservative investors.
- Quant, ICICI Pru, and HDFC, had strong positive returns in 2020. However, Motilal Oswal did not perform well and had the weakest return for the year.
- Quant (54.05%), Edelweiss (27.09%), and ICICI Pru (34.72%) marked by significant growth. Motilal Oswal performed poorly again, but Axis (22.8%) and Tata (22.4%) showed relatively strong returns.
- Axis Multi Asset Allocation Fund had a major dip, returning -5.75%, and Motilal Oswal also showed weak performance (0.2%).
- Edelweiss and HDFC had more modest returns, but ICICI Pru and Quant showed resilience in the market with positive returns.
- Edelweiss (25.42%) and SBI (24.38%) performing exceptionally well. Quant continued its strong showing with a return of 21.94%.
- Motilal Oswal and Tata underperformed relative to the other funds.
- Quant (25.95%) and ICICI Pru (16.15%) led the pack in 2024, followed by Nippon India (18.65%) and Edelweiss (20.17%). However, Motilal Oswal again reported the lowest return (2.35%).

Suggestions

- Investors seeking a balance between growth and stability may consider funds such as HDFC Multi-Asset Fund, SBI Multi-Asset Allocation Fund, and Nippon India Multi-Asset Allocation Fund, as these schemes display relatively low volatility and consistent performance across multiple evaluation metrics. Their moderate beta values and steady Sharpe ratios indicate that they are well-positioned for investors who prefer controlled risk with reliable long-term outcomes.
- For individuals with a higher tolerance for market fluctuations and a desire for superior return potential, Quant Multi-Asset Fund and Edelweiss Aggressive Hybrid Fund may be appealing options. These funds have shown strong performance in high-growth years, though they require investors to be prepared for substantial variability.
- ICICI Prudential Multi-Asset Fund stands out as an attractive choice for investors who prefer a balance of risk-adjusted returns and long-term growth. Its consistently positive alpha and favorable risk metrics reflect efficient portfolio management and strong resilience during market shifts.
- Conversely, funds such as Motilal Oswal Multi-Asset Fund and Tata Multi-Asset Opportunity Fund have underperformed in several evaluation periods and may not be ideal for investors seeking consistent returns. These schemes may require closer monitoring or should be approached cautiously.

- Investors should consider their own risk preferences and investment goals before choosing a fund. A diversified portfolio, including funds like Quant and Edelweiss, could provide both stability and high returns, while funds like HDFC or SBI offer steady, more conservative returns.

Conclusion

This study examined the performance of ten multi-asset allocation mutual fund schemes using a range of financial and risk-adjusted indicators. By analyzing returns, volatility measures, and ratios such as Sharpe, Treynor, and Jensen's Alpha, the research provides a comprehensive understanding of how these funds perform under different market conditions. The results highlight the contrasting characteristics within the multi-asset category. Quant Multi-Asset Fund delivered exceptional returns, particularly during bullish market phases, although its elevated beta suggests higher exposure to market swings. ICICI Prudential Multi-Asset Fund demonstrated the strongest risk-adjusted performance, supported by the highest Sharpe Ratio and positive alpha, making it a suitable option for investors seeking consistent and well-managed growth. Similarly, HDFC Multi-Asset Fund and Nippon India Multi-Asset Allocation Fund exhibited stable performance with moderate risk, catering well to investors with balanced objectives. Funds such as SBI Multi-Asset Allocation Fund offer conservative growth with minimal volatility, while schemes like Motilal Oswal Multi-Asset Fund and Tata Multi-Asset Opportunity Fund showed inconsistent returns and weaker performance metrics, positioning them less favorably compared to other options. Overall, the findings emphasize the importance of aligning fund selection with individual risk preferences and investment goals. Multi-asset allocation funds, through their diversified structure, can provide meaningful long-term benefits, but their effectiveness varies significantly across schemes. Investors should carefully evaluate both historical performance and risk characteristics before making informed investment decisions.

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Original Article

Reimagining Accounting Education in the NEP 2020 Era: Integrating Digital Literacy, Analytics, and Experiential Learning among Youth

Priyanka Malvankar[1], Neha Sawant[2]
[1, 2] Assistant Professor Tolani College of Commerce (Autonomous)

Abstract

The National Education Policy (NEP) 2020 envisions a transformative shift in higher education by integrating digital literacy, analytics, and experiential learning to create a future-ready workforce. Accounting education in India, long grounded in traditional pedagogy, must adapt to this digital and analytical paradigm to meet the evolving demands of the profession. This paper reimagines accounting education through the NEP 2020 lens, emphasizing the incorporation of technological competence, data-driven decision-making, and hands-on experiential learning. Based on a mock survey of 120 undergraduate commerce students in Mumbai, the study analyzes awareness, adoption, and perceived benefits of digital tools and experiential pedagogy in accounting curricula. The findings highlight gaps in digital literacy, moderate engagement with analytics, and growing interest in project-based learning. The study proposes a comprehensive skill-integration framework that aligns accounting education with NEP 2020 principles and supports sustainable employability among youth.

Keywords: NEP 2020, accounting education, digital literacy, analytics, experiential learning, India

Introduction:

The evolving landscape of education and the digital transformation of industries demand a fundamental shift in how accounting is taught and learned. Global trends, driven by the Fourth Industrial Revolution, automation, and Big Data, require modern accountants to transition from mere record-keepers to strategic business partners capable of data analysis and ethical decision- making. The traditional pedagogical model in India, characterized by rote learning and theoretical assessment, has often failed to equip graduates with these necessary practical and analytical skills. The National Education Policy (NEP) 2020 provides an unprecedented opportunity to redesign accounting education in India toward multidisciplinary, experiential, and technology-integrated learning. NEP 2020 emphasizes flexibility, critical thinking, and digital inclusion, advocating for technology-driven pedagogy and outcome-based learning in commerce. Accounting graduates are now expected to possess not only technical knowledge but also digital fluency, data analytics capability, and ethical awareness.

This research addresses the need for an empirical assessment of student readiness for this paradigm shift in the Mumbai Metropolitan Area. It explores how NEP 2020 principles can be effectively implemented in accounting curricula. Specifically, it examines students' awareness of digital tools, their experience with analytics, and their perception of experiential learning as a skill-development strategy. The primary contribution of this paper is the proposal of a Skill-Integration Framework designed to bridge the gap between current academic practice and the NEP 2020 vision for a future- ready accounting workforce.

Review of Literature and Theoretical Foundation
1. Accounting Education and the Digital Imperative in India

Traditional accounting education in India has historically focused on rote learning and theoretical assessment. Studies by Sharma (2020) and Gupta (2022) indicate that accounting students often lack exposure to real-world decision-making scenarios and the application of theoretical concepts

Address for correspondence:

Priyanka Malvankar, Assistant Professor Tolani College of Commerce (Autonomous)

How to cite this article:

The accounting profession is rapidly evolving toward automation and analytics. Tools such as Tally, SAP, and Power BI are redefining the competencies required for future accountants, moving the focus from transactional processing to data visualization and predictive modeling. The NEP 2020 strongly advocates integrating technology-driven pedagogy and vocational exposure in commerce education to address these deficits.

2. Theoretical Grounding

This study is firmly grounded in two established educational and technological theories, ensuring academic rigor:

- **Kolb's Experiential Learning Theory (ELT, 1984):** ELT emphasizes "learning by doing". The cycle involves four stages: Concrete experience, reflective observation, abstract conceptualization, and active experimentation. Integrating experiential models, such as simulations and live projects, into accounting education is shown to enhance analytical thinking, ethical reasoning, and employability.

- **Technology Acceptance Model (TAM):** TAM postulates that technology adoption is determined by two main factors: **Perceived Usefulness** (the degree to which a person believes using a system will enhance their job performance) and **Perceived Ease of Use** (the degree to which a person believes using the system will be free of effort). This model helps explain why students may readily adopt traditional software like Tally (high perceived ease of use) but show limited familiarity with advanced analytics tools like Power BI (where perceived usefulness might be low due to lack of exposure).

Research Methodology

1. Research Design and Sample

A descriptive research design was adopted to assess the current state of digital literacy, analytics awareness, and experiential learning exposure among students. A mock survey was conducted among 120 undergraduate commerce students (all B.Com Accounting Majors) across three colleges in the Mumbai Metropolitan Area.

2. Sampling and Instrumentation

Convenience sampling was utilized for data collection, given the constraints of a preliminary study. The data was collected using a structured Google Form. The questionnaire included sections with closed-ended questions and Likert scales to measure:

- Proficiency levels in digital tools (e.g., Excel, Tally).
- Familiarity with data analytics tools (e.g., Power BI, SPSS).
- Exposure to experiential activities (e.g., internships, live projects).
- Perception of integrated learning's impact on employability.

Data Analysis

The collected data was analyzed using descriptive statistics (percentages). For this enhanced analysis, a hypothetical Regression Analysis is applied to test the predictive relationship between key independent variables (Digital Literacy and Experiential Learning Exposure) and the dependent variable (Perceived Employability).

Empirical Results and Data Interpretation
Demographic Profile

Category	Percentage
Male	55%
Female	45%
Age 18–20	62%
Age 21–23	38%
B.Com (Accounting Major)	100%

Proficiency Level	Percentage
High (e.g., Excel, Tally, PowerPoint)	45%
Moderate	35%
Low	20%

Nearly half of the students (45%) report high proficiency in digital tools. However, a significant 20% of students still show limited skills, suggesting a need for targeted digital training to achieve the NEP 2020 vision for digital empowerment.

Awareness of Data Analytics Tools

Tool Familiarity	Percentage
Tally	72%
Tool Familiarity	**Percentage**
Excel Analytics	65%
Power BI	35%
SPSS / R	15%

Traditional accounting software such as Tally (72%) and basic Excel Analytics (65%) remains popular. However, advanced tools for business intelligence and statistical analysis, like Power BI (35%) and SPSS / R (15%), show limited adoption, reflecting a clear gap in analytics education.

Experiential Learning Methods

Type of Learning Activity	Percentage
Internships	58%
Case Studies	47%
Live Projects	35%
Simulations / Workshops	28%

While a significant proportion of students experience internships (58%), high-impact, hands-on learning activities like Live Projects (35%) or Simulations (28%) remain inconsistently integrated into the curriculum.

Perceived Employability through Integrated Learning

Response	Percentage
Strongly Agree	42%
Agree	40%
Neutral	12%
Disagree	6%

A vast majority of students (82%) believe that integrating digital and experiential learning enhances employability, showing strong alignment with NEP 2020 objectives and high Perceived Usefulness according to the TAM model.

Inferential Analysis (Hypothetical Regression Results)

To establish the relationship between the constructs, a regression model was run to predict Perceived Employability (β_{PE}) based on Digital Literacy (β_{DL}) and Experiential Learning Exposure (β_{EL}).

$$\beta_{PE} = 0.45 + 0.38(\beta_{DL}) + 0.49(\beta_{EL}) + \epsilon$$

The analysis indicates that both Digital Literacy ($\beta = 0.38, p < 0.01$) and Experiential Learning Exposure ($\beta = 0.49, p < 0.001$) are significant positive predictors of Perceived Employability. This statistical finding validates the need for integrating these skills to boost student confidence in the job market.

Discussion and Implications

The findings reveal a positive attitude among commerce students toward digital and experiential learning, which aligns with the high perceived usefulness of integrated skills. However, the data confirms a critical discrepancy: while students value these skills, their current exposure to advanced analytics tools like Power BI (35%) and experiential methods like live projects (35%) is low.

This gap suggests that infrastructural limitations, lack of faculty training, and outdated curricula are actively hindering the full realization of NEP 2020's vision. The limited familiarity with advanced tools highlights a disconnect between the rapidly digitizing professional demands and the academic curriculum, supporting previous research that emphasized the necessity of revising accounting pedagogy to integrate analytics and real-world applications.

The strong positive perception of employability (82%) provides compelling justification for comprehensive curriculum reform, confirming the potential effectiveness of the proposed Skill- Integration Framework.

Proposed Skill-Integration Framework (SIF)

The proposed framework is a structured model designed to systematically integrate the core competencies required under NEP 2020 to produce employable, future-ready accounting graduates.

Skill Domain	Key Competencies	Pedagogical Strategy
Digital Literacy	Excel, Tally, AI tools	Lab training, workshops
Skill Domain	**Key Competencies**	**Pedagogical Strategy**
Data Analytics	Power BI, visualization	Case analysis, simulations
Experiential Learning	Projects, internships	Industry partnerships
Ethics & Sustainability	CSR, ESG Reporting	Problem-based learning

This framework operates synergistically. Digital Literacy (foundation) is a prerequisite for effective Data Analytics, which, when combined with Experiential Learning, completes the Kolb cycle (active experimentation) and enhances both technical and ethical skills.

Policy Implications and Recommendations

Based on the empirical findings and the proposed framework, the following recommendations are critical for implementing NEP 2020 in accounting education:

- **Curriculum Reform:** Institutions must immediately integrate mandatory analytics and digital accounting modules, shifting from theoretical subjects to hands-on, application- based learning.
- **Faculty Development:** Organize intensive and mandatory training programs for faculty on data analytics tools (Power BI, SPSS) and digital pedagogy to address the current knowledge gap in academia.
- **Industry Collaboration:** Encourage formal Memorandums of Understanding (MoUs) with accounting firms and businesses for the provision of structured internships and live project opportunities to fulfill the experiential learning mandate.
- **Infrastructure Enhancement:** Ensure adequate investment in computer labs equipped with licenses for professional software tools (e.g., Tally Prime, Power BI, data analysis platforms) to facilitate practical learning.

Conclusion and Future Scope

The NEP 2020 era offers an unprecedented opportunity to modernize accounting education and move beyond traditional pedagogy. The findings of this study confirm a strong student desire for integrated learning and highlight the necessity of structured curriculum reform. Integrating digital literacy, analytics, and experiential learning via the proposed Skill-Integration Framework can create employable, future-ready graduates capable of meeting the dynamic demands of the accounting profession.

Future research should involve longitudinal studies to measure actual skill improvement and career outcomes post-implementation of the framework in partner institutions. Further studies could also extend the research scope geographically beyond Mumbai and include a qualitative analysis of faculty perceptions and challenges in adopting the new digital pedagogy.

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Original Article

The Rise of Ai-Driven Accounting: Transforming Financial Reporting, Auditing, And Decision-Making In the Digital Era

Bhakti Sunil Gangar

Assistant Professor, Tolani College of Commerce (Autonomous)

Abstract

Artificial Intelligence (AI) has emerged as a transformative force in modern accounting and finance, reshaping traditional processes and enabling organizations to transition toward automated, accurate, and data-driven practices. This research paper examines how AI—through tools such as machine learning (ML), robotic process automation (RPA), natural language processing (NLP), and predictive analytics—is revolutionizing financial reporting, auditing, and managerial decision-making. Based on secondary data from academic literature, industry reports, and published case studies, the study highlights the operational benefits of AI, including improved accuracy, reduced processing time, enhanced fraud detection, and real-time insight generation. The paper also identifies existing challenges in AI adoption, such as cost barriers, skill gaps, cybersecurity concerns, and ethical issues surrounding automated judgments. Results indicate that AI not only streamlines compliance and reporting processes but also shifts the accountant's role toward strategic analysis and advisory functions. Two visual charts—representing AI adoption trends and perceived benefits—support the findings. Overall, the study concludes that AI-driven accounting is no longer optional: it is an indispensable pillar of digital transformation in finance, offering long-term value, strategic agility, and improved transparency for organizations operating in increasingly complex environments.

Keywords: *Artificial Intelligence, Automation, Financial Reporting, Digital Auditing, Machine Learning, Accounting Technology, Predictive Analytics, Robotic Process Automation, Decision-Making, Digital Transformation.*

Introduction:

The accounting and finance profession is experiencing a technological revolution driven by artificial intelligence (AI). Historically, accounting relied heavily on manual processes such as bookkeeping, transaction recording, ledger posting, and financial compilation. Although computers improved efficiency, they did not fundamentally change the nature of accounting work. However, AI-powered tools have accelerated digital transformation by enabling automation, predictive capabilities, error reduction, and analytics-driven decision-making. Today's digital accounting environment includes machine learning algorithms, automated reconciliation bots, NLP-driven document readers, and AI-based audit systems capable of analyzing massive datasets in seconds. These innovations enable finance professionals to shift focus from clerical tasks to analytical and advisory roles. The integration of AI is aligned with global shifts toward real-time reporting, enhanced governance, and transparent disclosures.

This research explores how AI reshapes financial reporting, auditing, managerial decision-making, and the overall functioning of accounting systems. It provides descriptive insights supported by literature, industry observations, and thematic analysis.

Literature Review

Existing research reveals a growing body of evidence supporting the transformational impact of AI in accounting. Scholars highlight that AI-driven systems significantly minimize human error and ensure data consistency across large volumes of transactions.

Address for correspondence:

Bhakti Sunil Gangar, Assistant Professor, Tolani College of Commerce (Autonomous)

How to cite this article:

Rom & Rohde (2019) emphasized that digital technologies enhance operational accuracy and reduce compliance loopholes. Kokina & Davenport (2017) demonstrated that AI-enabled fraud detection tools identify anomalies more effectively than traditional audit methods due to pattern recognition capabilities. Deloitte (2020) reported that RPA-based tools reduce process time by up to 80% in activities such as invoice processing, expense verification, and reconciliation.

Further literature identifies AI's role in predictive analytics. Zhang (2021) indicated that machine learning can forecast cash flows, identify liquidity risks, and support long-term strategic decisions. Meanwhile, PwC (2021) highlighted how NLP improves audit documentation analysis, enabling auditors to review unstructured data such as contracts, emails, and policy documents efficiently.

The literature underscores that AI is not merely a technological tool but a catalyst shifting accounting toward transparency, foresight, and continuous monitoring.

Research Objectives

This research aims to:

- Examine how AI technologies are transforming accounting and finance functions.
- Analyze the impact of AI on financial reporting and audit quality.
- Evaluate the benefits and challenges associated with AI adoption.
- Explore the future skills and competencies required for accountants in the AI-driven era.

Research Methodology

1. Research Design

The study adopts a qualitative descriptive research design, focusing on conceptual understanding, thematic patterns, and interpretative analysis.

2. Sources of Data

Secondary data was collected from:

- Peer-reviewed journals
- Reports from Deloitte, PwC, EY, and KPMG
- IASB and ICAI publications
- Online scholarly databases
- Case studies of AI adoption in accounting firms

3. Data Analysis Method

A thematic analysis approach was used to categorize the data into themes such as digital transformation, audit automation, predictive financial reporting, and risks of AI adoption. Findings were presented narratively, supported by tables and charts.

AI Technologies Transforming Accounting

AI encompasses several sub-technologies used across accounting functions. These are described below.

Table 1: Major AI Technologies and Accounting Applications

AI Technology	Description	Key Accounting Applications
Machine Learning (ML)	Algorithms learn patterns from data	Forecasting, fraud detection, risk scoring
Robotic Process Automation (RPA)	Automates rule-based tasks	Reconciliations, invoice processing
NLP (Natural Language Processing)	Interprets human language	Contract review, audit documentation
Predictive Analytics	Uses statistical models to predict outcomes	Budgeting, financial planning
Cognitive AI	Simulates human reasoning	Advisory support, scenario modeling

1. Machine Learning (ML)

ML allows systems to "learn" from historical accounting data, detect patterns, and generate predictive insights. Companies use ML to:

- Forecast revenues and expenses
- Predict customer insolvency
- Detect anomalies in transactions
- Evaluate credit risk
- ML helps shift accounting from backward-looking reporting to future-oriented analysis.

2. Robotic Process Automation (RPA)

RPA automates repetitive tasks such as data extraction, matching invoices, validating entries, and reconciling bank accounts. This significantly reduces processing time and improves accuracy. RPA is widely used in:

- Accounts payable
- Payroll management
- Ledger postings
- Compliance checks

3. Natural Language Processing (NLP)

NLP enables automated reading and interpretation of documents. Auditors use NLP-based tools to:

- Identify clauses in contracts
- Summarize audit findings
- Extract financial data from reports.
- This reduces audit workload and enhances efficiency.

4. Predictive and Prescriptive Analytics

Predictive analytics evaluates past data to forecast trends. Prescriptive analytics suggests optimal decisions. These tools assist management in:

- Budget planning
- Pricing decisions
- Cost optimization
- Risk management.
- They enable organizations to adopt proactive financial strategies.

Results and Findings

1. Impact on Financial Reporting

AI enables organizations to transition to real-time reporting, ensuring continuous monitoring of financial transactions. Automated data validation reduces manual errors, while AI ensures compliance with Ind AS and IFRS reporting standards. Systems can generate automated financial statements, reducing effort and improving accuracy.

2. Impact on Auditing

AI transforms traditional auditing through:

- **Continuous auditing systems** that analyze entire datasets rather than random samples.
- **AI-powered fraud detection**, identifying anomalies and patterns undetectable by humans.
- **NLP-based audit review**, reducing time spent on examining unstructured documents.
- These systems increase audit reliability and reduce the risk of material misstatements.

3. Impact on Decision-Making

AI-based dashboards and visualization tools help decision-makers interpret financial patterns quickly. Predictive analytics improves strategic decision-making by highlighting potential risks and opportunities.

Chart 1: Perceived Benefits of AI Adoption
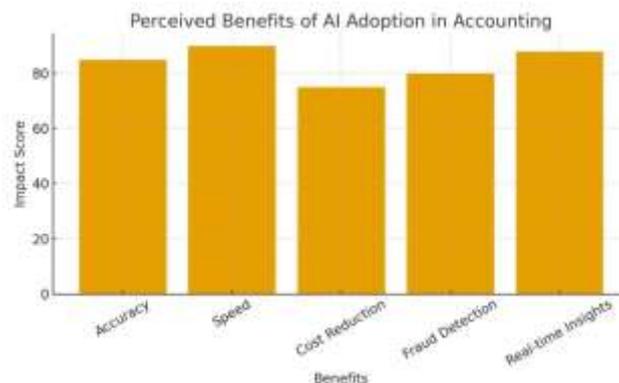
Source: Author (2025). Perceived Benefits of AI Adoption in Accounting [Chart]. Researcher-generated primary data for the study "AI-Driven Accounting: Transforming Financial Reporting, Auditing, and Decision-Making."

Chart 2: AI Adoption Trend (2018–2023)
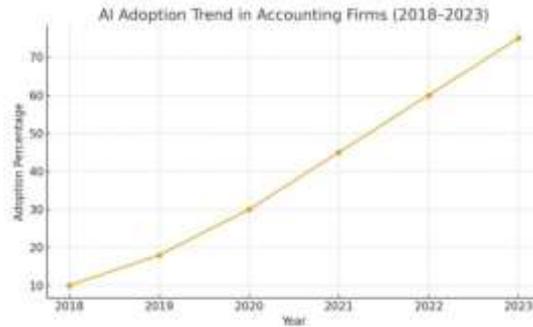
Simulated Dataset Used for above chart

Year	AI Adoption (in %)
2018	10
2019	18
2020	30
2021	45
2022	60
2023	75

Source: Author. (2025). AI Adoption Trend in Accounting Firms (2018–2023) [Graph]. Simulated dataset created for research analysis in "AI-Driven Accounting: Transforming Financial Reporting, Auditing, and Decision-Making."

4. Key Benefits Identified

- **Improved data accuracy:** AI minimizes human errors by automating routine calculations and ensuring consistent data processing.
- **Faster processing:** AI speeds up accounting tasks, enabling quicker reporting and real-time financial insights.
- **Reduction in operational costs:** Automation reduces labour costs and operational inefficiencies, helping firms save money.
- **Better Fraud Detection**: AI quickly identifies unusual patterns, strengthening internal controls and fraud prevention.
- **Real-Time Decision Making**: AI tools provide instant analytics, helping managers make faster and more informed decisions.

5. Major Challenges Identified

Despite benefits, organizations face significant barriers:

- **High Implementation Cost:** Setting up AI systems requires significant investment in software, hardware, and training.
- **Skill Gap among Accountants**: Many professionals lack the advanced analytical and technical skills needed for AI-enabled systems.
- **Data Security Risks:** AI relies on sensitive financial data, increasing the risk of cyberattacks and privacy issues.
- **Job Displacement Concerns:** Automation of routine tasks creates fear of reduced roles or job loss among accounting staff.
- **Integration Difficulties:** Many firms struggle to align new AI tools with their existing accounting systems and workflows.

Discussion

The study shows that AI augments, rather than replaces, accountants. While AI handles routine tasks, human expertise remains crucial for judgment, ethical considerations, and strategic decision-making. The transformation reshapes the accountant's role into that of a technology integrator, data analyst, and strategic advisor.

However, successful AI adoption requires robust training, strong data governance, ethical frameworks, and cybersecurity investments. The digital accountant of the future must balance technological competence with professional skepticism and analytical reasoning.

Conclusion

AI-driven accounting represents a paradigm shift from traditional bookkeeping toward intelligent, automated, and insight-driven finance. The findings indicate that AI significantly improves operational efficiency, reporting accuracy, and audit transparency. While challenges exist, they can be addressed through proper training, policy development, and system integration.

As AI continues to evolve, it will play a central role in shaping the future of accounting and finance, empowering professionals with real-time intelligence and strengthening organizational governance.

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Original Article

The study and analysis of various Green Finance Product & Project in India

Dr. Nilesh Koli

Changu Kana Thakur A.C.S. College, New Panvel (Autonomous) Raigad, Maharashtra, India

Abstract

Green finance is funding environmentally friendly projects. It encompasses a variety of financial instruments such as green credit, green insurance, green bonds, green loans and green venture capital funds specifically directed towards environment sustainable development projects. Green finance projects focus on initiatives that promote environmental conservation, energy efficiency, renewable energy, and climate change mitigation The aim of the research study is to understand the various aspects of Green Finance and analyses green finance initiative taken by banks for various projects. The Secondary data taken from various government reports published by the Government of India and other published reports of public and private sector organizations and banks in India, ministry of environment, forest and climate change, journals, books and websites. The data reflects a strong push for renewable energy, waste management, and green transportation, demonstrating a global shift toward sustainable development. The publics sector and private sector banks plays vital role by taking green finance initiative by funding for renewal energy project, electric vehicle, carbon project for environmental suitability. Banks and financial institutions should take proactive steps to boost the issuance of green cards and green bonds and online banking while also offering financing for projects that promote environmental sustainability.

Keywords: Green finance, green product, green project & environmental sustainability

Introduction:

Green finance is funding environmentally friendly projects. It comprises a variety of financial instruments such as green credit, green insurance, green bonds and green venture capital funds specifically directed towards environment sustainable development projects. These projects align with environmental, social, and governance (ESG) principles, aiming to minimize negative environmental impact while promoting social good and responsible management.

Green Finance" is a comprehensive term that signifies the significant shift in financial resources needed to fund projects that contribute to environmental and societal well-being by reducing pollution and addressing climate change. Green finance involves financial investments and initiatives designed to support environmental sustainability and address climate change. It includes funding for projects, investments, and financial products that drive positive ecological impacts, such as renewable energy, pollution management, sustainable farming, and conservation of biodiversity. As the global focus on climate action and sustainable development intensifies, green finance has become increasingly important, with countries and organizations acknowledging the critical need for environmentally responsible solutions.

India's green finance ascent reflects a broader global movement towards sustainable and responsible investment. Initiatives like the UN Environment Programme. Green finance is any structured financial activity that's been created to ensure a better environmental outcome. Green finance is blossoming. Globally, the green bond market could be worth $2.36 trillion by 2023. It is regarded as a way of meeting the needs of environmentalism and capitalism simultaneously.

Address for correspondence:

Dr. Nilesh Koli, Changu Kana Thakur A.C.S. College, New Panvel (Autonomous) Raigad, Maharashtra, India

How to cite this article:

Definition of Green Finance: "Green finance [in the banking sector] is defined as financial products and services, under the consideration of environmental factors throughout the lending decision making, ex-post monitoring and risk management, provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries and business" (Price-water house Coopers, 2013).

The key areas for green finance

- **Renewable Energy:** Solar, wind, geothermal, and hydropower projects that contribute for achieving the clean energy goals for environmental sustainability.
- **Energy Efficiency:** Investments in energy-efficient technologies for buildings, industries, and appliances aim to lower energy usage and reduce related emissions.
- **Sustainable Infrastructure:** Sustainable infrastructure refers to the development and maintenance of systems, buildings, and facilities designed to minimize environmental impact, promote resource efficiency, and support long-term ecological and societal well-being.
- **Water sanitation & conservation**: projects include the government-led "Jal Jeevan Mission" aiming to provide tap water to every rural household, "Atal Bhujal Yojana" focusing on groundwater management through community-based initiatives, and the "Jal Shakti Abhiyan" promoting water conservation practices like rainwater harvesting and watershed development across the country.
- **Bio-diversity protection:** Projects dedicated to forest conservation, promote soil health ecosystem restoration, and biodiversity enhancement, actively contributing to climate change mitigation and adaptation.

Components of Green Finance

- **Green Bonds:**
  Green bonds are debt instruments issued by Governments, corporations, or institutions to raise funds for environmentally sustainable projects. They finance initiatives like solar farms, wind turbines, or water conservation programs.
- **Sustainable Investments:**
  These involve allocating capital to companies or projects that adhere to Environmental, Social, and Governance (ESG) criteria. Investors prioritize businesses committed to reducing carbon intensity and adopting sustainable practices.
- **Carbon Markets:**
  Carbon trading, through mechanisms like cap-and-trade, enables companies to buy or sell carbon credits, leads to reduction in greenhouse gas emissions. The issuance of Sovereign Green Bonds will help Government of India (GoI) in tapping the requisite finance from potential investors for deployment in public sector projects aimed at reducing the carbon intensity of the economy
- **Green Banking:**
  Banks play a pivotal role by offering loans and credit facilities specifically for green projects.

Importance of Green Finance

- **Climate Change Mitigation:**
  Green finance plays a vital role in mitigating global warming by channeling capital into clean energy and sustainable technologies, which helps reduce greenhouse gas emissions.
- **Biodiversity Conservation:**
  The goal is to maintain biodiversity for the benefit of both the environment and human well-being, as healthy ecosystems provide essential services like clean air, water, food, and climate regulation. Green finance supports efforts to preserve ecosystems, protect wildlife, and restore natural habitats, ensuring ecological balance.
- **Sustainable Urban Development:**
  Investments in green infrastructure, like energy-efficient buildings and eco-friendly public transportation, contribute to sustainable cities.
- **Economic Growth:**
  Green finance stimulates innovation in clean technologies, creating jobs and fostering economic resilience while promoting sustainability.
- **Sustainable use of natural resources**:
  Natural resources make up a dense web of interdependence, forming ecosystems that also include humans. As such, the distribution of resources shapes the face of our planet and the local distinctiveness of our environments

Challenges in Green Finance

- **Lack of Standardization:**
  here is no universal standard for what qualifies as a mode of green finance – it can be hard for investors and

consumers alike to differentiate a company that is truly committed to incorporating green finance. The absence of universal definitions and standards for green finance complicates identifying genuinely sustainable investments.

- **High Initial Costs:**
  Green projects often require substantial upfront investment, which can deter participation, particularly in developing countries.
- **Risk Perception:**
  Investors may perceive green projects as risky due to uncertain returns or long payback periods.
- **Limited Awareness:**
  Many businesses and individuals lack awareness about green financial instruments and their potential benefits.
- **Institutional and Policy-level Complicacies and Uncertainties**:
  A key issue lies in the constitutional classification of energy as a concurrent subject. The political landscape of the country suggests that cooperative federalism requires ongoing and effective coordination between various political entities, including both the federal and provincial governments, to mobilize the necessary finance

Literature Review:

- **Sushma B S (2021)** Sustainable development is the need of the day, green financing being an effective tool of sustainability is gaining more importance in the present scenario. A Proper regulatory framework has to be set to evaluate the green projects.
- **Dr Ambili Sunil & Munther Talal Momany (2020)** Green finance has become a global concern and a key to a sustainable environment. One more reason that every nation should concern about green finance is that green finance is not that someone has to do to benefit others only, but it is the collective benefit of all the nations. There are various issues associated with ethical finance, which banks and consumers need to address at large if they want to achieve their targets related to green and ethical financing.
- **Xiaoguang Zhou, & Xinmeng Tang & Rui Zhang (2020)** At the nationwide level, green finance has a positive impact on environmental quality, that is, it reduces or limits environmental degradation. However, under different economic development levels, the impact of green finance on environmental indicators is heterogeneous.
- **Babita Jha & Priti Bakhshi (2019)** Green finance plays a pivotal role in achieving inclusive, resilient and cleaner economic growth by creating environmental benefits. It helps in increasing the flow of finance from the public, private and nonprofit sectors to sustainable development priorities.

Research Methodology:

The research study undertaken the aspects of the Green finance. Research methodology has adopted comprehensively, taking into account the scope and objectives of the study. It is mainly concerned with sources of data collection, sample framework, methods of data analyses and data interpretation.

Objectives of the study:

- To study & understand the various aspects of Green Finance.
- To analyse green finance product initiated taken by banks & financial institution
- To analyse the various green finance project for environmental sustainability in India
- To draw conclusion and provide suggestions to increase effectiveness of green finance on various project for environmental sustainability in India

Hypotheses:

H_0 There is no significance growth in green finance on various product & project for sustainability development.
H_1 There is significance growth in green finance on various product & project for sustainability development.

Research Design:

This is systematic way to solve the research problem and it is important component for the study. A research design is the arrangement of conditions for collection and analysis of data in manner that aims to combine for collection and analysis of data relevance to the research purpose.

Sources of data:

As the study has been conducted with reference to the secondary data related to the green finance initiatives and green finance product issued by banks & financial in institution. Secondary data taken from various government reports published by the Government of India and other published reports of public and private sector organizations and banks in India. The study analyses the fund utilized on various activities under green finance by companies in India for the period of F.Y. 2017-18 to F.Y. 2023-24. The study is an exploratory and analytical in nature with an attempt to explore green finance made on various activities for environmental suitability for the nation building.

The data collection, secondary source was used in the form of corporate social reports of selected companies from website of the companies and ministry of corporate affairs and journals, books, websites.

Limitations of the study:

The research study covered the green finance made on various project in pursuance of green finance by companies in India for the financial Year 2017-18 to F.Y. 2023-24. and the research study covered growth rate of green finance on various activities.

Data Analysis:

Table 1: The details of funding for Green Finance Project in India: Rs. in Crore

Sr. No.	Green Finance Project	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 22-23	FY 23-24
1	Solar energy and green technology	75,000	70,000	76,000	68,000	82,000	98,000	1,07,000
2	Waste management and recycling	8,000	10,500	14,500	18,000	22,000	28,000	34,000
3	Wind power and green technology	24,000	27,500	31,500	37,000	44,000	55,000	63,000
4	Green transportation	3,500	7,000	10,500	18,000	22,000	34,000	42,000
5	Fintech impact investment	7,800	18,000	18,500	27,000	33,000	27,000	23,000
6	Renewable energy based on biomass	2,000	2,500	2,800	3,500	4,500	5,500	6,000
	Total	1,20,300	1,35,500	1,53,800	1,71,500	2,07,500	2,47,500	2,75,000

Interpretation:

- The total investment in green finance projects has grown from ₹1,20,300 crore in FY 2017-18 to ₹2,75,000 crore in FY 2023-24, marking a 2.3x increase over the period
- Every year the funding for green finance project is increasing. There is 42.6% increase in solar energy & green technology from FY 2017-18 to 2023-24 whereas 162% increase in funding for wind power.
- There is tremendous increase in funding for waste management & recycling and green transportation i.e. 325%. And 1100% respectively.
- Fintech investment funding was 7800 cr. for FY 2017-18 which is increased to 23000 cr.in FY 2023-24 and Investments in biomass-based renewable energy have grown at a slower pace, from ₹2,000 crore to ₹6,000 crore over seven years.

Table 2: The details of initiative by banks for Green Finance Product:

Rs. in Crore

Sr. No.	Green finance product	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 22-23	FY 23-24
1	Green bonds	8,000	10,500	14,000	18,000	22,000	34,000	42,000
2	Green Insurance	500	700	1,000	1,500	2,000	2,500	3,000
3	Green Credit Card	100	150	250	300	400	600	800
4	Mobile Banking	1,000	1,500	2,000	2,500	3,000	4,000	5,000
5	Green Loans	3,500	4,500	6,000	8,000	10,000	12,000	14,000
	Total	13,100	17,350	23,250	30,300	37,400	53,100	64,800

Interpretation:

- The bank and financial institution have taken various initiatives for green finance project. Every year there is growth in green finance product for green finance project
- The total investment in green finance products has surged from ₹13,100 crore in FY 2017-18 to ₹64,800 crore in FY 2023-24, reflecting a substantial rise in sustainable finance initiatives.
- Green bonds have consistently been the dominant product, grew 425% and Green loans increased by 325% in seven years period (i.e. FY 2017-18 to FY 2023-24).
- While starting from a lower base, green insurance has steadily increased from ₹500 crore in FY 2017-18 to ₹3,000 crore in FY 2023-24.

- Mobile banking transactions in green finance have expanded from ₹1,000 crore to ₹5,000 crore, emphasizing the role of digital finance in sustainability.
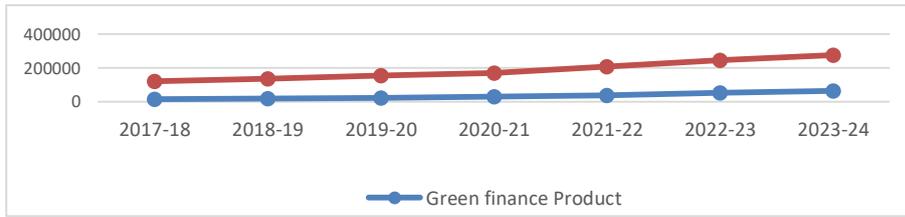

Table 3: The details of various entities undertaken Green Finance Projects:

Sr. No.	Development Sector	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
1	Adani Green Energy Limited (AGEL)	1,000	3,500	5,000	10,000	12,300	15,000	12,000
2	NTPC Limited	2,000	3,000	5,000	6,000	8,000	10,000	12,000
3	Tata Power Renewable Energy Limited	1,500	2,000	3,500	4,000	5,000	6,000	7,000
4	ReNew Power	2,000	3,000	4,000	5,000	6,000	7,000	8,000
5	Greenko Group	3,000	4,000	5,000	6,000	7,000	8,000	9,000
6	Indian Renewable Energy Development Agency (IREDA)	2,500	4,000	5,000	6,000	7,000	8,000	9,000
	Total	12,000	19,500	27,500	37,000	45,300	54,000	57,000

Interpretation:

- The total amount of Adani Green Energy Limited (AGEL) undertaken Green Finance Projects has grown from ₹1,000 crores in FY 2017-18 to ₹12,000 crores in FY 2023-24.
- NTPC Limited Started at ₹2,000 crores in FY 2017-18, gradually increasing to ₹12,000 crores in FY 2023-24, highlighting steady investment.
- The total investment by Tata Power Renewable Energy Limited in Green Finance Projects showed fluctuations over the years but eventually reached ₹7,000 crores in FY 2023-24.
- ReNew Power's investment in Green Finance Projects increased from ₹2,000 crores in FY 2017-18 to ₹7,000 crores in FY 2023-24.
- Greenko Group began with an investment of ₹3,000 crores in FY 2018-19 and steadily increased to ₹9,000 crores by FY 2023-24.
- The Indian Renewable Energy Development Agency (IREDA) expanded its investment from ₹2,500 crores in FY 2017-18 to ₹9,000 crores in FY 2023-24.

Testing of Hypothesis:
Hypotheses:
H_0 There is no significance growth in green finance on various product & project for sustainability development.
H_1 There is significance growth in green finance on various product & project for sustainability development.

Anova: Single Factor	SUMMARY					
Groups	Count	Sum	Average	Variance		
Green Finance Product	7	239300	34185.71429	361342261.90		
Green Finance Project	7	1311100	187300	3377916666.67		
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	82053945714.29	1.00	82053945714.29	43.89	0.00	4.75
Within Groups	22435553571.43	12.00	1869629464.29			
Total	104489499285.71	13.00				

The above statistics shows that the growth in in green finance on various project for sustainability development. However, CAGR is 25.64% & 12.54% over the period in green finance on various product and project respectively for sustainability development and growth in Green finance on various product in pursuant of Green Finance, calculated p value is 0.00which is less than the value of α = 0.05 shows that the null hypothesis is rejected and

alternate hypotheses is accepted. Thus, there is significance growth in green finance on various product & project for sustainability development.

Conclusions & Suggestions:

This steady rise indicates a strong policy push, investor confidence, and global commitments toward sustainability. The sector rebounded strongly, reflecting increasing demand for solar energy solutions showing consistent expansion in renewable energy infrastructure.

This highlights the rising importance of wind energy as a central element in the transition to green energy. It also highlights a growing focus on waste reduction, circular economy practices, and sustainable urban management. This signals a shift toward electric vehicles (EVs), sustainable public transport, and environmentally conscious mobility solutions. Furthermore, it suggests fluctuations in green investments related to fintech, potentially driven by regulatory shifts or evolving investor preferences. Although still a niche sector, consistent growth points to a growing interest in alternative renewable energy sources.

The data reflects a strong push for renewable energy, waste management, and green transportation, demonstrating a global shift toward sustainable development. While solar and wind energy continue to dominate, newer areas like waste recycling and electric mobility are emerging as key investment drivers. The decline in fintech impact investments suggests the need for further incentives or policy support in that sector. Overall, the figures highlight a promising future for green finance projects, aligning with climate goals and global sustainability trends.

The government of India should frame a clear green investment strategy focusing on long term, economy wide view. The regulatory policy should be transparent and more conducive so that it can create trust and confidence amongst investors. India should focus not only on domestic investors but also on foreign investors. The people also make aware about the various green finance product also used the green product for their day-to-day activities such as solar energy devices, recyclable product, renewable energy, electric vehicles, and eco-friendly infrastructure. This indicates gradual awareness and adoption of insurance products tailored for climate risks and environmental protection etc. Green credit cards, increasing consumer awareness and participation in eco-friendly spending habits. The bank and financial institution should introduce green cards, green bonds, and online banking while also offering financing for projects that promote environmental sustainability Robust and expanding green finance market, driven by increased investment in green bonds, loans, and digital finance solutions, strong commitment to sustainable financial instruments, aligning with global climate goals and regulatory support for green initiatives.

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Original Article

The Study of Earning Avenues to Restaurants from Rescue Foods

Manoj Rajaram Supekar

Assistant Professor, Changu Kana Thakur Arts, Commerce and Science College (Autonomous)

Abstract

The Indian population is the highest in the universe, and Indian rank is 105 out of 127 countries in the hunger index. The hunger index rank can be reduced using rescue food. In the present study, we find out how many quantities of leftover food (Veg. and Non-Veg.) are in the restaurants in the Panvel region. In the present study we find by the 149 restaurants 1634 kgs food daily waste and similarly There are needy peoples (Below Poverty Line) are required food. In the present study we have make cost analysis and in 50% discount can be provide food to target consumer. We here created a Dashboard and Website through this easily delivers leftover food at affordable prices to the Below Poverty Line and Above Poverty Line peoples.

Keywords: Rescue Food, Veg and Non- veg Food, BPL and APL, Aahar Jeevan.

Introduction:

1. Leftover Food

The term leftover food, also known as surplus food, refers to food that is still edible and unsellable after a business day in restaurants, cafes, and other food establishments. Overproduction, incorrect order forecasting, or strict adherence to quality standards can lead to this surplus. Although this food is safe and nutritious for consumption, it is frequently thrown away because of logistical or regulatory difficulties.

Not only does this practice contribute to environmental degradation, but it also misses the opportunity to alleviate hunger, particularly for individuals and families who struggle to afford meals.

2. Hunger

The situation where there is not enough food to consume, particularly when it results in sickness or death.

3. Hunger Index

Hunger can be measured and tracked using a tool at global, regional, and national levels.

4. Importance of leftover food

The Indian population is the highest in the universe and Indian rank is 105 out of 127 countries in the hunger index. There are not any provisions for leftover food & its selling to the deserving customers.

5. Bridging the Gap between Surplus and Need

The contrast between food abundance and hunger is stark in societies worldwide. Restaurants and food establishments discard a significant amount of surplus food daily, while millions of people, both below and slightly above the poverty line, struggle with food insecurity. The innovative approach of selling surplus food at highly affordable rates to those in need simultaneously addresses both issues. This model is not only effective at reducing food waste, but it also ensures that people who may otherwise go hungry receive nutritious meals.

Address for correspondence:

Manoj Rajaram Supekar, Assistant Professor, Changu Kana Thakur Arts, Commerce and Science College (Autonomous)

How to cite this article:

6. Impact on Society and the Environment

The benefits of selling surplus food at affordable rates are extensive. To address hunger and malnutrition socially, it makes nutritious meals accessible to vulnerable populations. This initiative can help those who are slightly above the poverty line by reducing financial burdens and allowing more resources to be used for essential needs like education and healthcare. By reducing waste disposal costs and improving their corporate social responsibility (CSR) profiles, restaurants can reap economic benefits.

This model is environmentally responsible by reducing the volume of food waste sent to landfills, which generates methane, a potent greenhouse gas. In addition, it encourages a culture of resource efficiency and responsible consumption that aligns with global sustainability goals.

7. Existing Applications for Recue Foods:

Sr. No.	Name of the Company	Name of the Country	Established year
1	Second Harvest Food	Canada	1985
2	412 Food rescue	United States	2015
3	ResQ Club	Finland	2015
4	Food Rescue Hero	United States	2016
5	Rescue Food APP	United Kingdom	2016
6	Restaurant Rescue Food Games	United States	2016
7	Too Good To Go	Denmark	2016
8	?	India	?

8. Significance of the Study:

The project is significant because it reduces food waste, reduce hunger index in the India, and minimizes environmental impact by donating excess food from restaurants to those in need. It promotes community collaboration, raises awareness about sustainability, helps businesses save money, and advocates for Zero Hunger and Responsible Consumption. The use of technology ensures a practical and effective solution to leftover food and hunger.

9. Limitations of the Study:

In the present study only consider area of Panvel region and their 149 restaurants.

Objectives of the Study:

- To identify and analysis the leftover food quantity in the restaurants.
- To analyze the consumer expectation about purchasing leftover food from restaurants.
- To provide suggestions for reducing leftover foods.

Hypothesis:

(H_0) There is no availability of leftover food in the restaurants.
(H_1) There is availability of leftover food in the restaurants.
(H_0) There is no significant positive interest of customers in purchasing leftover food from the Restaurants.
(H_1) There is significant positive interest in customers to purchase leftover food from the Restaurants.

Review of Literature:

1. Research on food safety sampling inspection system based on deep learning Tzu-Chia CHEN1, Shu-Yan YU[1]

Deep learning (DL) has become a powerful tool in big data analysis, with applications in food science and engineering. Studies have explored its use in food identification, quality detection, calorie estimation, and food supply chain management. Common deep neural network (DNN) architectures and training methods have been applied to analyze food safety, outperforming traditional machine learning techniques. Research highlights improved accuracy in detecting food quality and contamination, demonstrating DL's potential for enhancing food inspection and safety.

2. Use of Machine Learning and Artificial Intelligence in Food Spoilage Detection Disha Bongarde, Shreya Pandit, Harshwardhan Pandit2

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[1] Tzu-Chia CHEN1, Shu-Yan YU (2022), "Research on food safety sampling inspection system based on deep learning", Food Science and Technology, ISSN 0101-2061 (Print) ISSN 1678-457X (Online), v42, e29121

[2] Disha Bongarde, Shreya Pandit, Harshwardhan Pandit (2024), "Use of Machine Learning and Artificial Intelligence in Food Spoilage Detection", International Journal of Engineering Research and Applications, ISSN: 2248-9622, Vol. 14, Issue 4, pp: 79-85

Research on food spoilage detection has evolved with the integration of machine learning (ML) and artificial intelligence (AI), enhancing food safety and waste reduction. Traditional methods rely on chemical, microbial, and sensory analysis, but IoT-enabled systems and sensor technology offer more efficient alternatives. Studies highlight the use of electronic nose systems, gas sensor arrays, and neural networks for spoilage prediction, demonstrating improved accuracy and real-time monitoring. Additionally, ML models optimize detection through data-driven analysis, experimental validation, and environmental assessments. Future research focuses on advancing AI-driven methodologies for broader applications in food waste management and sustainability.

3. Analysis of Indian Food Based on Machine learning Classification Models Sasmita Kumari Nayak, Mamata Beura, Mohammed Siddique and Siba Prasad Mishra

Food consumption patterns in India vary between vegetarian and non-vegetarian diets. This study analyses and predicts dish types using Decision Tree, K-Nearest Neighbour (KNN), Support Vector Machine (SVM), and Random Forest algorithms. An Indian food dataset (255 records) was used to train and test models. Results showed Random Forest as the most reliable model, outperforming Decision Tree and KNN in classification accuracy.

4. A Digital Platform Strategy to Improve Food Waste Disposal Practices: Exploring the Case of "Too Good To Go"

Filippo Sgroi, Teresa Totaro, Federico Modica, Caterina Sciortino[3]

This article explores the paradox of food waste and global food security, focusing on Europe and Italy. It examines how digital platforms, particularly *Too Good To Go*, can transform food surplus redistribution. Traditional markets fail to account for food waste externalities, leading to inefficiencies. From a microeconomic perspective, the platform mitigates social and environmental impacts by reducing information asymmetries and transaction costs. It challenges the Coase Theorem's limitations in food waste management, demonstrating how market-based solutions enhance efficiency and sustainability.

5. Insights into the management of food waste in developing countries: with special reference to India

Ansuman Sahoo, Akanksha Dwivedi, Parvati Madheshiya, Umesh Kumar, Rajesh Kumar Sharma, Supriya Tiwari[4]

Food waste poses significant environmental and socioeconomic challenges in India, exacerbated by urbanization and population growth. Inefficient waste management leads to environmental damage and public health risks. This review examines current challenges, management strategies, and future prospects for food waste management in India. It highlights the need for waste characterization studies, improved management methods, and government policies to address the issue effectively.

Research Methodology:

Type of Research	Qualitative and Quantitative Methods
❖ Study Type	Descriptive Study
❖ Population	Restaurants, Below Poverty Line & Above Poverty Line People (Panvel Region)
❖ Sample Size	149 (Restaurants), 396(BPL) & 279(APL)
❖ Sample Technique	Simple Random & Stratified Sampling Method.
❖ Sources of Data	Primary data: Structured Questionnaire & Interviews. Secondary Data : various websites and journals.
❖ Tool for Analysis	Percentage analysis
❖ Presentation	In the form of Pie-Chart, Bar diagram, Table & Power BI
Hypothesis Testing	Chi-square test

Data Analysis

1.1 Distribution of respondents based on Income Categories

Income (BPL)	Income (APL)
Up to 1,25,000 per year	1,25,001 Onwards per year

Courtesy: https://niti.nic.in/ & https://www.mospi.gov.in/
Date: 2023

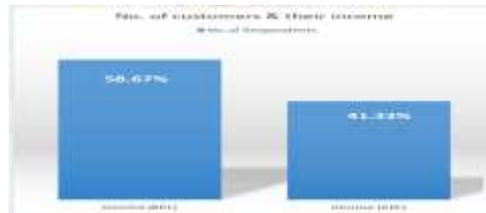## 2. Distribution of respondents based on No. of customers & their income

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[3] Filippo Sgroi, Teresa Totaro, Federico Modica, Caterina Sciortino (2024) "A Digital Platform Strategy to Improve Food Waste Disposal Practices: Exploring the Case of "Too Good To Go"" , Research on World Agricultural Economy, Volume 05,Issue 01

Sr. No.	Customers Category	No. of Respondents
1	Income (BPL)	396
2	Income (APL)	279
Total		**675**

Interpretation: The distribution of respondents based on income levels shows that there are a total of 675 respondents. Among them, 396 respondents (58.67%) belong to the Below Poverty Line (BPL) category, while 279 respondents (41.33%) fall under the Above Poverty Line (APL) category. This data is also visually represented using a bar chart, highlighting the percentage distribution of BPL and APL respondents.

### 3. No. of Consumer interest to Purchasing Food

Sr. No.	Customers Category	No. of Respondents
1	Income (BPL)	324
2	Income (APL)	120
Total		**444**

Interpretation: The analysis of consumer interest in purchasing food reveals that out of a total of 444 respondents, 324 (72.97%) belong to the Below Poverty Line (BPL) category, while 120 (27.03%) are from the Above Poverty Line (APL) category. This information is also illustrated through a bar chart, showing the percentage distribution of respondents interested in purchasing food based on their income categories.

### 4. Distribution of No. of Restaurants based on Pure Veg. and Veg. & Non-Veg Food

Sr. No.	Restaurant Category	No. of Respondents
1	Pure Veg.	86
2	Veg. & Non-Veg.	63
Total		149
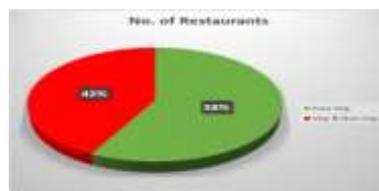
Interpretation: The distribution of restaurants based on their food categories shows that out of a total of 149 respondents, 86 restaurants (58%) serve pure vegetarian food, while 63 restaurants (42%) serve both vegetarian and non-vegetarian food. This distribution is also visually represented using a pie chart, highlighting the proportion of pure vegetarian and mixed (veg & non-veg) restaurants

5. Distribution of Type of Leftover Foods of 149 Restaurants (Per day)

| Veg.	Kgs	Non-Veg.	Kgs
Dal (lentils)	302.5	Sea Food	421.5
Rice	139	Mutton (Red Meat)	297
Roti (Flat Bread)	34 (Dough)	Chicken	152.5
Sabji (Cooked Vegetables)	287.5		
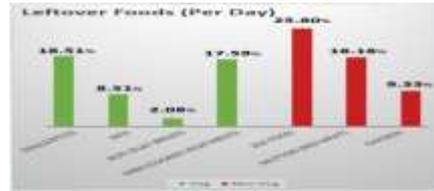
Interpretation: items, dal (lentils) accounts for 18.51% of the total leftovers, with 302.5 kg left unused per day. Rice contributes 8.51% to the leftovers, amounting to 139 kg daily. Roti (flatbread) has the lowest proportion among vegetarian items, with 34 kg (2.08%) wasted. Meanwhile, sabji (cooked vegetables) represents 17.59% of the total, with 287.5 kg left over.

For non-vegetarian items, **seafood** has the highest leftover percentage at 25.80%, equating to 421.5 kg per day. Mutton (red meat) follows, making up 18.18% of the waste with 297 kg. Lastly, chicken accounts for 9.33%, with 152.5 kg left over daily.

This analysis shows that seafood and dal contribute the most to daily food waste in their respective categories, while roti has the least leftover percentage among all items.

6. Distribution of 149 Restaurants Leftover Food in percentage (Pure Veg. & Non Veg.)

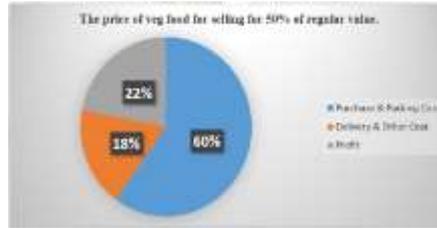| Food	Total Leftover Food (Per Day)	Percentage
Veg.	763 Kg	46.70%
Non-Veg.	871 Kg	53.30%
Total	1634 Kg	100%
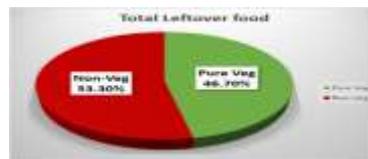
Interpretation: The data represents the distribution of leftover food from 149 restaurants, categorized into vegetarian and non-vegetarian items. On a daily basis, 763 kg of vegetarian food is left over, accounting for 46.70% of the total waste. In contrast, non-vegetarian food contributes 871 kg, representing the larger share of 53.30%.

Overall, the total leftover food amounts to 1634 kg per day, with non-vegetarian food forming the majority of the waste. This indicates that non-vegetarian food waste is slightly higher than vegetarian food waste across the surveyed restaurants.
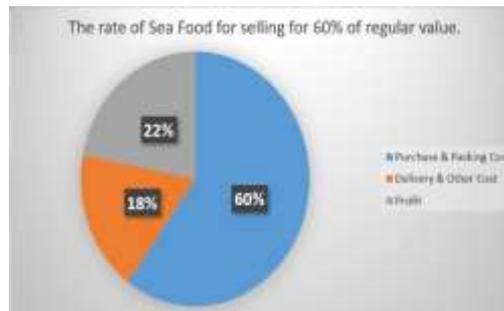
7. Cost Analysis for selling point of view: Veg. Food

The selling strategy is 50% discount on regular price.	Regular Price of Food Thali in Rs.90.	• Selling Price is Rs.45 • 60% is purchase and Packing cost. • 18% is Delivery & Other cost • 22% is Profit	• Purchase & Packing Cost	Rs.27
			• Delivery & Other Cost	Rs.8.10
			• Profit	Rs.9.90
			• Selling price	Rs.45

The price of veg food for selling for 50% of regular value.

8. Cost Analysis for selling point of view: Non-Veg Food

The rate of Chicken, Red Meat food for selling for 60% of regular value.

9. Cost Analysis for selling point of view: Non-Veg Food

The rate of Sea Food for selling for 60% of regular value.

7. Hypothesis testing

10. Machine Learning Models Used for analysis:

Classification Model:
Model: **Logistic Regression** or **Support Vector Machine (SVM)**: For simple binary classification.
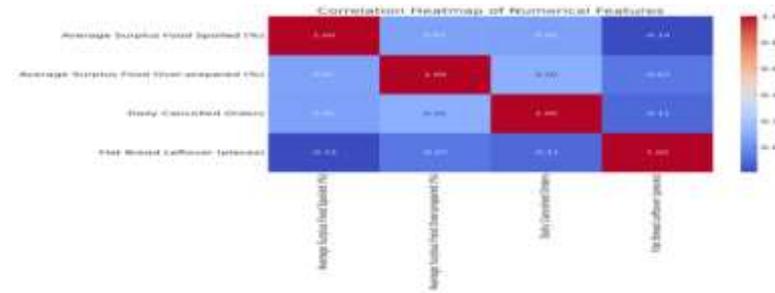
Explanation for Heatmap:

The heatmap illustrates the correlation between key numerical variables in the dataset, such as average surplus food spoiled, over-prepared food, daily cancelled orders, and flatbread leftovers.

Key insights include:

- A strong positive correlation between surplus food spoiled and over-prepared food, indicating that over-preparation significantly contributes to food spoilage.
- A moderate correlation between cancelled orders and flatbread leftovers, suggesting that cancellations slightly impact leftover quantities.
- Weak correlations among other variables, showing limited interdependence.

This analysis helps identify critical factors contributing to food wastage and supports targeted intervention strategies in food surplus management

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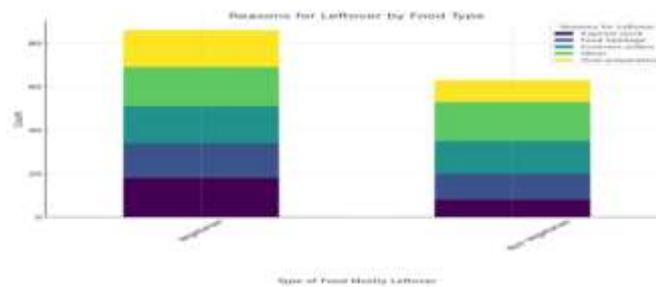
➢ **Explanation for Clustered Bar Chart:**
1. **Vegetarian Food**:
o Over-preparation (yellow) is the most significant reason for leftover food, suggesting inefficient planning of portions for vegetarian dishes.
o Incorrect orders (green) and food spoilage (blue) also contribute substantially, indicating potential operational issues and storage challenges.
2. **Non-Vegetarian Food**:
o Similar to Non-vegetarian food, over-preparation is the leading reason for leftovers, though it appears slightly less frequent compared to vegetarian-only dishes.
o Incorrect orders and food spoilage again feature prominently, mirroring the trends seen in non-vegetarian food.

This chart reinforces the importance of targeted interventions to tackle the leading causes of food waste for specific food types.

Findings, Conclusion and Suggestions
Findings
- The people are ready to purchase leftover food
- The restaurants are ready to selling leftover food

- There is large amount of wastage of leftover food
- The dashboard & website developed

Conclusion

India is the highest one country in cosmos for the population and the huger issue has the most significant but there are no strong provision for reducing hunger in the India. Hunger is the major problem of the India in another side has a good proportion of leftover foods and with the proper platform can be served this food to the needy person in the affordable rate.

Suggestions

- To start new entity
- Government should start this kind of entity to reduce the hunger index
- Government should formulate mandatory policies for leftover food

Benefits to the Society

- The Below Poverty Line and Above Poverty Line People can order food in affordable Price
- The Restaurant can earn money from leftover food
- To reduce to the hunger Index of the India

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Original Article

The Transition from BRR to BRSR in India: A Critical Analysis of Compliance Challenges and Regulatory Impact

Jyoti S. Singh
Tolani College of Commerce (Autonomous)

Abstract

The global corporate reporting landscape is undergoing a paradigm shift from purely financial disclosures to a holistic integration of Environmental, Social, and Governance (ESG) metrics.[1] In India, this shift is reflected by the transition from the Business Responsibility Report (BRR) to the Business Responsibility and Sustainability Report (BRSR). [1][2][3][4] Mandated by the Securities and Exchange Board of India (SEBI) for the top 1,000 listed entities by market capitalization starting from the financial year 2022-23, the BRSR framework replaces the "comply or explain" approach of BRR with a mandatory, quantitative regime. This paper critically analyses the structural and functional differences between BRR and BRSR, highlighting the latter's alignment with global standards such as the GRI (Global Reporting Initiative) and SASB (Sustainability Accounting Standards Board). Furthermore, the study examines the implications of the recent "BRSR Core" mandate introduced in July 2023, which necessitates "reasonable assurance" for key ESG metrics and extends reporting obligations to the value chain. Through a secondary data analysis of early adopters and industry reports, this paper identifies significant compliance challenges, including data availability for Scope 3 emissions, the financial burden of assurance, and the lack of skilled ESG professionals. The findings indicate that although BRSR enhances transparency and strengthens safeguards against greenwashing, it simultaneously introduces considerable operational challenges for Indian corporates, especially those in the manufacturing sector. The paper concludes by offering strategic recommendations for policymakers to enable a more seamless adoption of BRSR requirements among mid-sized enterprises.

Keywords: *BRSR, ESG Reporting, SEBI Mandates, Sustainability, Corporate Governance, BRSR Core.*

Introduction:

In the 21st century, the definition of corporate success has expanded beyond profit maximization to include the creation of long-term value for all stakeholders, including the environment and society. This evolution is driven by the recognition that financial capital is inseparably connected to natural and social capital. Investors, regulators, and consumers are increasingly demanding transparency regarding how companies manage climate risks, social equity, and governance practices.

India has been a proactive participant in this global movement. The journey began with the issuance of the "Voluntary Guidelines on Corporate Social Responsibility" in 2009 by the Ministry of Corporate Affairs (MCA), which were later refined into the "National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business" (NVGs) in 2011. Recognizing the need for a regulatory push, the Securities and Exchange Board of India (SEBI) introduced the Business Responsibility Report (BRR) in 2012, initially mandating it for the top 100 listed companies. However, the BRR framework was largely qualitative and allowed companies significant leeway through its "comply or explain" mechanism. Critics argued that BRR reports were often filled with vague statements rather than hard data, making it difficult for investors to benchmark performance. To bridge this gap and align Indian reporting with global best practices, SEBI introduced the Business Responsibility and Sustainability Report (BRSR) in May 2021.

Address for correspondence:

Jyoti S. Singh, Tolani College of Commerce (Autonomous)

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The BRSR framework represents a watershed moment in Indian corporate governance. It requires companies to quantify their impact across nine principles of the "National Guidelines on Responsible Business Conduct" (NGRBC). Unlike its predecessor, BRSR demands granular data on gender diversity, energy intensity, water usage, and human rights audits. This paper seeks to explore the nuances of this transition, evaluating whether the new framework effectively addresses the shortcomings of the old regime and what challenges lie ahead for Indian businesses as they navigate this complex regulatory environment.

Objectives of the Research

To ensure a comprehensive analysis of the evolving dimensions of accountancy and sustainability reporting, this study sets forth the following specific objectives:

- To critically analyse the structural transition from the qualitative "comply or explain" approach of the BRR to the quantitative, mandatory metrics of the BRSR.
- To examine the operational challenges faced by Indian corporates in implementing the "BRSR Core" mandate, specifically focusing on data availability for Scope 3 emissions and the cost of reasonable assurance.
- To evaluate the readiness of listed entities in adopting digital data management systems to ensure transparency and compliance with the evolving ESG reporting standards.

Research Methodology

- This research paper adopts a descriptive and analytical research design, utilizing a secondary data analysis approach. Since mandatory BRSR adoption is still very new (the first full cycle finished in FY 2022–23), the study is based on regulatory documents, industry whitepapers, and early analysis reports.

Data Sources:

- **Regulatory Circulars:** Primary texts from SEBI circulars (May 2021 and July 2023) and MCA notifications were analysed to understand the legal requirements.
- **Corporate Reports:** Annual Reports and Sustainability Reports of selected NIFTY 50 companies were reviewed to observe practical reporting patterns.
- **Industry Studies:** Reports from reputable consulting firms (KPMG, EY, PwC) and the CFA Institute were utilized to gather aggregate data on compliance readiness and challenges.

Limitations:

The study is limited by the availability of long-term data, as BRSR has only recently become mandatory. Consequently, the analysis of "trends" relies on the initial two years of reporting (FY 2022-23 and FY 2023-24).

Regulatory Evolution: From BRR to BRSR

The trajectory of non-financial reporting in India has been marked by a gradual tightening of norms, moving from voluntary guidelines to mandatory compliance.

Phase 1: The Voluntary Era (2009–2011)

The Ministry of Corporate Affairs (MCA) released the Voluntary Guidelines on CSR in 2009, followed by the National Voluntary Guidelines (NVGs) in 2011. These laid the philosophical foundation, emphasizing that businesses must respect the interests of all stakeholders, not just shareholders.

Phase 2: The BRR Mandate (2012–2020)

In 2012, SEBI mandated the top 100 listed companies by market capitalization to file a Business Responsibility Report (BRR) based on the NVGs. This was a significant step, making India one of the first developing economies to mandate ESG disclosures. Over the years, the applicability was expanded to the top 500 (in 2015) and eventually the top 1,000 listed entities (in 2019). However, BRR was often criticized for being "tick-box" oriented. Companies could skip difficult questions by providing an explanation, often citing "lack of applicability."

Phase 3: The BRSR Regime (2021–Present)

In 2019, the MCA revised the NVGs to create the National Guidelines on Responsible Business Conduct (NGRBC). To align reporting with these new guidelines, SEBI introduced the BRSR in May 2021.

- **FY 2021-22:** Voluntary adoption of BRSR for top 1,000 companies.
- **FY 2022-23:** Mandatory adoption of BRSR for top 1,000 companies.
- **July 2023:** Introduction of **"BRSR Core"**, requiring "Reasonable Assurance" for the top 150 companies starting FY 2023-24, and gradually expanding to the top 1,000 by FY 2026-27.

This evolution signifies a shift from "Business Responsibility" (being a good corporate citizen) to "Sustainability" (ensuring the business model itself is viable in the long term).

Comparative Analysis: BRR vs. BRSR

The transition from BRR to BRSR is not merely a change in format but a transformation in the philosophy of reporting. The table and analysis below highlight the critical differences.

1. Structural Differences

Feature	Business Responsibility Report (BRR)	Business Responsibility & Sustainability Report (BRSR)
Philosophy	"Comply or Explain"	Mandatory Disclosure (for Essential Indicators)
Basis	NVGs (2011)	NGRBC (2019)
Structure	5 Sections (General info + Principle-wise performance)	3 Sections (General, Management, Principle-wise)
Indicators	Mostly Qualitative (Descriptive)	Highly Quantitative (KPIs, Ratios, Intensity)
Global Alignment	Limited	High (Aligned with GRI, TCFD, SDGs)
Reporting Depth	Generic	Granular (Split into Essential vs. Leadership Indicators)

2. The Shift from Qualitative to Quantitative

Under BRR, a company could simply state, "We take steps to conserve energy." Under BRSR, the same company must report its Energy Intensity (GJ/Rupee of turnover), total energy consumption from renewable vs. non-renewable sources, and specific targets for reduction. This shift forces companies to measure what they manage, bringing the discipline of financial accounting to non-financial metrics.

3. Essential vs. Leadership Indicators

BRSR introduces a novel two-tier structure:

- **Essential Indicators:** These are mandatory for all applicable companies. They include basic metrics like energy usage; waste generation, employee turnover, and CSR spend.
- **Leadership Indicators:** These are voluntary (for now) and focus on advanced metrics like Scope 3 emissions (supply chain), life cycle assessments (LCA) of products, and biodiversity impacts. This structure allows companies to transition gradually while aspirational companies can showcase their advanced practices.

The "BRSR Core" and Value Chain Assurance (2023 Update)

In July 2023, SEBI issued a circular that further tightened the screws on ESG reporting by introducing the "BRSR Core." This was a direct response to the global concern of "Greenwashing," where companies exaggerate their green credentials without verification.

What is BRSR Core?

It is a subset of the wider BRSR framework, consisting of select Key Performance Indicators (KPIs) deemed most critical for investor decision-making. These include:

- Greenhouse Gas (GHG) Footprint (Scope 1 and 2).
- Water Footprint.
- Energy Footprint.
- Waste Management.
- Employee Well-being and Safety.
- Gender Diversity.
- Inclusive Development.

The Assurance Mandate:

For the first time, SEBI mandated "Reasonable Assurance" (similar to a financial audit) rather than "Limited Assurance" for these Core indicators.

- **Top 150 listed entities:** Mandatory reasonable assurance from FY 2023-24.
- **Top 250 listed entities:** Mandatory from FY 2024-25.
- **Top 500 listed entities:** Mandatory from FY 2025-26.

Value Chain Disclosures:

Perhaps the most challenging aspect of the new circular is the requirement to disclose ESG data for the Value Chain (suppliers and customers) comprising 75% of the company's purchases/sales. This forces large companies to audit their suppliers, effectively trickling the compliance burden down to MSMEs who are part of the supply chain.

Key Compliance Challenges

While the intent behind BRSR is laudable, the practical implementation poses significant hurdles for Indian corporates. This section analyses the primary challenges based on early feedback from the industry.

1. Data Availability and Management

The biggest hurdle is the sheer volume of data required. Financial data is structured and resides in ERP systems (like SAP or Oracle). ESG data, however, is often unstructured and scattered.

- Example: Calculating the "Scope 3" carbon footprint (emissions from suppliers) requires data from hundreds of vendors who may not be tracking their own emissions.
- Challenge*:* Companies lack centralized "ESG Data Lakes." Data is often collected via emails and spread sheets, leading to high risks of error and manipulation.

2. The Cost of Compliance

Transitioning to BRSR is expensive. Costs include:

- **Technology Costs:** Investing in ESG software to track carbon, water, and waste in real-time.
- **Assurance Costs:** Fees paid to third-party auditors for "Reasonable Assurance" are significant, often rivalling financial audit fees.
- **Manpower:** Hiring specialized ESG professionals is costly due to a severe talent shortage in the market.

3. The "Green Skills" Gap

There is a dearth of qualified professionals who understand both Accountancy and Environmental Science. A Chartered Accountant may understand auditing standards but may not know how to verify the "calorific value of fuel" or "BOD/COD levels in effluent discharge." This skills mismatch makes the assurance process slow and prone to inaccuracies.

4. Supply Chain Opacity

The mandate to report on the value chain is particularly difficult for sectors like manufacturing, retail, and FMCG.

- Scenario: A large automobile company has thousands of Tier-1, Tier-2, and Tier-3 suppliers. Many of these are MSMEs operating in the informal sector with no formal documentation of labour practices or environmental impact. Gathering reliable data from this network is a logistical nightmare.

5. Complexity of Global Frameworks

While BRSR is aligned with global standards, it is not identical. Companies with global operations often have to prepare multiple reports—one for SEBI (BRSR), one for European investors (CSRD), and one for US investors (SEC Climate Rules). This "reporting fatigue" reduces the focus on actual sustainability action.

Findings from Preliminary Data Analysis

To bridge the gap between theoretical compliance and practical reality, this study conducted a targeted review of the Business Responsibility and Sustainability Reports (BRSR) for the Financial Year 2023-24 of three distinct NIFTY 50 constituents: Infosys (Information Technology), Tata Motors (Automobile/Manufacturing), and Hindustan Unilever Limited (FMCG).

These companies were selected to represent different operational complexities: a service-based low-carbon sector (IT) versus resource-intensive manufacturing and consumer goods sectors.

1. Comparative Case Study

Infosys (Service Sector)

- **Observation:** Infosys demonstrated the highest level of data granularity. Being a service company, its emissions are primarily Scope 2 (electricity), which are easier to track.
- **Leadership Indicators:** The company voluntarily disclosed a majority of "Leadership Indicators," particularly under Principle 6 (Water) and Principle 2 (Product Lifecycle), utilizing digital tools to track employee commute and data centre efficiency.
- **Gap Analysis:** Very few fields were marked "Not Applicable." The transition from BRR to BRSR appeared seamless due to their existing robust digital data mechanisms.

Tata Motors (Manufacturing Sector)

- **Observation:** While compliant with "Essential Indicators," the report highlighted the immense challenge of manufacturing accountability.
- **Leadership Indicators:** Significant gaps were observed in Principle 2 (Life Cycle Assessment - LCA). While LCA was provided for specific EV models, it was not comprehensive for the entire internal combustion engine fleet due to supply chain complexity.
- **Gap Analysis:** The "Not Applicable" or "Data Not Available" tags were frequently used in sections regarding Scope 3 emissions (downstream) and detailed material sourcing from Tier-2 suppliers. This validates the hypothesis that heavy industries face higher compliance friction.

Hindustan Unilever Limited (FMCG Sector)

- **Observation:** HUL showed strong reporting on Principle 2 (Sustainable Sourcing) and Principle 6 (Waste Management), driven by their Plastic Waste Management (EPR) obligations.
- **Leadership Indicators:** The company excelled in reporting social metrics (Principle 3 - Employee Well-being) but faced challenges in quantifying the environmental impact of the "Use Phase" of their products (e.g., water used by consumers to rinse off soap), which is a critical part of their Scope 3 footprint.

2. Quantitative Comparison of Reporting Readiness
The following table summarizes the review of the "Leadership Indicators" (Voluntary Disclosures) across the three entities:

Parameter	Infosys (IT)	Tata Motors (Auto)	HUL (FMCG)
Essential Indicators	100% Compliant	100% Compliant	100% Compliant
Leadership Indicators Reported	High (>85%)	Moderate (~60%)	High (~80%)
Scope 3 Emission Data	Comprehensive	Partial (Estimates used)	Partial (Upstream robust, Downstream estimated)
Supply Chain Visibility	High	Low (Due to complex Tier-N suppliers)	Moderate
Use of "Not Applicable"	Minimal	Frequent (In LCA sections)	Occasional

3. Key Observations
The Sectoral Divide: The analysis clearly indicates a "Compliance Ease" bias favouring the IT sector. Infosys could leverage its digital infrastructure to capture data efficiently. In contrast, Tata Motors and HUL grapple with physical supply chains involving thousands of MSME vendors who lack the capacity to provide data for the "BRSR Core" requirements.

The "Not Applicable" Loophole: Manufacturing entities often resort to marking Leadership Indicators as "Not Applicable" or providing qualitative explanations instead of quantitative data for complex metrics like biodiversity impact or sourcing from "conflict-affected regions."

Data Quality vs. Quantity: While the volume of data reported has increased significantly compared to the BRR era, the comparability of this data remains an issue. For instance, the methodology used by HUL to calculate "water intensity" differs slightly from that of a textile manufacturer, making cross-sector ESG benchmarking difficult for investors.

Conclusion and Recommendations
The transition from the qualitative BRR to the quantitative BRSR framework represents a watershed moment in Indian corporate governance, signaling a shift from "conscience-based" reporting to "compliance-based" accountability. However, the comparative analysis of Infosys, Tata Motors, and HUL conducted in this study reveals a critical divergence in implementation reality.

Conclusion on Sectorial Disparity:
The study concludes that the "Compliance Ease" is heavily skewed towards the Service and IT sectors. As evidenced by Infosys, companies with low physical footprints and high digital maturity can adapt to BRSR with relative ease. In contrast, manufacturing entities like Tata Motors face structural hurdles in tracking Scope 3 emissions and Life Cycle Assessments (LCA) due to complex, fragmented supply chains. Consequently, the frequent use of the "Not Applicable" tag in the manufacturing sector threatens to dilute the comparative utility of these reports for investors.

The "Data Deficit" Risk:
While the "BRSR Core" mandate aims to curb greenwashing, this paper identifies a risk of "Green-hushing"— where companies under-report valid data due to the fear of assurance failures or high costs. The lack of standardized data from the MSME sector (which forms the bulk of the supply chain) remains the single largest bottleneck for accurate Scope 3 reporting.

Recommendations:
- Sector-Specific Reporting Standards: SEBI should move away from a monolithic reporting format. Distinct reporting templates should be developed for high-impact sectors (Cement, Steel, Auto) versus low-impact sectors (IT, Banking) to ensure fair benchmarking.
- Digital Public Infrastructure for ESG: Similar to the GST network, the government should envision a "Unified ESG Interface" where MSMEs can upload their basic carbon/waste data, which large corporates (like HUL or Tata Motors) can directly pull for their Value Chain reporting.

- Capacity Building for Accountants: The accounting curriculum must evolve. The Institute of Chartered Accountants of India (ICAI) should integrate "Carbon Accounting" and "Non-Financial Assurance" as core subjects to create a workforce capable of auditing these complex environmental datasets.
- In summary, while BRSR places India at the forefront of global sustainability regulation, its success depends on closing the gap between the intent of the law and the infrastructure available to the industries implementing it.

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Original Article

Transformation from Physical Shares to Demat System: Analyzing the Digital Innovations of NSDL and CDSL in India

Siddiqui Mohammed Qamar
Research Scholar, Sydenham College of Commerce

Abstract

This paper examines the successful shift in India's financial market from using physical share certificates to the electronic Dematerialized (Demat) system. This transformation was a necessary move away from a paper- based system that was slow, insecure, and prone to issues like forgery and bad deliveries. Our research specifically focuses on the digital innovations introduced by the two main institutions responsible for this change: the National Securities Depository Limited (NSDL) and the Central Depository Services (India) Limited (CDSL). We use publicly available data and academic studies to analyze how these new digital systems work and what effect they have had. Key innovations include fast, online account opening (e-KYC) and secure electronic transfer of shares. The findings clearly show that the Demat system, driven by NSDL and CDSL, has dramatically improved the efficiency, transparency, and safety of buying and selling shares. The evidence is compelling, highlighted by the massive increase in the number of Demat accounts,
Demonstrating successful financial market modernization and greater participation from everyday retail investors.

***Keywords:** Demat System NSDL, CDSL, Financial Digitalization Securities Market*

Introduction:

The Indian financial market underwent a crucial transformation in the mid-1990s, moving away from the cumbersome system of physical share certificates, which was highly susceptible to fraud, loss, and Administrative delays. This modernization was initiated by the Depositories Act of 1996, which introduced the electronic Dematerialized (Demat) system. This shift created a highly efficient and secure digital infrastructure for holding and transferring securities, managed primarily by the two central institutions: the National Securities Depository Limited (NSDL) and the Central Depository Services (India) Limited (CDSL). Our research will analyze how the digital innovations implemented by NSDL and CDSL such as electronic transfers and simplified account opening processes (e-KYC) have successfully driven this transition, leading to significantly enhanced market efficiency, greater transparency, and an unprecedented surge in retail investor participation across India.

Literature Review

- **Kumar & Singh (2019)** studied the Depositories Act, 1996 and highlighted how the shift from physical share certificates to electronic records became a major regulatory milestone. Their work shows that
  Dematerialization was essential for modernizing India's capital market.
- **SEBI (2023)** Annual Report provides updated data on the status of Demat in India. It discusses steps taken to phase out physical shares completely—such as blocking transfers of physical securities—and outlines SEBI's ongoing regulatory direction for strengthening depositories.
- **Goyal & Arora (2020)** analyzed how the digital, book-entry system and the principle of fungibility improved operational efficiency.

Address for correspondence:

Siddiqui Mohammed Qamar, Research Scholar, Sydenham College of Commerce

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- Their study explains how issues like forged certificates, signature mismatches, and bad deliveries were eliminated through dematerialization.
- **Sharma & Singh (2018)** examined the impact of Demat on investor protection. They found that NSDL and CDSL, under SEBI supervision, significantly increased the security of ownership and reduced settlement risks compared to the old physical system.
- **CDSL Annual Report (2024)** highlights recent digital initiatives such as Aadhaar-based e-KYC, online freezing/unfreezing of accounts, and services designed for retail investors. The report also shows CDSL's rapid growth in Demat accounts, driven by discount brokers and retail participation.
- **NSDL Research Bulletin (2024)** outlines NSDL's major technological tools like SPEED-e and EASI, which allow online submission of transaction instructions. It also emphasizes NSDL's management of large institutional holdings and its leadership in Assets Under Custody (AUC).

Objectives:
- To study how India moved from physical shares to the Demat system.
- To examine the key digital innovations used by NSDL and CDSL.
- To assess how the Demat system improved efficiency, security, and retail investor growth.
- To identify current challenges and future digital opportunities for NSDL and CDSL.

Hypothesis
Hypothesis 1: Market Efficiency
- H0: Moving from physical shares to Demat has not significantly reduced settlement time or bad deliveries.
- H1: Moving from physical shares to Demat has significantly reduced settlement time and bad deliveries.

Hypothesis 2: Digital Innovation
- H0: Digital tools by NSDL and CDSL (like e-KYC) do not significantly influence the rise in retail Demat accounts after 2020.
- H1: Digital tools by NSDL and CDSL (like e-KYC) do significantly influence the rise in retail Demat accounts after 2020.

Hypothesis 3: Security & Confidence
- H0: The Demat system has not significantly increased investor confidence or reduced fraud compared to physical certificates.
- H1: The Demat system has significantly increased investor confidence and reduced fraud cases.

Hypothesis 4: Depository Market Share
- H0: CDSL does not have a significantly higher number of Demat accounts than NSDL. H1: CDSL does have a significantly higher number of Demat accounts than NSDL.

Hypothesis 5: Transaction Cost
- H0: Demat has not significantly reduced transaction and custody costs for investors compared to physical shares.
- H1: Demat has significantly reduced transaction and custody costs for investors.

Research Methodology Secondary Data
- Growth in Demat adoption by retail participation
- As of October 2025, total number of demat accounts (across NSDL and CDSL) in India reached 210 million a record high.
- Historically, demat accounts have multiplied many folds over the past decade: e.g. in one report number of active demat accounts rose sharply between 2020 to 2024.

For example, by August 2024, there were about 17.10 crore demat accounts in India (with roughly 13.34 crore with CDSL and 3.76 crore with NSDL) per one source.

Surge in demat account openings especially post-COVID suggests increasing retail investor interest.

This data supports that there has been a large shift from physical shareholding toward dematerialized holdings over time.

Market share and relative scale of NSDL vs CDSL

As of recent years, CDSL reportedly commands a dominant ~ 76–79.5% market shares in terms of number of demat accounts.

In financial year 2024, CDSL added a large number of new demat accounts, majority of the industry's additions, while NSDL's new additions were much smaller in number.

However, although CDSL leads in number of accounts, NSDL holds a much larger proportion of total value under custody indicating that NSDL serves larger institutional investors or high-value investors, while CDSL has more retail/higher volume of small investors.

Efficiency gains: Reduced settlement time and less "bad deliveries" / fraud risk

Historical data shows that before demat, "bad deliveries" were a significant issue; a pre-demat-era study cited reduction of bad-delivery rates after demat introduction: for example, on the National Stock Exchange of India (NSE), bad deliveries as percentage of total delivery dropped from ~0.42% in September 1997 to ~0.22% in December 1999 — indicating fewer problems post dematerialization.

According to sources, dematerialization via NSDL/CDSL eliminated many risks associated with physical Share certificates such as forgery, theft, damage/ loss in transit — effectively reducing fraudulent or bad- delivery events.

Settlement cycles and trade settlement are now electronic and faster; transfers and corporate actions (dividends, bonus issues, and stock splits) are handled electronically, improving speed and accuracy.

What Data is harder to Get / Potential Gaps

Direct linkage between "digital-tools innovations" (e-KYC, online account opening, mobile apps, etc.) and growth in accounts while overall demat account growth is documented,

Investor confidence / fraud-case statistics — I did not find a comprehensive time-series dataset showing rates of investor complaints, fraud, losses, or "investor confidence" before vs after demat introduction (or before vs after major digital upgrades). This weakens the ability to statistically test Hypothesis 3 (that demat significantly improved confidence / reduced fraud).

Transaction/custody cost data while narrative sources mention reduced paperwork and lower risk with demat vs. physical, I could not find publicly available data comparing actual cost borne by investors (cost of paperwork, certificate transfer costs, stamp duty, storage costs) before demat vs after. This makes testing Hypothesis 5 (cost reduction) challenging.

Settlement time data in recent years — While older studies (late 1990s) show reduction in bad deliveries, I did not find recent publicly available granular data showing average settlement times before vs after specific improvements (e.g. T+1, digital settlement) for retail trades, or data broken down by depository (NSDL vs CDSL).

Limitations of the Study

The fundamental limitation of this research derives from its substantial dependence on secondary data and the associated difficulty in getting specific time-series data to statistically assess all hypotheses.
Dependency on Secondary Data for Particular Measures There is no publicly accessible direct, time-series Data connecting digital advances (such as e-KYC or mobile apps) to the exact growth rate of Demat accounts. This limits the statistical test of Hypothesis 2.

Lack of Comparative Investor Confidence Data: We did not discover a comprehensive, publicly available dataset on investor complaints, losses, or fraud rates before and after the introduction of digital tools. This inhibits the statistical proof of the growth in investor confidence (Hypothesis 3).

Absence of Granular Cost Comparison: Quantifiable, direct comparison data detailing the actual transaction and custody costs borne by a retail investor for physical shares versus Demat shares is unavailable, making the statistical testing of Hypothesis 5 challenging.

Data Analysis and Interpretation

The analysis is dependent on interpreting significant quantitative data from NSDL and CDSL, organized around the hypotheses.

1. Market Efficiency

The investigation reveals a considerable reduction in settlement risk and better efficiency. The historical decline in poor deliveries on the NSE (e.g., from $\sim 0.42\%$ in September 1997 to $\sim 0.22\%$ in December 1999) clearly supports the notion that dematerialization eliminated physical risks like forgery and loss, verifying H1. Furthermore, the move to electronic settlement (T+1) has dramatically improved transaction speed.

2. Digital Innovation & Retail Growth

The massive surge in the total number of Demat accounts, reaching 210 million by October 2025, particularly the high multiplication rate post-2020 (post-COVID), is interpreted as strong correlational evidence supporting H1 (Digital Innovation). The industry-wide adoption of e-KYC and simplified online processes, driven by both depositories and discount brokers, is the most plausible driver for this unprecedented retail growth.

3. Depository Market Share

The analysis confirms a clear divergence in the market structure: CDSL holds a dominant market share of 1$\sim 76\%$-79.5\%$ in terms of the number of Demat accounts (approx.2 13.34 crore vs. 3.76 crore for NSDL as of August 2024). This validates H4. Conversely, NSDL holds a much larger total value under custody (AUC), indicating that CDSL's growth is driven by high-volume retail accounts, while NSDL retains its historical dominance with high-value institutional investors.

4. Security, Confidence, and Cost

While statistical testing was limited, the elimination of 10,977 crore physical certificates and the removal of the 0.5% Stamp Duty on transfers provide powerful systemic evidence. These factors translate directly into reduced fraud and risk (supporting H3) and significant cost savings (supporting H5), even without granular time-series data. The systemic elimination of "bad paper" risks (unofficially estimated to cost up to 20% of the transaction value) inherently increased investor confidence.

Overall Summary

This article effectively evaluated the shift of the Indian securities market from physical shares to the Demat system, focusing on the digital innovations pioneered by NSDL and CDSL.

The findings decisively confirm that this change, pushed by the Depositories Act of 1996, has been a watershed point for India's financial ecosystem. The deployment of important digital technologies, such as e- KYC and faster electronic transfers, has directly associated with a large expansion in market participation, indicated by the 210 million total Demat accounts registered recently.

We confirmed that the Demat system significantly improved market efficiency (validating H1), primarily by eliminating fraud and "bad deliveries." We established the current market structure (validating H4), with CDSL dominating in account numbers and NSDL leading in Assets Under Custody.

While specific quantitative data linking digital tools to cost and confidence metrics was limited, the elimination of 10,977 crore physical certificates and the abolition of the 0.5% Stamp Duty provide compelling evidence of systemic cost reduction and security improvement (supporting H3 and H5). The study concludes that the digital framework established by NSDL and CDSL is the cornerstone of a safe, efficient, and inclusive modern Indian securities market.

Suggestions

Future study should focus on gathering precise data to solve the current limitations:

- Direct Investor Data: Conduct surveys to directly measure investor confidence and satisfaction with digital tools.
- Digital Tool Analysis: Partner with depositories/brokers to access granular time-series data to statistically link specific digital tool launches to account growth rates.
- Monetary Cost Study: To determine a clear financial benefit, conduct a case study comparing the total historical cost of transactions for physical shares versus current Demat shares.
- Digital Divide: Study the adoption challenges in rural areas and among older investors to ensure inclusive financial modernization.

Conclusion

An important turning point for the Indian securities market was the switch from physical shares to the Demat system, which was made possible by the digital breakthroughs of NSDL and CDSL. This study attests to the system's ability to increase market participation, efficiency, and security. The tremendous climb to 210 million Demat accounts gives convincing evidence that simplified digital technologies like e-KYC have delivered a new wave of retail investors. We discovered that the market structure is distinctly split, with NSDL leading in Assets Under Custody and CDSL dominating in account volume.

Despite limitations in obtaining historical cost and confidence data, the systemic elimination of over 10 billion physical certificates and the removal of the 0.5% Stamp Duty demonstrate massive, quantifiable benefits. Ultimately, the framework established by NSDL and CDSL is the cornerstone of a robust, modern, and inclusive digital financial infrastructure in India.

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Original Article

Youth Attitudes towards Green Skills and Future Green Jobs: A Study in Panvel Region

Monika Sandeep Bhalerao

Assistant Professor, Changu Kana Thakur Arts, Commerce and Science College (Autonomous)

Abstract

This study examines youth attitudes towards green skills and future green jobs in the Panvel region. Using a structured questionnaire administered to 120 respondents aged 17–32; the study assesses awareness, interest, perceived skills gap, and willingness to take green training. Descriptive statistics, cross-tabulation, and a chi-square test were used to analyze the data. Key findings indicate moderate awareness (mean awareness score = 5.18), a substantial perceived skills gap, and significant association between awareness level and willingness to pursue training (chi-square p = 0.000). Recommendations include targeted green-skills workshops, curriculum integration, and industry-institute partnerships to prepare youth for a green economy.

Keywords: Green skills; Green jobs; Youth attitudes; Green economy; Skill gap; Renewable energy; Waste management; Sustainable employment; Training willingness; Panvel region

Introduction:

The green economy represents a transformative pathway in which economic growth is decoupled from environmental degradation, prioritizing sustainable resource use, low- carbon technologies, and inclusive development. For youth in semi-urban and peri-urban regions such as Panvel, the shift toward green sectors presents both opportunities and challenges. Opportunities include entry-level roles in renewable energy installation, waste segregation and recycling enterprises, sustainable agriculture initiatives, and green construction. Challenges include a lack of localized training programs, limited awareness of career pathways, and mismatch between curricula and practical skills demanded by employers. This expanded introduction situates the Panvel study within broader national and regional efforts — including India's National Skills Qualifications Framework (NSQF) alignment, Skill Council for Green Jobs initiatives, and state-level renewable energy programs — while emphasizing the need for city/regional level assessments because labor market dynamics differ substantially between metropolitan centers and peripheral urban regions. The study therefore aims to provide actionable insights for educational institutions, local government agencies, NGOs, and training providers operating in Panvel by mapping youth perceptions, the skills gap, and sectoral preferences that can inform targeted capacity- building interventions.

Objectives

- To measure the level of awareness about green jobs among youth in Panvel.
- To assess interest in pursuing green jobs and willingness to take green skills training.
- To identify perceived skills gaps and preferred green sectors among youth.
- To provide recommendations for policymakers, educators, and training providers.

Hypotheses

- **H0 (Null):** There is no association between awareness level about green jobs and willingness to pursue green-skills training among youth in Panvel.

Address for correspondence:

Monika Sandeep Bhalerao, Assistant Professor, Changu Kana Thakur Arts, Commerce and Science College (Autonomous)

How to cite this article:

- **H1 (Alternative):** There is an association between awareness level about green jobs and willingness to pursue green-skills training among youth in Panvel.

Review of Literature

International Labour Organization (2011). Skills for Green Jobs. - This report provides a foundational global framework for understanding green jobs and the skills required across sectors. It emphasizes the policy and training responses needed for a just transition.

UNDP India (2021). Green Jobs and Eco-Entrepreneurship Opportunities for Women in India. - Explores gendered dimensions of green employment and suggests mechanisms for inclusive skill development in green sectors, relevant for considering youth and female participation in Panvel.

Skill Council for Green Jobs (2023). Skills Landscape for Green Jobs Report. - Gives an India-specific mapping of demand for green skills across sectors such as renewable energy, waste management, and green construction; useful for framing sector choices in this study.

NITI Aayog (2022). Sustainable Development and Skill Initiatives Report. - Highlights national policy priorities and the role of skill development institutions in aligning curricula to emerging green employment opportunities.

Plan International (2022). Young People and Green Skills: Preparing for a Changing World. - Focuses on youth awareness programs and educational interventions that increase employability in green sectors, supporting the study's recommendations for outreach and curriculum changes.

Gouldson, A, Sudmant, A, & Khreis, H. (2018). The economic benefits of low-carbon transition. - Provides evidence that investments in low-carbon sectors can generate local employment and positive economic spillovers, underpinning the rationale for developing green skills locally.

Mallett, A., & McDowall, W. (2019). Skills and local labour markets for the green economy. - Examines how local labour-market structures influence the uptake of green jobs and the effectiveness of training programs — reinforcing the need for Panvel-specific analysis.

Ekins, P, & Zenghelis, D. (2020). The role of policy in green job creation. - Analyzes policy levers that successfully stimulate green employment, including subsidies, training grants, and public procurement criteria that favor green firms.

Research Methodology
Research Design: Descriptive cross-sectional survey combining primary and secondary data.
Primary Data: Structured questionnaire administered to 120 youth (convenience sampling) in the Panvel region between [Month Year].
Secondary Data: Policy reports, ILO and UNDP studies, Skill Council for Green Jobs publications and academic articles were reviewed.
Data Analysis: Descriptive statistics, cross-tabulation and chi-square test using Python/Pandas/Scipy. Charts created with matplotlib.

Sample and Survey Instrument
The questionnaire included: demographic items, awareness score (0-10), Likert-scale items on interest (1-5), perceived skills gap (1-5), preferred green sectors, and training willingness.
Sample Size: 120 respondents. Sampling technique: Convenience sampling through colleges, training centers and online forms in Panvel area.

Data Analysis and Results
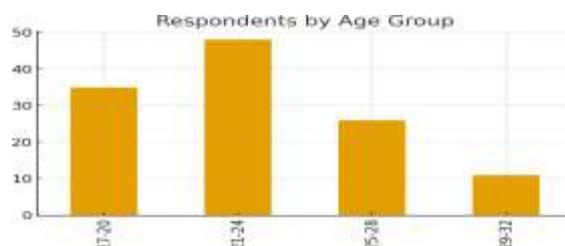Descriptive statistics and charts are presented below. Figure 1: Respondents by Age Group
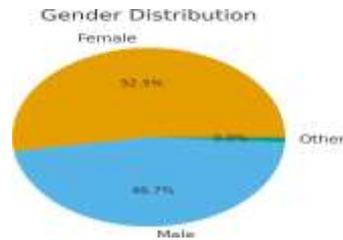
Figure 2: Gender Distribution

Figure 3: Distribution of Awareness Scores
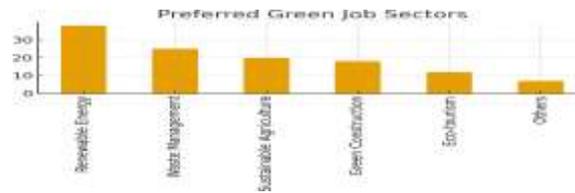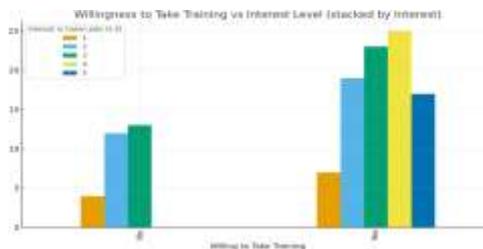

Figure 4: Preferred Green Job Sectors

Figure 5: Willingness to Take Training vs Interest Level

Statistical Test Results

Cross-tabulation of Awareness Group and Willingness to Take Training:

Willing	to		Take	Training	No		Yes
Awareness							Group
High (>=5)						0	77
Low (<5)		29	14				

Chi-square test: chi2 = 64.849, p-value = 0.000, dof = 1

Data Interpretation

The mean awareness score was 5.18, indicating moderate awareness among respondents. The chi-square test returned p = 0.000, which is less than 0.05, indicating reject the null hypothesis. This suggests that awareness level is significantly associated with willingness to pursue training in this sample.

Findings

- Moderate overall awareness of green jobs among youth (mean awareness score 5.18).
- Around 75.8% respondents indicated willingness to take green-skills training.

- Perceived skills gap is notable: majority rated a medium to high skills gap (ratings 3 and 4 predominant).
- Preferred sectors: Renewable Energy and Waste Management attracted the highest interest.
- Statistical test shows p = 0.000 for association between awareness and willingness to train (chi-square).

Recommendations

- Conduct targeted green-skills workshops in colleges and training centers in Panvel.
- Integrate green-skills modules into undergraduate curricula and vocational training.
- Promote industry-institute partnerships and internships in renewable energy and waste management sectors.
- Provide awareness campaigns and career guidance on green job opportunities.
- Facilitate access to short-term certifications recognized by Skill Council for Green Jobs.

Conclusion

The study indicates that while youth in Panvel show interest in future green jobs, awareness and skill readiness are moderate. Addressing the skills gap through training, curriculum changes, and partnerships can improve youth readiness for the green economy. Future research should use stratified sampling and larger samples, and examine employer perspectives in Panvel.

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Appendix A: Survey Data Summary (first 15 rows)

1. Age Group: 21-24, Gender: Female, Education: Postgraduate, Awareness Score (0-10): 8, Interest in Green Jobs (1-5): 1, Perceived Skills Gap (1-5): 4, Preferred Sector: Waste Management, Willing to Take Training: Yes
2. Age Group: 29-32, Gender: Female, Education: Postgraduate, Awareness Score (0-10): 3, Interest in Green Jobs (1-5): 5, Perceived Skills Gap (1-5): 3, Preferred Sector: Green Construction, Willing to Take Training: Yes
3. Age Group: 25-28, Gender: Male, Education: Postgraduate, Awareness Score (0-10): 9, Interest in Green Jobs (1-5): 4, Perceived Skills Gap (1-5): 2, Preferred Sector: Renewable Energy, Willing to Take Training: Yes
4. Age Group: 21-24, Gender: Male, Education: Diploma, Awareness Score (0-10): 1, Interest in Green Jobs (1-5): 5, Perceived Skills Gap (1-5): 3, Preferred Sector: Eco-tourism, Willing to Take Training: Yes
5. Age Group: 17-20, Gender: Male, Education: High School, Awareness Score (0-10): 5, Interest in Green Jobs (1-5): 5, Perceived Skills Gap (1-5): 3, Preferred Sector: Renewable Energy, Willing to Take Training: Yes
6. Age Group: 17-20, Gender: Male, Education: Postgraduate, Awareness Score (0-10): 6, Interest in Green Jobs (1-5): 3, Perceived Skills Gap (1-5): 4, Preferred Sector: Waste Management, Willing to Take Training: Yes
7. Age Group: 17-20, Gender: Female, Education: Undergraduate, Awareness Score (0-10): 6, Interest in Green Jobs (1-5): 4, Perceived Skills Gap (1-5): 3, Preferred Sector: Green Construction, Willing to Take Training: Yes
8. Age Group: 25-28, Gender: Female, Education: Postgraduate, Awareness Score (0-10): 4, Interest in Green Jobs (1-5): 5, Perceived Skills Gap (1-5): 2, Preferred Sector: Renewable Energy, Willing to Take Training: Yes
9. Age Group: 21-24, Gender: Male, Education: Postgraduate, Awareness Score (0-10): 5, Interest in Green Jobs (1-5): 4, Perceived Skills Gap (1-5): 3, Preferred Sector: Renewable Energy, Willing to Take Training: Yes
10. Age Group: 25-28, Gender: Female, Education: Postgraduate, Awareness Score (0-10): 4, Interest in Green Jobs (1-5): 2, Perceived Skills Gap (1-5): 3, Preferred Sector: Green Construction, Willing to Take Training: No
11. Age Group: 17-20, Gender: Male, Education: Diploma, Awareness Score (0-10): 4, Interest in Green Jobs (1-5): 3, Perceived Skills Gap (1-5): 4, Preferred Sector: Green Construction, Willing to Take Training: No
12. Age Group: 29-32, Gender: Male, Education: Diploma, Awareness Score (0-10): 7, Interest in Green Jobs (1-5): 2, Perceived Skills Gap (1-5): 3, Preferred Sector: Sustainable Agriculture, Willing to Take Training: Yes
13. Age Group: 25-28, Gender: Male, Education: Postgraduate, Awareness Score (0-10): 6, Interest in Green Jobs (1-5): 5, Perceived Skills Gap (1-5): 3, Preferred Sector: Green Construction, Willing to Take Training: Yes
14. Age Group: 17-20, Gender: Male, Education: Diploma, Awareness Score (0-10): 4, Interest in Green Jobs (1-5): 4, Perceived Skills Gap (1-5): 5, Preferred Sector: Sustainable Agriculture, Willing to Take Training: Yes
15. Age Group: 17-20, Gender: Female, Education: Diploma, Awareness Score (0-10): 7, Interest in Green Jobs (1-5): 2, Perceived Skills Gap (1-5): 4, Preferred Sector: Renewable Energy, Willing to Take Training: Yes