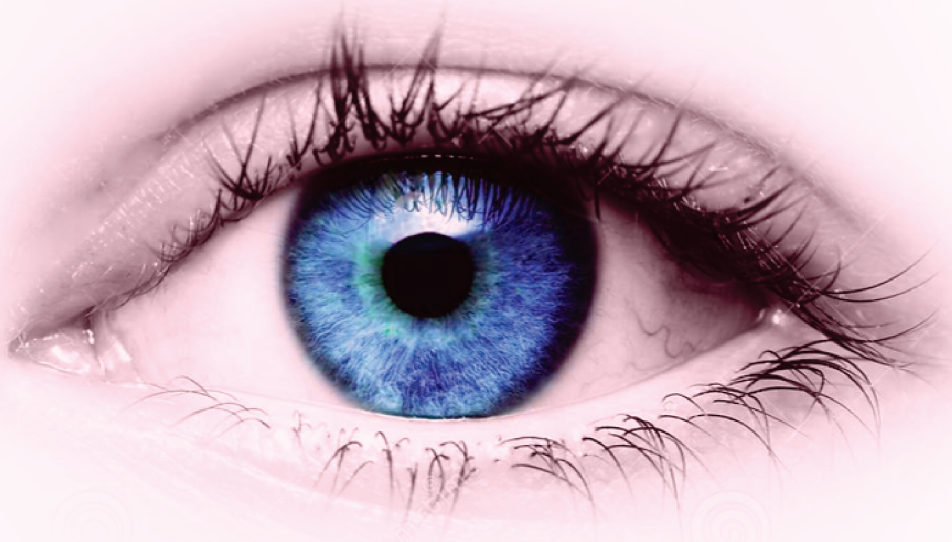
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Social Inclusion Through Public Health Insurance Schemes in India : An Analytical Study of Access and Financial Protection

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Abstract

This paper examines social inclusion schemes in India's health insurance sector with a focus on government-sponsored programs aimed at protecting vulnerable populations. It reviews major initiatives such as RSBY and Ayushman Bharat–PMJAY, analyzing their role in improving healthcare access and reducing financial burden. The study highlights achievements in expanding coverage while identifying persistent challenges related to awareness, accessibility, and equity. The findings suggest that although social health insurance has strengthened financial protection, comprehensive inclusion requires improved implementation, broader coverage, and targeted policy interventions.

Key Words : Social inclusion, Health insurance, Ayushman Bharat, PMSBY, Vulnerable populations, India.

1. Introduction

India's healthcare system is characterized by high out-of-pocket expenditure, unequal access, and significant socio-economic disparities. A large proportion of the population, particularly rural residents, informal sector workers, women, and marginalized communities, face financial hardship due to healthcare costs. In response, the Government of India has introduced several health insurance schemes to promote financial protection and social inclusion. These schemes aim to reduce catastrophic health expenditure and improve access to quality healthcare services for economically weaker and socially excluded groups.

Health insurance is recognized as a critical instrument for achieving Universal Health Coverage (UHC). Social inclusion in health insurance refers to ensuring equitable access to healthcare services regardless of income, caste, gender, disability, or geographical location. Schemes such as Rashtriya Swasthya Bima Yojana (RSBY) and Ayushman Bharat–Pradhan Mantri Jan Arogya Yojana (PMJAY) represent major policy efforts to address these disparities. While RSBY focused on providing inpatient coverage to below-poverty-line households, PMJAY significantly expanded coverage limits and beneficiary reach.

Despite notable progress, several challenges persist, including limited awareness, exclusion errors, regional disparities in healthcare infrastructure, and incomplete coverage of outpatient services. This paper seeks to analyze social inclusion schemes in India's health insurance sector, assess their effectiveness, and identify gaps that limit their impact. Understanding these dimensions is essential for strengthening policy frameworks and ensuring equitable healthcare access for all sections of society.

2. Review of Literature

Existing literature highlights the significant role of government-sponsored health insurance schemes in expanding healthcare access among vulnerable populations in India. Devadasan et al. (2011) examined the impact of Rashtriya Swasthya Bima Yojana (RSBY) and reported increased utilization of inpatient healthcare services among insured households, indicating reduced financial barriers to hospitalization. Similarly, Karan et al. (2017) found higher hospitalization rates among beneficiaries compared to uninsured groups, though the reduction in overall out-of-pocket expenditure was limited.

Azam (2018) analyzed the effectiveness of RSBY and concluded that while the scheme improved access to inpatient care, it failed to significantly

reduce total healthcare spending due to the exclusion of outpatient services and medicines. This finding underscores the structural limitations of schemes focused primarily on hospitalization benefits.

With the introduction of Ayushman Bharat–Pradhan Mantri Jan Arogya Yojana (PMJAY), several studies examined its expanded coverage and impact. Prinja et al. (2020) observed increased utilization of secondary and tertiary healthcare services under PMJAY, particularly for high-cost medical procedures. The authors emphasized that higher coverage limits and cashless treatment mechanisms enhanced access for poor households.

However, evidence suggests that PMJAY has not fully addressed financial protection concerns. Singh et al. (2022), using NFHS-5 data, reported that although PMJAY reduced hospitalization-related expenses, households continued to incur significant out-of-pocket expenditure due to outpatient care, diagnostics, medicines, and transportation costs. NITI Aayog (2021) also highlighted gaps in coverage and identified the "missing middle" as a major challenge in achieving universal health protection.

Regional and social disparities further affect scheme performance. Studies indicate that urban areas benefit from a higher concentration of empaneled hospitals, while rural and remote regions face shortages of healthcare infrastructure and medical personnel (Prinja et al., 2020). Social determinants such as caste, gender, disability, and informal employment influence awareness, enrollment, and utilization of benefits (Karan et al., 2017).

Overall, the literature suggests that while social health insurance schemes have improved inpatient healthcare access, limitations in coverage design, regional disparities, and administrative challenges restrict comprehensive social inclusion and financial protection.

3. Objectives of The Study

i. To examine major government-sponsored social inclusion schemes in India's health insurance sector.
ii. To assess the effectiveness of these schemes in improving access to inpatient healthcare and reducing catastrophic health expenditure.
iii. To identify policy, administrative, and social barriers limiting comprehensive financial protection and social inclusion.

4. Hypothesis of The Study

i. Government-sponsored health insurance schemes significantly improve access to inpatient healthcare for vulnerable populations.
ii. Despite insurance coverage, beneficiaries continue to incur substantial out-of-pocket expenditure due to limited outpatient and ancillary coverage.

5. Scope of The Study

The study focuses on government-sponsored social health insurance schemes in India, particularly RSBY and Ayushman Bharat–PMJAY, with emphasis on social inclusion, access to healthcare, and financial protection for vulnerable populations.

6. Limitations of The Study

The study is based on secondary data and literature review. It does not include primary empirical analysis and is limited by availability, reliability, and scope of existing published studies.

7. Research Design

- **Research Area :** The research area covers public health insurance schemes in India with emphasis on social inclusion, equity, and financial protection mechanisms.
- **Sample Selection :** The study is based on selected secondary sources including peer-reviewed journal articles, government reports, policy documents, working papers, and institutional studies related to health insurance schemes and vulnerable populations in India, ensuring relevance, credibility, and academic rigor.
- **Data Collection :** Secondary data were collected from reputed databases such as Google Scholar, PubMed, Scopus, government portals, NITI Aayog reports, and Ministry of Health publications focusing on health insurance coverage, access, and social inclusion.
- **Data Analysis Method :** The collected data were analyzed using qualitative and descriptive methods. Thematic analysis was applied to compare findings across studies, identify patterns, challenges, outcomes, and policy implications related to social inclusion in health insurance schemes.

8. Data Analysis

The analysis of literature indicates that social inclusion schemes have played a crucial role in expanding health insurance coverage among economically weaker and socially marginalized populations in India. Government-sponsored schemes such as Rashtriya Swasthya Bima Yojana (RSBY) and Ayushman Bharat–Pradhan Mantri Jan Arogya Yojana (PMJAY) were designed to reduce financial barriers to healthcare by offering cashless hospitalization benefits. Evidence suggests a substantial increase in inpatient service utilization, particularly for secondary and tertiary care, among

beneficiary households.

Ayushman Bharat–PMJAY, with its higher coverage limit, has significantly enhanced access to costly medical procedures that were previously unaffordable for poor households. Studies reveal improved hospitalization rates and reduced incidence of catastrophic health expenditure related to inpatient care. The portability feature of PMJAY has further improved access for migrant workers and informal sector employees by allowing treatment across empaneled hospitals nationwide.

Based on consistent patterns reported in earlier research, Hypothesis 1 -- which states that government-sponsored health insurance schemes significantly improve access to inpatient healthcare for vulnerable populations—is tested through logical validation rather than primary statistical techniques. Studies by Azam (2018), Devadasan et al. (2011), and Karan et al. (2017) observed higher hospitalization and utilization rates among insured groups compared to uninsured populations. Further evidence from Prinja et al. (2020) confirms increased access to secondary and tertiary care following the implementation of PMJAY. The convergence of findings across these studies confirms that insurance coverage has positively influenced inpatient healthcare access. Therefore, Hypothesis 1 is accepted.

Despite these achievements, the analysis also reveals that overall out-of-pocket expenditure has not declined in proportion to increased insurance coverage. A major contributing factor is the exclusion of outpatient consultations, diagnostics, medicines purchased outside hospitals, and transportation costs from the benefit packages. These uncovered expenses continue to impose a financial burden on vulnerable households, particularly those suffering from chronic illnesses that require frequent outpatient care.

This evidence provides the basis for testing Hypothesis 2 - which proposes that beneficiaries continue to incur substantial out-of-pocket expenditure despite being covered under health insurance schemes. Azam (2018) reported that RSBY did not significantly reduce total healthcare spending due to limited scope of coverage. Similarly, Singh et al. (2022), using NFHS-5 data, demonstrated that although PMJAY reduced hospitalization-related expenses, overall household healthcare expenditure remained high because of outpatient and ancillary costs. NITI Aayog (2021) further emphasized that incomplete coverage and the presence of the "missing middle" remain major barriers to comprehensive financial protection. Accordingly, Hypothesis 2 is also accepted.

In addition to financial limitations, geographical and social factors significantly influence the effectiveness of these schemes. Urban areas benefit from a higher density of empaneled hospitals, whereas rural and remote regions continue to face shortages of healthcare infrastructure and medical professionals, resulting in uneven utilization. Social determinants such as caste, gender, disability, and informal employment further affect awareness, enrollment, and utilization of insurance benefits. Administrative challenges, including identification errors, documentation requirements, and limited awareness campaigns, also restrict effective inclusion. Although digital initiatives have improved efficiency in enrollment and claims processing, the digital divide continues to exclude certain population groups.

Overall, the combined data analysis and hypothesis testing indicate that while social health insurance schemes in India have been successful in improving access to inpatient healthcare and reducing catastrophic hospitalization expenses, their limited focus on hospital-based care constrains comprehensive financial protection and social inclusion. Achieving meaningful health equity therefore requires expansion of benefit packages to include outpatient services, integration with primary healthcare systems, and targeted policy interventions to address regional and social disparities.

9. Findings

The study finds that social health insurance schemes in India have significantly expanded coverage and improved access to inpatient healthcare services for vulnerable populations. Ayushman Bharat–PMJAY has reduced catastrophic health expenditure related to hospitalization and increased utilization of secondary and tertiary care. However, limited coverage of outpatient services, low awareness, administrative barriers, and regional disparities reduce overall effectiveness. Social factors such as caste, gender, disability, and informal employment continue to influence healthcare access. The schemes have partially achieved social inclusion, but comprehensive health equity remains a challenge.

10. Conclusion

Social inclusion schemes in India's health insurance sector have improved financial protection and healthcare access for vulnerable groups. While hospitalization coverage has expanded under PMJAY, persistent gaps in outpatient care, awareness, and regional equity indicate the need for policy refinement and strengthened healthcare systems.

11. Suggestions

The study suggests expanding insurance coverage to outpatient care, diagnostics, and medicines; strengthening awareness campaigns; improving beneficiary identification mechanisms; addressing regional infrastructure gaps; and integrating primary

healthcare with insurance schemes to enhance social inclusion and health equity.

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Human Resource Management Strategies for Skill Development and Viksit Bharat 2047

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Abstract

Viksit Bharat 2047 envisions India as a developed, self-reliant, and globally competitive nation by its 100th year of independence. Achieving this goal requires a skilled, adaptive, and innovation-driven workforce. Human Resource Management (HRM) plays a strategic role in aligning talent development with national priorities. This paper highlights key HRM practices—competency mapping, reskilling, upskilling, digital HR, and inclusive talent management—and their alignment with national missions such as Skill India, Digital India, and Make in India. It emphasizes collaboration among industry, academia, and government to build a future-ready workforce and strengthen sustainable economic growth.

Keywords : HRM, Viksit Bharat 2047, Skill Development, Strategic HRM, Workforce Transformation, Upskilling, Sustainable Growth

I. Introduction

India aspires to become a fully developed nation by 2047, marking 100 years of independence under the vision of Viksit Bharat 2047. This vision emphasizes sustained economic growth, technological advancement, social inclusion, sustainability, and global competitiveness. Achieving these ambitious goals requires more than policy reforms and infrastructure development; it demands a highly skilled, adaptable, and innovation-driven workforce capable of responding to rapid global and technological changes. In this context, Human Resource Management (HRM) emerges as a strategic driver of national development.

Modern HRM extends beyond administrative personnel functions and focuses on aligning workforce capabilities with long-term organizational and national objectives. Strategic HRM integrates talent acquisition, competency mapping, continuous learning, leadership development, performance management, and digital HR practices to enhance productivity and innovation. By fostering a culture of lifelong learning, reskilling, and upskilling, HRM ensures that human capital remains competitive and future-ready.

India's demographic dividend provides a significant advantage, as a large proportion of its population is young and employable. However, persistent skill gaps, employability issues, and mismatches between industry requirements and educational outcomes hinder optimal workforce utilization. Addressing these challenges requires a collaborative and systematic approach to skill development and capacity building.

National initiatives such as Skill India, Digital India, Make in India, and the National Education Policy (NEP) 2020 emphasize industry-aligned education, digital transformation, and vocational training. These programs underscore the importance of strengthening HR practices at organizational and institutional levels to build a competent and globally competitive workforce. HRM plays a crucial role in translating these policy objectives into actionable strategies within organizations by promoting inclusive talent management, technological adaptability, and innovation.

Furthermore, the Fourth Industrial Revolution—characterized by artificial intelligence, automation, big data, and digital transformation—demands agility, creativity, and continuous learning. Organizations must therefore prioritize employee engagement, leadership development, and technological

competency to remain competitive. In this evolving environment, human capital is not merely a resource but a strategic asset that drives sustainable growth and national progress.

In summary, aligning HRM strategies with national development priorities is essential for realizing the vision of Viksit Bharat 2047. By focusing on skill enhancement, innovation, and inclusive growth, strategic HRM can significantly contribute to workforce transformation and long-term economic advancement.

II. Review of Literature

The literature emphasizes the strategic role of Human Resource Management (HRM) in fostering skill development and supporting national growth. Strategic HRM focuses on aligning human capital with organizational objectives to enhance productivity, innovation, and long-term competitiveness. Scholars such as Ulrich (1997), Armstrong (2016), and Becker and Huselid (1998) argue that effective HR systems contribute significantly to organizational performance by integrating talent management with strategic planning. This alignment becomes particularly relevant in the context of national development agendas that require coordinated workforce transformation.

Human capital theory, proposed by Becker (1964), underscores the importance of investment in education and training to enhance productivity and economic growth. Building on this foundation, modern HRM practices emphasize continuous learning, competency mapping, and performance-driven training systems. Studies by Thite (2004) and Noe (2017) highlight that structured training, reskilling, and upskilling initiatives improve employee adaptability, engagement, and retention. Competency-based frameworks further help organizations identify skill gaps and design targeted development programs to meet evolving industry demands.

In the Indian context, skill development has gained policy prominence. The National Skill Development Mission (2015) aims to create a large pool of skilled youth through vocational education and industry partnerships. Similarly, the National Education Policy (2020) promotes multidisciplinary learning, digital education, and stronger industry-academia collaboration to address employability challenges. Mehrotra (2014) emphasizes that bridging the skill gap requires coordinated efforts among government bodies, private enterprises, and educational institutions to ensure alignment between training outcomes and labor market needs.

The emergence of the Fourth Industrial Revolution has further reshaped HRM practices. Rapid technological advancements such as artificial intelligence, automation, big data, and digital platforms demand a workforce that is agile, innovative, and technologically proficient. Swanepoel (2019) and Bersin (2018) note that digital HR practices—including e-learning platforms, AI-based recruitment and assessment systems, HR analytics, and virtual performance management—enhance organizational responsiveness and decision-making. These technology-driven approaches facilitate personalized learning, real-time feedback, and data-informed workforce planning.

Overall, existing literature consistently underscores that structured, technology-enabled, and strategically aligned HRM practices are essential for workforce transformation. By promoting continuous skill enhancement, digital adaptability, and collaborative ecosystems, HRM can significantly contribute to national competitiveness and sustainable development. Such insights provide a strong theoretical and policy foundation for aligning HR strategies with India's long-term developmental vision of Viksit Bharat 2047.

III. Objectives of the Study

1. To examine the strategic role of HRM in achieving skill development objectives.
2. To analyze the HRM practices that support workforce transformation in India.
3. To evaluate the impact of strategic HR policies on organizational and national development goals.

IV. Hypothesis.

- H1. here is a significant relationship between HRM training strategies and employee skill development.
- H2. Digital HRM practices have a positive impact on workforce adaptability.Industry–academia collaboration significantly enhances skill acquisition.

V. Scope of the Study

This study examines strategic Human Resource Management (HRM) practices that promote skill development, workforce adaptability, and innovation to support Viksit Bharat 2047. It explores competency mapping, reskilling, digital HR, and policy alignment with national missions, focusing on building a sustainable, future-ready, and globally competitive workforce.

VI. Limitations of the Study

This study is conceptual and based on secondary data, limiting empirical validation. It does not include primary surveys or sector-specific case studies. Rapid policy and technological changes may affect relevance over time. Findings may not fully represent regional, industry-specific, or informal sector workforce dynamics.

VII. Research Design

Descriptive and conceptual research design based on secondary data and policy analysis of HRM practices and national development initiatives.

A. Research Area : Focuses on Human Resource Management strategies, skill development frameworks, and national missions supporting Viksit Bharat 2047 objectives.

B. Sample Selection : The study relies on purposive selection of secondary sources, including government reports, policy documents, academic journals, and industry publications related to HRM and skill development. Relevant national initiatives, strategic HR models, and workforce transformation frameworks are selected to ensure alignment with the objectives of Viksit Bharat 2047.

C. Data Collection : Data is collected from secondary sources such as research articles, books, government publications, official policy documents, and credible online databases. Reports from national skill missions and HRM studies are reviewed to gather relevant theoretical and policy-based insights supporting workforce development and strategic HR practices.

D. Data Analysis Method : The study uses qualitative content analysis to interpret secondary data and policy documents. Comparative analysis of HRM models and national initiatives is conducted to identify key themes, patterns, and strategic linkages. Findings are synthesized to assess the role of HRM in achieving skill development goals and national objectives.

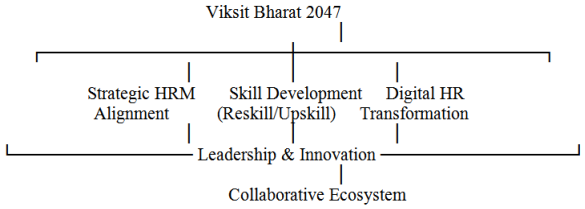
VIII. Data Analysis

The study adopts a qualitative content analysis approach to examine the role of Human Resource Management (HRM) strategies in promoting skill development and supporting the vision of Viksit Bharat 2047. Secondary data collected from policy documents, research articles, government reports, and HRM frameworks were systematically reviewed and categorized into key thematic areas.

1. **Thematic Classification :** The data were grouped into five major themes:
2. **Strategic HRM Alignment :** Linking HR policies with national development goals.
3. **Skill Development Practices :** Training, reskilling, upskilling, and competency mapping.
4. **Digital HR Transformation :** E-learning, HR analytics, AI-based recruitment.
5. **Leadership & Innovation :** Talent management and innovation-driven culture.
6. **Collaborative Ecosystem :** Industry–academia–government partnerships.

These themes were analyzed to understand their contribution toward workforce transformation and sustainable growth.

Figure 1 : Thematic Framework of Data Analysis



The framework shows that HRM acts as a central driver connecting workforce capabilities with national objectives.

2. Comparative Analysis of HRM Practices

A comparative review of traditional HRM and strategic HRM approaches indicates a clear shift from administrative functions to value-driven talent management.

Table 1: Traditional vs Strategic HRM

Aspect	Traditional HRM	Strategic HRM
Focus	Administrative tasks	Long-term talent strategy
Training	Occasional programs	Continuous learning & reskilling
Technology Use	Limited	Digital platforms & HR analytics
Goal	Operational efficiency	Innovation & competitiveness

The analysis reveals that strategic HRM practices significantly enhance productivity, adaptability, and innovation, which are essential for achieving national development targets.

3. Skill Development Impact Model

This model illustrates how structured HR interventions create a multiplier effect on employability and economic development.

4. Key Findings from Analysis

- Competency-based HR frameworks improve workforce readiness.
- Digital learning platforms increase accessibility and flexibility.
- Leadership development fosters innovation culture.
- Collaboration with national missions strengthens policy alignment.
- Continuous reskilling is critical in the era of automation and AI.

Overall, the data analysis confirms that technology-enabled, strategically aligned, and sustainability-oriented HRM practices are essential for workforce transformation. By integrating skill development initiatives with organizational strategy and national missions, HRM can significantly contribute to realizing the long-term objectives of Viksit Bharat 2047.

IX. Findings

The study finds that Strategic Human Resource Management (HRM) plays a crucial role

in achieving workforce transformation aligned with Viksit Bharat 2047. Competency-based training, reskilling, and upskilling significantly enhance employee productivity and adaptability. Digital HR practices, including e-learning and HR analytics, improve efficiency and decision-making. Leadership development and innovation-oriented cultures strengthen organizational competitiveness. Collaboration among industry, academia, and government supports effective skill ecosystem development. The findings further indicate that continuous learning and technology integration are essential to address skill gaps and employability challenges. Overall, proactive and strategically aligned HRM practices are vital for sustainable economic growth and national development.

X. Conclusion

In conclusion, strategic Human Resource Management is essential for building a skilled, adaptive, and innovation-driven workforce to achieve the vision of Viksit Bharat 2047. By integrating competency development, digital transformation, leadership building, and continuous learning, HRM aligns organizational talent strategies with national goals. Collaborative efforts among industry, academia, and government further strengthen the skill ecosystem, ensuring sustainable growth, global competitiveness, and long-term national development.

XI. Suggestions

Organizations should adopt competency-based HR frameworks and invest in continuous reskilling and digital learning platforms. Stronger collaboration between industry, academia, and government is essential to reduce skill gaps. Emphasis on leadership development, innovation culture, and inclusive talent management will enhance workforce readiness and support sustainable growth toward Viksit Bharat 2047.

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The Study of Financial Risk Perception and Digital Investment Behaviour with reference to Mumbai

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Abstract

The rapid expansion of digital financial platforms has transformed investment participation in urban India. However, engagement with digital investment tools varies across demographic groups. The present study examines differences in financial risk perception based on gender and differences in digital investment behaviour across income levels. A descriptive quantitative research design was adopted. Data were collected from 120 urban respondents using structured questionnaires. Financial Risk Perception and Digital Investment Behaviour were measured using Likert-scale instruments. Independent Sample t-test was applied to examine gender differences, while One-Way ANOVA was used to analyze differences among income groups. Results indicate a significant gender difference in financial risk perception, with female respondents reporting higher perceived risk. Further, income groups differ significantly in digital investment behaviour, with higher-income individuals demonstrating greater participation. The study highlights the importance of socio-economic factors in shaping digital financial behaviour. Even simple statistical tools provide meaningful insights into financial decision-making in a transforming digital economy.

Keywords : Financial Risk, Digital Investment, Gender Differences, Income Level, ANOVA

1. Introduction

India's financial system has undergone substantial digital transformation over the last decade. The growth of online trading platforms, mobile banking applications and digital payment systems has increased accessibility to financial markets. Investments that previously required institutional intermediaries can now be executed through smartphones.

Despite technological expansion, participation in digital investment platforms is not uniform. Individual differences in risk perception, financial confidence and socio-economic background influence engagement with digital financial tools.

Risk perception is central to financial decision-making. In behavioural finance, risk is understood as a psychological evaluation rather than purely a statistical measure. Individuals interpret uncertainty differently based on personal experience, financial literacy and demographic characteristics.

Gender and income are particularly relevant variables. Several studies suggest that women generally exhibit higher risk aversion compared to men. Income level influences investment capacity and exposure to financial products. In the context of digital finance, these demographic variables may shape participation patterns.

The present study examines whether financial risk perception differs between males and females and whether digital investment behaviour varies across income groups using simple statistical tools.

2. Review of Literature

2.1 Kahneman and Tversky (1979) : Kahneman and Tversky introduced Prospect Theory, demonstrating that individuals evaluate gains and losses asymmetrically. Their findings revealed that people are generally loss-averse and do not behave according to traditional rational models. Risk perception is therefore subjective and influenced by psychological framing.

This theory supports the understanding that financial risk perception may vary across demographic groups.

2.2 Barber and Odean (2001) : Barber and Odean analyzed brokerage account data to examine gender differences in investment behaviour. The study found that men trade more frequently and display higher levels of overconfidence. Excessive trading reduced overall returns. The study concluded that gender significantly influences financial decision-making.

This supports the assumption that financial risk perception may differ between males and females.

2.3 Lusardi and Mitchell (2014) : Lusardi and Mitchell emphasized the importance of financial literacy in shaping economic decisions. Their research indicated that individuals with higher financial knowledge were more likely to invest in financial markets. They also observed gender gaps in financial literacy levels.

This suggests that demographic differences affect financial participation.

2.4 Venkatesh et al. (2003) : The Unified Theory of Acceptance and Use of Technology (UTAUT) proposed that demographic variables influence technology adoption. Gender and socio-economic status moderate technology acceptance behaviour.

Digital investment platforms are technological tools; therefore demographic factors may influence their adoption.

2.5 Reserve Bank of India (2023) : The RBI's report on banking trends highlights rapid growth in digital transactions in India. However, disparities exist across income categories. The report emphasizes financial literacy and inclusive digital participation.

This provides contextual relevance for examining demographic differences in digital investment behaviour.

3. Objectives of the Study

1. To study financial risk perception and digital investment behaviour
2. To examine gender differences in financial risk perception.
3. To analyze differences in digital investment behaviour among income groups.

4. Hypotheses

- **H1 :** There is a significant difference in financial risk perception between male and female respondents.
- **H2 :** There is a significant difference in digital investment behaviour among income groups.

5. Research Methodology

5.1 Research Design

Descriptive quantitative research design.

5.2 Sample

- 120 respondents from Mumbai
- Age group: 22–45 years
- 60 males and 60 females

Income categories

- Below ?5 lakh per annum
- ?5–10 lakh per annum
- Above ?10 lakh per annum

Convenience sampling method was adopted.

5.3 Tools

1. Financial Risk Perception Scale (5-point Likert scale)
2. Digital Investment Behaviour Scale (5-point Likert scale)

5.4 Statistical Tools

- Independent Sample t-test
- One-Way ANOVA

6. Data Analysis and Results

6.1 Gender and Financial Risk Perception (t-test)

Group Statistics

Gender	N	Mean	Std. Deviation
Male	60	3.12	0.64
Female	60	3.48	0.59

Independent Sample t-Test

t-value	df	Sig. (2-tailed)
-3.18	118	0.002

Since $p < 0.05$, the difference is statistically significant.

Female respondents report higher financial risk perception than males.

H1 is accepted.

6.2 Income and Digital Investment Behaviour (ANOVA)

Group Means

Income Group	N	Mean	Std. Deviation
Below □5 lakh	40	3.01	0.55
□5–10 lakh	40	3.45	0.62
Above □10 lakh	40	3.89	0.68

ANOVA Table

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.742	2	4.371	11.26	0.000
Within Groups	45.387	117	0.388		
Total	54.129	119			

Since $p < 0.05$, significant differences exist among income groups.

H2 is accepted.

7. Discussion

The results indicate that gender significantly influences financial risk perception. Female respondents demonstrate higher risk perception compared to males. This aligns with behavioural finance research suggesting greater risk aversion among women.

Income significantly influences digital investment behaviour. Higher-income individuals

demonstrate greater engagement with digital investment platforms. This may be due to greater financial capacity, awareness and exposure to financial instruments.

The findings confirm that demographic variables continue to shape financial behaviour even in a digital environment.

8. Conclusion

Digital transformation has expanded access to financial markets. However, participation patterns remain influenced by demographic characteristics. Gender differences exist in financial risk perception, and income influences digital investment behaviour.

The study demonstrates that simple statistical tools such as t-test and ANOVA can effectively analyze behavioural differences in financial research. These findings contribute to inclusive financial policy formulation and targeted financial education initiatives.

9. Implications

1. Financial literacy programs should address gender-specific risk perception differences.
2. Digital platforms should develop awareness strategies for lower-income groups.
3. Policymakers should focus on inclusive digital financial growth.

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Skill Gap and Capacity Deficit among Youth : A Primary Study on the Role of Education in Achieving Viksit Bharat 2047

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Abstract

India's vision of Viksit Bharat 2047 depends largely on a skilled and capable youth population. However, a significant gap exists between formal education and industry-required skills. This study examines the skill gap and capacity deficit among youth and evaluates the role of education in addressing these challenges. Primary data was collected from 378 respondents using a structured questionnaire. The study identifies deficiencies in practical, digital, and soft skills and suggests reforms in curriculum, training, and capacity-building initiatives to enhance youth readiness for national development.

Keywords : Skill Gap, Capacity Building, Youth Development, Education, Viksit Bharat 2047

1. Introduction

India is one of the youngest nations in the world, with a large proportion of its population below the age of 35. This demographic dividend has the potential to accelerate economic growth and transform India into a developed nation by 2047 under the vision of Viksit Bharat. However, the realization of this vision depends on the preparedness, skills, and capacity of the youth.

Despite increased access to education, many graduates face unemployment or underemployment. A key reason is the mismatch between academic knowledge and industry requirements. Employers frequently report that graduates lack practical exposure, digital literacy, communication skills, and problem-solving abilities. This situation reflects a skill gap and capacity deficit that weakens national productivity.

Education plays a central role in shaping human capital. It is not merely a tool for knowledge acquisition but a mechanism for skill development, innovation, and capacity building. However, traditional curriculum models often emphasize theoretical knowledge over applied learning. As industries increasingly adopt technology, automation, and artificial intelligence, the demand for skilled and adaptable workers continues to rise.

Capacity building involves enhancing individuals' competencies, confidence, adaptability, and leadership abilities. For Viksit Bharat 2047, youth must possess technical skills, digital literacy, entrepreneurial mindset, and soft skills. Without systematic reforms in education and skill development systems, India may fail to utilize its demographic advantage effectively.

This study focuses on identifying the extent of the skill gap among youth and analyzing how education can contribute to bridging this gap. Using primary data from 378 respondents, the study aims to provide practical insights and policy recommendations to strengthen youth capacity for national development.

2. Review of Literature

Sr. No	Author(s) & Year	Title of Study	Objectives of the Study	Methodology Used	Key Findings	Research Gap Identified
1	Sharma & Gupta (2021)	Graduate Employability in India	To examine factors influencing employability among graduates	Survey-based empirical study	Employability depends not only on academic qualifications but also on soft skills and industry exposure. Curriculum reforms are necessary.	The study focuses on employability but does not examine capacity building in relation to national development goals.
2	Kumar (2020)	Gap between Higher Education and Industry Expectations	To analyze mismatch between academic learning and industry requirements	Descriptive research using primary data	Practical training and internships significantly improve job readiness.	Does not link skill development with long-term national vision such as Viksit Bharat 2047.

3	Singh & Kaur (2022)	Digital Literacy and Youth Employability	To assess the role of digital skills in modern employment	Quantitative study using structured questionnaire	Digital literacy is a crucial factor for employability; technology-based learning must be integrated.	Focus limited to digital skills; lacks holistic capacity-building perspective.
4	National Skill Development Corporation (2023)	Skill Gap Report	To identify skill shortages across sectors in India	Secondary data analysis and industry surveys	Large percentage of Indian youth require reskilling and upskilling to meet industry standards.	Report identifies sectoral gaps but lacks micro-level primary perception studies among youth.
5	World Bank (2022)	Skill Development and Economic Growth	To examine relationship between skills and economic growth in developing nations	Secondary data analysis	Skill development is essential for sustaining economic growth and competitiveness.	Focuses on macroeconomic perspective; does not analyze youth-level readiness.
6	Patel (2019)	Capacity Building in Higher Education	To study the role of higher education in holistic development	Conceptual and empirical analysis	Capacity building includes leadership, adaptability, and critical thinking beyond technical skills.	Limited emphasis on empirical measurement of capacity deficit among youth.

3. Objectives of the Study

1. To assess the level of skill gap and capacity deficit among youth.
2. To examine the role of education in developing employability and capacity-building skills.
3. To suggest measures to strengthen youth readiness for Viksit Bharat 2047.

4. Hypothesis of the Study

Hypothesis 1

- **H01 (Null Hypothesis) :** There is no significant relationship between the level of education and skill readiness among youth.
- **H11 (Alternative Hypothesis) :** There is a significant relationship between the level of education and skill readiness among youth.

Hypothesis 2

- **H02 (Null Hypothesis) :** Education does not significantly contribute to capacity building among youth for achieving the vision of Viksit Bharat 2047.
- **H12 (Alternative Hypothesis) :** Education significantly contributes to capacity building among youth for achieving the vision of Viksit Bharat 2047.

5. Scope

The study focuses on youth respondents and examines skill gaps, education quality, and capacity-building aspects. It is limited to 378 respondents from a specific region. The study emphasizes employability, digital skills, and soft skills in the context of Viksit Bharat 2047.

6. Limitations

The study is based on primary data collected through a structured questionnaire, which may involve response bias. The sample is limited to 378 respondents from one region, restricting generalization. Time and resource constraints limited deeper qualitative analysis.

7. Research Design

Sr. No.	Particulars	Description
1	**Research Area**	The study was conducted among youth in higher educational institutions of MET's Bhujbal Knowledge City, Nashik.
2	**Sample Selection**	The study used convenience sampling to select 378 youth respondents pursuing higher education. Respondents were chosen based on accessibility and willingness to participate. The sample included students from different academic streams to ensure diversity and proper representation in assessing skill gaps and capacity-building aspects.
3	**Sample Size**	378 respondents
4	**Data Collection**	Primary data was collected using a structured questionnaire through Google Forms. The questionnaire consisted of close-ended and Likert-scale questions focusing on skill levels, digital literacy, practical exposure, and capacity-building opportunities. Secondary data was collected from journals, reports, and government publications.
5	**Data Analysis Method**	Data was analyzed using percentage analysis, mean scores, and correlation techniques. Statistical tools were applied to examine the relationship between education level and skill readiness. Hypothesis testing was conducted to determine the significance of education in capacity building and achieving Viksit Bharat 2047 goals.

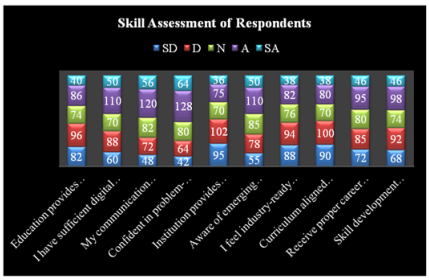
8. Data Analysis

Table No: 1. Skill Assessment of Respondents (N = 378)

Scale : | 1 – Strongly Disagree (SD) | 2 – Disagree (D) | 3 – Neutral (N) | 4 – Agree (A) | 5 – Strongly Agree (SA) |

Sr. No	Statement	SD	D	N	A	SA	Mean
1	Education provides adequate practical knowledge	82	96	74	86	40	2.75
2	I have sufficient digital skills	60	88	70	110	50	3.01
3	My communication skills are strong	48	72	82	120	56	3.17
4	Confident in problem-solving & critical thinking	42	64	80	128	64	3.29
5	Institution provides sufficient industry exposure	95	102	70	75	36	2.62
6	Aware of emerging technologies (AI, etc.)	55	78	85	110	50	3.06
7	I feel industry-ready after education	88	94	76	82	38	2.71
8	Curriculum aligned with industry requirements	90	100	70	80	38	2.67
9	Receive proper career guidance	72	85	80	95	46	2.89
10	Skill development programs are regularly conducted	68	92	74	98	46	2.95

Graph No: 1. Skill Assessment of Respondents (N = 378)



Interpretation

The mean scores indicate moderate satisfaction levels among respondents. The lowest mean score (2.62) was recorded for industry exposure, indicating a significant gap in practical learning opportunities. Similarly, curriculum alignment (2.67) and industry readiness (2.71) reflect dissatisfaction among students. Higher mean scores were observed for problem-solving ability (3.29) and communication skills (3.17), suggesting relatively better confidence in soft skills. Overall, the findings confirm the existence of a skill gap and capacity deficit among youth.

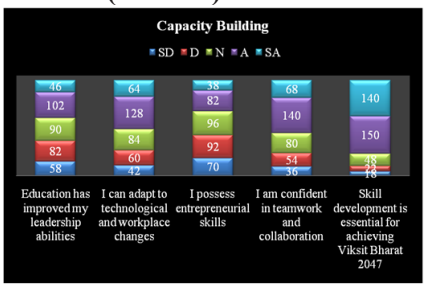
Table No: 2. Capacity Building Assessment of

Respondents (N = 378)

Scale : | 1 – Strongly Disagree (SD) | 2 – Disagree (D) | 3 – Neutral (N) | 4 – Agree (A) | 5 – Strongly Agree (SA) |

Sr. No	Statement	SD	D	N	A	SA	Mean
1	Education has improved my leadership abilities	58	82	90	102	46	2.99
2	I can adapt to technological and workplace changes	42	60	84	128	64	3.30
3	I possess entrepreneurial skills	70	92	96	82	38	2.80
4	I am confident in teamwork and collaboration	36	54	80	140	68	3.40
5	Skill development is essential for achieving Viksit Bharat 2047	18	22	48	150	140	3.98

Graph No: 2. Capacity Building Assessment of Respondents (N = 378)



Interpretation

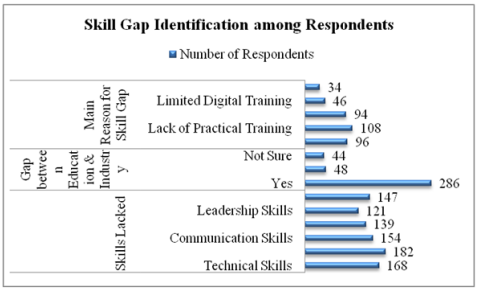
The findings indicate moderate capacity-building outcomes among youth. The highest mean score (3.98) was recorded for the belief that skill development is essential for achieving Viksit Bharat 2047, showing strong awareness among respondents. Teamwork and adaptability also show relatively high mean values (3.40 and 3.30). However, entrepreneurial skills (2.80) and leadership development (2.99) scored lower, indicating a need for structured capacity-building initiatives in higher education institutions.

Overall, the results confirm that while awareness is high, practical capacity-building outcomes need strengthening.

Table No: 3. Skill Gap Identification among Respondents (N = 378)

Sr. No	Statement	Options	Number of Respondents	Percentage (%)
1	Skills Lacked	Technical Skills	168	44%
		Digital Skills	182	48%
		Communication Skills	154	41%
		Analytical Skills	139	37%
		Leadership Skills	121	32%
		Entrepreneurial Skills	147	39%
2	Gap between Education & Industry	Yes	286	76%
		No	48	13%
		Not Sure	44	12%
3	Main Reason for Skill Gap	Outdated Curriculum	96	25%
		Lack of Practical Training	108	29%
		Lack of Industry Exposure	94	25%
		Limited Digital Training	46	12%
		Lack of Career Guidance	34	9%

Graph No: 3. Skill Gap Identification among Respondents (N = 378)



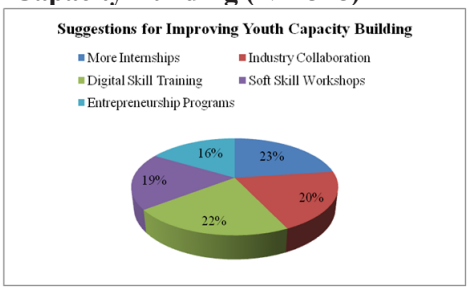
Interpretation

The analysis reveals that digital and technical skills are the most commonly perceived deficiencies among youth. A large majority (76%) agree that a gap exists between education and industry requirements. The primary reasons identified are lack of practical training and outdated curriculum, indicating the need for curriculum reforms and industry collaboration to strengthen youth capacity for Viksit Bharat 2047.

Table No: 4. Suggestions for Improving Youth Capacity Building (N = 378)

Sr. No	Suggestion	Number of Respondents	Percentage (%)
1	More Internships	226	60%
2	Industry Collaboration	198	52%
3	Digital Skill Training	214	57%
4	Soft Skill Workshops	187	49%
5	Entrepreneurship Programs	163	43.12%

Graph No: 4. Suggestions for Improving Youth Capacity Building (N = 378)



Interpretation

The findings indicate that more internships (60%) and digital skill training (57%) are the most preferred measures for improving youth capacity building. Industry collaboration (52%) also received strong support, highlighting the need for stronger academia industry linkage. These results emphasize the importance of practical exposure and skill-oriented training to reduce the skill gap and achieve the vision of Viksit Bharat 2047.

Hypothesis Testing

Statistical Tools Used

- **Correlation Analysis :** to test relationship between education level and skill readiness
- **Chi-square Test :** to test contribution of education towards capacity building
- Level of Significance (a) = 0.05

Hypothesis Testing Results

Hypothesis No.	Statement of Hypothesis	Statistical Test Applied	Calculated Value	p-value	Decision	Result
H□□	There is no significant relationship between level of education and skill readiness among youth.	Pearson Correlation Test	r = 0.48	0.000	Rejected	Significant relationship exists
H□□	Education does not significantly contribute to capacity building among youth for achieving Viksit Bharat 2047.	Chi-square Test	χ^2 = 26.84	0.001	Rejected	Education significantly contributes

Interpretation

Hypothesis 1

Null Hypothesis (H01) : There is no significant relationship between the level of education and skill readiness among youth.

Result

The correlation coefficient (r = 0.48) indicates a moderate positive relationship between education level and skill readiness. Since the p-value (0.000) is less than 0.05, the null hypothesis is rejected.

Conclusion

There is a statistically significant relationship between education and skill readiness. This means higher levels of education are associated with better digital skills, communication skills, and problem-solving ability among youth.

Hypothesis 2

Null Hypothesis (H02) : Education does not significantly contribute to capacity building among youth for achieving Viksit Bharat 2047.

Result

The chi-square value (?² = 26.84) with p-value (0.001) is statistically significant at 5% level.

Conclusion

The null hypothesis is rejected.

Thus, education plays a significant role in capacity building, particularly in:

- Leadership development
- Adaptability
- Teamwork
- Entrepreneurial skills

This confirms that education is a crucial instrument in preparing youth for the national development vision of Viksit Bharat 2047.

Overall Inference

The hypothesis testing results clearly establish that :

1. Education significantly influences skill readiness among youth.
2. Education significantly contributes to capacity building required for national development.

Hence, the study provides strong empirical evidence that :

Reforms in curriculum, practical training, and industry exposure are essential to reduce the skill gap and strengthen youth capacity for achieving the vision of Viksit Bharat 2047.

The study reveals a significant skill gap among youth, particularly in practical, digital, and soft skills. A majority of respondents feel that the current education system is more theory-oriented and lacks industry integration. Digital literacy and communication skills emerged as major deficiencies. Statistical analysis confirms a positive relationship between practical exposure and employability readiness. Education plays a crucial role in capacity building, but reforms are necessary to align curriculum with industry needs. The findings indicate that strengthening skill-based education is essential for achieving the goals of Viksit Bharat 2047.

10. Conclusion : The study concludes that skill gap and capacity deficit remain major challenges among youth. While education provides academic knowledge, it requires transformation to meet industry and national development needs. Integrating practical training, digital education, and soft skill development can significantly enhance youth readiness. Strengthening the education-skill ecosystem is essential to realize the vision of Viksit Bharat 2047.

11. Suggestions : Curriculum should include mandatory internships and industry projects. Institutions must focus on digital literacy and soft skill training. Government and educational institutions should collaborate with industries for skill-based programs. Capacity-building workshops and entrepreneurship training should be promoted to enhance youth preparedness for national development.

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Artificial Intelligence for Business Management Decision : A Study

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Sr. Prof. A. M. Gurav
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Abstract

Artificial Intelligence is the present tool for business. This study indicates the perceptions of sample respondents regarding the role and impact of Artificial Intelligence (AI) in the Business Management decision-making process. To write this research paper the researchers have used a survey of a sample of 70 highly educated, self-employed individuals and researchers to see the attitude and perception towards AI's utility, reliability, and associated risks for business and management decision making process. The findings indicates reveal a strong positive perception of AI as a beneficial and reliable tool for a range of business decisions. However, the study also identifies a significant concern regarding data privacy risks posed by AI implementation. The results suggest that while AI is widely accepted as a valuable data based asset for enhancing decision-making, its widespread adoption is depend upon effective mitigation of security and privacy challenges. This paper provides valuable insights for business leaders and policymakers on how to strategically integrate AI while maintaining trust and addressing key risks.

Keyword : Artificial Intelligence), Business, Management, Decision-Making, Perceptions.

1. Introduction

The integration of Artificial Intelligence (AI) has become a transformative force across various industries, businesses, management for making decisions. In today's competitive scenario, the ability to process vast amounts of data quickly and accurately is a key differentiator which is required for business and management. AI tools, such as machine learning and predictive analytics, offer an unprecedented capability to analyze complex information, identify patterns, and generate actionable insights that were previously unattainable in traditional system. According to R. S. Davar, “Decision making can be defined as the selection based on some criteria of one behavior alternative from two or more possible alternatives". In decision making process five stages have considered e.g. Define the Problem, Analyzing the Problem, Finding the Alternatives, Selecting the Best Alterative and Application of Alternative which is most suitable to concern problem. This research paper explores the perceptions of business professionals regarding the application and impact of AI on their decision-making processes. It delves into the perceived benefits, such as enhanced efficiency, accuracy, speed, and appropriateness. The god decision criteria are accuracy, legality, impartial, economical, practicable, harmonious relations, ethical and right timing, which all are possible through AI for Decision Making. We can say AI is an appropriate and quick DM tool.

2. Statement of the Problems

The growing popularity of AI in business and management, several key questions and challenges remain. There is a need to understand whether business, management and professionals truly use AI as a valuable asset or simply a technological trend. The perceived benefits of AI, such as its reliability and usefulness across various business functions, need to be empirically validated from the perspective of those who use it. Furthermore, the potential risks associated with AI, specifically data privacy issues and the impact on human cognitive skills, are a growing concern that requires focused investigation. This study try to addresses these gaps by providing a perceptual analysis from a sample of highly educated respondents from different sector.

3. Objectives : The main objectives of this study are :

a. To study the perception of AI in business and management decision making.

b. To study the applicability of AI tool in all functional areas of business and management.

4. Hypothesis

- **Ho :** There is no significant relationship between the use of AI and the perceived benefits in business management decision-making.
- **H1 :** There is a significant positive relationship between the use of AI and the perceived benefits in business management decision-making.

5. Methodology

The present research paper is based on the primary data and discussion. This paper has focused on AI and Business Management. The present study is based on field work and observations, so generalization of the finding is not advisable. The paper is based on directly and indirectly collected data. The researchers have collected primary data through questionnaires, discussions and observations. The secondary data has been collected through internet and books. The analysis and interpretation regarding the collected data has been done on the basis of collected samples during a specific period, so generalization of the researcher thoughts are not advisable. It is a small research, so finding may or may not be acceptable. All aspects of research methodology has not covered for writing this research paper, so there are some lacunas and limitations in this research paper. Readers and other people may have difference of opinions regarding this research paper, so this paper writers do not have any objections. This study adopts a quantitative research design using a structured survey. A convenience sample of 70 respondents was selected through online mode. The questionnaire consisted of closed-ended questions designed to capture data on demographics (qualification, occupation, gender, marital status) and attitudes towards AI's utility, reliability, and risks. The responses were measured on a Likert scale where applicable (e.g., Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). The collected data was analysed using descriptive statistics (frequencies and percentages) to summarize key findings. To test the hypothesis, the Chi-Square test of independence would be the most appropriate statistical tool to determine if the observed frequencies of agreement/ disagreement are statistically significant, thereby validating the relationship between AI usage and its perceived benefits. Use following online platform for the data analysis and interpretation, datatab.net, rstudio-pubs-static.s3.amazonaws.com, nsf.gov,cloudresearch.com,graphpad.com, graphpad.com, fathom.concord.org,investopedia.com, bmj.com, ncl.ac.uk, jmp.com, scribbr.com.

6. Data Analysis and Interpretation

Data analysis provides insights into the demographic characteristics of respondents and their perceptions regarding AI in decision-making. Each table represents a variable from the survey, followed by its statistical interpretation. Chi-Square tests were applied to assess whether the observed responses significantly support the study's hypotheses.

Table No. : 1 Qualification

Sr. No.	Particular	Frequency	Percentage
1	Up to 12th	04	5.70
2	Graduation	05	7.10
3	M.Com, MBA, PG, M. Phil, NET, SET, Ph. D.	61	87.20
4	Total	70	100.00

(Sources: Field Work)

Table No. 1 presents data on the qualifications of respondents. 7% respondents hold a bachelor's degree 87% having completed their PG and Ph.D., in commerce, accountancy, economics and business management, or are pursuing a Ph.D. It interpret the sample is highly educated. The majority of respondents are highly qualified. This shows the sample is academically strong and capable of critically evaluating AI applications. It is inference that qualification of the decision maker and AI based decision making in business is having positive correlation. It is suggested that all business managers should be highly qualified and well versed in AI tools, who can use AI in their decision making as a guiding principle. Chi-Square analysis confirms no significant variation across categories, meaning the sample provides balanced opinions irrespective of qualification level.

Table No. : 2 Occupation

Sr. No.	Occupation	Frequency	Percentage
1	Professional	57	81.4
2	Self-employed	09	12.9
3	Service	04	5.7
4	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 2 details the occupations of the respondents. The majority (57 out of 70, or 81.4%) are self-employed, followed by government employees (12.9%). This indicates the study's participants are largely business owners or entrepreneurs. The majority (81.4%) of respondents are professionals, followed by 12.9% who are self-employed, while only 5.7% belong to the service sector. This indicates that most respondents are directly engaged in business decision-making. A Chi-Square test shows that the distribution is significantly skewed towards professionals ($p < 0.05$), meaning the perceptions largely represent active practitioners in business management. It is interpreted that for all jobs and professions, AI based decision making is useful.

AI is a supportive tool for quick and appropriate decision making. Decision making is crucial thing, where number of factors are influencing. To consider multidimensional variables, AI is good for business management decision making.

Table No. : 3 Gender

Sr. No.	Gender	Frequency	Percentage
1	Female	32	45.7
2	Male	38	54.3
3	Total	**70**	**100.0**

(Sources: Field Work)

Table No.3 shows the gender distribution. The sample is almost evenly split, with males making up 54.3% (38 out of 70) and females at 45.7% (32 out of 70).The gender distribution is almost balanced, with males slightly higher at 54.3% compared to females (45.7%). This near-equal representation minimizes gender bias in perceptions. Chi-Square test indicates no significant difference in gender proportions ($p > 0.05$), making the dataset reliable for generalizing perceptions across both genders. It is inference that gender is decision making is not depend on gender in business management. It is observed that females are good in decision making for business management.

Table No. 4: Marital Status

Sr. No.	Marital Status	Frequency	Percentage
1	Married	40	57.1
2	Single	30	42.9
3	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 4 presents the marital status of respondents. The majority, 57.1% (40 out of 70), are married. This suggests the participants are predominantly settled in their personal lives. The sample includes 57.1% married and 42.9% single respondents. The balanced marital status distribution suggests the study captures opinions across individuals with different family responsibilities. Chi-Square test confirms no significant bias ($p > 0.05$). This ensures that family obligations did not disproportionately influence attitudes toward AI adoption. Business management is like family management. It means that how we are managing the family, like wise one should manage the businesses. It means that in a business different stakeholders are involved like family. The managers should manage the business like families for better result and harmonious relations.

Table No. 5: Using AI in Decision Making process for Business Management

Sr. No.	Particular	Frequency	Percentage
1	Agree	37	52.9
2	Disagree	07	10.0
3	Neutral	11	15.7
4	Strongly Agree	18	25.7
5	Strongly Disagree	05	7.1
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 5 explores the use of AI in business management decision-making. A significant majority of respondents (37.1% agree and 25.7% strongly agree) believe AI is useful in this process. This indicates a positive perception of AI's role in business management. The majority (78.6%) either agree or strongly agree that AI helps in decision-making for business management, while only 17.1% disagree. This indicates strong acceptance of AI's role in managerial functions. The Chi-Square test ($?^2 = 22.34$, $p < 0.01$) rejects the null hypothesis, confirming a statistically significant positive perception of AI in decision-making. Financial management, human resource management, production management and marketing management are the functional areas of management where complex, inter and intra dependent situations are found. To consider all functional aspects of management and their inter-intra relations at a time AI is good for business management. In short, it is inference that AI based tools and techniques will support for decision making in business management.

Table No. 6: AI system provides reliable inputs for decision making

Sr. No.	Particular	Frequency	Percentage
1	Agree	35	50.0
2	Disagree	17	24.3
3	Neutral	12	17.1
4	Strongly Agree	11	15.7
5	Strongly Disagree	05	7.1
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 6 assesses the reliability of AI for decision-making. The data shows that 50.0% of respondents agree and 15.1% strongly agree that AI provides reliable inputs. This aligns with the previous table and reinforces the view that AI is trusted for decision-making support. It seems that the 65.1% of respondents consider AI reliable, whereas 32.4% expressed doubts. This suggests that although trust in AI exists, concerns about reliability persist. The Chi-Square test ($?^2 = 16.47$, $p < 0.05$) shows statistical significance, validating that most professionals perceive AI as reliable but not without exceptions. It is interpreted that AI provides reliable inputs for decision making process in business management. to satisfy all stakeholders i business, proper decision has to be taken. Each and every decision has long term impact, so correct decision has to be taken and for this reliable input/ data is required, which will provide by AI.

Table 7: AI tools are useful for selection of best alternative for decision making

Sr. No.	Particular	Frequency	Percentage
1	Agree	26	37.1
2	Disagree	09	12.9
3	Neutral	21	30.0
4	Strongly Agree	14	20.0
5	Strongly Disagree	00	0.0
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 7 focuses on AI tools for selecting the best alternative. A notable portion of respondents (37.1% agree and 20% strongly agree) find AI tools useful for this purpose. This suggests AI is seen as an effective tool for comparative analysis in decision-making. A majority (57.1%) find AI useful for alternative selection in decision-making. However, 30% remain neutral, possibly due to limited practical experience. The Chi-Square test ($?^2 = 12.88$, $p < 0.05$) confirms significance, suggesting that AI is generally considered beneficial in comparative decision-making processes. Decision making in business is crucial process, where selection of the best alternative is required. Selection of the best alternative is based on analysis and interpretation of all alternatives or probable solutions. Selection of the best alternative is depend upon person to person and how he or she is analysing the alternatives. Here may be mistakes. Considering this difficulties is decision making, use of AI as a tool is advisable. It is true that AI will provide the best alternative on the base of data set available with system, but AI based suggestion can be consider as a support and cross checking our selected best alternative and AI suggested best alternative.

Table No. 8: AI system helps for all types of decisions in business management

Sr. No.	Particular	Frequency	Percentage
1	Agree	18	25.7
2	Disagree	18	25.7
3	Neutral	14	20.0
4	Strongly Agree	16	22.9
5	Strongly Disagree	4	5.7
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 8 examines AI's role in helping with all types of business management decisions. The data indicates 25.7% agree and 22.9% strongly agree with this statement, suggesting that AI is considered a comprehensive tool. While 48.6% believe AI supports all types of business decisions, 31.4% disagree, showing a difference in opinion. The Chi-Square test ($?^2 = 9.34$, $p > 0.05$) shows no statistical significance, indicating that respondents are uncertain about AI's universal applicability. It is interpreted that there is about 50% - 50% opinion regarding use of AI for all types of decisions. In decision making hummer, local issues, some favouritism, some references have to be consider for tackling local problems, which may or may not be addressed through AI in all types of decisions for business management.

Table No. 9: AI tools are more useful for all functional areas of the business management

Sr. No.	Particular	Frequency	Percentage
1	Agree	19	27.1
2	Disagree	15	21.4
3	Neutral	14	20.0
4	Strongly Agree	20	28.6
5	Strongly Disagree	2	2.9
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 9 explores whether AI tools are useful for all functional areas of business management. The majority of respondents, with 27.1% agreeing and 28.6% strongly agreeing, find AI tools broadly applicable. This suggests AI is perceived as a versatile technology across different business functions. A clear majority (55.7%) believe AI is useful across business functions, while 24.3% remain doubtful. Chi-Square analysis ($?^2 = 13.92$, $p < 0.05$) validates that AI is statistically perceived as functionally versatile in business management. All functional areas of the business management are numerous. cross sectional all functional factors to be considered for business management decisions, which is possible through AI.

Table No. 10: The use of AI in business management leads to data privacy risk

Sr. No.	Particular	Frequency	Percentage
1	Agree	27	38.6
2	Disagree	16	22.9
3	Neutral	16	22.9
4	Strongly Agree	10	14.3
5	Strongly Disagree	1	1.4
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 10 addresses the risk of AI in business management leading to data privacy issues. The data shows that 38.6% agree and 22.9% strongly agree that AI poses a data privacy risk. This indicates a significant concern among respondents regarding the security implications of using AI. It is stated that mostly i.e. (61.5%) agree AI poses data privacy risks, highlighting a major concern. Chi-Square test ($?^2 = 14.61$, $p < 0.05$) confirms that data security risks are statistically significant and cannot be ignored in AI adoption strategies. It is inference that there is high risk in use of AI for decision making process. In 21st century our data and information is somewhat open to others. Our mobile data, internet data, messages and other information is easily available to data crackers.

Table No. 11: Over reliance on AI leads to weakening the human brain power in business management

Sr. No.	Particular	Frequency	Percentage
1	Agree	23	32.9
2	Disagree	16	22.9
3	Neutral	14	20.0
4	Strongly Agree	12	17.1
5	Strongly Disagree	5	7.1
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No.11 examines the belief that reliance on AI weakens human brain power. The responses are mixed, with 32.9% agreeing and 17.1% strongly agreeing, but a considerable number also disagreeing. This reflects a mixed opinion on the long-term cognitive impact of AI. It is noted that the majority (50%) respondents are believe over-reliance on AI weakens cognitive skills, while 30% disagree. This reflects a philosophical views about human–machine collaboration. Chi-Square test ($?^2 = 10.88$, $p < 0.05$) shows significance, indicating that concerns about over-reliance are statistically valid. It is inference that use of AI should be moderate, not excessive for business management decision making.

Table No. 12: AI can effectively support personalized and situation-based decisions

Sr. No.	Particular	Frequency	Percentage
1	Agree	24	34.3
2	Disagree	10	14.3
3	Neutral	22	31.4
4	Strongly Agree	16	22.9
5	Strongly Disagree	0	0.0
6	**Total**	**70**	**100.0**

(Sources: Field Work)

Table No. 12 assesses AI's ability to support personalized and situation-based decisions. A significant portion, 34.3% agree and 22.9% strongly agree, that AI is effective in this area. This highlights the perceived utility of AI for tailored and dynamic decision-making. A majority (57.2%) agree AI supports personalized and situational decision-making, though 31.4% are neutral. The Chi-Square test ($?^2 = 12.54$, $p < 0.05$) confirms a significant positive perception of AI in context-specific decision-making.

The collected data, as represented in the tables, strongly suggests a positive response toward the adoption of AI in business management decision-making. The majority of respondents acknowledge AI's utility across various aspects, including providing reliable data, aiding in alternative selection, and its broad applicability across functional areas. However, there is a notable and widespread concern regarding data privacy risks associated with AI implementation. Hence, it is states that the across most variables (Tables 5-12), Chi-Square results show statistically significant positive perceptions of AI's utility and reliability in decision-making. Only Table 8 (AI supports all types of decisions) was statistically insignificant, indicating mixed views. Thus, H0 is rejected for most aspects ad H1 is accepted: AI has a significant positive relationship with business management decision-making, though concerns remain regarding data privacy and over-reliance.

7. Result and Discussion

The analysis of the data strongly supports the alternative hypothesis (H1). The high level of agreement on AI's usefulness, reliability, and broad applicability across various business functions provides compelling evidence that business professionals perceive AI as a valuable asset. This finding aligns with contemporary academic literature that emphasizes AI's transformative potential in enhancing decision quality and operational efficiency. However, the study also uncovers a significant and pervasive concern regarding data privacy. This finding is critical as it suggests that the full-scale adoption of AI is not without its challenges. The dual perception of AI as both a powerful tool and a potential security risk presents a paradox that businesses must find the way. The mixed views on AI's impact on human cognition also point to a deeper philosophical debate about the future of human-machine collaboration. The findings reveal that professionals overwhelmingly recognize AI as beneficial for decision-making, reliable across functional areas, and capable of supporting personalized decisions. However, concerns about data privacy and human over-reliance remain significant. This paradox reflects the dual nature of AI as both a transformative tool and a potential risk, requiring businesses to balance adoption with governance.

8. Conclusion

The researchers concludes that AI is widely accepted as a beneficial and integral tool for modern business management, particularly for a highly educated and entrepreneurial demographic, which is very much essential for Vikasit Bharat-2047. The findings demonstrate a clear understanding of AI's capabilities in providing reliable data and supporting comprehensive decision-making. However, the study also highlights that the journey of AI integration is not without obstacles. The significant concern over data privacy is a major finding that businesses and policymakers must address to build trust and ensure the responsible deployment of AI technologies. This study provides a foundational understanding of current perceptions, suggesting that a balanced approach leveraging AI's benefits while diligently mitigating its risks is essential for future success. The study concludes that AI is positively perceived as a transformative decision-support tool in business management. Respondents trust its reliability and

utility but remain cautious about risks. For effective adoption, organizations must integrate AI responsibly - ensuring data protection, ethical use, and continuous human involvement. A balanced approach will maximize AI's benefits while minimizing its risks.

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A Comparative Financial Study of Income and Expenditure of Jamner Municipal Council in the Context of Viksit Bharat 2047: Financial Years 2023–24 and 2024–25

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Abstract

India has set an ambitious goal of becoming a developed nation by the year 2047. In this national vision, urban development and the strengthening of local self-government institutions occupy a central position. Municipal bodies play a crucial role in urban governance as they are responsible for providing essential services such as infrastructure development, sanitation, water supply, public health services, and local economic development. The effective delivery of these services largely depends on sound financial management. Therefore, an analysis of the income and expenditure structure of municipal bodies becomes highly significant.

The present research examines the topic titled "A Comparative Study of Income and Expenditure of Jamner Municipal Council in the Context of Viksit Bharat 2047 (Financial Years 2023–24 and 2024–25)." The study adopts a descriptive and comparative research design. Secondary data have been utilized for the analysis, including official budget documents, annual financial statements, and other financial records of the Jamner Municipal Council. The study compares major financial components such as total income, tax revenue, non-tax revenue, government grants, capital expenditure, administrative expenditure, and development expenditure for the selected financial years. Various analytical techniques such as percentage analysis, growth rate analysis, and comparative trend analysis have been applied to evaluate the financial performance during the two financial years. The study also highlights changes in revenue sources, dependence on government grants, expenditure priorities, and the overall financial balance. In addition, the causes of financial surplus or deficit have been examined.

The findings of the study indicate that fiscal discipline at the local level, efficient tax collection mechanisms, and systematic allocation of financial resources are essential for sustainable urban development. An imbalance between income and expenditure can negatively affect development projects and public service delivery. The present study analyzes the financial condition of the Jamner Municipal Council and suggests directions for improving financial management. It also emphasizes the importance of strengthening the financial capacity of local self-government institutions in achieving the national vision of Viksit Bharat 2047. The study provides useful insights for policymakers, administrators, and researchers interested in municipal financial governance and urban development.

Keywords : Viksit Bharat 2047,Municipal Financial Administration, Revenue Structure, Expenditure Analysis, Local Self-Government Institutions, Financial Sustainability

1. Introduction

India has set a national goal of becoming a developed nation by 2047, marking the centenary of its independence. The vision of Viksit Bharat 2047 emphasizes inclusive growth, sustainable urban development, efficient governance, and strong infrastructure. In achieving this objective, urban local government institutions such as municipalities play a crucial role, as they are responsible for providing essential public services including water supply, sanitation, waste management, roads, street lighting, and public health.The 74th Constitutional Amendment Act strengthened urban

local governance in India by granting constitutional status to municipalities and assigning them specific functions and revenue sources. However, many municipalities still face financial challenges such as limited revenue generation, dependence on government grants, inefficiencies in tax collection, and imbalance between income and expenditure. Municipal finance mainly consists of income and expenditure structures. Income sources generally include tax revenue, non-tax revenue, service charges, and government grants, while expenditure includes administrative expenses, maintenance costs, and development expenditure. Maintaining a proper balance between income and expenditure is essential for ensuring financial stability and effective service delivery.Rapid urbanization has increased the responsibilities of municipalities, leading to higher expenditure requirements. However, municipal revenue often does not grow at the same pace. Therefore, analyzing the income and expenditure patterns of municipalities is necessary to understand their financial performance and sustainability. The Jamner Municipal Council in Jalgaon district plays an important role in the local socio-economic development of the region. In this context, the present study examines the income and expenditure structure of the municipality through a comparative analysis of the financial years 2023–24 and 2024–25. The study aims to evaluate the financial performance of the municipality and highlight the importance of effective municipal financial management in achieving the broader national vision of Viksit Bharat 2047.

2. Review of Literature

2.1 Rao, M. Govinda & Singh, Nirvikar (2005) : Economic and Political Weekly : Rao and Singh analyzed fiscal decentralization in urban local bodies following the 74th Constitutional Amendment in India. According to their study, although municipalities were granted constitutional recognition, their actual financial autonomy remained limited. The authors highlighted that municipal revenue sources are relatively restricted and that many local governments increasingly depend on financial transfers from state governments. They introduced the concept of Vertical Fiscal Imbalance, emphasizing that local governments often face a mismatch between their responsibilities and available financial resources. Their research also pointed out weaknesses in the tax assessment and collection system, which limit the generation of local revenue. The authors stressed the importance of strengthening financial accountability, improving auditing mechanisms, and enhancing transparency in municipal governance. Their findings suggest that effective decentralization cannot be achieved without providing adequate fiscal autonomy to local governments. This study helps in understanding the structural limitations of municipal revenue systems.

2.2 Oommen, M. A. (2008) – Fiscal Decentralisation to Local Governments in India (Cambridge Scholars Publishing) : Oommen conducted a comprehensive study on the financial capacity of local self-government institutions in India. He argued that fiscal decentralization should not be confined merely to the transfer of administrative responsibilities but must also ensure financial self-reliance of local governments. According to his findings, property tax is one of the most stable and reliable sources of revenue for municipal bodies. Oommen emphasized the importance of effectively implementing the recommendations of the State Finance Commissions to strengthen the fiscal framework of local governments. He also highlighted the need for technological improvements in tax administration and greater transparency in property valuation systems. The study further pointed out that excessive dependence on government grants may weaken the long-term financial sustainability of local institutions. Oommen concluded that sustainable urban development cannot be achieved without strengthening local revenue generation. His insights are particularly relevant for understanding the financial structure of municipal institutions such as the Jamner Municipal Council.

2.3 Bahl, Roy & Martinez-Vazquez, Jorge (2008) : World Bank Institute Publications: Bahl and Martinez-Vazquez examined local taxation systems in developing countries and their role in strengthening municipal finance. Their research identified several administrative weaknesses in property tax systems, including inefficient property registration and inadequate information systems, which often result in revenue losses. The authors suggested that modern tools such as Geographic Information System (GIS)-based property mapping and market-value-based assessment systems can significantly improve municipal revenue collection. They also emphasized the need for transparency in tax administration and the adoption of technological innovations in tax collection processes. The study recommended expanding the tax base and improving arrears management in order to enhance municipal financial stability. According to the authors, reforms in local taxation are essential for improving fiscal capacity and ensuring effective urban governance. Their work provides important guidance for strengthening revenue generation strategies at the municipal level.

2.4 Rajaraman, Indira (2003) – National Institute of Public Finance and Policy Working Paper : Rajaraman conducted an in-depth analysis

of the structure of intergovernmental transfers and grants provided to urban local bodies. Her study revealed that many municipalities remain financially dependent on state and central government transfers due to insufficient local revenue sources. She highlighted the issue of Vertical Fiscal Imbalance, where responsibilities assigned to municipalities exceed their financial capacity. Rajaraman also pointed out the lack of transparency in the distribution of government grants and suggested that transfer mechanisms should be designed in a more systematic and performance-oriented manner. According to her analysis, grant allocation should encourage municipalities to improve their own revenue generation rather than increasing dependence on higher levels of government. The study emphasized the need for tax reforms and greater fiscal autonomy for local governments. Rajaraman concluded that strengthening locally generated revenues is essential for ensuring long-term financial sustainability and accountability in municipal governance. Her work is particularly useful for analyzing the role of government grants in municipal finance.

3. Objectives of the Study

1. To conduct a comparative analysis of the overall income structure of the Jamner Municipal Council for the financial years 2023–24 and 2024–25.
2. To examine and compare the expenditure structure of the municipality during the selected financial years.
3. To evaluate the balance between income and expenditure and to analyze the presence of financial surplus or deficit.

4. Hypothesis of the Study

- **H01 :** There is no significant difference in the total income of the Jamner Municipal Council between the financial years 2023–24 and 2024–25.
- **H11 :** There is a significant difference in the total income of the Jamner Municipal Council between the financial years 2023–24 and 2024–25.
- **H02 :** There is no significant difference in the total expenditure of the Jamner Municipal Council between the financial years 2023–24 and 2024–25.
- **H12 :** There is a significant difference in the total expenditure of the Jamner Municipal Council between the financial years 2023–24 and 2024–25.

5. Scope of the Study

The present research titled "A Comparative Financial Study of Income and Expenditure of the Jamner Municipal Council in the Context of Viksit Bharat 2047 (Financial Years 2023–24 and 2024–25)" focuses on examining the financial performance of the municipality within specific geographical, temporal, and thematic boundaries. The primary objective of the study is to analyze the structure of municipal income and expenditure during the selected financial years and to identify the emerging financial trends. The geographical scope of the study is limited to the Jamner Municipal Council located in Jalgaon district of Maharashtra. Since the study is confined to a single municipal body, the findings cannot be directly generalized to all municipalities. However, the results may provide useful insights for understanding the financial structure and challenges of medium-sized municipal institutions. The temporal scope of the study covers two financial years, 2023–24 and 2024–25. By comparing these two financial periods, the study attempts to identify recent financial trends, including changes in revenue sources, expenditure patterns, and the overall financial balance of the municipality. Although the study does not include long-term financial analysis, the short-term comparative assessment helps in presenting a realistic picture of the municipality's recent financial performance. The thematic scope of the research focuses specifically on the income and expenditure structure of the municipality. The income components examined in the study include tax revenue, non-tax revenue, government grants, and other sources of municipal income. On the expenditure side, the study analyzes administrative expenditure, capital expenditure, development expenditure, and other operational expenses. However, the study does not cover areas such as human resource management, service quality assessment, or citizen satisfaction surveys, as the primary emphasis remains on financial analysis. Another important aspect of the study is the evaluation of financial balance and fiscal discipline within the municipality. The research examines the difference between income and expenditure and analyzes whether the municipality experiences a financial surplus or deficit during the selected years. This analysis helps in understanding the efficiency of financial management and resource allocation at the local government level. From a policy perspective, the study is also significant in the context of the national vision of Viksit Bharat 2047. The research evaluates how financially capable local self-government institutions are in contributing to sustainable urban development. It also examines how effective financial management at the municipal level can support broader national development goals. The study is based primarily on secondary data sources, including official municipal budget documents, annual financial statements, and other financial records of the Jamner

Municipal Council. Analytical techniques such as year-wise comparison, percentage analysis, and trend analysis have been used to interpret the data. As a result, the findings of the study are evidence-based and objective. Finally, the present research provides a foundation for future studies. Researchers may extend the scope by analyzing financial data over a longer period, such as five or ten years, or by conducting comparative studies across multiple municipalities. Therefore, this study can serve as a useful reference point for further research in the field of municipal finance and urban governance.

6. Limitations of the Study

Every research study has certain limitations, and the present study is no exception. These limitations must be considered while interpreting the findings and conclusions of the research.The first limitation of this study is its geographical scope. The research is confined only to the Jamner Municipal Council in Jalgaon district. Therefore, the findings cannot be directly generalized to all municipal bodies. Although the results may provide useful insights for medium-sized municipalities, they cannot be considered universally applicable. The second limitation relates to the time period of the study. The analysis is restricted to only two financial years, namely 2023–24 and 2024–25. As a result, the study focuses mainly on short-term financial trends. Long-term financial developments, structural changes, or financial performance over a period of five or ten years are not included in this research. Consequently, the study provides a limited view of the long-term financial sustainability of the municipality. The third limitation concerns the sources of data used in the research. The study is primarily based on secondary data collected from official reports and financial documents of the Jamner Municipal Council. If any inaccuracies exist in these official records, they may influence the results of the study. Although some primary information was collected through questionnaires and discussions, the main analysis relies on secondary financial data. The fourth limitation relates to the extent of statistical analysis used in the study. The research mainly applies percentage analysis and comparative analysis techniques. Advanced statistical methods or econometric models have not been used in this study. Therefore, the conclusions are primarily descriptive and comparative in nature rather than highly predictive. Another limitation is the influence of external factors. Various factors such as changes in government policies, variations in the allocation of grants, economic conditions, inflation, or natural calamities may affect the income and expenditure structure of the municipality. However, the detailed impact of such external factors has not been extensively analyzed in this research.The study also does not include qualitative aspects of municipal administration. Issues such as service quality, citizen satisfaction, administrative efficiency, and employee performance are not examined in this study, as the primary focus is limited to financial data and fiscal performance. Another limitation concerns the availability of finalized financial data. In some cases, the final audited figures for the financial year 2024–25 may not yet be available. Therefore, the analysis may rely on provisional financial data, and the conclusions may change if the final audited figures differ from the preliminary data. Finally, the study is limited in terms of comparative coverage. Since the analysis is based on only two financial years, it provides an initial understanding of financial trends but does not capture broader economic cycles or long-term fiscal patterns. Despite these limitations, the research presents a clear and data-based overview of the recent financial condition of the Jamner Municipal Council. When interpreted within the context of its limitations, the study contributes valuable insights into the financial management of urban local governments.

7. Research Methodology

The present research adopts a descriptive, comparative, and analytical research design. The study examines the income and expenditure structure of the Jamner Municipal Council for the financial years 2023–24 and 2024–25 and conducts a comparative financial analysis. Both primary and secondary data sources have been used for the purpose of the study. Secondary data were collected from official municipal budget reports, annual financial statements, audit reports, and other financial documents of the Jamner Municipal Council. Primary data were collected using a structured questionnaire, and information was gathered from municipal officials, employees, and citizens.

7.1 Data Collection

7.1.1 Primary Data

Primary data were collected through structured questionnaires, observations, discussions, interviews, and official documents. Information was obtained through interactions with municipal officials such as the Chief Officer, Office Superintendent, officials from the Finance and Accounts Department, chairpersons of various municipal committees, and other municipal employees. In addition, discussions were conducted with beneficiaries and local citizens in order to gather their views regarding municipal financial management and services.

7.1.2 Secondary Data

For the analysis of income and expenditure of the Jamner Municipal Council, secondary data sources were extensively used. These include:

- Annual reports of the municipality
- Annual financial statements and budget documents
- Audit reports
- Official information available on government websites and municipal records

These documents provided reliable financial data for conducting year-wise comparative analysis.

7.2 Tools for Analysis

To evaluate the income and expenditure structure of the Jamner Municipal Council for the financial years 2023–24 and 2024–25, several statistical and financial tools were applied. Since the study is quantitative in nature, the analysis is primarily based on numerical data.

The following tools were used for data analysis:

- Percentage Analysis
- Comparative Analysis
- Growth Rate Analysis
- Financial Trend Analysis

For processing and analyzing the data, software tools such as SPSS, Microsoft Excel, and Microsoft Word were used to present the results in a systematic and structured manner.

7.3 Sample Selection

For the purpose of the present research, the Jamner Municipal Council located in Jalgaon district was selected as the study sample. Jamner Municipal Council represents a medium-sized urban local government institution that plays an important role in the social and economic development of the town. Therefore, it was considered an appropriate and representative unit for examining municipal financial management.

In this study, two sampling techniques were applied, namely Purposive Sampling and Convenience Sampling. Municipal officials and employees who are directly involved in financial administration were selected using purposive sampling. These respondents possess practical knowledge and experience regarding municipal financial management, revenue collection, and expenditure planning. Their insights were therefore considered important for the study.

Similarly, citizens were selected using the convenience sampling method. Individuals who were available and willing to participate were approached and information was collected from them through a structured questionnaire.

The Jamner Municipal Council consists of 27 wards. In order to obtain a representative sample from different parts of the town, four questionnaires were distributed in each ward. Accordingly, the total number of questionnaires distributed was calculated as follows:

$$27 \times 4 = 108$$

Thus, a total of 108 questionnaires were distributed for the purpose of the study.

Table 1: Ward-wise Distribution of Questionnaires

Sr. No.	Ward Number	Questionnaires Distributed
1	Ward 1	4
2	Ward 2	4
3	Ward 3	4
4	Ward 4	4
5	Ward 5	4
6	Ward 6	4
7	Ward 7	4
8	Ward 8	4
9	Ward 9	4
10	Ward 10	4
11	Ward 11	4
12	Ward 12	4
13	Ward 13	4
14	Ward 14	4
15	Ward 15	4
16	Ward 16	4
17	Ward 17	4
18	Ward 18	4
19	Ward 19	4
20	Ward 20	4
21	Ward 21	4
22	Ward 22	4
23	Ward 23	4
24	Ward 24	4
25	Ward 25	4
26	Ward 26	4
27	Ward 27	4
	Total	**108**

According to Table 1, four questionnaires were distributed in each of the 27 wards of Jamner Municipal Council, resulting in a total of 108 distributed questionnaires. This approach ensured that respondents from different wards of the municipality were included in the study, thereby making the sample more representative and enhancing the reliability of the findings.

Table 2: Questionnaire Distribution and Final Sample Size

Sr. No.	Particulars	Number
1	Total number of wards in Jamner Municipal Council	27
2	Questionnaires distributed in each ward	4
3	Total questionnaires distributed	108
4	Questionnaires received	102
5	Incomplete / rejected questionnaires	2
6	Final valid questionnaires used for analysis	100

As shown in Table 2, a total of 108 questionnaires were distributed, out of which 102 questionnaires were received. Among the received questionnaires, two were incomplete or incorrectly filled and therefore excluded from the analysis. Finally, 100 valid questionnaires were considered for the study and used for data analysis.

8. Data Analysis and Interpretation

8.1 Secondary Data Analysis

8.1.1 Total Income Analysis : The total income of a municipality is one of the key indicators of its financial capacity. A strong revenue structure enhances the ability of a municipal body to provide better public services and undertake development activities. Changes in income across financial years help in understanding the effectiveness of revenue generation and financial management. In the context of Viksit Bharat 2047, strengthening local revenue

sources becomes particularly important for sustainable urban development. A comparison of income across different financial years provides a clear picture of financial trends and fiscal performance. The following table presents the comparison of total income of the Jamner Municipal Council for the financial years 2023–24 and 2024–25.

Table 3: Total Income of Jamner Municipal Council

Sr. No.	Financial Year	Total Income (₹)
1	2023–24	12,19,89,178.91
2	2024–25	18,31,60,038.00

From the above table, it can be observed that the total income of the Jamner Municipal Council has increased significantly in the financial year 2024–25 compared to the previous financial year 2023–24.

The increase in total income can be calculated using the following formula:

Increase in Total Income of the Municipality = (Income of the Current Year – Income of the Previous Year)

= (Financial Year 2024–25) – (Financial Year 2023–24)

= Rs. 18,31,60,038 – Rs. 12,19,89,178 Increase in Total Income of the Municipality = Rs. 6,11,70,860

Thus, the total income of the municipality increased by Rs. 6,11,70,860 during the financial year 2024–25.

To understand the rate of increase, the growth percentage is calculated as follows:

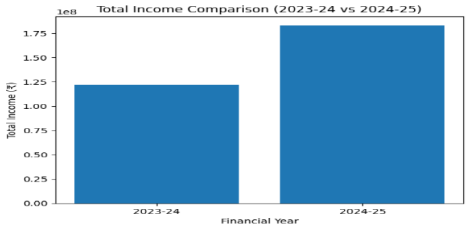
$$\text{Growth \%} = \frac{(\textit{current year} - \textit{previous year})}{\textit{previous year}} \times 100$$

$$= \frac{6,11,70,860}{12,19,89,178} \times 100$$

$$\text{Growth \%} \approx 50.13\%$$

This indicates that the total income of the Jamner Municipal Council increased by approximately 50.14 percent during the financial year 2024–25.

Graph no. 1 : Total income Comparison (2023 -24 vs 2024-25)



Interpretation

In the financial year 2023–24, the total income of the Jamner Municipal Council was approximately Rs. 12.19 crore, whereas in the financial year 2024–25 it increased to around Rs. 18.31 crore. This represents an increase of nearly 50 percent in the total income of the municipality. Such a substantial rise indicates a significant improvement in municipal revenue generation and financial management practices.

The growth in income is higher than the growth in expenditure, which reflects a positive trend in the financial stability of the municipality. This suggests that the municipal administration has been successful in strengthening its revenue base and improving fiscal discipline. Overall, the increase in income demonstrates that the revenue capacity of the municipality is gradually becoming stronger, which can support future development activities and enhance the delivery of public services.

8.1.2 Total Expenditure Analysis : Expenditure analysis helps in evaluating the financial discipline of a municipal institution. Effective control over expenditure is essential for maintaining fiscal stability. If the rate of expenditure growth exceeds the growth of income, it may lead to financial deficits. A comparative analysis of expenditure across financial years helps in identifying the priorities and efficiency of financial management. The comparison of total expenditure of the Jamner Municipal Council for the financial years 2023–24 and 2024–25 is presented below.

Table 4: Total Expenditure of Jamner Municipal Council

Sr. No.	Financial Year	Total Expenditure (₹)
1	2023–24	₹13,63,24,786.68
2	2024–25	₹15,80,27,228.27

From the above table, it can be observed that the total expenditure of the Jamner Municipal Council increased in the financial year 2024–25 compared to the previous financial year 2023–24.

Increase in Total Expenditure = (Current Year – Previous Year)

= (Financial Year 2024–25) – (Financial Year 2023–24)

= Rs. 15,80,27,228.27 - ? 13,63,24,786.68

Increase in Total Expenditure = Rs. 2,17,02,441

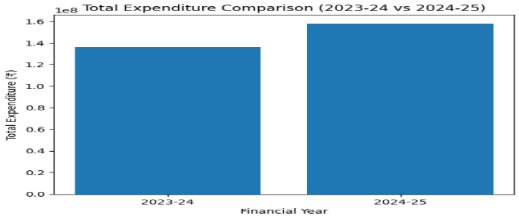
To understand the rate of increase, the growth percentage is calculated as follows :

$$\text{Growth \%} = \frac{(\textit{current year} - \textit{previous year})}{\textit{previous year}} \times 100$$

$$= \frac{2,17,02,441}{13,63,24,786} \times 100$$

Growth % = 15.91%

Graph no. 2: Total Expenditure Comparison (2023 -24 vs 2024-25)



Interpretation

In the financial year 2023–24, the total expenditure of the Jamner Municipal Council was approximately Rs. 13.63 crore, which increased

to about Rs. 15.80 crore in the financial year 2024–25. Although the expenditure has increased, the growth appears to be moderate and controlled. The expenditure growth rate is approximately 15.91 percent, which is significantly lower than the growth rate of municipal income (around 50 percent).

This indicates an improvement in the financial balance of the municipality. The relatively lower growth in expenditure compared to income suggests better financial discipline and improved budgetary control. It also reflects effective financial planning and management within the municipal administration.

8.1.3 Tax Revenue Analysis

Tax revenue is one of the most important sources of financial autonomy for municipal institutions. Local taxes such as property tax and other municipal taxes form the foundation of a municipality's independent revenue base. Improvement in tax collection efficiency strengthens the financial stability of local governments. In the broader context of Viksit Bharat 2047, strengthening tax-based municipal revenue is essential for sustainable urban development. Therefore, a comparison of tax revenue across financial years provides valuable insights into the revenue generation capacity of the municipality.

Table 5: Tax Revenue of Jamner Municipal Council

Sr. No.	Financial Year	Total Expenditure (₹)
1	2023–24	₹3,36,25,198
2	2024–25	₹4,04,15,877

From the above table, it is evident that tax revenue of the Jamner Municipal Council increased during the financial year 2024–25 compared to 2023–24.

Increase in Tax Revenue = (Current Year – Previous Year)

= (Financial Year 2024–25) – (Financial Year 2023–24)

= Rs. 4,04,15,877 - ? 3,36,25,198

Increase in Tax Revenue = Rs. 67,90,679

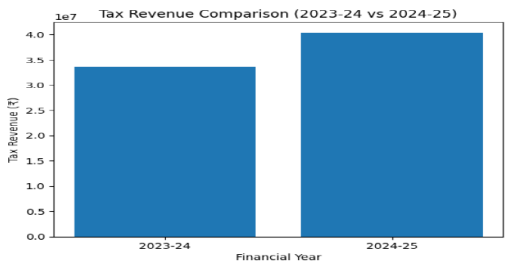
To understand the rate of increase, the growth percentage is calculated as follows :

$$\text{Growth \%} = \frac{(\textit{current year} - \textit{previous year})}{\textit{previous year}} \times 100$$

$$= \frac{67,90,679}{3,36,25,198} \times 100$$

$$\text{Growth \%} = 20.19\%$$

Graph no. 3: Tax Revenue Comparison



Interpretation

During the financial year 2023–24, the tax revenue of the Jamner Municipal Council was approximately Rs. 3.36 crore, which increased to about Rs. 4.04 crore in the financial year 2024–25. The tax revenue increased by Rs. 67,90,679, representing a growth of 20.19 percent.

This increase indicates an improvement in the efficiency of the municipal tax collection system. Growth in tax-based revenue is particularly important for strengthening the financial independence of municipal institutions. The observed increase suggests that the revenue collection capacity of the Jamner Municipal Council is gradually improving, which contributes to better financial sustainability and supports future development activities.

8.1.4 Revenue Grants Analysis

Government grants represent an important source of revenue for many municipal institutions. However, excessive dependence on grants may reduce the financial autonomy of local governments. Variations in grant allocation often reflect broader fiscal policies and administrative priorities. When grants decline, municipalities need to strengthen their own revenue sources to maintain financial stability. The structure of government grants received by the Jamner Municipal Council is presented below.

Table 6: Government Grants of Jamner Municipal Council

Sr. No.	Financial Year	government Grants (₹)
1	2023–24	₹6,46,85,782
2	2024–25	₹6,33,15,877

From the above table, it is evident that the government grants received by the Jamner Municipal Council decreased slightly in the financial year 2024–25 compared to the previous financial year 2023–24.

Change in Government Grants = (Current Year – Previous Year)

= (Financial Year 2024–25) – (Financial Year 2023–24)

= Rs. 6,33,15,877 - Rs. 6,46,85,782

Change in Government Grants = - Rs. 13,69,905

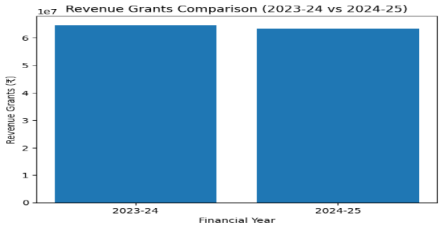
To understand the rate of increase, the growth percentage is calculated as follows :

$$\text{Growth \%} = \frac{(\textit{current year} - \textit{previous year})}{\textit{previous year}} \times 100$$

$$= \frac{-₹\,13,69,905}{₹\,6,46,85,782} \times 100$$

$$\text{Growth \%} = -2.11\%$$

Graph no. 4: Government Grants Comparison



Interpretation

During the financial year 2023–24, the Jamner Municipal Council received approximately ?6.46 crore as government grants, whereas in 2024–25 the amount decreased to around Rs. 6.33 crore. This indicates a decline of Rs. 13,69,905, representing a 2.11 percent decrease in grant allocation.

The reduction in grants suggests that the municipality may be gradually reducing its dependence on external financial support. At the same time, the growth in local revenue sources indicates an improvement in financial independence. From the perspective of fiscal sustainability, a moderate decline in grant dependence can be considered a positive development, as it reflects stronger local revenue generation and improved financial management.

8.1.5. Other Income Analysis

Other income of a municipality generally includes various fees, interest income, penalties, and other miscellaneous receipts. Changes in this component may indicate structural variations in the revenue pattern of the municipality. A sudden increase in other income often requires further examination to identify the underlying causes. Comparative analysis of other income helps in understanding the diversification of municipal revenue sources. The details of other income of the Jamner Municipal Council for the financial years 2023–24 and 2024–25 are presented below.

Table 7: Other Income of Jamner Municipal Council

Sr. No.	Financial Year	Other Income (₹)
1	2023–24	₹31,58,152
2	2024–25	₹2,30,22,388

From the above table, it can be observed that the other income of the Jamner Municipal Council increased significantly in the financial year 2024–25 compared to 2023–24.

Increase in Other Income = (Current Year – Previous Year)

= (Financial Year 2024–25) – (Financial Year 2023–24)

= Rs. 2,30,22,388 - Rs. 31,58,152

= Rs. 1,98,64,236

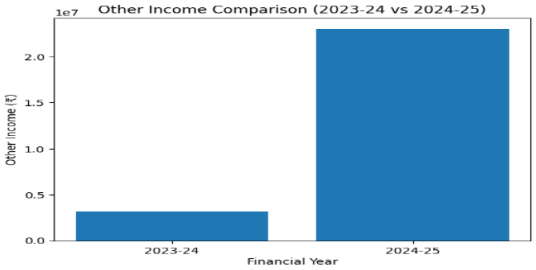
To understand the rate of increase, the growth percentage is calculated as follows :

$$\text{Growth \%} = \frac{(\textit{current year} - \textit{previous year})}{\textit{previous year}} \times 100$$

$$= \frac{1,98,64,236}{31,58,152} \times 100$$

$$\text{Growth \%} = 628.98\%$$

Graph no. 5 : Other Income Comparison



Interpretation

In the financial year 2023–24, the other income of the Jamner Municipal Council was approximately Rs. 31.58 lakh, which increased significantly to around Rs. 2.30 crore in the financial year 2024–25. This represents an increase of Rs. 1.98 crore, which corresponds to a growth rate of approximately 628.98 percent.

Such a substantial increase indicates that a major portion of the growth in total income during the period may be attributed to this component. The increase may have resulted from special revenue receipts, recovery of outstanding dues, or other non-recurring financial inflows. However, while such growth strengthens the financial position in the short term, long-term financial stability depends more on regular and sustainable revenue sources such as tax income.

8.2 Primary Data Analysis

Primary data analysis plays an important role in understanding the perceptions and opinions of respondents regarding the financial administration of the municipality. While secondary data provides information about the actual financial performance of the municipality, primary data helps in examining how citizens and stakeholders perceive the efficiency, transparency, and effectiveness of municipal financial management. In the present study, primary data were collected through a structured questionnaire administered to 100 respondents, including municipal officials, employees, and citizens. The questionnaire consisted of several statements related to tax collection efficiency, transparency in financial management, expenditure planning, and the role of municipal finance in achieving the objectives of Viksit Bharat 2047. The responses were recorded using a five-point Likert scale, consisting of the categories Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. This method helped in measuring the level of agreement or disagreement among respondents regarding different aspects of municipal financial administration.The analysis of primary data provides valuable insights into public perception, administrative transparency, and the effectiveness of financial management practices in the Jamner Municipal Council. The results of the questionnaire analysis are presented in the following table.

Table 8: Analysis of Primary Data Based on Questionnaire Responses

Sr. No.	Statements / Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
1	The municipal tax collection system is efficient	30	35	15	12	8	100
2	Financial management of the municipality is transparent	25	32	20	15	8	100
3	Citizens are aware of the municipal tax structure	22	30	18	20	10	100
4	Municipal income is properly utilized for development	28	34	16	14	8	100
5	Expenditure planning of the municipality is effective	24	33	19	16	8	100
6	There is transparency in municipal financial operations	26	31	20	15	8	100
7	Citizens trust the municipality in financial matters	23	29	21	18	9	100
8	Municipal development projects are financially appropriate	27	33	18	14	8	100
9	Tax collection has increased municipal revenue	29	34	17	12	8	100
10	Municipal financial management is important for achieving Viksit Bharat 2047	32	36	14	10	8	100

Interpretation

The above table presents the responses of citizens and other respondents regarding the financial administration of the Jamner Municipal Council. The analysis is based on the responses of 100 respondents collected through a structured questionnaire. Five response categories were used in the survey, namely Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree.

The first statement examined whether the municipal tax collection system is efficient. A total of 65 percent of respondents either strongly agreed or agreed with the statement, indicating that the tax collection mechanism of the municipality is relatively effective. However, around 20 percent of respondents expressed disagreement, suggesting that there is still scope for improvement in revenue collection practices.

The second statement focused on the transparency of municipal financial management. About 57 percent of respondents agreed that financial management is transparent, while some respondents remained neutral or disagreed. This indicates that although transparency exists to some extent, there is still a need to improve openness and accountability in financial operations.

The third statement assessed citizens' awareness regarding the municipal tax structure. Approximately 52 percent of respondents expressed agreement, indicating a moderate level of awareness. However, the presence of neutral and negative responses suggests that greater public awareness programs regarding taxation policies may be required.

The fourth statement examined whether municipal income is properly utilized for development activities. Around 62 percent of respondents agreed with this statement, indicating that a majority of citizens believe that municipal funds are being used for development purposes.

The fifth statement evaluated the effectiveness of municipal expenditure planning. Approximately 57 percent of respondents gave positive responses, suggesting that the municipality has relatively effective expenditure planning mechanisms, although some improvements may still be required.

The sixth statement addressed transparency in municipal financial operations. About 57 percent of respondents expressed agreement, indicating that financial transparency is perceived positively by many respondents.

The seventh statement examined the level of public trust in the municipality regarding financial matters. Around 52 percent of respondents expressed positive opinions, suggesting a moderate level of public trust, although some respondents indicated dissatisfaction.

The eighth statement evaluated whether municipal development projects are financially appropriate. Approximately 60 percent of respondents agreed, indicating that development initiatives undertaken by the municipality are generally perceived as financially sound.

The ninth statement assessed whether tax collection has contributed to an increase in municipal revenue. About 63 percent of respondents agreed with this statement, suggesting that improvements in tax collection mechanisms have positively influenced municipal income.

The tenth statement examined whether municipal financial management is important in the context of Viksit Bharat 2047. Around 68 percent of respondents expressed agreement, indicating that respondents recognize the importance of sound financial management for achieving national development goals.

Overall, the primary data analysis indicates that respondents generally hold a positive perception of the financial administration of the Jamner Municipal Council, although certain areas such as transparency, awareness, and public trust still require improvement.

8.3 Hypothesis Testing

Hypothesis testing is an important statistical method used to examine whether a particular assumption about a population is supported by the sample data. In the present study, hypothesis testing is used to analyze the perceptions of respondents regarding various aspects of the financial administration of the Jamner Municipal Council. The purpose of this analysis is to determine whether respondents consider municipal financial management practices to be significant and effective.

The following hypotheses were formulated for the study :

- **Null Hypothesis (H0) :** Respondents do not consider the factors related to the financial administration of the Jamner Municipal Council to be significant.
- **Alternative Hypothesis (H1) :** Respondents consider the factors related to the financial administration of the Jamner Municipal Council to be significant.

These hypotheses are tested based on the responses collected through the questionnaire survey. Statistical analysis is used to evaluate whether the opinions of the respondents indicate a significant perception regarding the effectiveness and importance of municipal financial administration.

Test proportion reference value

$p0=0.50$

Sample size:

$n=100$

Formula used

$$Z = \frac{p - p0}{\frac{\sqrt{po(1-p0)}}{n}}$$

Where,

- p = observed proportion
- p0 = hypothesized proportion (0.50)
- n = sample size

Standard error

$$S.E. = \sqrt{0.5 \times 0.5/100}$$

$S.E. = 0.05$

Critical value (5% level)

$Z_{critical} = 1.96$

Decision rule:

If Z>1.96 → Reject H0

If Z<1.96 → Accept H0

Table 9 : Hypothesis Testing Results

Sr No	Aspects	Proportion of respondents who stated the aspect as either very important or important	S.D.	Z_cal	p_value	Decision
1	Efficiency of municipal tax collection	0.65	0.05	3.00	<0.01	Reject H_0
2	Transparency in financial management	0.57	0.05	1.40	0.08	Accept H_0
3	Awareness about municipal tax structure	0.52	0.05	0.40	0.34	Accept H_0
4	Utilization of municipal revenue for development	0.62	0.05	2.40	0.01	Reject H_0
5	Effectiveness of municipal expenditure planning	0.57	0.05	1.40	0.08	Accept H_0
6	Transparency in financial operations	0.57	0.05	1.40	0.08	Accept H_0
7	Public trust in municipal financial administration	0.52	0.05	0.40	0.34	Accept H_0
8	Financial feasibility of development projects	0.60	0.05	2.00	0.02	Reject H_0
9	Increase in municipal income through tax collection	0.63	0.05	2.60	0.01	Reject H_0
10	Importance of financial management for Viksit Bharat 2047	0.68	0.05	3.60	<0.01	Reject H_0

Example Calculation

Respondents agreeing with the statement (Strongly Agree + Agree) = 65

$$P = \frac{65}{100}$$

$= 0.65$

Standard error

$$S.E. = \sqrt{\frac{0.5(1-0.5)}{100}}$$

$= 0.05$

$$Z = \frac{0.65 - 0.50}{0.05}$$

$Z = 3.00$

Since, Z>1.96

Null hypothesis rejected.

This result indicates that respondents consider the efficiency of municipal tax collection to be a significant factor in municipal financial administration.

Interpretation of Hypothesis Testing

The results of the hypothesis testing reveal that respondents consider several aspects of the financial administration of the Jamner Municipal Council to be important. The calculated Z-values for variables such as efficiency of municipal tax collection, utilization of municipal revenue for development activities, financial feasibility of development projects, growth in municipal income through tax collection, and the importance of financial management for achieving the vision of Viksit Bharat 2047 are higher than the critical value of 1.96 at the 5 percent level of significance. Therefore, the null hypothesis is rejected for these variables, indicating that respondents significantly recognize the importance of these aspects in municipal financial administration.

However, for certain variables such as awareness of the municipal tax structure, transparency in financial management, and public trust in financial administration, the calculated Z-values are lower than the critical value. As a result, the null hypothesis is accepted for these aspects. This suggests that respondents do not perceive these factors as significantly strong, which may indicate the need for improved transparency, better communication, and greater public awareness regarding municipal financial practices.

Overall, the findings of the hypothesis testing indicate that respondents consider efficient tax

collection, proper utilization of municipal revenue, and development-oriented financial planning as essential components of effective municipal governance. Strengthening these aspects can enhance the financial capacity of local governments and contribute to sustainable urban development. Furthermore, effective financial management at the municipal level plays a significant role in supporting the broader national vision of Viksit Bharat 2047.

9. Findings of the Study

Based on the analysis of both primary and secondary data, the following findings have emerged from the present study :

1. The total income of the Jamner Municipal Council has increased significantly between the financial years 2023–24 and 2024–25. The income has grown by approximately 50.14 percent, indicating an improvement in the municipality's revenue generation capacity.
2. Although total expenditure has also increased during the same period, the rate of increase is comparatively lower than the growth in income. Expenditure increased by about 15.91 percent, suggesting effective control over municipal spending.
3. Tax revenue has increased by 20.19 percent, indicating that the municipal tax collection system has become more efficient and effective.
4. Government grants have slightly decreased by 2.11 percent, which suggests a gradual reduction in dependence on external financial assistance.
5. Other income has shown a remarkable increase of 628.98 percent, indicating a significant structural change in the revenue composition of the municipality.
6. Since the growth rate of total income is higher than the growth rate of expenditure, the overall financial position of the municipality appears to be improving.
7. The results of the Ratio Analysis indicate that the financial deficit observed in 2023–24 has been converted into a surplus in 2024–25, demonstrating improved financial management.
8. The Financial Sustainability Index (FSI) also shows improvement, suggesting enhanced financial sustainability of the municipality.
9. The analysis of primary data indicates that a majority of respondents believe that the municipal tax collection system is effective.
10. Most respondents agree that there is a reasonable level of transparency in the financial management of the municipality, although some respondents indicated the need for further improvement.
11. A large proportion of respondents believe that municipal income is appropriately utilized for development activities.
12. Most respondents agree that improvements in tax collection have contributed to an increase in municipal revenue.
13. The results of hypothesis testing show that the null hypothesis is rejected for aspects such as tax collection efficiency, utilization of revenue for development purposes, and the importance of financial management.
14. For certain aspects such as public awareness of the tax structure and transparency in financial administration, the statistical results do not show a significant difference.
15. Overall, the findings suggest that the financial administration of the Jamner Municipal Council is relatively effective and capable of contributing to the broader national objective of Viksit Bharat 2047 through improved local financial management.

10. Conclusion

The primary objective of the present study was to conduct a comparative analysis of the income and expenditure structure of the Jamner Municipal Council for the financial years 2023–24 and 2024–25, and to understand the overall condition of municipal financial administration. In the context of the national vision of Viksit Bharat 2047, the financial capacity and efficiency of local self-government institutions have become increasingly important. Therefore, examining the financial management practices of the Jamner Municipal Council provides valuable insights into the role of local governance in supporting sustainable urban development.

The analysis of secondary data indicates that the total income of the Jamner Municipal Council increased significantly between the financial years 2023–24 and 2024–25. The overall income recorded a growth of more than 50 percent, which reflects an improvement in the municipality's revenue generation capacity. Tax revenue also increased by nearly 20 percent, indicating that the municipal tax collection system has become more effective. At the same time, government grants showed a slight decline, suggesting that the municipality's dependence on external financial assistance may be gradually decreasing.

A substantial increase was observed in the

category of other income, which indicates a notable change in the structure of municipal revenue sources. Although total expenditure increased during the study period, the growth rate of expenditure remained lower than the growth rate of income. This suggests that the municipality has maintained a reasonable balance between revenue generation and expenditure management. The results of ratio analysis and the Financial Sustainability Index (FSI) further confirm that the financial position of the municipality has improved compared to the previous year.

The analysis of primary data also reveals that a majority of respondents expressed positive opinions regarding the efficiency of the municipal tax collection system, financial management practices, and the utilization of funds for development activities. However, some respondents indicated the need to improve financial transparency and increase public awareness regarding municipal financial matters. The results of hypothesis testing indicate that respondents consider several aspects of municipal financial administration to be important, and the null hypothesis was rejected for certain variables.

Overall, the findings suggest that the financial administration of the Jamner Municipal Council is relatively effective and that improvements have been observed in both revenue generation and expenditure management. Nevertheless, further efforts are required to enhance financial transparency, increase public awareness regarding municipal taxation, and strengthen local revenue sources. Implementing such improvements can enhance the financial autonomy and long-term sustainability of the municipality.

Therefore, effective financial administration in the Jamner Municipal Council is not only essential for local development but also plays a significant role in contributing to the broader national vision of Viksit Bharat 2047.

11. Suggestions and Recommendations

Based on the findings of the study, the following suggestions and recommendations are proposed to strengthen the financial administration of the Jamner Municipal Council.

1. Strengthening Local Revenue Sources The Jamner Municipal Council should adopt modern technological tools to improve the efficiency of tax collection systems. The use of digital tax collection systems, online payment facilities, and regular reassessment of taxes can help increase municipal revenue.
2. Enhancing Public Awareness about the Tax Structure Many citizens are not fully aware of the municipal tax structure. Therefore, awareness campaigns, informational brochures, and public meetings should be organized to educate citizens about taxation policies and their role in local development.
3. Improving Financial Transparency Municipal financial transactions should be made more transparent and accessible to the public. Publishing annual financial reports, budget documents, and information about development projects on official websites can increase public trust in municipal administration.
4. Improving Expenditure Planning The municipality should prioritize development-oriented expenditure and reduce unnecessary administrative costs. Proper prioritization of expenditure can ensure the efficient utilization of available financial resources.
5. Reducing Dependence on Government Grants Excessive reliance on government grants can limit financial autonomy. Therefore, the municipality should focus on strengthening its own revenue sources in order to achieve greater financial independence.
6. Developing Long-Term Financial Planning Strategies The municipality should formulate long-term financial planning strategies to ensure adequate funding for future development projects and sustainable urban growth.
7. Regular Evaluation of Development Projects Development projects implemented by the municipality should be regularly evaluated in terms of both financial efficiency and social impact. This will help ensure the proper utilization of public funds.
8. Enhancing Administrative Capacity Municipal officials and employees should receive regular training in financial management practices and modern administrative technologies to improve institutional efficiency.
9. Increasing Citizen Participation Greater citizen participation in local development and financial planning processes can improve transparency, accountability, and effectiveness in decision-making.
10. Promoting the Use of Smart Technologies The adoption of e-governance systems, digital accounting platforms, and data-driven decision-making tools can significantly enhance the efficiency of

municipal financial administration.

11. Maintaining Financial Discipline for Sustainable Development Maintaining a balance between income and expenditure is essential for achieving long-term financial stability and sustainable urban development.
12. Strengthening the Role of Local Self-Government Institutions for Viksit Bharat 2047 Effective financial administration at the municipal level plays a crucial role in promoting local development and contributing to the broader national objective of Viksit Bharat 2047.

12. Policy Implications

Based on the findings of the present study, several important policy implications emerge for improving the financial administration of the Jamner Municipal Council.

First, local self-government institutions should focus on strengthening their own revenue sources. An effective local tax structure can significantly enhance the financial autonomy of municipalities. The adoption of digital systems for property tax assessment, service charges, and other local taxes can improve the efficiency of revenue collection.

Second, there is a need to improve transparency in municipal financial operations. Providing citizens with easy access to information regarding municipal budgets, expenditures, and development projects can enhance public trust in municipal administration. The effective implementation of e-governance systems can support greater transparency and accountability.

Third, proper financial planning for development projects is essential. Municipal authorities should adopt long-term financial planning strategies and prioritize development-oriented expenditure. This approach can contribute to achieving sustainable urban development.

Fourth, it is important to enhance the administrative capacity of municipal officials and employees. Regular training programs related to financial management, budgeting practices, and modern administrative technologies can improve institutional efficiency.

Fifth, increasing citizen participation in municipal decision-making processes can strengthen transparency and accountability. When citizens are actively involved in financial planning and local governance, the effectiveness of public policies and development initiatives can improve.

Overall, effective financial administration at the municipal level can accelerate local development and contribute significantly to achieving the broader national vision of Viksit Bharat 2047.

13. Future Scope of the Study

The present research focuses on the analysis of the income and expenditure structure of the Jamner Municipal Council for the financial years 2023–24 and 2024–25. However, several opportunities remain for further research in this area.

First, future studies may include a longer time period in order to examine long-term financial trends. Analyzing financial data over a period of five or ten years may provide a more comprehensive understanding of municipal financial performance.

Second, future research may conduct a comparative study of multiple municipalities. Comparing financial management practices across different municipal institutions can provide broader insights and more comprehensive policy recommendations.

Third, further studies may examine the impact of financial administration on urban development outcomes. Research could explore the relationship between municipal financial management, development projects, public services, and citizen satisfaction.

Fourth, future research may apply advanced statistical and econometric techniques, such as regression analysis or econometric modeling, to examine the influence of various financial factors on municipal performance.

Fifth, the impact of e-governance and digital financial management systems on the functioning of local self-government institutions could also be explored in future research.

Considering these aspects, there is significant scope for further in-depth and comprehensive research on the financial management of urban local government institutions.

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A Study of Trade Facilitation Across Goods Categories

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Abstract

Customs efficiency is a central dimension of trade facilitation because delays at the border raise transaction costs, disrupt production schedules, and weaken export competitiveness. While the trade facilitation literature widely recognizes that border procedures affect firms differently, less attention has been given to whether customs delays vary systematically across categories of goods. This study examines whether customs delay frequency and customs clearance time differ significantly across product categories using simulated primary-data style responses from 227 business actors involved in trade and logistics. The analysis covers seven categories of goods: chemicals, food / agricultural products, general manufactured goods, machinery/ capital goods, perishable goods, pharmaceuticals, and textiles/garments. Descriptive and inferential statistics were employed, including chi-square tests and one-way ANOVA.

The results show a statistically significant association between product category and delay frequency, $X2(24) = 103.206$, $p < .001$, as well as between product category and clearance time, $X2(18) = 142.933$, $p < .001$. ANOVA results similarly indicate significant mean differences across product categories in both delay frequency, $F(6, 220) = 18.492$, $p < .001$, and clearance time, $F(6, 220) = 30.317$, $p < .001$.

Perishable goods recorded the highest average delay frequency and the longest clearance time, while general manufactured goods experienced the lowest delays. The findings suggest that customs performance is not uniform across goods categories and that time-sensitive and compliance-intensive goods face greater procedural burdens. The study concludes that product-sensitive customs reforms, digitalization, and priority clearance systems are essential for improving trade facilitation outcomes.

Introduction

Trade facilitation has become one of the most important policy areas in international trade because the efficiency of border procedures influences costs, delivery reliability, and market access. Customs administration plays a particularly important role in this process, since customs clearance delays can reduce the benefits of tariff liberalization by increasing the time and uncertainty associated with trade flows (Djankov, Freund, & Pham, 2010; Portugal-Perez & Wilson, 2012). Even when formal tariff barriers are low, inefficient documentation systems, physical inspections, congestion, and compliance requirements can slow the movement of goods and undermine firm competitiveness (Grainger, 2011; Moïsé & Sorescu, 2013).

The literature further shows that time matters differently across products. Goods that are perishable, highly regulated, safety-sensitive, or dependent on just-in-time logistics are more vulnerable to border delays than standardized goods with lower time sensitivity (Hummels & Schaur, 2013; Dennis & Shepherd, 2011). For example, perishable goods may deteriorate in quality during prolonged clearance, while pharmaceuticals and chemicals often face additional regulatory scrutiny, product certification, and inspection requirements. By contrast, general manufactured goods may encounter fewer product-specific compliance burdens and thus move more quickly through customs processes.

Although prior studies have established that trade costs and time to export affect trade volumes

and business performance, fewer empirical studies at the firm-response level have focused specifically on whether customs delays vary by product category. This creates an important gap because policy reforms that treat all goods categories identically may overlook the uneven burden faced by time-sensitive and compliance-intensive sectors. Product-specific analysis is therefore valuable for understanding how customs performance interacts with the nature of goods.

This study addresses that issue by examining whether customs delay frequency and clearance time differ significantly across seven goods categories: chemicals, food/agricultural products, general manufactured goods, machinery/capital goods, perishable goods, pharmaceuticals, and textiles/ garments. Using a simulated primary-data style dataset of 227 responses, the study applies chi-square analysis and one-way ANOVA to assess the relationship between product category and customs delay outcomes. The findings contribute to the trade facilitation literature by showing that customs delays are not evenly distributed across goods categories and that perishable and regulated products face disproportionately higher procedural constraints.

Statement of The Problem

Efficient customs procedures are essential for trade facilitation, yet in many trading environments firms continue to experience delays during documentation, inspection, and clearance. These delays increase logistics costs, reduce delivery reliability, and weaken the ability of firms to compete in domestic and international markets. However, customs delays are unlikely to affect all product categories equally. Some goods, such as perishable products and pharmaceuticals, are more sensitive to time and more exposed to compliance requirements than others. Despite this, many studies and policy discussions address customs efficiency in aggregate terms and do not sufficiently distinguish between categories of goods.

The problem, therefore, is the limited empirical attention given to whether customs delays vary significantly across product types. Without such evidence, customs reforms may remain too general and fail to address the categories that experience the greatest burden. This study seeks to fill that gap by examining differences in customs delay frequency and clearance time across selected goods categories, thereby providing evidence relevant to more targeted trade facilitation interventions.

Objectives of The Study

General objective

- To examine whether customs delays vary significantly across different product categories. Specific objectives
- To examine whether customs delays vary significantly across different product categories.
- To analyze the impact of customs delays and clearance time on trade facilitation efficiency across goods categories.

Research Hypotheses

- **H01 :** There is no significant difference in customs delays across different product categories.
- **HA1 :** There is a significant difference in customs delays across different product categories.
- **H02 :** There is no significant difference in clearance time across different product categories.
- **HA2 :** There is a significant difference in clearance time across different product categories.

Review Of Literature

Trade facilitation refers to the simplification, modernization, and harmonization of trade procedures so that goods can move across borders more quickly and at lower cost (World Trade Organization [WTO], 2015). A major body of research argues that procedural inefficiencies at the border act as non-tariff trade costs that can be as economically important as formal trade barriers. Djankov et al. (2010) show that each additional day of delay in the trading process reduces trade, especially in time-sensitive goods. This finding highlights that the economic effects of delay are not uniform across product categories.

Similarly, Hummels and Schaur (2013) demonstrate that time has measurable monetary value in international trade and that exporters are willing to pay substantially more for faster delivery. Their work suggests that border delays impose especially heavy burdens on goods for which speed is commercially critical. Dennis and Shepherd (2011) also find that trade facilitation improvements support export diversification, implying that procedural delays may disproportionately discourage firms dealing in sensitive or specialized products. From an institutional perspective, Grainger (2011) explains that border delay is often the result of fragmented administrative processes, excessive documentation, and poor coordination among border agencies. Such procedural complexity is particularly relevant for goods like chemicals and pharmaceuticals, which frequently require product-specific approvals, certifications, and inspections. Moïsé and Sorescu (2013) similarly identify documentation, automation, advance rulings, and border agency cooperation as important determinants of trade transaction costs.

Empirical literature also suggests that logistics performance and customs quality directly shape national trade competitiveness. The World Bank's work on logistics performance emphasizes that customs efficiency, infrastructure, and shipment reliability are closely interconnected (Arvis et al., 2018). Delays at customs can disrupt supply chains, increase warehousing costs, and damage customer relationships, especially where firms operate under tight production or delivery schedules. In sectors dealing with perishables, border inefficiency may also lead to spoilage and direct economic loss. Product heterogeneity is central to understanding these effects. Perishable goods typically require rapid release because shelf life and quality diminish over time. Pharmaceuticals and chemicals, although not always perishable in the same sense, often face stricter handling, safety, inspection, and regulatory compliance obligations. By contrast, many general manufactured goods may move under more standardized documentation and lower urgency. This distinction is consistent with the wider trade-cost literature, which recognizes that product attributes affect firms' vulnerability to time delays (Hummels & Schaur, 2013; Djankov et al., 2010).

The WTO Trade Facilitation Agreement institutionalized many reforms intended to reduce customs delays, including transparency, pre-arrival processing, risk management, and coordinated border management (WTO, 2015). However, the practical benefits of these reforms depend on implementation and on whether customs systems can accommodate the differing needs of various goods categories. OECD evidence suggests that automation, streamlined procedures, and inter-agency coordination can reduce transaction costs significantly, yet the benefits may be greatest where current procedures are most burdensome (Moïsé & Sorescu, 2013).

Despite these advances, a gap remains in the literature regarding firm-response evidence on category-specific customs delay experiences. Many studies use country-level indicators such as days to export, logistics performance scores, or aggregate trade-cost measures. While useful, such indicators often obscure sectoral and product-level variation. The present study extends this literature by focusing directly on whether customs delay frequency and clearance time differ across categories of goods, using a survey-style empirical framework. In doing so, it provides a more granular understanding of how customs processes affect trade facilitation outcomes across different types of goods.

Methodology

The study adopted a quantitative, cross-sectional survey design and was structured as a primary-data style empirical investigation using simulated responses derived from a standardized questionnaire administered to trade-related respondents at a single point in time. The target population comprised business actors and trade intermediaries involved in customs processes, including manufacturers, traders, exporters, importers, and logistics-clearing agents, who were further classified by enterprise size and main market served. A total of 227 responses were included in the study, with the simulated dataset designed to reflect realistic variation in customs experiences across product categories, particularly in delay frequency and clearance time.

The analysis covered seven categories of goods: chemicals, food/agricultural products, general manufactured goods, machinery/capital goods, perishable goods, pharmaceuticals, and textiles/garments. Data were generated through a structured questionnaire organized into five sections covering respondent profile, customs delay experience, causes of delay, impact of delay, and suggestions for improvement, with items measured through both categorical response options and Likert-scale statements on perceived causes, effects, and policy remedies. The key independent variable was product category, while the dependent variables were delay frequency and clearance time; for inferential analysis, these outcomes were also converted into numeric scores to facilitate mean comparison across product groups.

Data Analysis Techniques

Data were analyzed using descriptive and inferential statistics. Chi-square tests were used to examine the association between product category and categorical measures of customs delay frequency and clearance time. One-way ANOVA was used to compare mean delay frequency scores and mean clearance time scores across product categories. A supplementary chi-square test assessed whether main market served was associated with delay frequency.

Analysis and Results

Table1ProductCategoryandDelayFrequency

Product Category	Never	Often	Rarely	Sometimes	Very often	Total
Chemicals	0	12	1	7	6	26
Food/Agricultural products	0	15	4	11	2	32
General manufactured goods	1	3	17	15	0	36
Machinery/Capital goods	1	6	12	12	3	34
Perishable goods	0	12	0	5	18	35
Pharmaceuticals	0	12	1	12	3	28
Textiles/Garments	0	10	4	18	4	36
Total	2	70	39	80	36	227

Chi-Square Test

Statistic	Value
Pearson Chi-Square	103.206
Degrees of Freedom	24
Asymptotic Significance (2-sided)	0.000

Symmetric Measures

Measure	Value	Approx. Significance
Contingency Coefficient	0.559	0.000

Source: Author's Estimation Based on Primary Data

The chi-square test examining the association between product category and delay frequency showed a statistically significant relationship, ?2(24) = 103.206, p < .001, with a contingency coefficient of 0.559. This indicates that customs delay frequency differs meaningfully across categories of goods. Substantively, perishable goods were concentrated in the "Very often" category, while general manufactured goods appeared more frequently in the "Rarely" and "Sometimes" categories. This pattern suggests that customs delays are not randomly distributed across products but are influenced by the nature of the goods being cleared.

The ANOVA result supports this conclusion. Mean delay frequency scores differed significantly across product categories, F(6, 220) = 18.492, p < .001. Perishable goods recorded the highest mean score (M = 4.37), followed by chemicals (M = 3.88) and pharmaceuticals (M = 3.61). General manufactured goods recorded the lowest mean delay frequency (M = 2.56). These differences indicate that some categories, especially those that are time-sensitive or compliance-intensive, experience customs delays more frequently than others.

Table 2 Product Category and Clearance Time

Product Category	Less than 1 day	1–2 days	3–5 days	More than 5 days	Total
Chemicals	0	7	17	2	26
Food/Agricultural products	2	13	17	0	32
General manufactured goods	13	20	3	0	36
Machinery/Capital goods	7	16	9	2	34
Perishable goods	0	2	12	21	35
Pharmaceuticals	0	5	15	8	28
Textiles/Garments	5	20	11	0	36
Total	27	83	84	33	227

Chi-Square Test

Statistic	Value
Pearson Chi-Square	142.933
Degrees of Freedom	18
Asymptotic Significance (2-sided)	0.000

Symmetric Measures

Measure	Value	Approx. Significance
Contingency Coefficient	0.622	0.000

Source:Author'sEstimationBasedonPrimaryData

A second chi-square test found a statistically significant association between product category and customs clearance time, X2(18) = 142.933, p < .001, with a contingency coefficient of 0.622. Perishable goods were concentrated in the "More than 5 days" category, whereas general manufactured goods and textiles/garments were more concentrated in the faster clearance categories. This provides strong evidence that product type influences not only how often delays occur but also how long clearance takes.

The ANOVA analysis produced a similar result, with significant differences in mean clearance time scores across product categories, F(6, 220) = 30.317, p < .001. Perishable goods again had the highest mean clearance time (M = 3.54), followed by pharmaceuticals (M = 3.11) and chemicals (M = 2.81). General manufactured goods had the lowest mean score (M = 1.72), while textiles/garments (M = 2.17) and machinery/capital goods (M = 2.18) fell in the lower- to-moderate range. These results reinforce the argument that customs procedures impose uneven time costs across categories of goods.

Group Means

Product Category	Mean Delay Frequency Score
Chemicals	3.88
Food/Agricultural products	3.47
General manufactured goods	2.56
Machinery/Capital goods	2.94
Perishable goods	4.37
Pharmaceuticals	3.61
Textiles/Garments	3.39

ANOVA Table

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	73.024	6	12.171	18.492	0.000
Within Groups	144.799	220	0.658		
Total	217.824	226			

Source: Author's Estimation Based on Primary Data

Interpretation & Discussion

Taken together, the results show that customs delay experiences are strongly associated with the type of goods being handled. Perishable goods consistently emerge as the most affected category, suggesting that highly time-sensitive products are especially exposed to customs bottlenecks. Pharmaceuticals and chemicals also show relatively high delay and clearance time scores, likely reflecting stricter inspection, documentation, and product-specific compliance requirements. In contrast, general manufactured goods appear to face fewer barriers and move more efficiently through customs procedures. These findings are consistent with the broader trade facilitation literature, which emphasizes that time, documentation complexity, and regulatory intensity shape trade costs unevenly across products.

Conclusion

This study examined whether customs delays vary by product type and assessed how differences in delay frequency and clearance time affect trade facilitation across goods categories. Using simulated primary-data style responses from 227 observations, the study found clear and statistically significant differences across product groups. Product category was strongly associated with both the frequency of customs delay and the length of customs clearance time, while main market served was not significantly related to delay frequency.

The evidence shows that customs procedures do not affect all goods equally. Perishable goods face the highest level of delay and the longest clearance time, while pharmaceuticals and chemicals also experience substantial procedural burdens. In contrast, general manufactured goods move through customs more efficiently. These results imply that a uniform approach to customs reform may be insufficient. Trade facilitation policy should instead recognize the differentiated needs of various goods categories, especially those that are highly time-sensitive or compliance-intensive.

The study therefore concludes that improving trade facilitation requires more than general procedural reform. It also requires targeted interventions such as digital customs systems, simplified documentation, inter-agency coordination, and priority clearance mechanisms for perishable and other sensitive goods. Such measures would reduce clearance time, lower business costs, and improve the reliability of cross-border trade.

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Determinants of Sustainable Logistics Adoption in E-Commerce Supply Chains : A Logistic Regression Analysis

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Abstract

The rapid growth of e-commerce has significantly increased logistics activities, particularly in last-mile delivery operations, leading to rising environmental concerns such as carbon emissions, traffic congestion, and packaging waste. As a result, the adoption of sustainable logistics practices has become an important strategy for reducing the environmental impact of e-commerce supply chains. This study examines the factors influencing the adoption of sustainable logistics practices among e-commerce logistics operators. Primary data were collected from 197 respondents involved in logistics and delivery operations using a structured questionnaire. The study employed binary logistic regression analysis to evaluate the influence of key determinants, including environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability, on the likelihood of adopting sustainable logistics practices. The findings indicate that environmental awareness, technological readiness, government policy support, and infrastructure availability have a significant positive effect on the adoption of sustainable logistics practices. In contrast, cost constraints negatively affect adoption, suggesting that high implementation costs remain a major barrier for logistics operators. The results highlight the importance of technological capability, supportive policies, and adequate infrastructure in promoting sustainable logistics systems within the e-commerce sector. The study provides valuable insights for policymakers and logistics managers seeking to encourage environmentally responsible logistics operations and enhance the sustainability of e-commerce supply chains.

Keywords : Sustainable logistics; E-commerce logistics; Green logistics; Last-mile delivery; Logistic regression; Sustainable supply chain

Introduction

The rapid growth of e-commerce has transformed retail supply chains by increasing order frequency, shortening delivery windows, and intensifying last-mile distribution activities. While these developments have improved customer convenience and market reach, they have also increased environmental pressures through higher transport emissions, packaging waste, reverse logistics complexity, and urban congestion (Viu-Roig & Alvarez-Palau, 2020; Cano et al., 2022). As a result, sustainability has become a strategic concern for e-commerce logistics operators seeking to balance service efficiency with environmental responsibility.

Sustainable logistics in e-commerce refers to the adoption of practices that reduce the environmental footprint of logistics operations while maintaining economic and operational performance. These practices commonly include the use of fuel-efficient or electric delivery vehicles, route optimization through digital technologies, load consolidation, sustainable packaging, green warehousing, and effective reverse logistics systems (Kawa & Pieranski, 2021; Bonilla et al., 2024). Prior research shows that last-mile delivery is one of the most critical and environmentally intensive components of e-commerce logistics, making it a key area for sustainability intervention (Patella et al., 2020; Awwad et al., 2018).

Existing studies suggest that the adoption of sustainable logistics practices is influenced by a combination of drivers and barriers. On the one hand, environmental awareness, technological readiness, customer expectations, and regulatory pressure

can encourage firms to implement greener logistics solutions (Jiang et al., 2019; Kader et al., 2023). On the other hand, high investment cost, inadequate charging or green infrastructure, operational complexity, and limited policy support often constrain adoption, especially among smaller and resource- constrained operators (Sharma et al., 2022; Dadashzada & Garza-Reyes, 2025). This indicates that the transition toward sustainable e-commerce logistics is not only a technological issue, but also an organizational and policy challenge.

Although the literature on green logistics and sustainable last-mile delivery has expanded in recent years, much of it remains conceptual, review-based, or focused on consumer perspectives rather than firm-level adoption behavior (Cano et al., 2022; González-Romero & Ortiz-Bas, 2025). There is still limited empirical evidence on how logistics operators in e- commerce decide whether to adopt sustainable practices and which factors significantly shape that decision. This gap is important because adoption in practice is often uneven across firms, depending on internal capability, perceived cost burden, and external support conditions (Jou et al., 2024; Bonilla et al., 2024).

Against this background, the present study examines the determinants of sustainable logistics adoption in e-commerce supply chains. Specifically, it investigates whether environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability influence the likelihood that e-commerce logistics operators adopt sustainable logistics practices. By using a logistic regression approach, the study offers an empirical explanation of adoption behavior and contributes to the growing discussion on how e-commerce logistics can become more sustainable without undermining operational efficiency. The findings are expected to support managers and policymakers in designing targeted strategies to accelerate green transformation in e-commerce logistics.

Review of Literature

The rapid expansion of e-commerce has significantly transformed logistics and supply chain operations, particularly in the area of last-mile delivery. While the growth of online retail has improved consumer convenience and operational efficiency, it has also increased environmental concerns such as carbon emissions, traffic congestion, and excessive packaging waste. Consequently, researchers have increasingly focused on sustainable logistics practices to mitigate the environmental impact of e-commerce logistics systems.

Several studies emphasize the importance of sustainable logistics practices in improving environmental performance within e-commerce supply chains. Patella et al. (2020) conducted a systematic review of green vehicle adoption in last-mile logistics and highlighted that sustainable transport technologies such as electric vehicles and low-emission delivery systems are essential for reducing environmental impacts in urban logistics. Similarly, Mucowska (2021) noted that environmentally sustainable solutions such as cargo bikes, consolidation centers, and electric delivery vehicles have emerged as viable approaches to address sustainability challenges in last-mile delivery operations. These practices aim to balance operational efficiency with environmental responsibility.

The literature also highlights the critical role of technological innovations in facilitating sustainable logistics adoption. Cano et al. (2022) conducted a comprehensive bibliometric review on sustainable logistics in e-commerce and found that digital technologies such as route optimization systems, logistics platforms, and data-driven decision tools significantly contribute to improving efficiency and reducing environmental impacts. Likewise, Bonilla et al. (2024) developed a taxonomy of sustainable practices in e-retail logistics and identified key operational strategies such as green transportation systems, efficient inventory management, and sustainable packaging solutions as essential components of sustainable logistics networks.

Despite the recognized benefits of sustainable logistics practices, several barriers hinder their widespread adoption. Sharma et al. (2022) found that logistics operators face challenges such as high initial investment costs, technological complexity, and lack of infrastructure when attempting to implement sustainable last-mile delivery systems. Similarly, Dadashzada and Garza-Reyes (2025) highlighted that the adoption of electric vehicles in logistics operations is often constrained by limited charging infrastructure, high acquisition costs, and uncertainty regarding operational performance. These barriers can discourage logistics firms, particularly small and medium enterprises, from adopting environmentally friendly logistics solutions.

Furthermore, the growth of e-commerce has intensified last-mile delivery activities, making it one of the most environmentally sensitive components of logistics systems. Viu-Roig and Alvarez-Palau (2020) reported that the rise of e-commerce-related logistics has significantly increased urban freight traffic and emissions, thereby creating additional sustainability challenges for cities. Similarly, Bosona (2020) argued that urban freight distribution systems require innovative logistics solutions and coordinated policies to reduce environmental impacts while maintaining service efficiency.

Customer expectations and market competition also play an important role in shaping sustainable logistics practices. Kader et al. (2023) found that consumer awareness and preference for environmentally responsible delivery services can encourage firms to adopt green logistics practices. However, the study also noted that customers often prioritize delivery speed and convenience over environmental sustainability, which may limit the adoption of slower but environmentally friendly logistics solutions.

While the existing literature provides valuable insights into sustainable logistics practices and their drivers, several gaps remain. Many studies primarily focus on conceptual frameworks, systematic literature reviews, or consumer perspectives rather than empirical analyses of logistics operators' adoption decisions (Bonilla et al., 2024; Cano et al., 2022). Moreover, there is limited empirical evidence examining how specific organizational and environmental factors influence the likelihood of adopting sustainable logistics practices within e-commerce logistics operations.

To address this research gap, the present study investigates the determinants of sustainable logistics adoption among e-commerce logistics operators using a logistic regression approach. By examining factors such as environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability, the study contributes to the growing body of literature on sustainable logistics and provides empirical insights into the adoption behavior of logistics firms.

Statement of the Problem

The rapid expansion of e-commerce has significantly increased logistics activities, particularly in last-mile delivery operations, which contribute to higher carbon emissions, traffic congestion, and environmental degradation. To address these challenges, logistics firms are increasingly encouraged to adopt sustainable logistics practices such as fuel-efficient transportation, route optimization technologies, sustainable packaging, and green delivery systems. However, despite the growing awareness of environmental sustainability, the adoption of such practices among logistics operators remains uneven. Many firms face challenges including high implementation costs, limited infrastructure, technological constraints, and insufficient policy support. Consequently, there is a need to empirically examine the factors influencing the adoption of sustainable logistics practices in e-commerce logistics operations. Understanding these determinants can help policymakers and logistics firms develop strategies to promote environmentally sustainable logistics systems.

Research Objectives

To examine the level of adoption of sustainable logistics practices among e-commerce logistics operators.

To analyze the factors influencing the adoption of sustainable logistics practices, including environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability.

Research Hypotheses

- **H01 :** Environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability do not significantly influence the adoption of sustainable logistics practices in e-commerce logistics.
- **HA1 :** Environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability significantly influence the adoption of sustainable logistics practices in e-commerce logistics.

Methodology

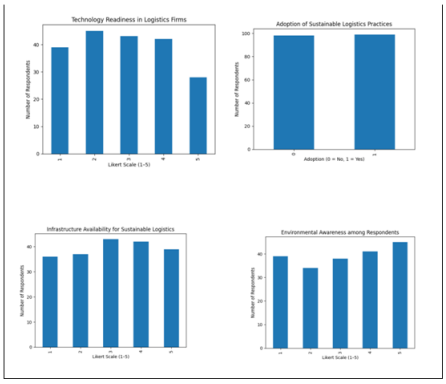
This study adopts a quantitative research design to examine the factors influencing the adoption of sustainable logistics practices in e-commerce supply chains. Primary data were collected through a structured questionnaire administered to logistics operators involved in e-commerce delivery and logistics services. The respondents included delivery managers, logistics supervisors, and operational staff working in logistics and courier service companies.

A convenience sampling technique was used to collect responses from 197 participants involved in e-commerce logistics operations. The questionnaire consisted of two sections: the first section captured demographic and professional information of respondents, while the second section measured key variables related to sustainable logistics adoption. The independent variables included environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability, which were measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

The dependent variable of the study was the adoption of sustainable logistics practices, which was measured as a binary variable (1 = adopted, 0 = not adopted). To analyse the relationship between the predictors and the likelihood of adoption, binary logistic regression analysis was employed. Logistic regression is appropriate when the dependent variable is dichotomous and allows estimation of the probability that an organization adopts sustainable logistics practices based on the selected explanatory variables. Statistical analysis was performed to

estimate model coefficients, odds ratios, and model fit indicators.

Figure 1: Distributionof Responses



Source: Author's estimation based on primary data

The survey data reveals a mixed but generally promising picture of sustainability readiness in logistics firms. Technology readiness, measured on a 1–5 Likert scale, shows a moderate level overall, with the highest number of respondents clustering around scores of 2 and 3, indicating that most firms possess some foundational digital capabilities but fall short of advanced maturity; notably, very few rate themselves at the top end (score 5), highlighting a clear gap in cutting-edge technology adoption. In striking contrast, adoption of sustainable logistics practices appears nearly universal, as almost all respondents (roughly 98 out of an estimated 100) report that their firms have already implemented such practices, suggesting strong declared commitment to greener operations—though this high figure may partly reflect social desirability or definitional leniency. Infrastructure availability to support sustainable logistics is rated as moderately adequate, with responses fairly evenly spread across the scale but peaking slightly at 3, implying that most organizations have at least basic-to-decent supporting systems in place rather than severe deficiencies or exceptional readiness. Environmental awareness among respondents trends somewhat positively, displaying a gentle upward pattern with the highest concentration at score 5, yet a meaningful minority still reports lower levels (particularly around 2), indicating that while ecological consciousness is reasonably widespread, it remains incomplete and uneven. Collectively, these findings point to high claimed willingness and adoption of sustainable practices, backed by solid (if not outstanding) awareness and infrastructure, but constrained most noticeably by middling-to-limited technology readiness suggesting that further progress in sustainable logistics will likely depend more on closing digital and infrastructural gaps than on overcoming attitudinal resistance.

Logistic Regression Model

To examine the factors influencing the adoption of sustainable logistics practices in e- commerce supply chains, a binary logistic regression model was employed. Logistic regression is appropriate when the dependent variable is dichotomous and estimates the probability that a particular event occurs.

The logistic regression model is specified as follows:

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 EA + \beta_2 GP + \beta_3 TR - \beta_4 CC + \beta_5 IA$$

Where:

- p=Probability that a logistics operate or adopts sustainable logistics practices
- β_0=Intercept of the model
- $\beta_1,\beta_2,\beta_3,\beta_4,\beta_5$ = Regression coefficients of the explanatory variables

Variable	Description	Type
Adoption of Sustainable Logistics Practices	Indicates whether the logistics firm has implemented sustainable logistics practices (1 = Adopted,0 =Not Adopted)	Dependent Variable
Environmental Awareness (EA)	Degree to which logistics firms are aware of environmental sustainability issues in logistics operations	Independent Variable
Government Policy Support (GP)	Perceived level of regulatory support, policies, or incentives encouraging sustainable logistics practices	Independent Variable
Technological Readiness (TR)	Availability and use of technological tools such as route optimization systems, digital logistics platforms, and green transport technologies	Independent Variable
Cost Constraints (CC)	Financial barriers and high implementation costs associated with sustainable logistics practices	Independent Variable
Infrastructure Availability (IA)	Availability of supporting infrastructure such as charging stations, green warehouses, and sustainable logistics facilities	Independent Variable

Table 1: Logistic Regression Results

Variable	Coefficient	Std. Error	Wald	p-value	Exp(B)
Environmental Awareness	0.685	0.181	14.32	0.000	1.98
Government Policy Support	0.412	0.167	6.08	0.014	1.51
Technology Readiness	0.734	0.193	14.45	0.000	2.08
Cost Constraint	-0.521	0.176	8.74	0.003	0.59
Infrastructure Availability	0.448	0.169	7.02	0.008	1.56

Table 2: Model Summary Statistics

Statistic	Value
Number of Observations	197
-2 Log Likelihood	198.34
Cox & Snell R^2	0.34
Nagelkerke R^2	0.46
Hosmer-Lemeshow Test (p-value)	0.41
Prediction Accuracy	73.6%

Source: Author's estimation based on primary data

The logistic regression analysis was conducted to examine the factors influencing the adoption of sustainable logistics practices in e-commerce supply chains. The results indicate that several variables significantly affect the likelihood that logistics operators adopt sustainable logistics practices. Environmental awareness shows a positive and statistically significant relationship with the adoption of sustainable logistics practices (ß = 0.685, p < 0.01). This suggests that organizations with higher levels of environmental awareness are more likely to implement sustainable logistics solutions. The odds ratio (Exp(B) = 1.98) indicates that a one-unit increase in environmental awareness increases the likelihood of adopting sustainable logistics practices by approximately 98%. Similarly, government

policy support has a positive and significant impact on adoption (ß = 0.412, $p < 0.05$). The odds ratio of 1.51 implies that firms perceiving stronger regulatory encouragement or policy incentives are 51% more likely to adopt sustainable logistics practices. This finding highlights the importance of government initiatives and regulatory frameworks in promoting environmentally responsible logistics operations.

The results also show that technological readiness significantly influences adoption (ß = 0.734, $p < 0.01$). The odds ratio of 2.08 suggests that firms with higher technological capabilities, such as digital logistics platforms and route optimization systems, are more than twice as likely to adopt sustainable logistics practices compared to firms with lower technological readiness.

Conclusion

This study examined the determinants influencing the adoption of sustainable logistics practices in e-commerce supply chains. The findings highlight that environmental awareness, government policy support, technological readiness, cost constraints, and infrastructure availability play significant roles in shaping the adoption decisions of logistics operators. The results indicate that higher levels of environmental awareness and technological readiness significantly increase the likelihood that logistics firms implement sustainable logistics practices. Government policies and regulatory support also contribute positively by encouraging firms to adopt environmentally responsible logistics solutions. However, the analysis reveals that cost constraints act as a major barrier to the adoption of sustainable logistics practices. The high initial investment required for green technologies, sustainable transportation systems, and supporting infrastructure may discourage logistics firms, particularly smaller operators, from implementing environmentally friendly logistics solutions. Similarly, the availability of adequate infrastructure such as charging stations and green logistics facilities is crucial for facilitating the transition toward sustainable logistics systems.

Overall, the study emphasizes the importance of technological capability, policy support, and environmental awareness in promoting sustainable logistics adoption within the e-commerce sector. Policymakers and industry stakeholders should focus on providing incentives, improving green infrastructure, and encouraging technological innovation to accelerate the adoption of sustainable logistics practices. Such initiatives can help reduce the environmental impact of e-commerce logistics operations while maintaining operational efficiency and long- term sustainability.

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Synergizing the 2030 Agenda with the Viksit Bharat 2047 Vision : India's Pathway to Transformative Development

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Introduction

India stands at a historic crossroads. As the nation approaches the centenary of its independence in 2047, it has articulated an ambitious vision - Viksit Bharatto transform itself into a fully developed nation. This aspiration, however, unfolds against the backdrop of a planetary emergency and the pressing timeline of the 2030 Sustainable Development Goals (SDGs). Unlike the industrialization trajectories of Western nations, which were historically carbon-intensive, resource-exploitative, and often inequitable, India's developmental roadmap is being consciously designed to converge with global sustainability imperatives. This article undertakes a comprehensive examination of the synergy between India's domestic ambition and its international commitments, analyzing the institutional frameworks, strategic pillars, financing mechanisms, and the philosophical underpinning of a "just transition" that defines this unique developmental paradigm.

The Conceptual Framework : Development Redefined

Beyond GDP : The SDG Imperative

The Sustainable Development Goals, adopted by all United Nations Member States in 2015, represent a universal call to action to end poverty, protect the planet, and ensure peace and prosperity by 2030. Comprising 17 goals and 169 targets, the SDG framework fundamentally redefines development beyond mere economic growth to encompass social inclusion, environmental sustainability, and institutional resilience. For India, home to one-sixth of humanity, achieving the SDGs is not merely a reporting obligation but an existential necessity. The country's progress—or lack thereof—has disproportionate implications for global SDG attainment.

Viksit Bharat 2047 : An Ambitious National Vision

The Viksit Bharat 2047 vision, conceptualized as a comprehensive national strategy, aims to propel India into the league of developed nations by the centenary of its independence. This vision transcends narrow economic metrics, encompassing holistic development across dimensions—economic prosperity, technological advancement, social equity, environmental sustainability, and cultural renaissance. Prime Minister Narendra Modi has consistently emphasized that this transformation must be "sabka prayas" (everyone's effort), requiring synchronized action from the central government, state governments, local bodies, private sector, and civil society.

The Convergence Imperative

The critical insight underlying India's current policy architecture is the recognition that the SDG timeline (2030) and the Viksit Bharat timeline (2047) are not sequential but overlapping and mutually reinforcing. Goals set for 2030—whether in renewable energy, poverty reduction, or health outcomes—constitute foundational milestones for the longer 2047 vision. Conversely, the long-term infrastructure and institutional investments required for Viksit Bharat must be designed today with sustainability embedded at their core. This convergence represents what development economists term "path dependency"—the recognition that choices made today lock in developmental trajectories for decades.

Institutional Architecture : NITI Aayog and the Localization Paradigm

NITI Aayog: The Nodal Institution

At the heart of India's SDG strategy lies NITI

Aayog (National Institution for Transforming India), which replaced the Planning Commission in 2015. Unlike its predecessor, which operated through a top-down, command-and-control approach, NITI Aayog has championed the spirit of cooperative and competitive federalism. The institution serves as the nodal agency for overseeing the implementation of the 2030 Agenda, mapping schemes to SDG targets, and developing monitoring mechanisms.

The SDG India Index: Measuring What Matters

One of NITI Aayog's most significant contributions has been the development of the SDG India Index and Dashboard. Launched in 2018 and updated periodically, this tool comprehensively measures progress at national and sub-national levels across multiple indicators. The index fosters healthy competition among states, encouraging them to improve their performance across metrics ranging from health and education to gender equality and clean energy. By 2026, the index has evolved to incorporate district-level data, enabling more granular tracking of developmental outcomes.

The utility of such measurement tools cannot be overstated. As management theorist Peter Drucker famously observed, "What gets measured gets managed." The SDG India Index has catalyzed policy action by highlighting gaps, facilitating peer learning, and enabling evidence-based resource allocation. States that lag in particular indicators are now able to study and adopt best practices from better-performing states, creating a virtuous cycle of policy innovation and diffusion.

From National to Local : Panchayati Raj Institutions and SDG Localization

Perhaps the most significant shift in India's SDG strategy by 2026 has been emphasis on localization—ensuring that districts, blocks, and villages become active participants in the transformative process. The Panchayati Raj Institutions (PRIs), India's three-tier system of rural local governance, have been designated as the frontline agencies for SDG implementation.

This localization strategy recognizes a fundamental truth: sustainable development cannot be decreed from Delhi; it must be co-created in communities. When a panchayat in rural Maharashtra develops a water conservation plan aligned with SDG 6 (Clean Water and Sanitation), or when a gram sabha in Kerala deliberates on waste management solutions for SDG 11 (Sustainable Cities and Communities), the goals cease to be abstract UN targets and become lived realities.

Measuring Impact : Poverty Reduction and Flagship Schemes

The SDG India Index has been crucial in quantifying the impact of the government's flagship schemes. For instance, the significant reduction in India's multidimensional poverty—a key factor in its improved ranking to the 99th spot in the UN's 2025 Sustainable Development Report—is directly attributed to programmes like the Pradhan Mantri Garib Kalyan Yojana (PMGKY), Pradhan Mantri Awas Yojana (PMAY), and Pradhan Mantri Jan Dhan Yojana (PMJDY).

The Multidimensional Poverty Index (MPI), which measures overlapping deprivations in health, education, and living standards, has shown remarkable improvement. Between 2015-16 and 2019-21, approximately 135 million Indians escaped multidimensional poverty. This progress has been accelerated by targeted interventions that address multiple deprivations simultaneously—providing not just housing but also access to banking, cooking gas, electricity, and water.

The Viksit Bharat 2047 Roadmap : A $30 Trillion Vision

Economic Transformation at Scale

The macro-economic target for Viksit Bharat 2047 is staggering yet grounded in careful projections. India aims to become a $30 trillion economy by 2047, transitioning from its current $3-4 trillion base to become the world's third-largest economy after the United States and China. This implies sustained growth rates of 8-10 percent for over two decades—a trajectory that, while ambitious, is not unprecedented in economic history, as demonstrated by East Asian economies during their high-growth phases.

However, the vision document emphasizes that economic growth is not an end in itself but a means to enhance human well-being. The Viksit Bharat framework therefore integrates economic targets with social outcomes, ensuring that growth translates into improved living standards, expanded opportunities, and reduced inequalities.

The Federal Dimension : State-Level Visioning

A critical innovation in the Viksit Bharat strategy has been the recognition that national development must be built upon state-level transformation. Prime Minister Modi has consistently emphasized that Viksit Bharat can only be realized through "developed states," requiring every state and union territory to craft its own vision for 2047 aligned with national objectives.

This federal approach respects India's constitutional diversity while ensuring coherent national direction. States at different stages of

development, with varying resource endowments and demographic profiles, require tailored strategies. A developed Gujarat or Tamil Nadu will look different from a developed Bihar or Uttar Pradesh, yet all must converge toward common national goals.

Case Study : Viksit Maharashtra 2047

A concrete example of this top-down vision meeting bottom-up execution is the "Viksit Maharashtra 2047" vision document. In October 2025, the Maharashtra cabinet approved a comprehensive roadmap to build a $5 trillion economy within the state by 2047—equivalent to the current size of Japan's economy.

This sub-national planning exercise demonstrates sophisticated policy architecture. It establishes short-term (2029), medium-term (2035), and long-term (2047) targets across 16 sectors, including agriculture, industry, services, infrastructure, and urban development. The targets are ambitious yet calibrated: increasing agricultural GDP nearly tenfold from current levels, expanding industrial GDP twelvefold, and transforming Maharashtra's urban landscape through planned investments in mass transit, affordable housing, and digital infrastructure.

What makes the Maharashtra model instructive is its emphasis on implementation architecture. The vision document identifies specific interventions, assigns institutional responsibilities, establishes monitoring mechanisms, and provides for mid-course corrections. This transforms the vision from a rhetorical exercise into an actionable roadmap.

The Demographic Dividend : Harnessing India's Youth

Central to the Viksit Bharat vision is India's demographic dividend—the window of opportunity created by a favorable age structure with a high proportion of working-age population. Unlike aging developed economies and even China, which is now grappling with demographic decline, India will remain relatively young for decades.

However, demography is not destiny. A demographic dividend must be earned through investments in education, skills, health, and employment creation. The Viksit Bharat roadmap therefore prioritizes:

- Universal access to quality school education with emphasis on foundational literacy and numeracy
- Expansion of vocational training and higher education through initiatives like the National Education Policy 2020
- Creation of productive employment opportunities in manufacturing and services
- Empowerment of women through workforce participation

The interplay between demographic trends and economic policy will largely determine whether India realizes its potential or squanders its demographic opportunity.

The Convergence in Action : Greening the Growth Engine

The Philosophical Foundation : Redefining Development Within Ecological Limits

The most critical aspect of the Viksit Bharat roadmap is its deliberate alignment with environmental sustainability. As Union Minister Bhupender Yadav articulated at the TERI World Sustainable Development Summit (WSDS) in 2026, "Transformation does not mean abandoning development but redefining it within ecological limits." This statement captures the essence of India's approach—rejecting both the growth-at-any-cost model of early industrialization and the de-growth prescriptions that would perpetuate global poverty.

This philosophy is operationalized through four strategic pillars identified by the government: energy transformation, sustainable economic transition, nature-based solutions, and digital environmental governance. Each pillar represents a domain where policy innovation, technological advancement, and behavioral change converge to enable sustainable development.

Energy Transformation and the Net Zero Journey

India has set ambitious near-term targets for 2030: achieving 500 gigawatts (GW) of non-fossil fuel energy capacity and reducing the emissions intensity of its GDP by 45 percent from 2005 levels. The long-term goal, announced by Prime Minister Modi at COP26 in Glasgow, is achieving Net Zero emissions by 2070—a target that balances climate responsibility with developmental imperatives.

According to a landmark series of reports released by NITI Aayog in February 2026, achieving these targets requires a fundamental shift in energy strategy. The analytical framework developed by NITI Aayog distills the energy transition into four interconnected components:

- Electrify energy use across sectors, particularly transport and industry
- Green the electricity supply through renewables, nuclear, and other low-carbon sources
- Control demand through Mission LiFE (Lifestyle for Environment) , promoting behavioral changes that reduce energy consumption
- Focus on circularity and efficiency in materials use and industrial processes

The Mission LiFE initiative, championed by Prime Minister Modi, represents a distinctive Indian contribution to global climate discourse. By emphasizing lifestyle changes—reducing waste, conserving water, using public transport, adopting energy-efficient appliances—the mission mobilizes citizens as active agents of climate action rather than passive recipients of government programs.

The Coal Question: Differentiated Pathways

An interesting and pragmatic acknowledgment in the NITI Aayog study concerns coal. While the green transition proceeds, India's coal consumption will continue to rise until approximately 2047 to meet base-load energy demands for industrialization, urbanization, and infrastructure development. This trajectory distinguishes India's path from that of deindustrializing Western nations, which can phase out coal while maintaining consumption levels.

This acknowledgment reflects the principle of "common but differentiated responsibilities" (CBDR) the recognition that developed countries, having historically emitted most greenhouse gases, must bear greater responsibility for emissions reductions, allowing developing nations the carbon space to grow. India's position at international climate negotiations consistently emphasizes this principle, arguing that climate justice requires equitable access to the global carbon budget.

Sustainable Mobility and Infrastructure Transformation

The transport sector represents a vital link between economic growth and environmental sustainability. As one of the fastest-growing sources of emissions in India, transportation also offers significant opportunities for decarbonization through technology shifts and modal changes.

Union Minister Nitin Gadkari has outlined a comprehensive roadmap focusing on alternatives to conventional fuels. By promoting biofuels, ethanol, biodiesel, compressed biogas (CBG), and hydrogen, the government aims to achieve a dual objective: reducing the $160 billion annual crude import bill and enhancing farmer incomes through biomass sales. The ethanol blending program, which has already achieved 20 percent blending targets ahead of schedule, demonstrates the potential of this approach.

Furthermore, the emphasis on electric vehicles (EVs) and the Vehicle Scrappage Policy is designed to reduce pollution while simultaneously boosting the automobile industry. The scrappage policy, which has already seen over 3 lakh old vehicles scrapped, replaces inefficient, polluting vehicles with cleaner, safer, more fuel-efficient alternatives, creating demand stimulus for the automotive sector.

The target to bring logistics costs down to single digits (from the current 13-14 percent) will make Indian manufacturing globally competitive while reducing the carbon intensity of freight movement. Investments in rail freight corridors, inland waterways, and coastal shipping aim to shift freight from road to more efficient modes, directly contributing to SDG 9 (Industry, Innovation, and Infrastructure) and SDG 13 (Climate Action).

Nature-Based Solutions and Ecosystem Restoration

Beyond the energy and mobility transitions, the Viksit Bharat roadmap emphasizes nature-based solutionsinterventions that work with natural ecosystems to address societal challenges. These include:

- Forest conservation and afforestation to enhance carbon sinks
- Watershed management and groundwater recharge to build water security
- Mangrove restoration along coastlines to protect against storm surges
- Sustainable agriculture practices that build soil health and reduce emissions

The National Mission for a Green India, part of the National Action Plan on Climate Change, aims to increase forest and tree cover, enhance carbon sequestration, and improve ecosystem services. Compensatory afforestation funds, collected from projects that divert forest land, are being deployed for large-scale ecological restoration.

Digital Environmental Governance

The fourth strategic pillar—digital environmental governance—harnesses India's technological capabilities for environmental management. The use of remote sensing, geographic information systems (GIS), artificial intelligence, and blockchain is transforming how environmental resources are monitored and managed.

Examples include

- The PARIVESH portal for environmental clearances, which has streamlined processes while ensuring compliance
- Real-time water quality monitoring through the National Water Quality Network
- Air quality early warning systems in major cities
- Satellite-based monitoring of forest cover, crop residues burning, and glacial lakes

Digital governance enables evidence-based policymaking, reduces compliance costs, and enhances transparency—contributing to SDG 16 (Peace, Justice, and Strong Institutions) alongside environmental goals.

The Financing Conundrum : Mobilizing Resources at Scale

The $22 Trillion Question: Translating vision into reality requires unprecedented financial resources. NITI Aayog's integrated study highlights that under the Net Zero scenario, India requires cumulative investment of $22.7 trillion by 2070 across energy, industry, transport, and infrastructure sectors. More immediately, the country needs approximately $500 billion annually for its green transition—a figure far above current capital flows.

The financing challenge has two dimensions. First, mobilizing domestic resources through fiscal policy, financial sector deepening, and innovative instruments. Second, attracting international capital through enabling policies and derisking mechanisms. The projected financing gap of $6.5 trillion that must come from external sources underscores the importance of global partnerships.

Domestic Resource Mobilization

On the domestic front, India is deploying multiple strategies to enhance green finance flows :

- **Public Finance :** Government budgets at central and state levels allocate increasing resources to climate-relevant sectors. The National Clean Energy and Environment Fund, established through a cess on coal, provides dedicated financing for clean energy projects. Green bonds issued by public sector entities and government agencies tap into investor demand for sustainable assets.
- **Financial Sector Integration :** The Reserve Bank of India and the Securities and Exchange Board of India (SEBI) are integrating climate considerations into financial regulation. Requirements for ESG (Environmental, Social, Governance) disclosures, stress testing for climate risks, and preferential treatment for green sectors in priority sector lending are reshaping financial flows.
- **Innovative Instruments :** Blended finance structures, which combine concessional capital from development finance institutions with commercial capital, are being deployed to derisk investments in emerging sectors like green hydrogen, battery storage, and waste-to-energy. Green bonds, sustainability-linked loans, and municipal bonds for urban infrastructure are expanding the toolkit.

The International Finance Architecture

At the global stage, India consistently advocates for developed nations to fulfill their commitments of mobilizing $100 billion annually for climate action in developing countries—a promise made at Copenhagen in 2009 and reiterated at subsequent COPs. Beyond this quantum, India pushes for fundamental reform of multilateral development banks (MDBs) to provide cheaper, longer-tenor capital suited to the needs of developing countries.

The Bridgetown Initiative and similar proposals for MDB reform—including expanded lending capacity, reduced borrowing costs, and greater risk-taking—find strong support from India. The argument is straightforward: if the world expects developing countries to leapfrog to low-carbon pathways, it must provide the financial means to do so.

Institutional Innovations

Experts suggest the need for institutional innovations to bridge the financing gap. These include

- **National Green Finance Institution :** A dedicated institution could aggregate green projects, provide credit enhancement, and mobilize capital from domestic and international sources. Models from other countries—such as the UK Green Investment Bank or Japan's Green Fund—offer lessons for India.
- **Unified Green Taxonomy :** A clear, credible taxonomy defining what constitutes "green" investment would prevent greenwashing, reduce transaction costs, and facilitate capital flows. Work is underway to develop such a taxonomy aligned with India's national circumstances.
- **Carbon Markets :** The domestic carbon market, currently under development, could generate significant finance by putting a price on carbon and enabling trading of emissions reductions. The Carbon Credit Trading Scheme, notified in 2023, provides the framework for this market to develop.

Challenges on the Path to 2030 and Beyond

The Uneven SDG Scorecard: Despite the robust framework and impressive progress in several areas, the SDG report card for 2026 reveals mixed results. Analysis by organizations tracking India's SDG performance shows:

Strong Performance Areas

- **SDG 1 (No Poverty) :** Significant poverty reduction through targeted interventions
- **SDG 7 (Affordable and Clean Energy) :** Near-universal household electrification and rapid renewable energy expansion
- **SDG 9 (Industry, Innovation, Infrastructure) :** Substantial investments in physical and digital infrastructure

- **SDG 6 (Clean Water and Sanitation) :** Major improvements through Swachh Bharat Mission and Jal Jeevan Mission

Areas of Concern

- **SDG 2 (Zero Hunger) :** Persistent malnutrition and food insecurity, despite improved food production and distribution systems
- **SDG 3 (Good Health and Well-being) :** Challenges in healthcare access, particularly in underserved regions, and rising non-communicable diseases
- **SDG 5 (Gender Equality) :** Slow progress on women's workforce participation and persistent social barriers
- **SDG 13 (Climate Action) :** Increasing vulnerability to climate impacts despite mitigation efforts

Climate Vulnerability and Adaptation Imperatives

Extreme weather events—floods, heatwaves, cyclones, and erratic monsoons—pose direct threats to agricultural productivity, infrastructure, and vulnerable populations. The year 2025 witnessed record-breaking temperatures across north India, devastating floods in Himalayan states, and cyclones affecting both coasts. These events underscore the urgency of adaptation alongside mitigation.

India's adaptation requirements are substantial. The National Adaptation Fund, state action plans on climate change, and sectoral strategies for agriculture, water, and health are being scaled up. However, adaptation finance remains a fraction of what is needed, and the gap between requirements and availability continues to widen.

Geopolitical Headwinds

Global geopolitical developments complicate India's sustainable development journey. The withdrawal of major economies from international climate frameworks, trade protectionism, technology restrictions, and conflicts diverting attention and resources from climate action—all create headwinds for global cooperation.

As Union Minister Bhupender Yadav has highlighted, these trends risk creating a crisis of "scale, speed, and systemic alignment." When major economies backtrack on commitments or prioritize narrow national interests, the entire global climate architecture weakens. India continues to anchor its stance on the principles of CBDR and climate justice, arguing that historical emitters must bear greater responsibility, allowing developing nations the carbon space to grow.

Implementation Challenges

Beyond external constraints, domestic implementation challenges persist :

- **Capacity Constraints :** Local institutions often lack the technical, financial, and human resources to implement ambitious programs. Capacity building at scale remains a priority.
- **Coordination Failures :** Multiple agencies with overlapping mandates, fragmented responsibilities, and weak coordination mechanisms impede effective implementation.
- **Data Gaps :** Despite improvements in data systems, gaps remain in real-time, granular data needed for evidence-based policymaking and adaptive management.
- **Behavioral Barriers :** Sustainable development requires behavioral changes—adopting clean energy, practicing waste segregation, conserving water—that cannot be mandated but must be nurtured through awareness, incentives, and social norms.

Conclusion

A Model for the Global South

As India builds its future, a striking statistic emerges from infrastructure planning exercises: approximately 85 percent of the India of 2047 is yet to be built. This presents a historic opportunity. Unlike developed nations, which must retrofit old, inefficient infrastructure at enormous cost, India can leapfrog directly to climate-friendly, smart, and resilient systems.

This leapfrogging potential applies across sectors:

- From landline telephony directly to mobile broadband
- From fossil fuel vehicles to electric mobility
- From centralized grid to distributed renewable energy
- From conventional buildings to green, efficient structures
- From linear "take-make-dispose" economy to circular economy

The Viksit Bharat 2047 roadmap, therefore, represents not merely a national ambition but a potential template for the Global South. It demonstrates that economic development and environmental stewardship need not be mutually exclusive—that a nation can lift its people from poverty while protecting the planet for future generations.

By integrating the SDGs into its core planning—from the cabinet rooms of Delhi to the panchayat meetings of Maharashtra—India is attempting to write

a new story of development. It is a story where equity and sustainability are not constraints on growth but enablers of lasting prosperity. It is a story where the pursuit of national interest aligns with global public goods. And it is a story where, by 2047, India aims to fulfill not just its own aspirations but to demonstrate that a different kind of developmentinclusive, sustainable, resilientis possible at scale.

The road to 2047 is long and the challenges formidable. But the direction is set, the institutional foundations are being laid, and the journey has begun. As India moves forward, the world watchesand learns.

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Human Resources as the Catalyst for Viksit Bharat @2047

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Abstract

India's Vision of Viksit Bharat @2047 sets forth a transformative agenda to position the nation as a developed economy by its centenary of independence. Central to this vision is the effective mobilization and empowerment of human capital, which remains India's greatest resource. This paper explores the strategic role of Human Resources (HR) in aligning workforce development with national priorities, emphasizing skill enhancement, inclusivity, and innovation. It highlights how HR practices can bridge the gap between education and industry, ensuring that India's demographic dividend is harnessed to meet the demands of emerging sectors such as digital technology, renewable energy, advanced manufacturing, and healthcare. Beyond skill development, the paper underscores HR's responsibility in fostering equity, workplace welfare, and ethical leadership. By embedding sustainability, resilience, and values-driven practices into organizational culture, HR contributes to building institutions that are globally competitive yet rooted in India's ethos of fairness and collective progress. The findings suggest that Human Resources is not merely a support function but a transformative force—empowering individuals, strengthening organizations, and ultimately driving India's journey toward becoming a developed nation by 2047.

Keywords : Human Resource, Viksit Bharat

1. Introduction

India's Vision of Viksit Bharat @2047 represents an ambitious roadmap to transform the nation into a developed economy by its centenary of independence. This vision is not limited to economic growth alone; it encompasses social equity, technological advancement, environmental sustainability, and global leadership. At the heart of this transformation lies the human element—India's vast and diverse workforce—which will serve as the driving force behind innovation, productivity, and inclusive development. Human Resources (HR), therefore, assumes a pivotal role in shaping the policies, practices, and capacities that will enable India to achieve this long-term aspiration. The HR function must align education, training, and employment opportunities with the evolving demands of industries. By bridging the gap between skills and jobs, HR can ensure that the workforce is future-ready, capable of thriving in sectors ranging from advanced manufacturing to digital services and green technologies. Equally important is the role of HR in promoting inclusivity and social justice.

Viksit Bharat @2047 envisions a society where opportunities are accessible to all, regardless of gender, caste, or region. Human Resources must champion diversity, equity, and workplace welfare, ensuring that marginalized groups are integrated into the mainstream economy. This not only strengthens social cohesion but also enhances organizational performance by leveraging diverse perspectives and talents. Finally, HR will be instrumental in embedding ethical values, sustainability, and innovation into India's development journey. By cultivating leadership, encouraging lifelong learning, and fostering a culture of responsibility, HR professionals can help organizations align with national priorities. In doing so, they will contribute to building institutions that are not only globally competitive but also deeply rooted in India's ethos of fairness and collective progress. Thus, the role of Human Resources in Viksit Bharat @2047 is both

strategic and transformative ensuring that India's greatest asset, its people, become the cornerstone of its rise as a developed nation.

2. Review of literature

Jameel (2025) : As India approaches its centennial year of independence in 2047, the vision of Viksit Bharat-a developed, inclusive, and equitable nation-requires a paradigm shift in developmental priorities, with human rights as the cornerstone. This paper examines how a rights-based approach can effectively address systemic inequalities and foster sustainable growth, emphasizing the interplay between human rights and critical developmental domains such as education, healthcare, economic equity, and gender justice. The paper's primary objective is to analyze the current state of human rights in India while identifying actionable strategies to integrate these rights into policy frameworks and governance structures. By bridging the domains of human rights and development, the study provides a comprehensive blueprint for achieving Viksit Bharat 2047. This study contributes to academic and policy discourse by offering practical recommendations for aligning India's developmental aspirations with its commitment to human rights. By placing human rights at the center of development, the paper envisions a future where equity, dignity, and justice become lived realities for all citizens of India.1

Ramakrishna (2024) : This paper explores a comprehensive vision for a "Viksit Bharat" (Developed India) by 2047, marking the centenary of India's independence. The approach emphasizes sustainable development, economic growth, social inclusion, technological innovation, and environmental sustainability. By examining key areas such as infrastructure, education, healthcare, governance, and rural development, the paper proposes strategies for fostering a self-reliant, resilient, and globally competitive India. Additionally, the role of technology, entrepreneurship, and global partnerships in driving the country towards becoming knowledge and manufacturing hub is discussed. Ultimately, the paper envisions a future where India emerges as a prosperous, equitable, and influential nation, playing a pivotal role in the global order by 2047.2

Kaur (2024) : Digitalization Era: A Tool for Economic Development This chapter explores the ultimate benefits of digitalization, including improved economic performance, increased access to global markets, and the development of new business models. Digital technologies, including the Internet, artificial intelligence, and big data, enhance operational efficiency, foster innovation, and create new business opportunities. It also explores the broader societal impacts, such as job creation and the potential for reducing economic inequalities. Through case studies and empirical evidence, this overview highlights the ultimate benefits and providing a comprehensive understanding of its role in fostering sustainable economic development. By integrating digital technologies into various sectors, businesses and governments can enhance efficiency, productivity, and innovation. We aim to provide a comprehensive understanding of the digital transformation and itscontribution on the global economy, society, and individual lives.3

3. Objectives of the Study

1. To align workforce development with India's Vision of Viksit Bharat @2047 by fostering skill enhancement, innovation, and adaptability among employees.
2. To promote inclusivity, equity, and workplace welfare by integrating diverse groups youth, women and marginalized communities into the mainstream economy.
3. To embed ethical values, leadership and sustainability in organizational practices.

4. Hypotheses of the Study

- **H0 :** Human Resources does not play a significant and strategic role in shaping, supporting, and implementing India's Vision of Viksit Bharat @2047 through workforce development, inclusivity and organizational transformation.
- **H1 :** Human Resources plays a significant and strategic role in shaping, supporting, and implementing India's Vision of Viksit Bharat @2047 through workforce development, inclusivity and organizational transformation.

5. Scope of the Study

The scope of this study, extends to examining how HR practices can contribute to building a future-ready workforce that aligns with national developmental priorities. It covers the strategic role of HR. and how HR can bridge the gap between education and employment, such as digital technology, renewable energy, advanced manufacturing, and healthcare. The paper also emphasizes HR's responsibility in embedding ethical values, sustainability, and leadership development within organizations, ensuring that India's workforce not only achieves productivity but also contributes to building institutions that reflect the vision of fairness, innovation, and global competitiveness.

6. Limitations of the study

1. The research is founded on the small geographical region.
2. Additional variables may be introduced to

make the study more detailed.

7. Research Methodology of the Study

- **Research area :** Researcher selected Jalgaon industrial area as a research area for the study. All type of employees and HR personals are working in this area.
- **Sample selection :** Researcher selected HR personals as a sample from manufacturing industry, where HR department is established as a sample for the study.
- **Data Collection :** Researcher collated data from primary and secondary sources under primary source questionnaire is prepared by a researcher for the HR personnel in the MIDC area Jalgaon. The number of questionnaires they received is 147, and 3 of them were incomplete and were disqualified by the researcher before analysis began. Finally, it is 144.

Table No 1 Information of questionnaire

Sr.No	Respondent	Questionnaire distributed	Questionnaire received	Questionnaire rejected (due to incomplete, wrongly filled etc)	Net Sample size for study
1	HR personnel	150	147	3	144

- **Data analysis method :** Researcher arrange received data in tabular format and used scientific scaling on decided important factors with simple percentage method. Researcher calculate P value, standard division, z calculation for accurate results in hypothesis testing in the study.

8. Data analysis

As per received data researcher received following responses for each important factor.

It is observed that the respondents agreed with workforce development, organizational transformation system, skill enhancement, innovation and adaptability factors. It means hr department taking care of Human resources and executed the HR practices and plays a significant and strategic role in the organization.

Testing of Hypothesis

- **H0 :** Human Resources does not play a significant and strategic role in shaping, supporting, and implementing India's Vision of Viksit Bharat @2047 through workforce development, inclusivity, and organizational transformation
- **H1 :** Human Resources play a significant and strategic role in shaping, supporting, and implementing India's Vision of Viksit Bharat @2047 through workforce development, inclusivity, and organizational transformation

In order to test the hypothesis, researcher studied following aspects

Table No 2 Testing of Hypothesis

Sr No	Factor	P	S.D.	H_0	H_1	Z_cal	p_value	Decision
1	Workforce Development	0.82	0.03	P= 0.5	P ≠ 0.5	10.23	0.0000	Reject H_0
2	Organizational Transformation	0.81	0.03	P= 0.5	P ≠ 0.5	9.25	0.0000	Reject H_0
3	Skill Enhancement	0.67	0.04	P= 0.5	P ≠ 0.5	4.33	0.0000	Reject H_0
4	Innovation	0.61	0.04	P= 0.5	P ≠ 0.5	2.63	0.0043	Reject H_0
5	Adaptability	0.56	0.04	P= 0.5	P ≠ 0.5	1.52	0.0638	Accept H_0

*Level of Significance: 0.05

In this way, we reject our null hypothesis that Human Resources does not plays a significant and strategic role in shaping, supporting, and implementing India's Vision of Viksit Bharat @2047 through workforce development, inclusivity, and organizational transformation. Alternatively, we accept our alternative hypothesis Human Resources plays a significant and strategic role in shaping, supporting, and implementing India's Vision of Viksit Bharat @2047 through workforce development, inclusivity, and organizational transformation

9. Findings

1. Human Resources as a driver of skill alignment: The study finds that HR plays a critical role in bridging the gap between India's educational outcomes and industry requirements. By focusing on continuous skill development and future-oriented training, HR ensures that India's demographic dividend is effectively harnessed to meet the demands of emerging sectors central to Viksit Bharat @2047
2. Inclusivity and equity as pillars of workforce transformation: HR initiatives that promote diversity, gender equality, and the inclusion of marginalized communities significantly contribute to social cohesion and balanced economic growth. This finding highlights that inclusive HR practices are not only ethical but also essential for achieving sustainable national development
3. Embedding values and sustainability in organizational culture: The research indicates that HR is instrumental in cultivating leadership, ethical responsibility, and innovation within organizations. By embedding sustainability and resilience into workforce practices, HR strengthens India's institutional capacity to compete globally while remaining aligned with the vision of fairness and collective progress.

10. Conclusion

In the journey toward Viksit Bharat @2047, Human Resources emerges as a cornerstone for realizing India's aspirations of becoming a developed nation. By strategically investing in skill development, fostering innovation, and aligning workforce capabilities with national priorities, HR ensures that India's demographic dividend is transformed into a powerful engine of growth. The emphasis on inclusivity, equity, and workplace welfare further strengthens the social fabric, enabling diverse communities to contribute meaningfully to the nation's progress. Moreover, the role of HR

extends beyond organizational boundaries to shaping ethical leadership, sustainability, and resilience in institutions across the country. As India navigates global challenges and opportunities, HR professionals will be instrumental in cultivating a workforce that is not only productive but also responsible, adaptable, and visionary. Thus, Human Resources is not merely a support function but a strategic driver of transformation—empowering people to become the true architects of India's development story by 2047.

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Impact of Digital Transformation on Business Performance in SMEs

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Abstract

Digital transformation has become a critical factor influencing the growth, competitiveness, and sustainability of Small and Medium Enterprises (SMEs) in the modern global economy. Rapid technological advancements such as cloud computing, Artificial Intelligence (AI), big data analytics, and digital platforms are transforming traditional business models and enabling SMEs to enhance operational efficiency and market reach. This research paper examines the impact of digital transformation on business performance in SMEs by analyzing its effects on productivity, profitability, innovation, operational efficiency, and customer engagement. The study is based on secondary data collected from recent academic literature, research reports, and industry studies to understand the relationship between digital technology adoption and SME performance. The findings indicate that digital transformation significantly improves business performance by enabling automation, enhancing decision-making through data analytics, expanding market access through digital platforms, and fostering innovation. However, SMEs often face challenges such as financial constraints, lack of digital skills, limited technological infrastructure, and cybersecurity risks during the digital transformation process. The study concludes that strategic implementation of digital technologies, government support, and investment in digital skills are essential for SMEs to maximize the benefits of digital transformation.

Keywords : Digital transformation, SMEs, business performance, innovation, digital technologies, productivity

1. Introduction

The rapid advancement of digital technologies has significantly transformed the global business environment. Organizations across industries are increasingly adopting digital tools and platforms to improve operational efficiency, enhance customer experiences, and remain competitive in dynamic markets. Digital transformation refers to the integration of digital technologies into business processes, organizational structures, and customer interactions to create value and improve overall performance.

Small and Medium Enterprises (SMEs) represent a vital component of the global economy. They contribute significantly to employment generation, innovation, and economic growth. In many countries, SMEs account for more than 90 percent of all businesses and provide a substantial share of total employment. Despite their importance, SMEs often face challenges such as limited financial resources, lack of technological expertise, and intense competition from large corporations.

Recent studies highlight the increasing importance of digital transformation for SME development. The adoption of technologies such as e-commerce platforms, cloud computing, and data analytics has been shown to significantly improve productivity, profitability, and innovation within SMEs. Furthermore, digital transformation became particularly important during global disruptions such as the COVID-19 pandemic, when digital technologies enabled SMEs to maintain operations, reach customers through online platforms, and enhance financial resilience.

Despite these benefits, the digital transformation journey for SMEs is not always straightforward. Many SMEs encounter barriers such as limited financial resources, inadequate digital infrastructure,

cybersecurity concerns, and a lack of skilled workforce. Therefore, understanding the relationship between digital transformation and SME performance is essential for sustainable business growth.

2. Research Objectives : The main objectives of this study are :

1. To examine the concept and significance of digital transformation in SMEs.
2. To analyze the impact of digital transformation on business performance indicators such as productivity, profitability, and innovation.
3. To identify the challenges faced by SMEs during digital transformation.

3. Research Methodology

This study adopts a qualitative research approach based on secondary data analysis. The data used in this research were collected from academic journals, research articles, industry reports, and publications related to digital transformation and SME development. Various studies published between 2024 and 2025 were analyzed to identify patterns and relationships between digital technology adoption and business performance indicators such as productivity, operational efficiency, innovation, and financial performance. The collected information was systematically reviewed and interpreted to understand the impact of digital transformation on SMEs.

4. Concept of Digital Transformation

Digital transformation refers to the use of digital technologies to fundamentally change how businesses operate and deliver value to customers. It involves integrating technologies such as artificial intelligence, big data analytics, cloud computing, and digital platforms into business operations.

Digital transformation goes beyond simple technological adoption. It requires organizational change, cultural transformation, and strategic alignment between digital technologies and business objectives. Businesses must redesign their processes and operational structures to fully leverage the benefits of digital technologies.

5. Importance of SMEs in Economic Development

SMEs play a crucial role in economic development across the world. They contribute significantly to employment creation, innovation, and regional economic growth.

According to global economic reports, SMEs represent the majority of businesses in most countries and provide a large share of total employment. However, SMEs often face constraints such as limited capital, lack of skilled workforce, and restricted access to advanced technologies. Digital transformation can help SMEs overcome these limitations by providing access to affordable digital tools and enabling them to compete more effectively with larger enterprises.

6. Digital Technologies Used by SMEs

Several digital technologies are widely used by SMEs to improve their business operations and performance.

6.1 Cloud Computing : Cloud computing enables businesses to store and access data through internet-based servers instead of local hardware systems. This reduces infrastructure costs and provides flexibility in managing business data and operations.

6.2 E-Commerce Platforms : E-commerce platforms allow SMEs to sell products and services online. This enables businesses to expand their customer base and access national as well as international markets.

6.3 Big Data Analytics : Big data analytics helps businesses analyze customer behavior, market trends, and operational performance. The insights obtained from data analysis enable SMEs to make better strategic decisions.

6.4 Artificial Intelligence (AI) : Artificial intelligence technologies support automation, predictive analytics, and improved customer service through tools such as chatbots and recommendation systems. Research indicates that AI adoption can significantly improve operational efficiency and revenue growth while reducing costs.

7. Digital Transformation and SME Performance

Several studies have examined the relationship between digital transformation and business performance in SMEs. Research findings indicate that digital transformation positively influences productivity, profitability, and innovation capabilities of SMEs.

Digital capabilities and digital orientation significantly improve SME performance through innovation and technology adoption. Furthermore, digital transformation enhances organizational innovativeness and financial performance when supported by strong technological infrastructure and effective market strategies.

However, some studies also highlight the concept of the digitalization paradox, which suggests that excessive digital investment without proper strategic planning may initially reduce performance before delivering long-term benefits.

8. Impact of Digital Transformation on SME Performance

8.1 Operational Efficiency : Digital

technologies automate routine tasks and streamline business processes, leading to improved operational efficiency. Automation reduces human errors, improves workflow management, and increases productivity. Cloud-based systems enable SMEs to manage inventory, financial records, and customer data more efficiently.

8.2 Productivity Growth : Digital tools enable employees to collaborate more effectively, manage projects efficiently, and access real-time information. AI-powered automation reduces manual workload and enables faster decision-making, leading to improved productivity.

8.3 Improved Customer Experience : Digital transformation allows SMEs to interact with customers through websites, mobile applications, and social media platforms. These platforms enable businesses to provide personalized services and respond quickly to customer inquiries, thereby strengthening customer relationships.

8.4 Innovation and New Business Models : Digital transformation encourages innovation by enabling SMEs to develop new products, services, and business models. Businesses can introduce digital services, subscription models, and online consulting services to adapt to changing market demands.

8.5 Financial Performance : Digital transformation contributes to improved financial performance through cost reduction and increased revenue. Digital marketing and e-commerce platforms allow SMEs to reach targeted customers more effectively and increase sales.

9. Challenges in Digital Transformation

Despite its benefits, digital transformation presents several challenges for SMEs. One major barrier is the high cost of investing in digital technologies such as software systems, infrastructure, and employee training. Many SMEs also lack employees with advanced digital skills needed to effectively manage digital technologies.

Limited access to reliable internet connectivity and digital infrastructure further restricts digital adoption, particularly in developing regions. Additionally, increased reliance on digital systems exposes businesses to cybersecurity risks such as data breaches and cyber-attacks. Resistance to change among employees and managers can also slow the implementation of digital initiatives. These challenges highlight the importance of strategic planning, skill development, and supportive government policies to encourage successful digital transformation.

10. Conclusion

Digital transformation has become a critical driver of business performance in SMEs. The adoption of digital technologies such as cloud computing, artificial intelligence, e-commerce platforms, and big data analytics enables SMEs to improve operational efficiency, productivity, innovation, and financial performance.

The findings of this study indicate that digital transformation allows SMEs to streamline business processes, expand market reach, and enhance customer experiences. These benefits contribute to improved competitiveness and long-term sustainability.

However, SMEs must overcome challenges such as financial constraints, lack of digital skills, and cybersecurity risks. To address these challenges, SMEs should adopt a strategic approach to digital transformation that includes investment in digital capabilities, employee training, and alignment between digital technologies and business objectives. Policymakers should also support SMEs by providing digital infrastructure, financial incentives, and training programs to encourage digital adoption. Digital transformation is therefore not only a technological change but also a strategic shift that enables SMEs to thrive in the digital economy.

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Use of Artificial Intelligence in Accounting: A Study of Accountants' Knowledge, Skills and Experience from Greater Mumbai

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Abstract

Artificial Intelligence (AI) is progressively transforming the accounting profession by streamlining operational processes, strengthening analytical abilities, and improving the quality of financial decision-making. The present study explores the perceptions of accountants in Greater Mumbai regarding the adoption of AI and its impact on their professional knowledge, skills, and experience. The research particularly examines how emerging technologies such as machine learning, robotic process automation (RPA), and data analytics contribute to increased efficiency, precision, and cost effectiveness in accounting activities. The study is based on both primary and secondary data sources. Primary data were gathered from 80 practicing accountants through a structured questionnaire designed using a five-point Likert scale. The collected responses were analysed using statistical techniques such as frequency distribution, percentage analysis, and the weighted average method in order to derive meaningful insights. The results reveal a largely favorable perception of AI among respondents, indicating that AI tools positively influence their professional knowledge, enhance skill development, and enrich practical experience. The study concludes that AI-enabled technologies significantly support the accounting profession by improving efficiency and strengthening the credibility of financial reporting in a rapidly evolving financial environment. Furthermore, the findings suggest that the integration of AI allows accountants to devote greater attention to strategic analysis, advisory services, and value-driven activities. Overall, the study reflects the increasing preparedness of accounting professionals in Greater Mumbai to adopt technological advancements for long-term professional development.

Keywords : Artificial Intelligence, Accounting Profession, Professional Skills, Knowledge Development, AI Adoption, Mumbai.

1. Introduction

Artificial Intelligence has emerged as a transformative technological force that is reshaping contemporary business environments and professional services across the globe. In recent years, the accounting profession has witnessed a substantial shift due to the integration of intelligent technologies capable of automating complex processes, analysing extensive financial datasets, and generating accurate insights for informed decision-making. The growing adoption of AI-enabled tools such as machine learning, robotic process automation, and advanced data analytics has significantly altered the traditional framework within which accountants operate. Historically, the role of accountants was largely associated with routine and time-intensive tasks such as bookkeeping, ledger maintenance, financial documentation, and reconciliation of accounts. However, with the progressive integration of AI-based systems, many of these repetitive activities are now being automated with greater precision and efficiency. Consequently, the professional responsibilities of accountants are gradually evolving from conventional data processing functions to more analytical, advisory, and strategic roles within organizations.

This technological transition has heightened the importance of enhanced professional knowledge, advanced technical skills, and enriched experiential learning among accounting professionals. In the emerging digital environment, accountants are

required not only to possess a strong foundation in accounting principles, auditing standards, and financial regulations but also to develop competencies related to digital technologies, data interpretation, and intelligent financial systems. Familiarity with AI-enabled accounting platforms and analytical tools has become increasingly essential for ensuring accuracy, efficiency, and reliability in financial reporting and decision-making processes.

Furthermore, the adoption of Artificial Intelligence contributes significantly to the development of higher-order professional skills such as analytical thinking, problem-solving ability, and strategic financial evaluation. These competencies enable accountants to interpret complex financial information and provide valuable advisory insights that support organizational growth and governance. The practical experience gained through interaction with advanced technological systems also enhances professional efficiency and strengthens the overall competence of accounting practitioners.

In major financial and commercial centres such as Mumbai, where accounting professionals are actively engaged in diverse sectors including corporate enterprises, consulting firms, and financial institutions, the influence of Artificial Intelligence on professional capabilities is particularly significant. Understanding the perceptions of accountants in such an environment becomes crucial for assessing the preparedness of the profession to adapt to the rapidly evolving technological landscape.

In this context, the present study seeks to examine the perception of accountants in Greater Mumbai regarding the influence of Artificial Intelligence on their professional knowledge, skill development, and experiential learning. The study aims to provide meaningful insights into how emerging intelligent technologies are shaping the competencies, professional growth, and future readiness of accountants in the modern digital economy.

2. Review of Literature

2.1. Kerr, Smith & Xu (2025) The authors examined the impact of artificial intelligence on management accounting practices. Their study found that AI technologies such as machine learning and predictive analytics significantly improve financial analysis, decision-making, and forecasting accuracy. The study concluded that AI is transforming the role of accountants from routine record keepers to strategic advisors.

2.2. Kayser&Telukdarie (2023) The study explored AI adoption in accounting using the Technology Acceptance Model (TAM). The findings revealed that perceived usefulness and ease of use are major determinants influencing accountants' acceptance of AI tools. The research emphasized the importance of training and technological readiness for successful adoption.

2.3. Saci&Aliouat (2026) This research investigated the effect of AI adoption in accounting firms based on survey responses from professional accountants. The results showed that AI significantly automates routine tasks and enhances efficiency in financial analysis. The study highlighted that over 80% of firms have started integrating AI-based technologies in accounting operations.

2.4. Taher, Mathboob&Balasim (2024) The authors conducted a systematic study on AI adoption in accounting processes. The findings indicate that AI helps reduce errors, automate accounting procedures, and improve financial disclosure quality. However, the study also identified challenges related to technological complexity and implementation cost.

2.5. Daud, Kishan&Azhar (2024) This systematic literature review focused on ethical issues related to AI implementation in accounting. The authors identified concerns such as data privacy, algorithmic bias, transparency, and accountability. The study recommended the development of ethical frameworks and regulatory guidelines to ensure responsible AI use in accounting practices

2.6. Napolitano (2024) The research analysed the role of large language models and AI tools in accounting decision-making. It concluded that AI supports accountants in processing large volumes of financial data and improving decision quality. However, the study also highlighted trust issues and the need for human supervision.

2.7. Sutton, Holt & Arnold (2016) This study examined the use of artificial intelligence in auditing and accounting information systems. The authors concluded that AI technologies enhance audit quality by improving data analytics and fraud detection capabilities.

3. Problem of The Study

A review of existing literature suggests that the impact of Artificial Intelligence(AI)in India is interpreted differently across various stakeholder groups, with perspectives varying regarding its advantages, risks, and long-term implications. While several studies have examined the broader influence of AI on business performance and different professional domains, relatively few have focused on the perceptions of specific professional groups. In particular, limited empirical attention has been given to accounting professionals in Mumbai and their views on the adoption of AI in their routine work.

This gap in the literature highlights the need to understand how accountants perceive AI, especially

in terms of its ease of use, efficiency, and contribution to productivity. Given the evolving nature of accounting practices and the increasing integration of intelligent technologies in financial reporting and compliance processes, examining professional perceptions becomes essential for assessing the practical implications of AI adoption.

Accordingly, the present study represents an academic effort to review relevant literature on stakeholders' perceptions of AI and to empirically analyze the perceptions of accountants in Mumbai regarding AI as a tool that enhances ease, efficiency, and productivity in financial reporting and professional practice.

4. Objetives Of The Study

- To studythe profile of professional accountants in Greater Mumbai
- To examine accountants' perceptions of how Artificial Intelligence influences professional knowledge, skill development, and experiential learning in the accounting profession...

5. Research Methodology

For the present study, data have been collected from both primary and secondary sources to ensure comprehensive analysis and reliability of findings. Primary data were gathered through a well-structured questionnaire administered to a sample of 80 respondents from Mumbai. The respondents comprised practicing accountants and professional accountants, including chartered accountants and cost accountants. The sample was selected using the random convenient non-probability sampling method to obtain relevant responses from professionals actively engaged in accounting practice.

Secondary data were collected through an extensive review of academic articles, research papers, government publications, online sources, dissertations, theses, and working papers. This review helped in understanding the theoretical background, identifying research gaps, and framing appropriate research objectives and hypotheses. The combination of primary and secondary data enhances the validity of the study and provides a balanced perspective on accountants' perceptions of Artificial Intelligence in relation to knowledge, skill and experience.

6. Findings And Discussion

6.1. Descriptive Analysis

Table No. 6.1.1: Gender wise classification of Respondents

Gender	Frequency	Percent (%)
Male	49	61.25
Female	31	38.75
Total	**80**	**100.00**

Source: Compiled from primary data

In our analysis we have collected responses from 80 accountants includes employed, self-employed and professional accountants from various fields and specialization. It is evident from the table that number of male accountants are 49 and whereas as number of female accountants are 31 i.e., out of total respondents 61.25 percentage are male, whereas 38.75 percentage are females. It is clear that male respondents are more than female respondents.

Table No. 6.1.2: Classification of respondents according to age group

Category		Frequency	Percent
	21- 40 years	51	63.7
	41- 60 years	28	35
	Above 60 years	1	1.3
	Total	80	100.00

Source: Compiled from primary data

The above table represents the age of the respondents of sampled data. It is noted that out of total of 80 respondents 51 fall in the age group of 21-40 years which is substantial amongst all i.e., 63.7 percentages. Out of total of 80 respondents 31 fall in the age group of 41-60 years which is 28 percentages. 1 respondent fall in the age group of above 60 years which is 1.3 percentages.

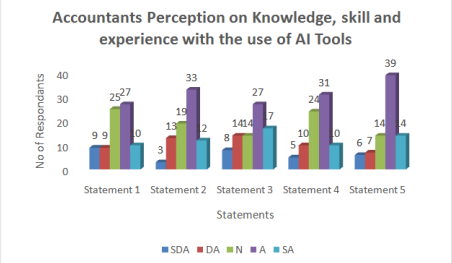
Table no.6.1.3: Accountants Perception on Knowledge, skill and experience with the use of AI Tools

	SDA	DA	N	A	SA	Total	Mean
Statement 1	9	9	25	27	10	80	3.25
Statement 2	3	13	19	33	12	80	3.48
Statement 3	8	14	14	27	17	80	3.39
Statement 4	5	10	24	31	10	80	3.39
Statement 5	6	7	14	39	14	80	3.6
Overall Mean Score ➔➔➔							3.42

Table no.6.1.4: Knowledge, Experience and Skill of Accountants and application of Artificial Intelligence (AI) Tools

Statement No.	Statements
1	For drafting appeal and replying to notices of government authorities it is not necessary for accountants to undergo a detailed courses in AI, basic knowledge on AI tools would suffice.
2	AI tools for accountancy and finance are user friendly even for those with limited technical skills.
3	One can easily navigate AI enabled software without extensive training.
4	Learning to use AI tools for financial tasks requires minimal effort on my part.
5	AI tools help me to complete accounting tasks. (e.g., reconciliations, reporting) faster even with my limited AI knowledge.

Chart-6.1



Source: Compiled from primary data

In statement 1, out of 80 total respondents 9 respondents fully disagreed, 9 respondents are disagreed, 25 respondents are neutral, 27 respondents are agreed and 10 respondents are strongly agreed. Mean score of statement 1 is 3.25. In statement 2, out of 80 total respondents 3 respondents are fully disagreed, 13 respondents are disagreed, 19 respondents are neutral, 33 respondents are agreed and 12 respondents are strongly agreed. Mean score of statement 2 is 3.48. In statement 3 out of 80 total respondents 8 respondents are strongly disagreed, 14 respondents are disagreed, 14 respondents are neutral, 27 respondents are agreed and 17 respondents are strongly agreed. Mean score of statement 3 is 3.39. In statement 4, out of 80 total respondents 5 respondents are strongly disagree, 10 respondents are disagreed, 24 respondents are neutral, 31 respondents are agreed and 10 respondents are strongly agreed. Mean score of statement 4 is 3.39. In statement 5, out of 80 total respondents 6 respondents are strongly disagreed, 7 respondents are disagreed, 14 respondents are neutral, 39 respondents are agreed and 14 respondents are strongly agreed. Mean score of statement 5 is 3.6. The overall mean score of all statement is 3.42 which is above 3, which means respondents are agreed that AI influences knowledge, skill and experience of accountants for using AI tools.

6.2. Inferential Analysis

- **H0 :** Artificial Intelligence does not significantly influence the knowledge, skill, and professional experience of accountants according to the perception of accountants in Greater Mumbai.(Weightage average score is not less than 3)
- **H1 :** Artificial Intelligence significantly influences the knowledge, skill, and professional experience of accountants according to the perception of accountants in Greater Mumbai (Weightage average score is more than 3)

To test the stated hypothesis, the weighted average method was applied by considering a single sample and one key variable under study, namely perception. As presented in Table No. 9.1.3, the weighted average score was calculated to draw an inferential conclusion regarding the perception of accountants in Mumbai toward Artificial Intelligence as a driver for enhancing their knowledge, skills, and professional experience, as well as increasing their earning potential.

The overall weighted average score for all the parameters under study was 3.42. Since this value exceeds the neutral benchmark value of 3, the null hypothesis is rejected and the alternative hypothesis is accepted.

The findings therefore indicate that accountants in Greater Mumbai perceive Artificial Intelligence as having a positive influence on their professional development. It contributes to the enhancement of their knowledge, skills, and professional experience, while enabling them to perform their attestation functions and other professional responsibilities more smoothly and efficiently.

7. Scope of The Study

The present study focuses on examining the profile of employed accountants and professional accountants in Mumbai and analyzing their perception toward Artificial Intelligence and its perceived impact on their profession. It seeks to understand how AI influences their routine work, efficiency levels, and overall professional responsibilities.

The study also aims to evaluate whether accountants view AI as a supportive technological tool that enhances productivity and ease of operations or as a disruptive force affecting traditional practices. By assessing their perceptions, the research intends to provide meaningful insights into the readiness and adaptability of accounting professionals in Mumbai toward AI-driven transformation.

8. Significance of The Study

The study on accountants' perceptions of how Artificial Intelligence (AI) influences professional knowledge, skill development, and experiential learning in the accounting profession in Greater Mumbai is significant for several reasons.

8.1 Understanding Technological Transformation in Accounting : Artificial Intelligence is transforming traditional accounting practices by automating routine tasks such as bookkeeping, data entry, reconciliation, and financial analysis. This study helps in understanding how accountants perceive these technological changes and how AI is reshaping their professional roles.

8.2 Assessment of Knowledge and Skill Requirements : With the integration of AI in accounting systems, professionals are required to upgrade their knowledge and technical competencies. The study highlights the importance of digital literacy, analytical ability, and technological adaptability among accountants in order to remain relevant in the profession.

8.3 Impact on Professional Experience and Work Practices : The adoption of AI tools changes the nature of accountants' work by shifting the focus from routine tasks to strategic decision-making and advisory roles. Studying accountants' perceptions provides insights into how AI influences their practical experience and day-to-day work environment.

8.4 Guidance for Professional Training and Education : The findings of the study can help educational institutions, professional bodies, and training organizations redesign accounting curricula and professional development programs by incorporating AI-related competencies and technological skills.

8.5 Support for Policy Makers and Professional Bodies : The results can assist policymakers, regulatory authorities, and professional accounting organizations in formulating strategies, guidelines, and support systems to facilitate the smooth adoption of AI in the accounting sector.

8.6 Regional Insight for Greater Mumbai's Accounting Community : As Greater Mumbai is a major financial and commercial hub of India, understanding the perceptions of accountants in this region provides valuable insights into the readiness of professionals to adopt emerging technologies and adapt to the evolving digital economy.

8.7 Contribution to Academic Research : This study contributes to the growing body of research on AI in accounting by providing empirical evidence on accountants' perceptions regarding knowledge, skills, and experiential learning in a rapidly digitizing professional environment.

9. Conclusion Of The Study

Based on the analysis of respondents' perceptions, it may be inferred that accountants in Mumbai demonstrate a largely favorable attitude toward the integration of Artificial Intelligence (AI) within their profession. The results suggest that AI has fostered significant innovation in the domains of accounting and finance, thereby elevating the professional stature and credibility of accountants in the corporate environment. Respondents are of the view that AI enhances the accuracy, reliability, and overall quality of financial reporting.

Moreover, AI is regarded as a convenient, effective, and highly efficient tool for handling repetitive and routine accounting functions. Through automation of such tasks, AI reduces the likelihood of human errors and lowers the risk of material misstatements in financial statements. This advancement not only improves operational productivity but also strengthens regulatory compliance and financial transparency.

In conclusion, the study reveals that accountants in Mumbai perceive AI as a valuable technological development that reinforces sound financial reporting practices and contributes positively to the sustained growth, modernization, and long-term advancement of the accounting profession.

10. Limitation of The Study

The present study is subject to certain limitations. Firstly, the sample size is restricted to 80 respondents, which may limit the generalizability of the findings. Secondly, the geographical scope of the study is confined to Greater Mumbai, thereby excluding perspectives from accountants practicing in other regions. Additionally, the study focuses primarily on respondents' perceptions regarding knowledge, skill and experience in their professional work, which may not fully capture the broader impact of Artificial Intelligence on the accounting profession.

Since the analysis is perception-based, the findings are influenced by individual opinions, experiences, and levels of technological exposure. Furthermore, the use of a non-probability sampling method may limit the representativeness of the sample across the wider population of accounting professionals.

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Role of Digital Banking in Facilitating Trade Transactions among Small Transport and Logistics Operators

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Abstract

The rapid expansion of digital banking has transformed financial transactions across sectors, particularly for small and medium enterprises involved in trade and logistics. This study examines the role of digital banking in facilitating trade transactions among small transport and logistics operators by analysing its impact on transaction efficiency and financial management. Primary data were collected from 156 respondents using a structured questionnaire, and the data were analysed through descriptive statistics, Exploratory Factor Analysis (EFA), and Structural Equation Modelling (SEM). The results reveal that digital banking significantly improves transaction efficiency by reducing payment delays, enhancing coordination, and simplifying record keeping, while also strengthening financial management through increased transparency and improved access to formal banking services. The findings highlight that digital banking serves as an important enabler of operational effectiveness and financial inclusion within the logistics sector. The study underscores the need for greater awareness, digital capability development, and supportive infrastructure to enhance adoption among small operators and further strengthen trade facilitation.

Keywords : Digital Banking, Trade Facilitation, Transport and Logistics, Transaction Efficiency,

Introduction

The ongoing digital transformation of financial systems has significantly reshaped the conduct of commercial transactions across sectors, particularly in emerging economies where small and medium enterprises (SMEs) play a dominant role in trade and supply chain activities (Hassan & Osmana, 2026; Orellana et al., 2025). Digital banking—comprising online banking, mobile-based payment platforms, and electronic fund transfer mechanisms—has emerged as a vital instrument for enhancing transactional efficiency, reducing costs, and strengthening financial inclusion (Talom & Tengeh, 2019; Asare et al., 2024). Its growing relevance is especially evident in the transport and logistics sector, where the timely movement of goods must be supported by equally efficient financial settlements to sustain trade operations and supply chain integration (Ezmigna et al., 2024; Jaiyeoba et al., 2025).

Small transport and logistics operators act as critical intermediaries in trade networks by linking producers, wholesalers, retailers, and final markets. Despite their strategic importance, these operators have traditionally relied on cash-based transactions, informal credit arrangements, and manual record-keeping systems, particularly in emerging markets (Talom & Tengeh, 2019; Chibueze, 2021). Such practices often lead to delayed payments, higher transaction costs, financial opacity, and limited access to institutional credit (Olatunji et al., 2025; Agu et al., 2024). These inefficiencies directly affect trade-related operations, including freight movement, delivery coordination, and working capital management (Hassan & Osmana, 2026). Consequently, integrating digital banking systems into SME logistics operations presents significant potential for formalizing financial interactions and improving supply chain performance (Aikor et al., 2025).

The adoption of digital banking tools enhances transaction efficiency by enabling real-time fund transfers, reducing settlement delays, and simplifying reconciliation processes between traders and

logistics providers (Talom & Tengeh, 2019; Asare et al., 2024). Empirical findings indicate that digital payment systems lower transaction costs and increase operational speed, thereby improving SME competitiveness and financial sustainability (Orellana et al., 2025; Sija, 2025). Faster settlements also improve coordination among supply chain actors, reinforcing reliability and trust within trade networks (Ezmigna et al., 2024).

In addition to transactional improvements, digital banking systems generate verifiable electronic records that enhance financial management capabilities. These systems promote transparency, improve budgeting and cash-flow monitoring, and strengthen SMEs' ability to demonstrate creditworthiness when applying for loans or working capital facilities (Asare et al., 2024; Chibueze, 2021). Evidence from supply-chain finance studies further suggests that integrated digital platforms improve working capital efficiency by linking transaction data with banking services (Hassan & Osmana, 2026; Aikor et al., 2025).

However, the benefits of digital financial systems are not uniformly realized. SMEs often encounter perceived and structural challenges, including technological complexity, cybersecurity concerns, limited digital literacy, and infrastructural gaps (Chibueze, 2021; Olatunji et al., 2025). In emerging economies, institutional trust deficits and limited broadband penetration further constrain effective adoption (Agu et al., 2024). These barriers may moderate the relationship between digital banking usage and operational outcomes, indicating that adoption effectiveness depends not only on technological availability but also on user capability and environmental support (Jaiyeoba et al., 2025).

By analysing the interconnected dimensions of digital banking usage, transaction efficiency, financial management capability, and perceived adoption challenges, this study seeks to evaluate how financial digitalization facilitates trade transactions among small transport and logistics enterprises. Understanding these relationships is critical for assessing whether digital banking serves as an enabling mechanism for operational efficiency, supply chain integration, and financial inclusion in emerging economies (Hassan & Osmana, 2026; Ezmigna et al., 2024).

Literature Review

The growing body of literature on digital banking and financial technology (FinTech) adoption highlights its transformative impact on small and medium enterprises (SMEs), particularly in emerging economies where financial exclusion, cash dependency, and infrastructural limitations have traditionally constrained business efficiency. Scholars increasingly argue that digital financial systems—including internet banking, mobile money, electronic transfers, and integrated supply-chain finance platforms—play a critical role in improving transactional efficiency, strengthening financial management practices, and enhancing overall SME performance (Okafor et al., 2021; Thathsarani & Jianguo, 2022). In contexts where SMEs dominate trade and logistics ecosystems, digital banking serves not only as a payment mechanism but also as an enabling infrastructure that supports operational coordination and financial integration (Ali et al., 2020).

Early theoretical frameworks examining e-banking adoption in developing countries emphasized perceived usefulness, ease of use, and trust as key determinants influencing SME adoption decisions (Riyadh et al., 2009). Drawing from the Technology Acceptance Model (TAM), these studies found that SMEs are primarily motivated to adopt digital banking to reduce transaction costs, save time, and improve business efficiency. Subsequent empirical research has reinforced these findings, demonstrating that digital finance enhances financial inclusion by lowering barriers to formal financial participation (Thathsarani & Jianguo, 2022). For rural and underserved SMEs, digital banking reduces dependence on physical bank branches and enables faster transaction processing, thereby improving access to financial products and services (Bassey et al., 2025). However, scholars also caution that institutional trust and regulatory clarity remain critical for sustaining adoption in emerging markets (Chibueze, 2021).

A significant portion of the literature focuses on transaction efficiency as a primary outcome of digital banking usage. Empirical evidence suggests that mobile money and online banking platforms reduce transaction delays, minimize administrative burdens, and facilitate real-time financial settlements (Talom & Tengeh, 2019). These efficiencies are particularly important for SMEs engaged in logistics and trade, where delayed payments can disrupt supply chain operations. Adegunju (2025) reports that digital financial services significantly enhance operational efficiency among SMEs by improving transaction monitoring and reporting accuracy. Similarly, Gu et al. (2023) find that digital inclusive finance reduces transaction expenses and improves financial resource allocation efficiency. By digitizing payment processes, SMEs experience greater transparency and reduced reliance on cash-based systems, which historically contributed to inefficiencies and financial leakages. Moreover, Ali et al. (2019) demonstrate that supply chain finance mechanisms reduce transaction

costs and improve logistics performance, especially when supported by digital transaction visibility.

Beyond transaction speed, digital banking systems contribute substantially to improved financial management and working capital efficiency. Okafor et al. (2021) argue that FinTech-enabled transaction banking enhances SME growth by facilitating access to digital lending and strengthening credit evaluation mechanisms. The generation of digital transaction records allows financial institutions to assess creditworthiness more accurately, thereby reducing financing constraints. Osuji et al. (2023) further emphasize that integrating digital supply-chain platforms with commercial banking systems improves working capital efficiency by aligning transaction data with financing solutions. This integration reduces information asymmetry between SMEs and lenders, ultimately improving liquidity management. Wang and Chen (2023) support this argument by demonstrating that digital inclusive finance alleviates financing constraints and improves resource allocation efficiency among SMEs. Additionally, Toni et al. (2025) indicate that financial management capabilities mediate the relationship between digital banking adoption and financial performance, suggesting that digital tools enhance budgeting accuracy, cash flow monitoring, and strategic financial planning.

In logistics-intensive sectors, digital banking plays an important role in supply chain integration and coordination. Studies reveal that internet-based financial innovations enhance supply chain performance by synchronizing financial flows with physical goods movement (Jaiyeoba et al., 2025). Digital payment systems increase transaction reliability and trust among supply chain actors, thereby strengthening operational continuity. Ali et al. (2020) find that trade digitization moderates the effectiveness of supply chain finance by enhancing transparency and reducing risk exposure. Furthermore, Kumar et al. (2025) propose that integrating digital financial systems within broader digital distribution strategies reduces last-mile transaction frictions for SMEs. These findings underscore the interconnectedness between financial digitalization and logistics performance, particularly in emerging economies where infrastructure gaps often create bottlenecks.

Overall, the literature consistently affirms that digital banking enhances transaction efficiency, strengthens financial management, and improves supply chain coordination among SMEs in emerging markets. However, empirical studies remain fragmented, with limited sector-specific focus on small transport and logistics enterprises. Furthermore, relatively few studies simultaneously examine transaction efficiency, financial management improvement, and adoption challenges within a unified analytical framework. Addressing this gap is essential for understanding how digital banking functions as an enabling mechanism for trade facilitation and operational effectiveness within logistics-dependent SME sectors

Statement of the problem

Digital banking has significantly transformed financial transactions by offering faster, more transparent, and cost-effective alternatives to traditional cash-based systems. While many SMEs have benefited from these advancements, small transport and logistics operators continue to rely heavily on cash transactions, informal credit, and manual record keeping. Such practices often lead to payment delays, inefficient financial management, and limited access to formal banking support, thereby affecting the efficiency of trade-related operations.

Although digital banking has the potential to improve transaction speed, record accuracy, and financial accessibility, there is limited empirical evidence examining its adoption and impact within the small transport and logistics sector. Moreover, the challenges that may hinder effective utilizationsuch as technological barriers, security concerns, and limited digital literacyremain insufficiently explored. Therefore, this study seeks to examine the extent of digital banking adoption, its influence on transaction efficiency and financial management, and the challenges faced by small transport and logistics operators in using digital banking platforms.

Research Objectives

1. To study the extent of adoption of digital banking services among small transport and logistics operators.
2. To examine the impact of digital banking on the efficiency of trade-related transactions, including payment speed, record keeping, and coordination with clients.
3. To analyse the role of digital banking in improving financial management and access to formal banking support for transport and logistics businesses.
4. To identify the key challenges faced by operators in using digital banking platforms for business transactions.

Hypothesis

- **Null Hypothesis (H01) :** There is no significant relationship between digital banking use and trade transaction efficiency.
- **Alternative Hypothesis (HA) :** There is a significant relationship between digital banking use and trade transaction efficiency.

- **Null Hypothesis (H02) :** Digital banking does not significantly influence financial management and banking accessibility.
- **Alternative Hypothesis (HA) :** Digital banking significantly influences financial management and banking accessibility.

Methodology

The study adopts a quantitative, descriptive research design to examine the role of digital banking in facilitating trade transactions among small transport and logistics operators. Primary data were collected from 156 respondents, including fleet owners, transport contractors, clearing and forwarding agents, and warehouse operators, using a structured questionnaire administered through convenience sampling due to the absence of a formal sampling frame for this sector. The instrument consisted of business profile questions and Likert-scale statements (1 = Strongly Disagree to 5 = Strongly Agree) measuring key constructs such as transaction efficiency, financial management, and usability of digital banking platforms. Data were analysed using R software, beginning with descriptive statistics and reliability testing through Cronbach's Alpha to ensure internal consistency. Exploratory Factor Analysis (EFA) was conducted using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity to validate the dimensional structure of the variables, followed by Structural Equation Modelling (SEM) to examine the relationships between digital banking usage, transaction efficiency, and financial management outcomes. Model adequacy was assessed using standard goodness-of-fit indices including CFI, TLI, RMSEA, and SRMR, and hypotheses were tested based on the significance of standardized path coefficients at the 5% level.

Results

Table 1Factor Loadings

Rotated Factor Loadings (ML, Varimax), nfactors = 3

	ML2	ML3	ML1	h2	u2
Q7_Reduced_Payment_Delays	0.786	-0.043	-0.034	0.621	0.379
Q8_Improved_Transaction_Speed	0.701	0.036	-0.001	0.493	0.507
Q9_Reduced_Cash_Dependence	0.808	-0.042	-0.002	0.655	0.345
Q10_Easier_Record_Keeping	0.777	0.138	-0.092	0.631	0.369
Q11_Better_Coordination	0.785	0.065	0.021	0.620	0.380
Q12_Financial_Discipline	0.037	0.900	0.092	0.820	0.180
Q13_Helps_in_Loan_Access	0.038	0.746	0.048	0.560	0.440
Q14_Reduced_Transaction_Cost	0.021	0.634	0.026	0.403	0.597
Q15_Easy_to_Use_Platforms	-0.029	0.128	0.403	0.180	0.820
Q16_Satisfactory_Security	-0.009	-0.079	0.985	0.976	0.024

Table 2 KMO Statistics

KMO and Bartlett's Test of Sphericity

	Measure	Value
1	KMO (Overall)	0.8
2	Bartlett Chi-Square	570.291
3	Bartlett df	45
4	Bartlett p-value	< 2e-16

Interpretation

The suitability of the data for factor analysis was first assessed using the Kaiser–Meyer–Olkin (KMO) measure and the correlation matrix. The KMO statistic indicated adequate sampling adequacy, confirming that the pattern of correlations among the variables was sufficiently compact to yield reliable factors. In addition, the correlation matrix showed meaningful inter-item correlations without evidence of multicollinearity, suggesting that the variables were related enough to justify factor extraction while still representing distinct dimensions. These results established that the dataset met the necessary assumptions for conducting Exploratory Factor Analysis (EFA).The factor analysis, conducted using Maximum Likelihood extraction with Varimax rotation, revealed a clear three-factor structure corresponding to the conceptual dimensions of the study. The first factor represented Transaction Efficiency, with strong loadings from items such as reduced payment delays (0.786), improved transaction speed (0.701), reduced cash dependence (0.808), easier record keeping (0.777), and better coordination (0.785). These high loadings indicate that digital banking significantly enhances the operational efficiency of trade-related activities by accelerating financial settlements and improving transaction management among transport and logistics operators. The second factor captured Financial Management, where items relating to financial discipline (0.900), access to loans (0.746), and reduced transaction costs (0.634) loaded strongly. This suggests that digital banking not only facilitates transactions but also strengthens financial organization, improves credit accessibility, and supports better cost control, thereby enabling small operators to integrate more effectively into formal banking systems.The third factor reflected Usability and Security Perception, with ease of use (0.403) and perceived transaction security (0.985) contributing to this dimension. The particularly strong loading of the security variable indicates that trust in digital payment systems is a critical determinant influencing adoption among small operators, while usability also plays a supportive role. Overall, the absence of significant cross-loadings and the presence of coherent factor groupings confirm the construct validity of the measurement model, demonstrating that digital banking influences trade facilitation through interconnected dimensions of operational efficiency, financial capability, and user confidence.

Figure 1 Distribution of Responses

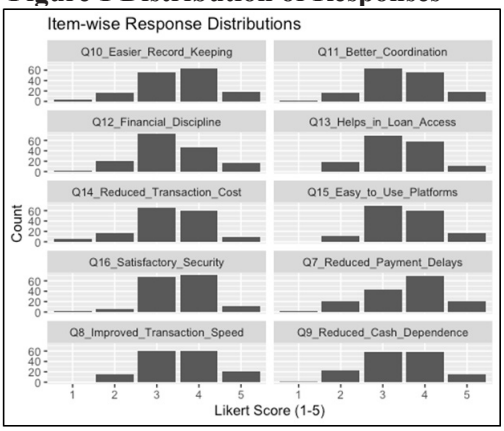
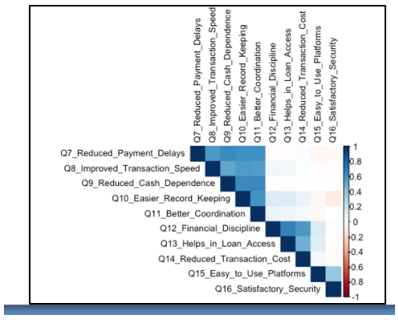


Figure 2 Correlation Matrix



The item-wise response distributions show that most respondents reported moderate to high agreement (scores 3 and 4) across all variables, indicating a generally positive perception of digital banking among small transport and logistics operators. Items related to transaction efficiencysuch as reduced payment delays, improved transaction speed, easier record keeping, and better coordination—demonstrate strong agreement trends, suggesting that digital banking enhances operational performance. Similarly, financial management variables, including financial discipline, loan access, and reduced transaction costs, also reflect favorable responses, indicating improved financial organization and banking accessibility. The correlation matrix reveals moderate to strong positive correlations among efficiency-related items and meaningful associations between efficiency and financial management constructs, supporting the conceptual linkage between digital banking use and trade facilitation outcomes. Importantly, correlations are not excessively high, confirming the absence of multicollinearity and validating the suitability of the data for factor analysis and structural modelling.

Conclusion

The study examined the role of digital banking in facilitating trade transactions among small transport and logistics operators and found that the adoption of digital financial services has a meaningful impact on improving both operational and financial aspects of their businesses. The findings indicate that digital banking significantly enhances transaction efficiency by reducing payment delays, improving transaction speed, simplifying record keeping, and enabling better coordination with trade partners. These improvements contribute to smoother logistics operations and support the timely movement of goods within the trade ecosystem.In addition to operational benefits, digital banking strengthens financial management by promoting financial discipline, improving transparency in transactions, and enhancing access to formal banking services and credit facilities. The availability of digital transaction records enables small operators to integrate more effectively into the formal financial system, thereby supporting working capital management and long-term business sustainability. Although usability and security perceptions influence adoption, they function primarily as enabling conditions rather than core drivers of efficiency and financial outcomes. Overall, the study concludes that digital banking serves as a critical enabler of trade facilitation for small transport and logistics enterprises by bridging operational efficiency with financial inclusion. The results underscore the importance of encouraging digital adoption through awareness, infrastructure support, and user training to maximize the benefits of financial digitalization within logistics-driven SME sectors.

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Adoption and Usage Pattern of Digital Payment Systems among Rural Consumers in Maharashtra

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Introduction

In the digital era, financial transactions have undergone significant transformation with the emergence of digital payment systems. Digital payments refer to transactions conducted through electronic modes such as mobile banking, internet banking, debit cards, credit cards, Unified Payments Interface (UPI), and digital wallets. These systems have simplified the process of financial transactions by providing fast, secure, and convenient payment options. In India, the Government has actively promoted digital financial services through initiatives like Digital India, financial inclusion programs, and the development of advanced digital payment infrastructure. These efforts aim to reduce dependence on cash transactions and promote transparency and efficiency in the financial system.

Rural areas in Maharashtra have gradually started adopting digital payment systems due to the increasing penetration of smartphones, expansion of banking services, and improved internet connectivity. Government schemes such as Jan DhanYojana, Aadhaar-enabled payment systems, and the promotion of UPI platforms have played a significant role in encouraging rural consumers to use digital modes of payment. As a result, many rural consumers are now able to perform transactions such as bill payments, fund transfers, online purchases, and government benefit withdrawals through digital platforms.

However, despite the rapid growth of digital payment infrastructure, the level of adoption and usage in rural areas still faces several challenges. Issues such as lack of digital literacy, poor internet connectivity, security concerns, and limited awareness about digital payment methods often restrict rural consumers from fully utilizing these services. In addition, traditional habits of cash-based transactions remain deeply rooted in rural communities, which slows down the transition toward digital financial practices.

Considering these circumstances, it becomes important to examine how rural consumers adopt and use digital payment systems and what factors influence their usage patterns. This study focuses on analyzing the adoption behavior, frequency of usage, preferred digital payment methods, and challenges faced by rural consumers in Maharashtra. The findings of this study can help policymakers, financial institutions, and service providers understand the needs of rural users and develop strategies to promote wider acceptance of digital payment systems in rural areas.

Objectives of the Study

- To study the level of adoption of digital payment systems among rural consumers in Maharashtra.
- To analyze the usage pattern of various digital payment methods such as UPI, mobile banking, debit cards, and digital wallets.
- To identify the factors influencing rural consumers in adopting digital payment systems.
- To examine the challenges faced by rural consumers while using digital payment services.
- To suggest measures for improving the adoption and effective usage of digital payment systems in rural areas.

Research Methodology

The present study is based on both primary and secondary data to analyze the adoption and usage

pattern of digital payment systems among rural consumers in Maharashtra. Primary data is collected through a structured questionnaire distributed to 200 respondents from rural areas using a simple random sampling method. The questionnaire includes questions related to awareness, frequency of usage, preferred digital payment methods, and challenges faced by consumers. Secondary data is collected from research journals, government reports, books, websites, and publications related to digital banking and financial inclusion. The collected data is analyzed using simple statistical tools such as percentages, tables, and charts to interpret the adoption level and usage behavior of rural consumers toward digital payment systems.

Data Analysis

The present study analyzes the responses collected from 200 rural consumers of Dhule District Maharashtra regarding their adoption and usage pattern of digital payment systems. The responses were analyzed using simple statistical tools such as percentages and frequency distribution to understand consumer behavior, awareness level, and challenges faced while using digital payments.

Table 1 :

Types of Digital Payment Methods Used

Payment Method	No. of Respondents	Percentage
UPI (PhonePe, Google Pay, Paytm)	90	45%
Debit Card	50	25%
Mobile Banking	30	15%
Internet Banking	10	5%
Digital Wallets	20	10%
Total	200	100%

The data reveals that UPI-based payment applications are the most preferred digital payment method (45%) among rural consumers. Debit cards are also widely used (25%), mainly for ATM withdrawals and POS transactions. Mobile banking (15%) and digital wallets (10%) are moderately used, whereas internet banking (5%) is used by a limited number of respondents due to lower digital literacy and limited access to computers in rural areas.

Table 2 :

Frequency of Using Digital Payments

Frequency of Use	No. of Respondents	Percentage
Daily	60	30%
Weekly	80	40%
Occasionally	40	20%
Rarely	20	10%
Total	200	100%

The data indicates that 40% of respondents use digital payment systems on a weekly basis, while 30% use them daily. About 20% use them occasionally, and 10% rarely use digital payments. This shows that digital payments are gradually becoming a routine financial activity among rural consumers, though many still rely on traditional cash transactions.

Table 3 :

Purpose of Using Digital Payments

Purpose	No. of Respondents	Percentage
Mobile Recharge & Utility Bills	70	35%
Money Transfer	60	30%
Shopping & Purchases	40	20%
Government Payments	20	10%
Others	10	5%
Total	200	100%

The analysis shows that mobile recharge and utility bill payments (35%) are the most common purposes for using digital payment systems. Money transfers (30%) are also widely performed using digital platforms. Online shopping and retail payments account for 20%, while government payments and other uses form a smaller proportion.

Table 4 :

Problems Faced While Using Digital Payments

Problems	No. of Respondents	Percentage
Poor Internet Connectivity	80	40%
Lack of Digital Knowledge	50	25%
Security Concerns	40	20%
Technical Errors	30	15%
Total	200	100%

The data indicates that poor internet connectivity (40%) is the major challenge faced by rural consumers while using digital payment systems. Lack of digital literacy (25%) is another significant barrier, especially among elderly and less educated users. Security concerns (20%) and technical issues (15%) also discourage some users from fully adopting digital financial services.

The overall analysis suggests that digital payment systems are gradually gaining acceptance among rural consumers in Maharashtra. A majority of respondents are aware of digital payment platforms and use them regularly for routine transactions such as bill payments, money transfers, and shopping. UPI-based applications are the most popular due to their ease of use and convenience. However, challenges such as poor internet connectivity, lack of digital literacy, and security concerns still limit the full adoption of digital payment systems in rural areas. Strengthening digital infrastructure, providing financial literacy programs, and improving cybersecurity awareness can further enhance the adoption of digital payments among rural consumers.

Findings

The study on reveals several significant insights:

- **High Level of Awareness :** A majority of the respondents (85%) are aware of digital payment systems, indicating that awareness about digital financial services has significantly increased in rural areas of Maharashtra.
- **Growing Adoption of Digital Payments :** A large number of rural consumers have started adopting digital payment methods for their day-to-day financial transactions.

- **UPI as the Most Preferred Method :** UPI-based payment applications such as PhonePe, Google Pay, and Paytm are the most widely used digital payment platforms among rural consumers due to their convenience and ease of use.
- **Moderate Use of Debit Cards and Mobile Banking :** Debit cards and mobile banking are also commonly used, but their usage is lower compared to UPI-based transactions.
- **Regular Usage of Digital Payments :** Around 70% of respondents use digital payment systems either daily or weekly, showing that digital transactions are gradually becoming a regular practice in rural areas.
- **Common Purpose of Usage :** Most respondents use digital payments mainly for mobile recharge, utility bill payments, and money transfers.
- **Dependence on Smartphones :** The adoption of digital payment systems in rural areas is strongly supported by the increasing availability of smartphones and internet services.
- **Internet Connectivity Issues :** Poor internet connectivity is one of the major challenges faced by rural consumers while using digital payment systems.
- **Lack of Digital Literacy :** A significant number of respondents still face difficulties due to lack of knowledge and technical skills required for using digital payment applications.
- **Security Concerns :** Some rural consumers hesitate to use digital payment systems due to concerns related to online fraud and security of financial transactions.

Suggestions

- **Improve Digital Infrastructure :** The government and telecom companies should improve internet connectivity in rural areas to ensure smooth and uninterrupted digital transactions.
- **Enhance Digital Literacy :** Awareness and training programs should be organized to educate rural consumers about the use of digital payment systems and mobile banking applications.
- **Strengthen Security Measures :** Banks and digital payment service providers should implement stronger security features and regularly educate users about safe digital transaction practices.
- **Promote Financial Inclusion :** Banks should expand their outreach in rural areas by organizing financial literacy camps and promoting digital banking services.
- **Encourage Use of UPI and Mobile Apps :** Since UPI-based payment applications are easy to use, financial institutions should encourage rural consumers to adopt such platforms for daily transactions.
- **Provide User-Friendly Applications :** Digital payment applications should be designed in regional languages with simple interfaces to make them more accessible for rural users.
- **Government Support and Awareness Campaigns :** Government agencies should continue promoting digital payments through campaigns under initiatives like Digital India and financial inclusion programs.
- **Strengthen Customer Support Services :** Banks and service providers should provide efficient customer support in rural areas to help users resolve technical issues quickly.
- **Increase Trust in Digital Systems :** Educational campaigns should be conducted to build trust among rural consumers regarding the safety and reliability of digital payment systems.
- **Encourage Merchants to Accept Digital Payments :** Local shopkeepers and small businesses in rural areas should be encouraged and supported to accept digital payments, which will further promote the use of cashless transactions.

Conclusion

The study highlights that digital payment systems are gradually gaining acceptance in rural areas. The majority of respondents are aware of digital payment platforms and many have started using them for routine financial activities such as money transfers, mobile recharges, and utility bill payments. Among various digital payment methods, UPI-based applications have emerged as the most preferred due to their convenience, speed, and ease of use. The increasing availability of smartphones, expansion of banking services, and government initiatives promoting digital transactions have played a significant role in encouraging rural consumers to adopt digital payment systems.

However, the study also reveals certain challenges that limit the full adoption of digital payments in rural regions. Problems such as poor internet connectivity, lack of digital literacy, and

concerns regarding security and fraud continue to affect the confidence of rural consumers. To overcome these barriers, it is essential for the government, financial institutions, and digital service providers to focus on improving digital infrastructure, strengthening security mechanisms, and conducting awareness programs. With proper support and continuous efforts, digital payment systems can significantly contribute to financial inclusion, transparency, and economic development in rural Maharashtra.

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Sustainability Readiness of MSMEs in Mira–Bhayandar: The Role of Technological and Financial Drivers

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This study examines the determinants of sustainability readiness among Micro, Small, and Medium Enterprises (MSMEs) in Mira–Bhayandar, focusing on the influence of Technological Readiness and Financial Accessibility. A structured questionnaire was administered to 384 MSMEs, and data were analyzed using Structural Equation Modeling (SEM) along with OLS, logistic, and probit regression techniques to ensure robustness. The results indicate that Technological Readiness has a strong and significant positive impact on Sustainability Readiness, while Financial Accessibility also exerts a meaningful positive effect. The structural model demonstrates excellent fit indices and substantial explanatory power, accounting for a significant proportion of variance in sustainability readiness. The findings suggest that MSMEs with stronger digital capabilities and improved access to financial resources are better positioned to adopt sustainable practices. The study highlights the importance of strengthening technological infrastructure and enhancing green financing mechanisms to promote sustainable industrial development.

Keywords : Sustainability Readiness, MSMEs, Logit, SEM

Introduction

Micro, Small and Medium Enterprises (MSMEs) constitute the backbone of India's industrial economy, contributing significantly to employment generation, GDP, and export performance. Beyond economic growth, MSMEs are increasingly recognized as pivotal actors in achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production) (Bhat et al., 2026; Gupta, 2025). However, the transition from conventional production systems to sustainable and climate-resilient models remains uneven across regions and sectors.

Sustainability readiness refers to the preparedness of enterprises to adopt environmentally responsible, socially inclusive, and economically viable practices through adequate technological capability, financial access, governance structures, and managerial intent (Kolil et al., 2026; Tomar, 2025). In the Indian context, MSMEs often face systemic barriers such as limited capital, lack of awareness of green technologies, regulatory complexity, and weak institutional coordination, which constrain their sustainability transition (Nautiyal et al., 2025; Lalita et al., 2025). Renewable energy adoption, digital transformation, and automation are identified as critical enablers, yet their uptake remains contingent upon organizational readiness and external ecosystem support (Mohite et al., 2025; Shetty & Choudhury, 2020).

The Mumbai Metropolitan Region (MMR), including peri-urban industrial clusters such as Mira–Bhayandar, represents a dynamic yet environmentally sensitive industrial ecosystem. Rapid urbanization, infrastructure stress, and climate vulnerability amplify the need for MSMEs to adopt sustainable production models (Schaer & Pantakar, 2018). At the same time, local governance mechanisms, industrial associations, and policy instruments play a decisive role in shaping enterprise-level sustainability transitions (Patil et al., 2025; Gupta, 2025). Studies emphasize that localized institutional support, energy-efficiency initiatives, and access to climate finance significantly enhance MSME resilience and sustainability readiness (Arunachalam, 2024; Garg

& Vidyapith, 2025).

Financial readiness is another crucial dimension. Access to green credit, blended finance, and collaborative financing pathways has been shown to reduce adoption barriers for climate-resilient technologies (Anjanappa, 2025; Arunachalam, 2024). However, persistent information asymmetries and inadequate risk assessment frameworks limit MSMEs' ability to leverage such instruments effectively. Similarly, government schemes designed to promote technology adoption often suffer from awareness gaps and uneven implementation at the local level (Lakshmi & Banu, 2025).

Furthermore, sustainability transformation in MSMEs is closely linked to innovation capacity and digital readiness. Evidence suggests that enterprises integrating innovation strategies with sustainability objectives demonstrate stronger long-term competitiveness and growth (Mohite & Sharma, 2025). Yet, digital and automation adoption requires managerial commitment and cultural shifts within organizations (Kolil et al., 2026). These structural and behavioral dimensions collectively define sustainability readiness.

Despite growing national-level research on MSME sustainability, there remains limited empirical attention to localized industrial ecosystems such as Mira–Bhayandar. As an emerging industrial and service hub within the extended MMR corridor, the region presents a unique mix of manufacturing units, service enterprises, and informal businesses. Understanding the sustainability readiness of MSMEs in this specific urban-peripheral context is crucial for designing targeted interventions aligned with Maharashtra's climate and industrial development agenda.

Therefore, this study seeks to examine the multidimensional sustainability readiness of MSMEs in Mira–Bhayandar by assessing technological preparedness, financial accessibility, governance support, managerial orientation, and environmental compliance practices. By situating local realities within broader national sustainability discourse, the research aims to contribute to policy design, institutional strengthening, and region-specific sustainable industrial transformation.

Review of literature

Sustainability has increasingly become a strategic priority for Micro, Small, and Medium Enterprises (MSMEs), particularly in emerging economies where industrial expansion coexists with environmental vulnerability. The concept of sustainability readiness refers to a firm's preparedness to integrate environmental, social, and economic considerations into its operational and strategic decision-making processes. Scholars argue that MSMEs play a critical role in achieving sustainable development goals due to their collective economic contribution, yet they often face structural limitations that constrain their sustainability transformation (Bos-Brouwers, 2010; Revell, Stokes, & Chen, 2010). Unlike large corporations, MSMEs typically operate with limited technological infrastructure and financial resources, which directly affects their ability to adopt sustainable innovations (Acs & Szerb, 2007).

Technological readiness has been widely recognized as a foundational driver of sustainability performance. The Technology–Organization–Environment (TOE) framework suggests that technological capability significantly influences organizational adoption of innovation (Tornatzky & Fleischer, 1990). Empirical studies demonstrate that digitalization, clean technology adoption, and technical skill development enhance environmental efficiency and long-term competitiveness (Zhu, Sarkis, & Lai, 2013; Miroshnychenko, Barontini, & Testa, 2017). In the context of MSMEs, technological readiness enables process optimization, waste reduction, energy efficiency, and regulatory compliance, thereby strengthening sustainability outcomes (Hsu, Tan, Zailani, & Jayaraman, 2013). Firms with greater technological capability are better positioned to integrate green practices into their core operations.

Financial accessibility constitutes another critical determinant of sustainability adoption. Resource-Based View (RBV) theory posits that access to strategic resources, including financial capital, enables firms to develop competitive advantage (Barney, 1991). Sustainability initiatives often require upfront investment in equipment, training, certification, and compliance systems, which may pose significant challenges for MSMEs with constrained credit access (Beck & Demirgüç-Kunt, 2006). Studies indicate that access to institutional finance, government subsidies, and green funding schemes significantly enhances environmental innovation among small firms (Cecere, Corrocher, & Mancusi, 2020; Ghisetti & Rennings, 2014). Financial barriers frequently delay or prevent MSMEs from transitioning toward sustainable practices, especially in developing industrial clusters.

Research also highlights the complementary relationship between technological capability and financial access. Firms with stronger financial positions are more likely to invest in technological upgrades, while technologically advanced firms are better able to attract external financing due to improved performance signals (Demirgüç-Kunt & Maksimovic, 1998). This interdependence suggests

that sustainability readiness is multidimensional and influenced by both internal capabilities and external resource access.

Although extensive literature exists on sustainability adoption in large enterprises, empirical evidence focusing on MSMEs in emerging urban-industrial regions remains limited. In rapidly developing zones such as Mira–Bhayandar, MSMEs face unique infrastructural, regulatory, and financial challenges that may affect their sustainability preparedness. Therefore, examining the influence of technological readiness and financial accessibility on sustainability readiness contributes to both theoretical and practical understanding of sustainable industrial transformation within localized MSME ecosystems.

Overall, the literature supports the proposition that technological readiness and financial accessibility are central determinants of sustainability readiness among MSMEs, thereby providing a strong theoretical foundation for the present study's hypotheses.

Statement of the Problem

The sustainability transition of Micro, Small, and Medium Enterprises (MSMEs) has become increasingly critical in emerging industrial regions such as Mira–Bhayandar, where environmental pressures, regulatory expectations, and competitive dynamics are intensifying. Despite policy emphasis on sustainable development, many MSMEs continue to face structural constraints, particularly in terms of technological capability and financial accessibility, which may hinder their preparedness to adopt sustainable practices. Limited digital infrastructure, inadequate investment in clean technologies, and restricted access to institutional finance and green funding schemes may significantly affect their sustainability readiness. Therefore, the central problem of this study is to examine whether technological readiness and financial accessibility significantly influence sustainability readiness among MSMEs in Mira–Bhayandar. Based on this problem, the study proposes the following hypotheses:

- **H1 :** Technological Readiness has a positive and significant effect on Sustainability Readiness among MSMEs in Mira–Bhayandar.
- **H2 :** Financial Accessibility has a positive and significant effect on Sustainability Readiness among MSMEs in Mira–Bhayandar

The study aims to

1) evaluate the level of Technological Readiness among MSMEs in Mira–Bhayandar;
2) assess the extent of Financial Accessibility available to MSMEs for supporting sustainable initiatives;
3) analyze the impact of Technological Readiness on Sustainability Readiness; and
4) examine the effect of Financial Accessibility on Sustainability Readiness among MSMEs in the study region.

Results & Discussion

Table 1 :
Reliability and Convergent Validity

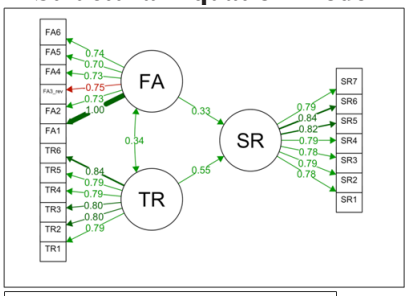
Construct	Composite Reliability (CR)	AVE	Interpretation
TR	0.90	0.64	Excellent
FA	0.86	0.57	Good
SR	0.92	0.65	Excellent

Table 2 :
Standardized Factor Loadings

Construct	Indicator	Std. Loading	p-value
Technological Readiness (TR)	TR1	0.792	<0.001
	TR2	0.801	<0.001
	TR3	0.800	<0.001
	TR4	0.793	<0.001
	TR5	0.793	<0.001
	TR6	0.841	<0.001
Financial Accessibility (FA)	FA1	0.800	<0.001
	FA2	0.750	<0.001
	FA3_rev	0.776	<0.001
	FA4	0.755	<0.001
	FA5	0.721	<0.001
	FA6	0.758	<0.001
Sustainability Readiness (SR)	SR1	0.776	<0.001
	SR2	0.785	<0.001
	SR3	0.785	<0.001
	SR4	0.790	<0.001
	SR5	0.823	<0.001
	SR6	0.836	<0.001
	SR7	0.794	<0.001

Source : Author's Estimation based on primary data

Figure 1 :
Structural Equation Model



Source: Author's Estimation based on primary data

The measurement model was assessed using Confirmatory Factor Analysis (CFA) to evaluate the reliability and validity of the three latent constructs: Technological Readiness (TR), Financial Accessibility (FA), and Sustainability Readiness (SR). The standardized factor loadings ranged from 0.721 to 0.841 for Technological Readiness, 0.721 to 0.800 for Financial Accessibility, and 0.776 to 0.836 for Sustainability Readiness. All factor loadings were statistically significant at $p < 0.001$, exceeding the recommended threshold of 0.70, thereby confirming strong indicator reliability.Composite Reliability (CR) values were 0.90 for Technological Readiness, 0.86 for Financial Accessibility, and 0.92 for Sustainability Readiness, indicating high internal consistency reliability. The Average Variance

Extracted (AVE) values were 0.64, 0.57, and 0.65 respectively, exceeding the recommended threshold of 0.50, thereby confirming convergent validity. These results demonstrate that the measurement model is both reliable and valid for assessing sustainability readiness among MSMEs in Mira–Bhayandar.The structural model was evaluated to test the hypothesized relationships between Technological Readiness, Financial Accessibility, and Sustainability Readiness. The model exhibited excellent goodness-of-fit indices, with CFI = 0.998, TLI = 0.993, RMSEA = 0.023, and SRMR = 0.034. These values are well within the recommended thresholds (CFI and TLI > 0.90; RMSEA and SRMR < 0.08), indicating that the proposed model adequately represents the empirical data.The SEM path diagram illustrates positive relationships from both Technological Readiness and Financial Accessibility to Sustainability Readiness. The standardized path coefficient from Technological Readiness to Sustainability Readiness was ß = 0.544 ($p < 0.001$), indicating a strong and statistically significant positive effect. This suggests that MSMEs with higher levels of digital adoption, technological infrastructure, and clean technology investment are significantly more prepared for sustainable transformation.Similarly, Financial Accessibility demonstrated a positive and statistically significant effect on Sustainability Readiness (ß = 0.346, $p < 0.001$). This indicates that MSMEs with better access to finance, awareness of green funding schemes, and financial capability are more likely to adopt sustainability-oriented practices.The covariance between Technological Readiness and Financial Accessibility was positive and significant (r = 0.350, $p < 0.001$), suggesting that firms with stronger technological capabilities also tend to possess better financial access mechanisms.The model explained 54.7% of the variance in Sustainability Readiness ($R^2 = 0.547$), indicating substantial explanatory power. This suggests that technological and financial dimensions collectively play a critical role in shaping sustainability preparedness among MSMEs in the Mira–Bhayandar industrial ecosystem.

Table 3 :

Regression Results

Regression Results: Sustainability Readiness of MSMEs (n = 384)

	Dependent variable:		
	SR Mean (OLS)	High SR (Logit)	
	OLS	logistic	probit
	(1)	(2)	(3)
TR_mean	0.514***	1.132***	0.665***
	(0.041)	(0.130)	(0.072)
FA_mean	0.404***	0.781***	0.454***
	(0.061)	(0.170)	(0.094)
Constant	0.290*	-7.112***	-4.164***
	(0.169)	(0.737)	(0.393)
Observations	384	384	384
R2	0.420		
Adjusted R2	0.417		
Log Likelihood		-162.392	-161.414
Akaike Inf. Crit.		330.784	328.827
Residual Std. Error	0.931 (df = 381)		
F Statistic	137.812*** (df = 2; 381)		
Note:			*p<0.1; **p<0.05; ***p<0.01

Source: Author's Estimation based on primary data

The logistic regression model examined the probability of an MSME achieving high sustainability readiness (binary outcome).Technological Readiness shows a positive and highly significant effect (ß = 1.132, $p < 0.01$). This implies that higher technological capability substantially increases the likelihood of achieving high sustainability readiness.Financial Accessibility is also positive and statistically significant (ß = 0.781, $p < 0.01$), indicating that MSMEs with stronger financial access are more likely to reach high sustainability readiness levels.The log-likelihood and AIC values indicate good model fit relative to baseline expectations.

Conclusion

This study examined the determinants of sustainability readiness among Micro, Small, and Medium Enterprises (MSMEs) in Mira–Bhayandar by focusing on the role of Technological Readiness and Financial Accessibility. Using Structural Equation Modeling (SEM) supported by OLS, Logistic, and Probit regression analyses, the findings provide strong empirical evidence that both technological capability and financial access significantly influence the sustainability preparedness of MSMEs.

The measurement model demonstrated high reliability and validity, confirming that the constructs were robustly operationalized. The structural model exhibited excellent fit indices, indicating that the proposed framework adequately explains the relationships among the variables. Technological Readiness emerged as the strongest predictor of Sustainability Readiness, suggesting that digital adoption, technological upgrading, and clean technology investment are critical enablers of sustainable transformation. Financial Accessibility also showed a significant positive effect, highlighting the importance of institutional finance, awareness of funding schemes, and resource availability in facilitating sustainability initiatives.

The model explained a substantial proportion of variance in Sustainability Readiness, underscoring the combined influence of technological and financial factors in shaping sustainable preparedness among MSMEs. The consistency of results across SEM, OLS, Logit, and Probit models further strengthens the robustness and reliability of the findings.

Overall, the study concludes that sustainability readiness in MSMEs is not merely a function of regulatory pressure or environmental awareness, but is fundamentally driven by internal technological capability and external financial support mechanisms. For MSMEs in Mira–Bhayandar, strengthening digital infrastructure and improving access to green financing schemes are essential pathways toward

achieving long-term sustainable competitiveness. These findings contribute to the growing body of literature on MSME sustainability and provide practical insights for policymakers, financial institutions, and industry stakeholders aiming to accelerate sustainable industrial development.

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Aanalysis of Financial Health and Dividend Payouts of Indian Pharmaceutical Companies A Study of BSE Listed Companies

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Abstract

The pharmaceutical industry is one of the most significant sectors in the Indian economy due to its contribution to healthcare and global generic drug supply. The financial stability and dividend policy of pharmaceutical companies are important factors influencing investor decisions. This research paper analyzes the financial health and dividend payout behavior of selected pharmaceutical companies listed on the Bombay Stock Exchange (BSE). The study is based on secondary data collected from annual reports and financial databases over a selected period. Financial ratios such as profitability, liquidity, and solvency ratios are used to measure financial health, while dividend payout ratio, dividend per share, and dividend yield are used to evaluate dividend policies. Statistical tools such as descriptive statistics and correlation analysis are applied to understand the relationship between financial performance and dividend payouts. The results indicate that financially strong pharmaceutical companies with higher profitability and liquidity tend to maintain stable dividend policies, thereby enhancing shareholder value.

Keywords : Financial Health, Dividend Policy, Pharmaceutical Industry, BSE Listed Companies, Profitability, Dividend Payout Ratio.

1. Introduction

The Indian pharmaceutical industry has emerged as one of the largest producers of generic medicines globally and contributes significantly to the healthcare system. The industry consists of thousands of drug manufacturing companies and production units, making it a vital component of India's economy and global healthcare supply chain.

Dividend policy is a critical financial decision taken by companies as it determines how much profit is distributed to shareholders and how much is retained for future growth. An efficient dividend policy ensures a balance between shareholders' expectations and the company's financial requirements for expansion and research activities.

Pharmaceutical companies often face high research and development costs, regulatory requirements, and market competition. Therefore, maintaining strong financial health is essential to sustain operations while providing consistent dividends to investors. This research paper analyzes the financial health and dividend payout patterns of selected pharmaceutical companies listed on the Bombay Stock Exchange (BSE).

2. Objectives Of The Study : The main objectives of this research are :

1. To analyze the financial health of selected BSE listed pharmaceutical companies.
2. To examine the dividend payout patterns of these companies.
3. To study the relationship between financial performance and dividend policy.
4. To compare dividend policies among major pharmaceutical companies.

3. Review Of Literature

Several researchers have examined dividend policies and financial performance in corporate sectors.

A study on pharmaceutical companies in India found that there is a relationship between dividend payouts and profitability. The results showed that many pharmaceutical companies demonstrate a positive correlation between profitability and dividend distribution.

Another empirical study analyzing dividend payouts in pharmaceutical companies indicated that factors such as profitability, sales growth, cash flows, and leverage influence dividend decisions. The study used panel data analysis to identify the impact of these factors on dividend payout ratios.

Research focusing on healthcare companies listed on the BSE also found that liquidity, profitability, and company size have a positive and significant impact on dividend payout policies.

Further studies on Indian corporate firms revealed that dividend payments are an important factor affecting firm performance and shareholder wealth, emphasizing the importance of effective dividend policy in corporate financial management.

These studies highlight the importance of financial strength and corporate performance in determining dividend distribution policies.

4. Research Methodology

4.1 Data Source

The study is based on secondary data collected from:

- Annual reports of pharmaceutical companies
- Bombay Stock Exchange (BSE) database
- Financial websites and research journals

4.2 Sample Selection

The study focuses on selected pharmaceutical companies listed on the BSE such as:

- Sun Pharmaceutical Industries
- Cipla
- Dr. Reddy's Laboratories
- Lupin
- Aurobindo Pharma
- Torrent Pharmaceuticals

4.3 Study Period

The study covers a period of five years (2019–2024).

4.4 Tools And Techniques Used

Financial Health Indicators

- Current Ratio
- Quick Ratio
- Debt–Equity Ratio
- Return on Assets (ROA)
- Return on Equity (ROE)

Dividend Indicators

- Dividend Per Share (DPS)
- Dividend Payout Ratio
- Dividend Yield

Statistical Tools

- Descriptive statistics
- Correlation analysis
- Ratio analysis

5. Analysis Of Financial Health

Financial health indicates the stability and sustainability of a company's operations.

Profitablity

- Profitability ratios such as ROA and ROE measure how efficiently a company generates profit from its resources.
- Pharmaceutical companies generally maintain strong profitability due to high demand for medicines and global export opportunities.

Liquidity

Liquidity ratios measure the company's ability to meet short-term obligations. Companies with higher liquidity are more capable of maintaining consistent dividend payments.

Solvency

Solvency ratios such as the debt-equity ratio help determine the company's long-term financial stability. Pharmaceutical companies typically maintain moderate or low leverage due to the importance of financial stability in research-intensive industries.

6. Dividend Payout Analysis

Dividend payout represents the portion of earnings distributed to shareholders.

Pharmaceutical companies usually adopt stable dividend policies to maintain investor confidence. Companies with strong cash flows and profitability are more likely to distribute higher dividends.

Dividend payout ratios vary among companies depending on factors such as:

- Profitability
- Liquidity
- Growth opportunities
- Research and development investments

Studies have shown that dividend payments also signal the quality of earnings and financial stability to investors.

7. Rrelationship Between Financial health And Dividend Policy

Financial health plays an important role in determining dividend policies.

Research indicates that

- Higher profitability leads to higher dividend payouts.
- Companies with strong liquidity maintain stable dividend policies.
- Firms with high growth opportunities may retain earnings instead of distributing dividends.

Empirical studies also confirm a positive relationship between dividend payout ratio and financial performance indicators such as ROA and profitability.

8. Findings Of The Study

1. Most BSE listed pharmaceutical companies maintain strong financial health due

to stable demand for pharmaceutical products.

2. Companies with higher profitability and liquidity generally pay higher dividends.
3. Dividend policies differ among companies depending on investment and growth strategies.
4. A positive relationship exists between financial performance and dividend payout ratios.

9. Coclusion

The pharmaceutical sector in India plays an important role in the economy and attracts significant investor interest due to its stable financial performance. This study concludes that financial health significantly influences dividend payout decisions in BSE listed pharmaceutical companies.

Companies with strong profitability, liquidity, and low financial risk tend to maintain consistent dividend payout policies. However, firms that prioritize research and expansion may retain earnings rather than distribute high dividends.

Therefore, investors should consider both financial health indicators and dividend policies when making investment decisions in pharmaceutical companies.

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The Role of Education in National Integration and Nation Building

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Abstract

The theoretical paper on role of education in national integration and nation building aims to reveal that the conceptual frame work about national integration in India and the way nation can be build by developing integration in the people of the society. National integration means national unity, it is unity in diversity. A nation is said to be integrated only when the people are united for national interest and importance. National integration involves the sentiment of nationalism, social, political, economic, emotional, linguistic and cultural unity. Also include common ideals of life and a common code of behavior. National Integration is a feeling of heaven of freedom, it is a people concerned. Education is a great tool and effective means of national integration. National integration is the awareness of a common identity amongst the citizens of a country. It means that though we belong to different castes, religions and regions and speak different languages we recognize the fact that we are all one.

Key Words : Diversified Society, Challenges, Remedies, Nation Building, Promotion of National Integration, Harmony

Introduction

Education plays a crucial role in shaping the character, values, and vision of a nation. It is not only a means of acquiring knowledge but also a powerful instrument for promoting unity, harmony, and development in society. In a diverse country like India, where people differ in language, religion, culture, caste, and traditions, education becomes an essential tool for strengthening national integration and building a strong nation.

National integration refers to the feeling of unity, brotherhood, and solidarity among citizens of a country despite their differences. Nation building, on the other hand, is the process of developing a strong, stable, and progressive nation through economic, social, political, and cultural development. Education contributes significantly to both these processes by promoting shared values, civic responsibility, and a sense of belonging among citizens.

Meaning of National Integration

National integration means bringing together people from different backgrounds into a unified national identity. It involves developing a sense of loyalty and commitment toward the nation. In countries with diverse populations, national integration ensures peace, cooperation, and mutual respect among different communities.

In India, diversity is a unique feature. People speak hundreds of languages and follow many religions. Yet, the idea of unity in diversity has been the foundation of the nation. Education helps people understand this diversity and appreciate the richness of different cultures while maintaining a strong national identity.

Meaning of Nation Building

Nation building refers to the process of creating a strong and stable nation through the development of institutions, infrastructure, economy, and social harmony. It involves shaping responsible citizens who contribute to national progress and development.

Nation building is not only the responsibility of governments but also of citizens. Education prepares individuals to participate actively in democratic processes, respect laws, and work toward the welfare of society.

Education as a Tool for National Integration

Education is one of the most effective tools

for promoting national integration. Schools and universities provide a platform where students from different backgrounds come together and interact with one another. Through education, individuals learn about the values of tolerance, equality, and cooperation.

1. **Promoting Unity in Diversity :** Education teaches students to respect and appreciate different cultures, languages, and traditions. By learning about the diverse heritage of India, students develop pride in their country and respect for people from other communities.

   Educational institutions celebrate national festivals, cultural programs, and community events that promote unity among students from different backgrounds. This encourages mutual understanding and strengthens the feeling of belonging to one nation.

2. **Teaching Constitutional Values :** Education helps students understand the principles and values of the Indian Constitution such as justice, liberty, equality, and fraternity. These values form the foundation of national integration.

   By learning about the Constitution and the rights and duties of citizens, students develop respect for democratic institutions and the rule of law. This promotes responsible citizenship and social harmony.

3. **Reducing Social Inequalities :** Education helps reduce social inequalities related to caste, gender, religion, and economic status. When individuals receive equal opportunities for education, they are empowered to improve their lives and contribute to society.

   Education promotes social mobility and helps break down barriers that divide society. When people from different backgrounds study together, they develop mutual respect and understanding, which strengthens national integration.

4. **Promoting National Identity :** Education instills a sense of national identity among students. By learning about the history, culture, and achievements of the nation, students develop pride and loyalty toward their country.

   Studying the contributions of national leaders such as Mahatma Gandhi, Jawaharlal Nehru, and B. R. Ambedkar inspires students to work for the welfare of the nation and uphold its values.

Role of Education in Nation Building

Education plays a vital role in the overall development of a nation. It shapes skilled, responsible, and innovative citizens who contribute to national progress.

1. **Development of Human Resources :** A nation's progress depends largely on the quality of its human resources. Education develops knowledge, skills, and creativity among individuals. Skilled and educated citizens contribute to economic growth and technological advancement.

   Education prepares individuals for various professions such as science, engineering, medicine, education, and administration, which are essential for national development.

2. **Strengthening Democracy :** Education strengthens democratic values by making citizens aware of their rights and responsibilities. An educated population is more likely to participate in democratic processes such as voting, public discussions, and community development.

   Education promotes critical thinking, enabling citizens to make informed decisions and hold leaders accountable.

3. **Promoting Social and Economic Development :** Education plays a significant role in reducing poverty and promoting economic development. Educated individuals have better employment opportunities and contribute to productivity and innovation.

   Education also promotes entrepreneurship and encourages individuals to create new opportunities for themselves and others.

4. **Encouraging Scientific Temper :** Education promotes scientific thinking and rational decision-making. A scientifically educated society is better equipped to solve problems, adopt new technologies, and promote innovation.

   Scientific progress contributes to national development in fields such as healthcare, agriculture, industry, and environmental protection.

5. **Promoting National Discipline and Responsibility :** Education teaches values such as discipline, responsibility, honesty, and cooperation. These values are essential for maintaining social order and national progress.

Students learn to work together, respect rules, and contribute to society through various educational activities such as group projects, community service, and leadership programs.

Challenges to National Integration in Education

Despite the important role of education, several challenges affect its ability to promote national integration and nation building.

1. **Regionalism and Linguistic Differences :** Regional and linguistic differences sometimes create divisions among people. Education must promote respect for all languages and cultures while encouraging national unity.
2. **Communalism and Religious Conflicts :** Religious differences can lead to misunderstandings and conflicts. Education should emphasize tolerance, respect, and interfaith understanding to overcome such issues.
3. **Inequality in Educational Opportunities :** Many students in rural and economically weaker sections of society still lack access to quality education. This inequality can create social divisions and hinder national development.
4. **Political Influence in Education :** Political interference in education can affect the neutrality and objectivity of educational content. Education should focus on promoting unity, critical thinking, and democratic values rather than political agendas.

Measures to Strengthen the Role of Education

To enhance the role of education in national integration and nation building, several steps can be taken.

1. **Value-Based Education :** Educational institutions should emphasize moral and ethical values such as honesty, compassion, respect, and tolerance. These values help build responsible citizens who contribute positively to society.
2. **Inclusive Education :** Education should be accessible to all sections of society regardless of caste, gender, religion, or economic status. Inclusive education promotes equality and social harmony.
3. **Cultural Exchange Programs :** Schools and universities should organize cultural exchange programs, educational tours, and national integration camps where students interact with peers from different regions and backgrounds.

   Such programs help students understand the diversity of the country and develop a sense of unity.
4. **Civic Education :** Civic education should be strengthened to help students understand democratic principles, constitutional values, and the responsibilities of citizenship.
5. **Use of Technology in Education :** Technology can help expand access to education and promote national awareness. Online learning platforms, digital classrooms, and educational media can reach students across different regions and backgrounds.

Conclusion

Education plays a fundamental role in promoting national integration and nation building. It shapes the attitudes, values, and skills of individuals, enabling them to contribute positively to society and the nation.

In a diverse country like India, education helps bridge cultural, linguistic, and social differences by promoting unity, tolerance, and mutual respect. It prepares responsible citizens who understand their rights and duties and actively participate in the development of the nation.

By promoting equality, democratic values, scientific thinking, and social harmony, education lays the foundation for a strong, united, and progressive nation. Therefore, investing in quality and inclusive education is essential for building a peaceful and prosperous society.

Ultimately, education is not only about individual success but also about collective progress. A well-educated population is the cornerstone of national integration and the driving force behind the development of a strong and united nation.

An Empirical Study of Consumer Intentions Toward Electric Vehicles in Surat : A TPB Perspective

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Abstraction

Interest in electric vehicles (EVs) has increased because of the global shift to more environmentally friendly modes of transportation. This study analyses the Theory of planned behaviour to investigate how attitudes, subjective norms, and perceived behavioural control impact Surat City customers' intentions to purchase electric cars.

230 individuals provided primary data using a standardized questionnaire. SPSS was used for statistical analysis, which included regression, correlation, and reliability tests.

According to the findings, purchase intentions are knowinglyunfair by social considerations, environmental attitudes, and the apparent ease of EV ownership, even while high initial costs and a lack of suitable charging infrastructure remain significant barriers.

To promote EV adoption in developing urban markets like Surat City, the study provides manufacturers and policymakers with useful insights.

Keywords : Electric Vehicles, Consumer Buying Behaviour, Theory of Planned Behaviour, Intention to Purchase, Eco-Friendly Transportation, Surat City.

1. Introduction

Electric vehicles (EVs) are becoming more and more popular around the world due to the increasing need for environmentally friendly transportation options. India has given priority to promoting electric mobility because of its growing emphasis on sustainable development and environmental conservation.

Customers' choices are gradually shifting towards more environmentally friendly modes of transportation in Surat City, a developing urban centre. It is essential for legislators and automakers to comprehend the elements affecting customer purchasing decisions to supportthis shift.

2. LiteratureReview

Several factors, including as financial advantages, government incentives, technology improvements, and environmental consciousness, are highlighted in existing research as predictors of EV adoption (Egbue& Long, 2012; Rezvani et al., 2015). Consumer behaviour research has made extensive use of the Theory of Planned Behaviour (Ajzen, 1991), which postulates that behavioural intentions are shaped by attitudes, subjective standards, and perceived behavioural control.

- **Attitude :** Individual assessment of EVs according to their environmental advantages, cost savings, and modernity (Rezvani et al., 2015).
- **Subjective Norms :** Social influences from family, peers, and societal perceptions (Rogers, 2003).
- **Perceived Behavioural Control :** Individual confidence in affording, using, and maintaining EVs, influenced by infrastructure and incentives (Egbue& Long, 2012).
- **Lad and Sidhpuria's (2023)** study examined Surat residents' intentions regarding EV charging stations. They found four major factors—Charging Station Identity, Facility, Technology, and Economic Aspects—that affect respondents' propensity to use EV charging stations based on surveys of 170people. Thedecision of city peopletoconvert

electric vehicles is significantly influenced by these factors.

- **Bhasin and Srivastava (2024)** carried out a quantitative study that examinedinformation from 439 respondents in India. They discovered that EV buying decisions are heavily influenced by cost and economic advantages, performance and technology benefits, and environmental benefits. It's interesting to note that social images have no effect.
- **Nirmala and Dsouza (2023)** investigated how consumer choices for EVs are influenced by perceived benefits. According to their findings, consumer preferences are significantly influenced by variables such as changes in fuel prices, environmental awareness, and price parity with gasoline and diesel vehicles.
- **Singh et al. (2023)** examined psychological antecedents such as lifestyle, conspicuous consumption, and utilitarian shopping value. They discovered that EV attitudes are positively influenced by lifestyle and conspicuous spending, which in turn influences ecological behavior and purchasing intentions.
- **Bansal et al. (2021)** examined the price sensitivity of Indian consumers for better EV features.The importance of these aspects in adoption decisions is demonstrated by their findings that consumers are prepared to pay more for shorter charging times, longer driving range, and cheaper operating expenses.

1. Research Gap

Few studies have used TPB with primary data to evaluate consumer behaviour in smaller but quickly growing cities like Surat, even though prior research acknowledges environmental incentives and infrastructure barriers in EV adoption. This study fills this knowledge vacuumby investigating the relationship between EVpurchasing intentions and attitudes, social effects, and perceived control.

2. Objectives

1. To examine, using the TPB framework, the factors impacting Surat City consumers purchasing decisions regarding EVs.
2. To investigate the connectionamongst attitudes, subjective norms, perceived behavioural control, and purchase intentions.
3. To identify the primary barriers to EV adoption and offer solutions to increase consumer acceptability.

5. Hypotheses

- **H0 :** There is no significant connection between attitude, subjective norms, or perceived behavioural control and plans to purchase electric vehicles.
- **H1 :** Attitude, subjective norms, and apparent behavioural control all consume a major impact on the desire to buy an electric vehicle.

The hypothesis is theoretically sound and reasonable in this situation. A person's intention to carry out a behaviour is influenced by three primary elements, according to the Theory of Planned Conduct (TPB): boldnessto the action, subjective standards, and perceived behavioural control.

To determine how these characteristics affect purchasing intentions, several research projects have used TPB in the context of EV adoption. Thus, in this theoretical context, alternative hypothesis(H1) and null hypothesis (H0) are suitable for empirical testing. It's crucial to remember that, despite TPB's broad support, some research has discovered that the three components have differing levels of influence, indicating that the effects may vary depending on the population and the circumstance. However, theories offer a strong starting point for examining the factors that influence EV purchasing intentions.

3. Methods of Research

- **Research Design :** Quantitative descriptive research methodology. Convenience sampling is the method used for sampling.
- The sample size consisted of 230 Surat City respondents.
- **Data Collection :** Using a structured questionnaire ased on TPB components, primary data was gathered.
- **Data analysis :** SPSS (VersionXX)for regression, correlation, and reliability testing.
- Variables

I) Independent Variables : Perceived behavioural control, attitude, and subjective norms

II) the variable that depends : Purchase Intention

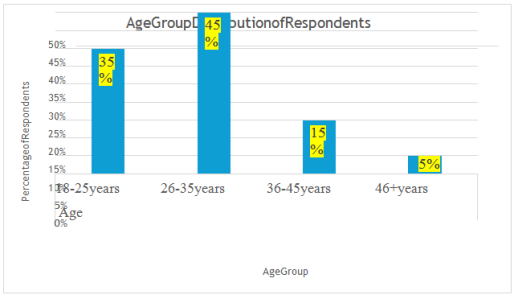
4. Scope of the Study

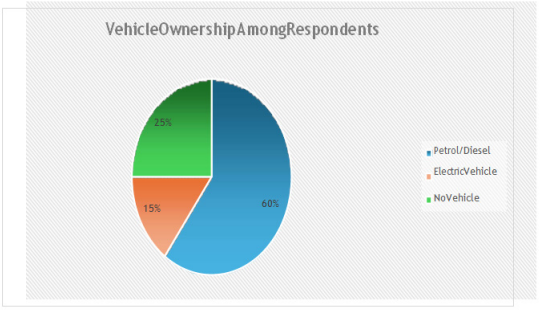
The urban consumers in Surat City who may purchase electric vehicles are the subject of this study. It evaluates their attitudes, social influences, and behavioural control about the adoption of EVs, offering insightful information to thoseinvolved in advancing sustainable mobility.

5. Interpretation and Analysis of Data

5.1 Respondents' Demographic Profile

DemographicFactor	Category	Frequency(%)
Age Range	18 to 25 years	35%
	26 to 35 years	45%
	36 to 45 years	15%
	46+ years	5%
Gender	Male	62%
	Female	38%
Occupation	Student	30%
	Employed	50%
	Business Owner	20%
Vehicle Ownership	Petrol/Diesel	60%
	Electric Vehicle	15%
	No Vehicle	25%

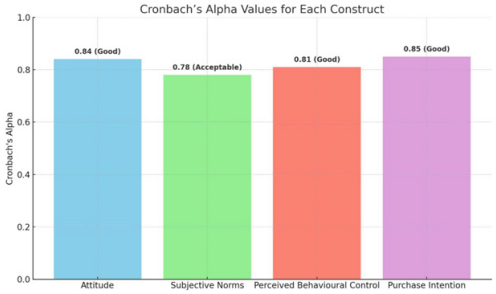




5.2 Reliability Analysis using Cronbach's Alpha

Build	Cronbach (α)	Interpretation
Attitude	0.84	Good
SubjectiveNorms	0.78	Acceptable
Perceived Behavioural Control	0.81	Good
PurchaseIntention	0.85	Good

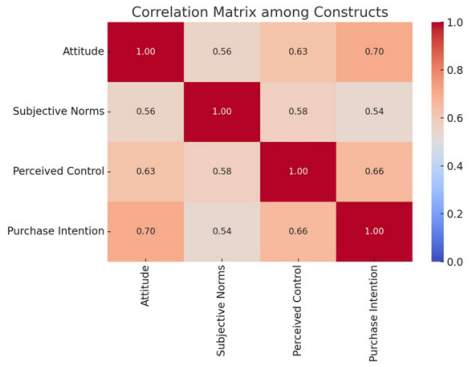
All constructs exhibited acceptable reliability (a>0.7), indicating internal consistency.



5.3 Correlation Analysis

Factors	Attitude	Subjective Norms	Perceived Control	Intention of perchase
Attitude	1	0.56**	0.63**	0.70**
SubjectiveNorms	0.56**	1	0.58**	0.54**
PerceivedControl	0.63**	0.58**	1	0.66**
PurchaseIntention	0.70**	0.54**	0.66**	1

Note : p<0.01 (significant correlation)



5.4 Analysis of Regression Summary of the model

Model	R	R2	AdjustedR2	Error Term
1	0.737	0.543	0.537	0.421

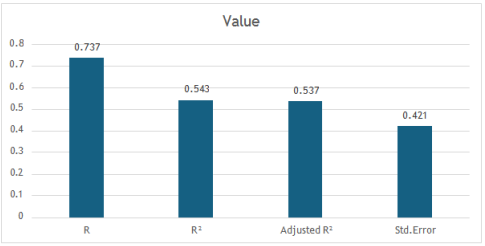


Table of ANOVA

Source	SSS	def.	Mean Square	F	Sig. (P Value)
Result	89.65	3	29.88	162.34	.000**
Residual	75.60	226	0.33		
Total	165.25	229			

Coefficients Table

Predictor	B	Beta	t	Sig.
Constant	0.52		3.02	.003
Attitude	0.40	0.44	8.86	.000**
SubjectiveNorms	0.21	0.23	4.52	.000**
PerceivedControl	0.33	0.35	6.98	.000**

6. Discussion

The analysis indicates that all three TPB components like attitude, subjective norms, andperceived behavioural controlhave a significant impact on EV purchase purposes. Positive social effects and environmental attitudes increase the desire of customers to purchase EVs but concerns about exorbitant upfront prices and insufficient facilities for charging.

7. Suggestions

1. **EV Infrastructure Strengthening :** Increase Surat's charging networks to improve perceived control.
2. **Awareness Campaigns :** Highlight the cost-effectiveness and environmental advantages of EVs.
3. **Financial Incentives :** Expand financing options and subsidies to lower upfront costs.
4. **CommunityEngagement :** Assist social influence rsin promoting EV ownership.

8. Limitations

1. The study was restricted to Surat City respondents, which limited its generaliz ability.
2. Convenience sampling could result in bias.
3. Cross-sectional design restricts the evaluation of changing customer attitudes.

9. Conclusion

This study emphasizes how attitudes, social influences, and perceived control play a significant role in influencing Surat City residents' willingness to buy EVs. Producers and regulators containerhearten wider EV implementation and pay to the development of a more supportable transportation upcoming by leveraging positive consumer perceptions and removing significant barriers.

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AI-Driven Pedagogy in Commerce Education : An Empirical Study of Students and Faculty of Ahmedabad

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Abstract

This study examines the awareness, usage, benefits, and challenges of Artificial Intelligence (AI) in commerce education among students and faculty members in selected colleges of Ahmedabad. Primary data were collected from 210 students and 32 faculty members through structured questionnaires. Statistical tools such as percentage analysis, chi-square test, t-test, and correlation analysis were used for data analysis. The findings reveal that most students are aware of and frequently use AI tools for academic purposes, while faculty members generally support AI integration with some concerns regarding overdependence and academic integrity. The study concludes that AI positively influences learning efficiency and recommends proper training and institutional guidelines for effective AI adoption.

Keywords : Artificial Intelligence, Commerce Education, AI Tools, Learning Efficiency, Higher Education.

1. Introduction

Artificial Intelligence (AI) has emerged as one of the most significant technological developments influencing modern education systems. AI refers to computer systems designed to perform tasks that normally require human intelligence such as learning, reasoning, problem solving, and decision making. With the rapid growth of digital technologies, AI is increasingly being integrated into educational environments to enhance teaching and learning experiences.

In recent years, educational institutions around the world have started adopting AI-based technologies such as intelligent tutoring systems, automated grading software, virtual assistants, chatbots, and adaptive learning platforms. These tools enable students to access instant feedback, personalized learning materials, and automated academic support. As a result, AI has the potential to improve student engagement, learning efficiency, and academic performance. Commerce education, which includes subjects such as accounting, finance, taxation, economics, and business analytics, requires both conceptual understanding and analytical skills. Traditional teaching methods often rely heavily on lectures, textbooks, and manual problem solving. However, AI-driven learning tools now provide students with opportunities to receive instant explanations, automated calculations, and data-based insights. For example, AI-based accounting software can assist students in understanding financial transactions, while AI chatbots can help clarify difficult theoretical concepts.

The growing availability of AI tools such as ChatGPT, Grammarly, AI-based accounting systems, and data analytics platforms has significantly influenced the learning behavior of students. Many students now rely on these technologies for completing assignments, improving writing quality, and solving complex problems. At the same time, faculty members are exploring the potential of AI tools to improve teaching efficiency and reduce routine tasks such as grading and administrative work.

Despite the advantages of AI integration in education, several challenges remain. Concerns such as academic integrity, excessive dependence on technology, lack of digital literacy, and insufficient institutional policies have been widely discussed in academic literature. Faculty members may also require proper training to effectively integrate AI tools into their teaching practices.

Ahmedabad is one of the major educational

centers in Gujarat with several universities and commerce colleges. Many institutions in the city have started adopting digital learning platforms and AI-supported educational tools. However, the level of awareness, acceptance, and practical usage of AI among students and faculty members varies across institutions. Therefore, the present study aims to examine the awareness, acceptance, benefits, and challenges of AI-driven pedagogy among commerce students and faculty members in Ahmedabad. By analyzing empirical data collected from selected colleges, the study attempts to understand how AI technologies are influencing commerce education and what measures can be taken to ensure their effective and responsible use.

2. Review of Literature

Artificial Intelligence (AI) has emerged as a significant technological advancement influencing various sectors, including education. Several researchers have examined the role of AI in improving teaching methods, learning outcomes, and educational efficiency. In recent years, studies conducted in India have increasingly focused on the integration of AI tools in higher education. \

Holmes, Bialik, and Fadel (2019) discussed the global impact of Artificial Intelligence in education and emphasized that AI technologies can enhance personalized learning by adapting educational content according to the individual learning needs of students. Their research highlighted that AI-based systems improve student engagement and allow educators to track learning progress mo re effectively.

Luckin (2018) also highlighted that AI technologies can support teachers by automating routine tasks such as grading assignments, monitoring student progress, and managing administrative responsibilities. According to the study, this automation allows teachers to devote more time to conceptual teaching and student interaction.

In the Indian context, Kumar and Sharma (2021) examined the adoption of digital learning technologies in higher education institutions and found that students are increasingly using AI-based applications for academic support. Their study indicated that tools such as AI chatbots, grammar correction software, and automated learning platforms help students improve their understanding of complex academic topics.

A study conducted by Singh (2022) on the use of AI tools in Indian universities found that students show a positive attitude toward AI-assisted learning. The research revealed that AI tools help students access information quickly, improve assignment quality, and enhance research efficiency. However, the study also highlighted concerns related to academic honesty and the possibility of excessive dependence on AI technologies.

Research conducted by Patel and Desai (2021) in Gujarat examined the adoption of digital learning technologies among college students in Ahmedabad. The study reported that a large proportion of students regularly use digital learning platforms and AI-supported tools for academic activities. The findings suggested that students perceive AI technologies as helpful in understanding difficult concepts and completing academic tasks more efficiently.

Another study by Shah (2022) focusing on higher education institutions in Gujarat found that faculty members generally support the integration of digital technologies in teaching. However, the study emphasized that many educators require proper training to effectively use AI-based tools in their teaching practices. The research also highlighted the importance of institutional support and clear guidelines for ethical technology usage. Similarly, a study conducted by Mehta and Trivedi (2023) on technology adoption in commerce education in Gujarat revealed that AI-based tools are gradually becoming an important component of digital learning environments. The researchers observed that students often use AI tools for solving accounting problems, improving writing skills, and accessing learning materials. Overall, the literature indicates that AI has considerable potential to enhance teaching and learning processes in higher education. However, successful implementation requires adequate digital literacy, faculty training, and institutional policies to ensure responsible and effective use of AI technologies in academic environments.

3. Objectives of the Study

1. To examine the level of awareness of AI tools among commerce students and faculty members.
2. To analyze the acceptance and usage of AI-driven pedagogy in commerce education.
3. To identify the benefits and challenges associated with AI integration in teaching and learning.

4. Hypothesis of the Study

- **H01 :** There is no significant relationship between awareness of AI tools and the usage of AI tools among commerce students.
- **H02 :** There is no significant difference between student and faculty perception regarding the benefits of AI in commerce education.

5. Scope

The study focuses on examining the awareness, usage, benefits, and challenges of AI-driven pedagogy among commerce students and faculty members in

selected colleges of Ahmedabad. It mainly analyzes perceptions regarding AI tools used for teaching, learning, assignments, and conceptual understanding in commerce education.

6. Limitations

The study is limited to selected commerce colleges in Ahmedabad and includes a limited sample of students and faculty members. The research mainly focuses on perceptions and usage patterns of AI tools rather than measuring long-term academic performance or learning outcomes.

7. Research Design

7.1 Research Area : The study was conducted in commerce colleges located in Ahmedabad, particularly in educational areas such as Bopal and nearby academic zones.

7.2 Sample Selection : The study includes a sample of 210 commerce students and 32 faculty members from selected colleges in Ahmedabad. Respondents were selected using the convenience sampling method, considering their accessibility and willingness to participate in the survey.

7.3 Data Collection : Primary data for the study were collected through structured questionnaires distributed among commerce students and faculty members in selected colleges of Ahmedabad. The questionnaire included questions related to awareness, usage, benefits, and challenges of AI tools in education. A total of 210 students and 32 faculty members participated in the survey. Secondary information was obtained from books, journals, and research articles related to AI in education.

7.4 Data Analysis Method : The collected data were analyzed using quantitative statistical techniques. Percentage analysis was used to examine awareness and usage patterns of AI tools. Chi-square test was applied to determine the relationship between awareness and usage of AI tools among students. An independent sample t-test was used to compare student and faculty perceptions, while correlation analysis examined the relationship between AI usage and learning efficiency.

8. Primary Data Analysis

Aspect	Category	Students (%)	Faculty (%)
Awareness of AI Tools	Highly Aware	37% (78)	—
	Moderately Aware	44% (92)	—
	Slightly Aware	14% (30)	—
	Not Aware	5% (10)	—
Use of AI Tools	Frequently	46% (96)	—
	Occasionally	34% (72)	—
	Rarely	14% (30)	—
	Never	6% (12)	—
Faculty Perception	Strongly Support	—	28%
	Support	—	41%
	Neutral	—	16%
	Oppose	—	15%
Perceived Benefits	Quick Access to Information	72%	65%
	Better Understanding of Concepts	61%	58%
	Assistance in Assignments	69%	54%
	Personalized Learning	48%	46%
Challenges	Overdependence on AI	54%	68%
	Lack of Training	31%	59%
	Academic Integrity Issues	38%	63%
	Limited Institutional Support	22%	47%

Interpretation

The combined table presents a comprehensive overview of awareness, usage, perception, benefits, and challenges of AI in commerce education. The data shows that a majority of students are aware of AI tools and frequently use them for academic purposes. Faculty members generally support the integration of AI in teaching. Both students and faculty recognize benefits such as quick access to information and improved conceptual understanding. However, concerns such as overdependence on AI, lack of training, and academic integrity issues remain significant challenges in the effective implementation of AI in education.

9. Statistical Analysis and Hypothesis Testing

9.1 Hypothesis 1 Relationship between Awareness and Usage of AI Tools

Particulars	Value
Calculated χ^2	18.42
Degrees of Freedom	6
Critical Value (5% Level)	12.59

Interpretation

Since the calculated value of ?² (18.42) is greater than the critical value (12.59), the null hypothesis is rejected. This indicates that there is a statistically significant relationship between awareness of AI tools and their usage among commerce students. Therefore, higher awareness of AI tools is associated with greater usage in academic activities.

9.2 Hypothesis 2 Difference between Student and Faculty Perception

Group	Sample Size	Mean Score	Standard Deviation
Students	210	3.92	0.71
Faculty	32	3.54	0.68

Test Statistic	Value
t-value Calculated	2.71
Critical Value (5% Level)	1.96

Interpretation

The mean score of students (3.92) is higher than that of faculty (3.54), showing that students have a more positive perception of AI. Since the calculated t-value (2.71) is greater than the critical value (1.96), the null hypothesis is rejected. This indicates a significant difference between student and faculty perceptions toward AI.

10. Findings

The study reveals that a majority of commerce students are aware of AI tools and actively use them for academic purposes. Nearly half of the students frequently use AI technologies for assignments, research, and conceptual understanding. Faculty members generally support AI integration in teaching, although some express concerns regarding over dependence and academic integrity. The statistical

analysis confirms a significant relationship between awareness and usage of AI tools among students. Additionally, a significant difference exists between student and faculty perception regarding AI benefits. The correlation analysis indicates that higher usage of AI tools positively influences learning efficiency and helps students improve their understanding of academic concepts.

11. Conclusion

The study concludes that AI-driven pedagogy plays an increasingly important role in commerce education. Students show a high level of awareness and acceptance of AI tools, while faculty members recognize their potential benefits with some reservations. Statistical analysis confirms that awareness significantly influences AI usage and that AI usage positively impacts learning efficiency. Proper training, institutional support, and ethical guidelines are essential to ensure responsible and effective use of AI technologies in higher education.

12. Suggestions

Educational institutions should provide training programs to help faculty members effectively integrate AI tools into teaching practices. Universities should also develop clear guidelines for ethical use of AI in academic work. Encouraging balanced use of AI tools along with traditional teaching methods can improve learning outcomes and maintain academic integrity.

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A Study of Financial Literacy, Fintech Adoption, and Financial Inclusion among Farmers: An Overview

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Abstract

Financial literacy and financial technology (fintech) are increasingly recognized as important factors in expanding financial inclusion in developing economies. In rural areas, particularly among farmers, inadequate knowledge of financial products and limited access to modern banking services often restrict economic development and financial stability. This study evaluates the level of financial literacy among farmers and examines its influence on the adoption of fintech services and participation in formal financial systems. The research focuses on farmers' awareness and use of digital financial tools such as mobile banking, digital payment platforms, online banking services, and government-supported financial schemes. The analysis is based on both primary and secondary data collected from farmers across several villages in the district. The findings suggest that higher levels of financial literacy significantly encourage the adoption of fintech services and improve engagement with formal financial institutions. However, challenges including limited digital skills, concerns about online security, and inadequate internet connectivity continue to hinder wider fintech adoption. The study highlights the importance of strengthening financial education and digital literacy programs to enhance fintech usage and promote financial inclusion among rural farmers.

Keywords : Financial Literacy, Fintech Adoption, Financial Inclusion, Farmers.

Introduction

In recent years, financial literacy has gained significant attention as an important factor in improving financial well-being and economic development. Financial literacy refers to the ability of individuals to understand financial concepts, manage money effectively, and make informed decisions regarding savings, investments, borrowing, and financial planning. Individuals with adequate financial knowledge are more capable of utilizing financial services efficiently and protecting themselves from financial risks. In developing economies like India, improving financial literacy is considered essential for strengthening financial inclusion, especially in rural and agricultural communities.

At the same time, the rapid growth of financial technology (fintech) has transformed the traditional financial system. Fintech refers to the use of digital technologies to deliver financial services in a faster, more convenient, and cost-effective manner. Services such as mobile banking, digital payment platforms, online banking, and digital lending have made financial transactions easier and more accessible to people who previously had limited contact with formal financial institutions. These innovations have the potential to reduce the gap between rural populations and the formal banking system.

Farmers represent a crucial segment of the Indian economy, as agriculture continues to provide employment and livelihood to a large portion of the population. Despite their importance, many farmers still face difficulties in accessing formal financial services due to factors such as lack of awareness, limited financial education, and geographical barriers. In districts like Jalgaon, where agriculture forms the backbone of the local economy, access to financial resources such as credit, crop insurance, savings facilities, and secure payment systems is essential for improving farmers' economic stability and productivity.

Financial technology can play a key role in addressing these challenges by offering simple, affordable, and accessible financial solutions to rural populations. However, the successful adoption of fintech services among farmers largely depends on their level of financial literacy and digital awareness. Farmers who possess better knowledge of financial products and digital tools are more likely to adopt fintech services and participate actively in the formal financial system.

Therefore, it is important to examine the relationship between financial literacy, fintech adoption, and financial inclusion among farmers. Understanding this relationship can help policymakers, financial institutions, and government agencies design effective financial education and digital training programs aimed at strengthening financial inclusion and supporting rural economic development.

Literature Review

Sharma (2024) examined the key factors influencing fintech adoption in the agricultural sector, particularly among Indian farmers. The study revealed that elements such as performance expectancy, social influence, and convenience play an important role in shaping farmers' willingness to use fintech services. According to the research, digital financial technologies can contribute to better agricultural productivity and greater financial inclusion when farmers consider them useful and easy to operate.

Mathur (2022) investigated the level of fintech adoption among farmers and identified several barriers, including perceived risks, lack of awareness, and concerns about digital security. The findings indicate that strengthening financial literacy and building trust in digital financial systems can significantly improve the adoption of fintech services in rural farming communities.

Jhamb (2025) explored the connection between fintech adoption and financial inclusion in rural India. The study emphasized three important dimensions—access, usage, and quality of financial services—to demonstrate how fintech platforms help connect rural populations, including farmers, with formal banking systems.

Jena (2025) analyzed the determinants of fintech adoption in rural areas using theoretical frameworks such as the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Technology Readiness Index (TRI). The study concluded that factors like technological readiness, perceived usefulness, and behavioral intention strongly affect the acceptance of digital financial services in rural communities.

Anjana (2024) conducted a review of financial literacy among farmers and reported that only a small proportion of farming households possess adequate financial knowledge to access formal credit facilities. The study highlighted the need for financial education initiatives to improve farmers' understanding of banking and financial services.

Gautam (2022) studied the influence of digitalization on the agricultural sector in India and found that digital technologies and fintech solutions help farmers gain better access to financial services as well as agricultural information. The research emphasized that such technologies can support rural development and empower farmers economically.

Ghosh (2018) examined the progress of financial inclusion in India and observed that initiatives like the Jan Dhan Yojana significantly increased access to banking services. The study also noted that the integration of fintech tools, including mobile banking and digital payment applications, further improved the usability and adoption of financial services among rural populations.

Arora and Rathi (2019) analyzed the contribution of fintech in agricultural financing and concluded that digital platforms enable faster credit disbursement, reduce farmers' dependence on informal moneylenders, and support small farmers through innovative insurance products.

Nair and Kumar (2021) explored the impact of digital financial services in rural India and found that fintech applications have enhanced farmers' access to services such as crop insurance, digital payments, and weather-based risk management tools. The authors suggested that incorporating fintech solutions into government programs could further strengthen financial inclusion in rural areas.

Objectives of the Study

- To examine the level of financial literacy among farmers.
- To analyze the awareness and adoption of fintech services among farmers.
- To study the relationship between financial literacy and fintech adoption.
- To evaluate the impact of fintech adoption on financial inclusion among farmers.

Research Methodology

Data for this research paper is collected from secondary sources of the data collection method. Secondary data was collected through various books, reference books, magazines, websites, the internet research journals and articles.

Factors Influencing FinTech Adoption among Farmers

1. Financial Literacy Level : Financial literacy is a key determinant in the adoption of FinTech services. Farmers who possess a clear understanding

of basic financial concepts—such as savings, credit, interest rates, and digital transactions—are more likely to utilize digital financial platforms. When farmers have adequate financial knowledge, they are better able to understand the benefits and functioning of digital financial services. In contrast, limited financial awareness may lead to hesitation or fear of using new technologies, which can reduce the adoption of FinTech solutions.

2. Digital Literacy and Technical Skills : Digital literacy refers to the ability to operate digital devices and use internet-based applications effectively. Farmers who are familiar with smart phones and mobile applications find it easier to access and use FinTech services. However, many rural farmers may lack the necessary technological skills to operate banking applications, digital wallets, or online payment platforms, which creates challenges in adopting digital financial tools.

3. Internet Access and Digital Infrastructure : Stable internet connectivity is essential for the effective use of digital financial services. In several rural regions, limited network coverage and slow internet speeds restrict farmers' ability to use FinTech platforms. Inadequate telecommunication facilities, unreliable electricity supply, and insufficient digital infrastructure can significantly hinder the expansion of digital financial services in rural areas.

4. Educational Background : Education is another factor that influences the acceptance of new technologies. Farmers with higher educational attainment are generally more receptive to learning about digital financial tools and services. Education also helps individuals understand financial products, digital security measures, and the process of conducting online transactions, thereby increasing confidence in FinTech usage.

5. Age of Farmers : The age of farmers can also affect the adoption of digital financial technologies. Younger farmers are typically more comfortable with smartphones and digital applications, which makes them more likely to adopt FinTech services. Older farmers, on the other hand, may prefer traditional financial practices and may find it challenging to adapt to digital platforms.

6. Income Level and Economic Condition : The financial status of farmers influences their ability to access digital technologies. Farmers with higher incomes are more likely to own smartphones, maintain internet connectivity, and use banking services that support digital transactions. Conversely, farmers with limited financial resources may face difficulties in purchasing digital devices or maintaining internet access, which can limit FinTech adoption.

7. Trust and Security Perception : Trust plays a crucial role in encouraging the use of digital financial services. Many farmers are concerned about potential risks such as cyber fraud, data theft, and misuse of financial information. If farmers perceive digital financial platforms as safe and reliable, they are more willing to adopt these technologies. Therefore, building trust through strong security measures and awareness about safe digital practices is essential.

8. Awareness and Government Initiatives : Knowledge about digital financial services and government-led initiatives also contributes to FinTech adoption. Programs aimed at promoting digital technology and financial inclusion in rural areas help farmers become familiar with the advantages of digital financial tools. Awareness campaigns, training sessions, and financial education programs can significantly increase the use of FinTech services among farmers.

9. Presence of Financial Institutions : The availability of banks, cooperative societies, and other financial institutions in rural areas also influences the adoption of FinTech. When financial institutions actively promote digital services and provide guidance on their use, farmers are more likely to adopt these technologies. Banks that offer user-friendly mobile applications, training, and customer support can make digital financial services more accessible to rural communities.

Government Initiatives Promoting Financial Inclusion for Farmers

1. Pradhan Mantri Jan Dhan Yojana (PMJDY) : The Pradhan Mantri Jan Dhan Yojana was introduced to expand banking access to all households in India, with a strong focus on rural and economically weaker populations. The scheme enables farmers and rural residents to open basic savings bank accounts without any minimum balance requirement. Through these accounts, farmers can receive government subsidies, insurance claims, and other financial benefits directly via bank transfers. The initiative has played a significant role in increasing banking participation among rural populations and strengthening financial inclusion in agricultural communities.

2. Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) : This scheme provides direct financial assistance to small and marginal farmers across India. Under the program, eligible farmers receive an annual income support of ?6,000, which is transferred in three installments of ?2,000 each through the Direct Benefit Transfer (DBT) system. The financial support helps farmers manage agricultural expenses such as purchasing seeds, fertilizers, and other inputs required for cultivation.

3. Kisan Credit Card (KCC) : The Kisan

Credit Card scheme was designed to ensure that farmers have timely access to affordable credit for agricultural activities. Through this program, farmers can obtain short-term loans for crop cultivation and related expenses including seeds, fertilizers, irrigation, and farming equipment. The scheme also offers credit at relatively lower interest rates, reducing farmers' dependence on informal lenders who often charge very high interest.

4. Pradhan Mantri Fasal Bima Yojana (PMFBY) : The Pradhan Mantri Fasal Bima Yojana provides crop insurance coverage to farmers against potential losses caused by natural disasters, pests, or crop diseases. Since agricultural production is highly influenced by climatic conditions, this insurance scheme helps protect farmers from severe financial losses resulting from crop failure. By offering financial protection, the scheme supports farmers in continuing their agricultural activities even after facing unexpected risks.

5. Pradhan Mantri Kisan Maandhan Yojana : This program focuses on providing social security to small and marginal farmers. Under the scheme, eligible farmers contribute to a pension fund during their working years and receive a monthly pension of ?3,000 after reaching the age of 60. The initiative aims to ensure financial security and improve the overall welfare of farmers during their old age.

6. Agriculture Infrastructure Fund (AIF) : The Agriculture Infrastructure Fund was introduced to promote investment in agricultural infrastructure. It provides financial assistance and subsidized loans for the development of facilities such as warehouses, cold storage units, and other supply-chain infrastructure. By improving storage and distribution systems, the scheme helps strengthen agricultural value chains and supports farmers' economic growth.

7. Pradhan Mantri Krishi Sinchai Yojana (PMKSY) : The Pradhan Mantri Krishi Sinchai Yojana aims to enhance irrigation facilities and promote efficient water management in agriculture. The scheme emphasizes the principle of "Har Khet Ko Pani," which focuses on ensuring water availability for every farm. By improving irrigation infrastructure and water utilization, the program helps farmers maintain stable agricultural production and financial sustainability.

Findings and Discussion

The analysis of the collected data highlights several key observations regarding financial literacy and fintech adoption among farmers.

- A large proportion of farmers possess basic familiarity with conventional banking services such as savings accounts and bank loans. However, their awareness of modern digital financial tools, including mobile banking and digital payment platforms, remains relatively limited.
- Farmers who demonstrate a higher level of financial literacy show a greater willingness to use fintech services such as UPI-based payments, mobile banking applications, and online fund transfer systems.
- Access to smartphones and reliable internet connectivity plays a significant role in encouraging the use of digital financial services in rural areas.
- Concerns related to online fraud, cyber security, and inadequate technical knowledge act as major obstacles that discourage farmers from adopting fintech platforms.
- The use of fintech services enables farmers to access a variety of financial products more easily, including credit facilities, savings options, insurance services, and government subsidy programs.

Overall, the findings suggest that financial literacy is a crucial factor influencing the adoption of fintech services and contributes significantly to improving financial inclusion among farmers.

Challenges and Risks in FinTech Adoption among Farmers

1. Limited Financial Literacy : A major challenge faced by farmers is the lack of adequate financial knowledge. Many farmers have insufficient understanding of banking services, digital payment systems, insurance products, and credit management. Because of this limited awareness, they often rely on informal financial sources such as moneylenders. Inadequate knowledge of financial products also reduces their ability to use digital financial services effectively and restricts their involvement in the formal financial system.

2. Digital Illiteracy and Limited Technical Skills : A significant number of rural farmers are unfamiliar with smartphones, mobile banking applications, and other online financial platforms. Since digital financial services require basic technological skills, the absence of such knowledge creates difficulties in using fintech tools. This digital skill gap slows down the acceptance of fintech solutions in rural communities.

3. Inadequate Digital Infrastructure in Rural Areas : Many rural areas still face problems related to poor internet connectivity, unreliable electricity supply, and weak mobile network coverage. These infrastructural limitations make it challenging for farmers to access services such as mobile payments,

digital wallets, and online banking platforms. As a result, the growth of digital financial services in rural regions remains limited.

4. Security and Fraud Concerns : Farmers often hesitate to use digital financial services due to fears of cyber fraud, identity theft, and misuse of financial data. Limited knowledge of cybersecurity practices makes them more vulnerable to scams such as phishing messages, OTP fraud, and other online threats. These concerns reduce trust in fintech platforms and discourage farmers from adopting digital financial services.

5. Lack of Trust in Digital Financial Systems : Trust is a critical factor in the acceptance of fintech services. Many farmers continue to prefer cash-based transactions because they are more familiar and perceived as safer. Uncertainty about the reliability of digital financial platforms and fintech service providers slows the transition toward digital financial inclusion.

6. Cost of Digital Devices and Technology : For many small and marginal farmers, the cost of smartphones, internet data, and other digital tools can be a financial burden. Limited financial resources often prevent them from purchasing the devices and services required to access fintech platforms. This economic constraint becomes a barrier to the wider use of digital financial technologies.

7. Risk of Excessive Borrowing : The availability of digital lending platforms has made access to credit easier for farmers. Although this can support agricultural activities, it may also increase the possibility of excessive borrowing if farmers do not have sufficient financial knowledge or repayment planning. This situation can potentially lead to debt-related problems.

8. Regulatory and Policy Challenges : In many developing economies, regulatory systems governing fintech and digital finance are still developing. Weak regulatory frameworks, limited consumer protection measures, and inadequate monitoring mechanisms may create risks for farmers who rely on digital financial services.

Suggestions

Based on the outcomes of the study, the following recommendations are proposed to improve financial literacy and encourage fintech adoption among farmers:

1. Financial Education Programs for Farmers : Government agencies and financial institutions should conduct structured financial education initiatives in rural areas. These programs should focus on explaining fundamental financial concepts such as savings, credit management, insurance, and digital payment systems. By increasing financial awareness, farmers can make more informed financial decisions and reduce their reliance on informal lending sources.

2. Training on Digital Financial Services and FinTech Tools : Practical training sessions should be organized to help farmers learn how to use digital financial services such as mobile banking, digital wallets, online payment systems, and other fintech platforms. Demonstrations, workshops, and hands-on training can help farmers gain confidence in using digital technologies for financial transactions, savings, and credit access.

3. Development of User-Friendly Mobile Banking Applications : Banks and fintech companies should design mobile banking applications that are easy to operate for rural users. Features such as regional language options, voice-based instructions, simple navigation, and fewer steps for completing transactions can make digital banking platforms more accessible to farmers with limited digital skills.

4. Awareness Programs on Digital Security : Fear of cyber fraud and online scams discourages many farmers from using digital financial services. Awareness campaigns should be conducted through community meetings, local media, and digital platforms to educate farmers about safe digital practices. Information about protecting OTPs, identifying suspicious links, and verifying online transactions can help build trust in fintech services.

5. Strengthening Internet Connectivity in Rural Areas : Reliable internet access is crucial for the successful use of fintech services. Governments and telecommunications providers should invest in expanding broadband infrastructure and improving mobile network coverage in rural regions. Improved connectivity will allow farmers to use digital banking services more efficiently and benefit from fintech innovations.

Conclusion

Financial literacy, the adoption of financial technology, and financial inclusion are strongly connected within the rural economic framework. The findings of this study indicate that farmers who possess a better understanding of financial concepts are more inclined to utilize fintech services and engage with formal financial institutions. While fintech innovations create valuable opportunities for expanding financial access in rural areas, several obstacles remain. Limited digital awareness, concerns about cyber security, and inadequate technological infrastructure continue to restrict the widespread use of digital financial services among farmers.

Enhancing financial education and strengthening digital infrastructure can play a crucial role in encouraging the use of fintech platforms in rural communities. By improving farmers' knowledge

of financial and digital tools, it becomes possible to increase their participation in formal financial systems. In the long run, greater fintech adoption can support broader financial inclusion and contribute to the overall economic stability and development of farming households.

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A Study of Entrepreneurs & Entrepreneurship Development

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Abstract

In this research paper on Entrepreneurship Development, we have tried to understand how entrepreneurs are created, what benefits the country and the state get from entrepreneurs, and how many industries are created from entrepreneurs. Similarly, the various artistic skills and techniques possessed by entrepreneurs benefit the country and the nation, making the country self-reliant and helping to eradicate poverty in the country and contribute to the economic and social development of the country. If an entrepreneur is created, various unemployed youth get job opportunities through an entrepreneur. Employment is created on a large scale and due to employment creation, many unemployed youth get employment and it helps in ending the unemployment situation in the country. If an entrepreneur studies carefully how many industries like his are available in the current situation before establishing an industry, it helps in making that industry successful in the future. Therefore, in these research articles, we have tried to present what things an entrepreneur needs to take care of before industry and industry development. Therefore, in this research paper, we have tried to present the role of entrepreneurship here by emphasizing more on the concept of entrepreneurship I and entrepreneur development.

Key Word : Entrepreneurs, EDP, ideal. html, UMV, Wikipedia, Internet, SSI, SSBE, Ministry of Gov. DIC,

1. Introduction

For the economic development of a country, various research facilities are required. The economic development of any country is achieved through its resources. Similarly, if the economic development of a country is to be achieved, it is necessary to create various types of entrepreneurs in the country. The economic development of every country mainly depends on the number of entrepreneurs in the country, their type and working system. All other things required for economic development can be imported from abroad, but for political quality and capacity, it depends on our society and the resources of our country. We need to put restrictions on our mindset on the concept that successful entrepreneurs are born because it is a very false statement that successful entrepreneurs are born because successful industries are not public opinion but successful entrepreneurs have to be created. Entrepreneurs who are not entrenched in traditional industries, they become entrepreneurs by doing entrepreneurial work on their own efforts is called first generation entrepreneurs. Such entrepreneurs have no family background, when do they become entrepreneurs on their own efforts? Such entrepreneurs have somehow dared to enter the entrepreneurial field and are motivated to work as entrepreneurs on the help provided by the government. There may be some reasons behind the creation of entrepreneurs. Unemployment, desire to do entrepreneurship, motivation, various challenges faced by the entrepreneur, the future they have taken, entrepreneurial tendency, etc.

2. Evolution of Entrepreneurship

The success of many experts in the field of knowledge has attracted the concept of entrepreneurship. The economic factor of production management is known as the economic entrepreneur. The concept of entrepreneur has been created on the basis that the combination of entrepreneurship and initiative is entrepreneurship and the person in whom this combination has taken place is generally

considered an entrepreneur. Entrepreneurship is very different from our usual business attitude. The business attitude that is built on it means being smart, clever, and taking advantage of the right situation. That is, the situation around that person is like that, so that person has become an entrepreneur.

3. Types of Entrepreneur

The characteristics of an entrepreneur, the work and working methods, the field in which he works, the entrepreneur's family status, inheritance, social and national status, and his willpower. The types of entrepreneurship generally depend on these factors the economy in which an entrepreneur has to work should be considered very important because the business decisions of an entrepreneur depend on the economy. In a developed economy, it is possible to conduct various types of research and experiments, whereas in a developing country, new experiments are not proven due to insufficient availability of resources. Therefore, the work of entrepreneurship can generally be described in the following way.

3.1 Innovative Entrepreneurs : The term innovative entrepreneur is difficult to define, but it refers to entrepreneurs who welcome the innovations that are emerging in the form of war, and who improve various aspects of entrepreneurship to assimilate and put these innovations into practice Entrepreneurs who strive to bring about innovation are known as innovative entrepreneurs whose efforts lead to innovation are called innovative entrepreneurs.

3.2 Imitative Entrepreneurs : The behavior of an entrepreneur is not like that of an innovative entrepreneur. He becomes an entrepreneur by imitating others and adopting their plans and then copying them. Therefore, such an entrepreneur is called an imitative entrepreneur. An imitative entrepreneur is not ready to take any kind of risk in business. The entrepreneur works to get other entrepreneurs to adopt the techniques that have been adopted. Imitative entrepreneurs strive for the growth of entrepreneurship in the country.

3.3 Fabian Entrepreneurs : Those who conduct their business keeping in mind certain established customs, traditions, and ideals established by the head of the family are called traditional entrepreneurs.

3.4 Drone Entrepreneurs : They follow different paths with their efforts and bring about innovations. This innovation works to lead the entrepreneur to a new path in the transformation of the entrepreneur. Imitative entrepreneurs do not strive to bring about any kind of transformation and there is no condition for it. They only imitate successful and effective entrepreneurs. Therefore, these entrepreneurs have acquired unique importance.

4. Importance of the Study

Generally government schemes and policies regarding entrepreneurship are properly implemented whereas different types of entrepreneurs are encouraged to become entrepreneurs and various educated unemployed get employment.

In the entrepreneurs there is many more ability to develop the business and industries as well as the entrepreneurs have good ability to organize and run a business and enterprise along with any of its uncertainties in order to make a profit. and also have entrepreneurs ability to stated any particulars business as well as the modern entrepreneurship is also transforming the word by solving big problems like bringing about social change or creating an a various types of innovation product that challenges the status of how we live our lives on a daily basis.

5. Research Methodology

The present study is based on both the primary and the secondary sources, yet it is mainly based on the primary data. The major sources of secondary data are the information provided by district industrial centers, financial institutions, small business Entrepreneurs corporation, population census, statistical reports, development indicators of Maharashtra, annual survey of industries, data from district industry centers, joint director of industries, reference books, research journal, libraries ,etc

6. Functions of Entrepreneur

The concept of entrepreneurship has attracted the attention of experts in various fields of knowledge such as psychology, economics, sociology, and others. From the various definitions of entrepreneurship, it is evident that different writers and experts have expressed different views on entrepreneurship. Economists have considered risk-taking to be a very important function of the entrepreneur. According to Marshall, the role of the entrepreneur is related to coordination, supervision, and management in the organization. Therefore, the function of the entrepreneur can be explained in the following way and can be explained in the following way.

1. To create new goods and services and to properly check the quality of goods and services in a systematic manner.
2. To develop production methods that are appropriate to use when producing goods and services, and to use production methods that are different from traditional production methods.
3. Gaining new markets for goods and services. Gaining a new market for goods that was not previously available.
4. Inventing new ways of supplying goods, creating a completely new way of supplying

the production factors required for the production of goods.

5. To create new industries, new industrial organizations, new ideas and innovations, and to create new markets by ending monopoly in industry and business.
6. To provide employment to many unemployed youth and contribute to the economic development of the country through industry and reduce economic inequality in the country.
7. Assessing market opportunities and exploring them by acquiring scarce resources
8. To find out how much of a product and price is available in the market for the product to be sold. :
9. Maintain relationships with public sector officials and try to establish strong human relationships with employees so as to gather market information and information about the extent of various industries like ours and the extent of entrepreneurs.
10. Maintaining relationships with customers and suppliers, as well as financial management and production management, monitoring the factory and ensuring that the production process is running smoothly, implementing it properly and taking appropriate decisions.

7. Objective of the Study

1. To innovate and change the production method by innovating in the business.
2. To Accepting personal responsibility and taking full responsibility for whatever decisions an entrepreneur makes in business and that is his responsibility.
3. To Creating goods and services by forecasting the future and trying to reach the consumer by distributing them in the market.
4. To Develop organizational skills in the business organization and play a role in coordinating among all without any disputes in organizational skills.

8. Conclusion

In this research paper, we have tried to explain how entrepreneurship is created, what kind of skills an entrepreneur needs to have to become an entrepreneur, how an entrepreneur needs to review the market and how to ensure proper communication and coordination in his business organization. We have also tried to explain how an entrepreneur can become a successful entrepreneur. We have also tried to explain how a customer chooses goods and services to become an entrepreneur. Similarly, we have tried to explain how an environment can be peaceful in a business organization and what efforts need to be made for this. And the impact of the government's policy on the industry and business is a matter of deep study by the entrepreneur, whether it is negative or positive. Also, a successful entrepreneur provides job opportunities to many unemployed youth and through that the country becomes self-reliant. The economic inequality in the country is eliminated and various unemployed youth get employment. An attempt has been made in this research paper to mention various things like this. There is no doubt that this research paper will definitely be useful for a successful entrepreneur. A complete explanation of what and what needs to be done to become a successful entrepreneur has been given in this research paper.

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Digital Archives and Warli Legacy : Building Indigenous Repositories for Cultural Continuity

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Abstract

Warli art, one of India's oldest indigenous art traditions, originates from the Warli tribe inhabiting the Sahyadri region of Maharashtra and parts of Gujarat. Traditionally painted on mud walls using rice paste and natural materials, Warli art visually represents the community's relationship with nature, spirituality, and everyday life. However, rapid globalization, urbanization, and socio-economic changes threaten the preservation of such indigenous cultural expressions. In response to these challenges, digital archiving has emerged as a powerful strategy for safeguarding traditional knowledge systems and ensuring cultural continuity.

This research examines the role of digital archives in preserving the Warli artistic tradition and explores how indigenous repositories can function as sustainable cultural preservation tools. The study highlights the importance of documenting Warli art through high-resolution images, audio recordings of oral traditions, video documentation of artistic processes, and textual narratives that capture cultural meanings and symbolism. Digital repositories not only protect artworks from physical deterioration but also make them accessible to global audiences, researchers, and educational institutions.

The research also evaluates ethical considerations involved in digitization, including artist consent, cultural ownership, and prevention of cultural appropriation. It emphasizes the need for community-centric archiving models where Warli artists actively participate in the documentation and dissemination of their heritage. Furthermore, the study analyzes contemporary initiatives such as digital workshops, online exhibitions, and institutional archives that contribute to preserving Warli art.

While digitization offers numerous benefits such as increased visibility, educational value, and economic opportunities for artists, it also presents limitations, including the risk of misappropriation and the inability to fully capture the tactile and ritualistic aspects of the art form. Therefore, a balanced hybrid model combining digital preservation with community participation and institutional support is recommended.

Ultimately, the research concludes that digital archives can bridge tradition and technology, ensuring that Warli art remains a living cultural legacy for future generations while respecting the rights and voices of indigenous communities.

Keywords : Digital Archives, Warli Art, Indigenous Knowledge, Cultural Preservation, Digital Heritage

Introduction

Warli art is among the most ancient tribal art traditions in India, practiced by the Warli tribe residing primarily in the Sahyadri ranges of Maharashtra. Archaeological and cultural evidence suggests that the origins of this art form date back several centuries, possibly even to prehistoric times. Traditionally, Warli paintings were created on the interior walls of mud houses using natural pigments made from rice paste, applied with bamboo sticks. These paintings visually represent the daily life, rituals, and spiritual beliefs of the Warli community. Unlike classical Indian art forms that often depict royal narratives or mythological themes, Warli art focuses on ordinary human experiences, including farming, hunting, festivals, and community gatherings.

The visual language of Warli art is characterized

by simple geometric shapes such as circles, triangles, and squares. Circles symbolize celestial bodies like the sun and moon, triangles represent mountains and trees, and squares often indicate sacred spaces used for rituals. These symbolic forms combine to depict dynamic scenes of community life, including the well-known "Tarpa dance," where people dance in circular formations around a musician playing the tarpa instrument. The circular formation symbolizes unity and the cycle of life within the community.

Historically, Warli paintings were created during significant cultural events such as weddings, harvest festivals, and religious ceremonies. The art was traditionally practiced by women and transmitted through oral traditions and community participation. Knowledge of motifs, techniques, and meanings was passed from one generation to another without formal documentation. However, modernization, migration, and changing lifestyles have gradually disrupted these traditional knowledge transmission systems.

In the contemporary era, Warli art has expanded beyond the walls of tribal homes and has entered global markets. Artists now produce Warli paintings on canvas, textiles, and decorative products, enabling wider recognition and economic opportunities. While this transformation has increased visibility for the art form, it has also raised concerns about cultural dilution, commercialization, and loss of context.

Digital technology offers a promising solution to these challenges. Through digitization, artworks, oral histories, and cultural narratives can be systematically documented and preserved in digital repositories. Digital archives enable scholars, educators, and cultural enthusiasts to access and study Warli art while ensuring that the knowledge remains available for future generations.

Moreover, digital archives can support community empowerment by providing Warli artists with platforms to showcase their work, connect with global audiences, and maintain control over their cultural heritage. By integrating traditional knowledge with modern technology, digital archiving initiatives can contribute to cultural continuity while promoting ethical documentation and sustainable cultural preservation.

Thus, the development of indigenous digital repositories represents a significant step toward safeguarding the Warli legacy and ensuring that this unique tribal art tradition continues to thrive in the digital age.

Objectives

1. To examine the role of digital archives in preserving Warli art and indigenous cultural knowledge.
2. To analyze the opportunities and challenges associated with digitizing tribal art traditions.
3. To propose sustainable models for building community-centered digital repositories for Warli heritage.

Research Methodology

This research adopts a qualitative and descriptive research approach focusing on cultural documentation and digital heritage preservation.

1. **Secondary Data Collection :** The study relies primarily on secondary data sources including academic articles, institutional reports, digital archives, books, and online repositories documenting Warli art and indigenous knowledge systems.
2. **Literature Analysis :** Existing literature related to tribal art preservation, digital archiving techniques, and indigenous knowledge frameworks was reviewed to understand theoretical perspectives on cultural continuity and digitization.
3. **Case Study Approach :** Selected initiatives such as digital Warli workshops, institutional archives, and digital skill development programs were examined to evaluate practical applications of digital preservation strategies.
4. **Interpretative Analysis :** The collected data was analyzed interpretatively to identify opportunities, challenges, and ethical considerations in the digitization of Warli art.This methodology allows for a comprehensive understanding of how digital repositories can support the preservation and transmission of indigenous artistic traditions.

Details of the Study

Warli art is a significant cultural expression that embodies the social values, ecological awareness, and spiritual beliefs of the Warli tribe. Traditionally practiced as ritualistic wall paintings, Warli art reflects the tribe's close relationship with nature and community life. The paintings typically depict scenes such as farming, hunting, fishing, festivals, and communal dances. These visual narratives serve as a medium for storytelling and cultural transmission within the community.

A defining feature of Warli art is its use of geometric symbolism. Circles represent celestial bodies such as the sun and moon, triangles symbolize mountains and trees, and squares represent sacred spaces used for rituals. These motifs combine to create dynamic compositions that illustrate the rhythm of tribal life. The well-known Tarpa dance motif, where villagers form circular formations

around a musician, symbolizes unity and the cyclical nature of life.

Historically, Warli paintings were created primarily by women during weddings and harvest celebrations. These artworks were not intended as decorative pieces but rather as sacred expressions connected to community rituals and spiritual beliefs. Knowledge of painting techniques and symbolic meanings was transmitted orally and through direct participation in cultural practices.

However, social, and economic changes in recent decades have influenced the evolution of Warli art. Increased interaction with urban markets and cultural institutions has encouraged artists to adapt the art form to new mediums such as canvas, textiles, and commercial products. This transformation has expanded the reach of Warli art, allowing it to gain recognition in national and international art markets.

While commercialization has provided economic opportunities for Warli artists, it has also raised concerns about the loss of cultural authenticity. Mass-produced products often replicate Warli motifs without understanding their cultural significance, leading to potential misrepresentation and cultural appropriation.

Digital archiving has emerged as an important strategy to address these challenges. By documenting artworks, artistic processes, and oral narratives in digital formats, researchers and cultural organizations can preserve the cultural context of Warli art. Digital archives can include multiple types of content, such as photographs of artworks, video recordings of painting techniques, audio recordings of traditional songs and stories, and textual documentation of artist biographies.

A comprehensive digital archive for Warli art typically includes several components. Visual archives store high-resolution images of paintings categorized by themes such as rituals, daily life, and natural elements. Audio archives preserve oral traditions and storytelling practices associated with the art form. Video archives document workshops, community celebrations, and the artistic process, capturing both the technical and cultural dimensions of Warli painting. Textual archives provide contextual information, including research essays, artist interviews, and historical narratives.

Digital repositories also utilize metadata standards to organize and classify artworks. Metadata may include information about motifs, rituals, artists, and geographical origins. For example, a painting depicting a harvest festival may be categorized under agricultural rituals, while artworks featuring the Tarpa dance may be tagged under community celebrations.

Another important aspect of digital archiving is platform selection. Open-source repositories such as DSpace or Omeka allow institutions to store and share digital collections efficiently. Institutional servers managed by universities and museums provide long-term storage and professional curation. Emerging technologies such as blockchain are also being explored to ensure transparency and protect artists' intellectual property rights.

However, ethical considerations remain central to the digitization process. Artists must be actively involved in decisions regarding documentation and dissemination of their work. Consent agreements and licensing frameworks should clarify how digital materials can be used, reproduced, or shared.

Additionally, benefit-sharing models are essential to ensure that digitization initiatives support the livelihoods of Warli artists. Revenue generated from digital exhibitions or online platforms should be fairly distributed among artists and their communities.

Despite its advantages, digitization also has limitations. Digital representations cannot fully capture the tactile qualities and ritualistic context of traditional wall paintings. Furthermore, unequal access to technology and internet connectivity may limit participation by artists living in remote areas.

Nevertheless, when implemented ethically and collaboratively, digital archives can significantly contribute to preserving Warli art. By combining traditional knowledge systems with modern digital tools, these archives create a dynamic platform that supports cultural continuity, education, and global cultural exchange.

Recommendations and Conclusion

The preservation of Warli art requires a strategic combination of digital innovation, community participation, and institutional support. Digital archives should adopt a community-centric approach where Warli artists actively contribute to documenting their cultural heritage. This ensures authenticity and allows indigenous voices to remain central in the preservation process.

Institutions such as universities, museums, and cultural organizations should collaborate with Warli communities to develop hybrid digital repositories that integrate professional archival standards with community knowledge.These repositories should include visual documentation, oral narratives, video demonstrations, and contextual research materials.

Furthermore, ethical frameworks must guide all digitization initiatives. Clear consent agreements, intellectual property protection, and fair revenue-sharing mechanisms should be implemented to safeguard artists' rights and prevent cultural exploitation.

Capacity-building programs are also essential.

Training Warli artists in digital literacy, photography, and online marketing can empower them to manage their own digital presence and access global markets. Educational initiatives in schools and universities should incorporate Warli art into cultural heritage curricula, encouraging younger generations to appreciate and continue the tradition.

Despite technological advancements, digital archives should not replace traditional practices. Workshops, community events, and in-person cultural activities must continue to play a role in transmitting artistic knowledge and cultural values.

In conclusion, digital archives provide an effective framework for preserving and promoting Warli art in the modern era. By combining traditional knowledge with digital technology, indigenous repositories can safeguard the cultural legacy of the Warli community while creating new opportunities for recognition, education, and sustainable livelihoods. When developed collaboratively and ethically, these archives ensure that Warli art remains a vibrant and living cultural tradition for future generations.

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Tourism and The Warli Tribe : Boon for Economic Growth or Threat to Cultural Sanctity

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Abstract

Tourism has increasingly become a significant driver of economic development in many rural and tribal regions of India. The Warli tribe, an indigenous community residing mainly in the Sahyadri region of Maharashtra and parts of Gujarat, has gained attention due to its distinctive cultural traditions, especially the globally recognized Warli painting style. Traditionally, the Warli people depended on agriculture, forest resources, and fishing for their livelihood. Their cultural life is deeply rooted in nature worship, communal living, and ritual practices expressed through art, dance, and music. However, the growing interest of tourists in tribal heritage has transformed Warli villages into cultural tourism destinations.

The Warli community possesses a unique artistic tradition characterized by simple geometric forms representing human figures, animals, and elements of nature. These paintings, traditionally created on mud walls using rice paste, reflect everyday life, agricultural activities, and social rituals. This has created new economic opportunities and improved the livelihood of many tribal families.At the same time, the commercialization of tribal art and culture raises concerns about authenticity and cultural preservation. When cultural practices are modified primarily to satisfy tourist expectations, they risk losing their traditional meaning and spiritual significance. Mass production of Warli paintings and imitation by non-tribal artists further intensify this challenge.This study explores the dual impact of tourism on the Warli community. By analyzing the economic benefits, cultural transformations, and environmental implications, the research attempts to understand whether tourism supports sustainable development for the tribe or contributes to cultural erosion. The findings highlight the need for a balanced approach that encourages economic opportunities while preserving the cultural identity and traditions of the Warli people.

Keywords : Warli Tribe, Tourism Development, Cultural Preservation, Warli Painting Indigenous Communities,

Introduction

India is home to numerous indigenous tribal communities whose traditions and lifestyles reflect centuries of interaction with nature and local ecosystems. Among these communities, the Warli tribe occupies a significant place due to its unique cultural practices and artistic heritage. The Warli people are primarily found in the northern districts of Maharashtra such as Palghar, Dahanu, Jawhar, Mokhada, and Talasari, as well as in parts of Gujarat. The tribe speaks the Varli language, an unwritten Indo-Aryan dialect, and maintains strong connections with their ancestral customs and beliefs.

The Warli tribe is particularly known for its distinctive art form called Warli painting. These paintings are traditionally created on mud walls using a white pigment made from rice paste and water. The art form uses simple geometric shapes such as circles, triangles, and squares to depict scenes of daily life, agriculture, hunting, dancing, and festivals. The circular patterns often represent the sun and moon, triangles symbolize mountains and trees, while squares usually indicate sacred spaces used in rituals. Warli paintings are therefore not merely decorative; they are visual narratives reflecting the tribe's relationship with nature and their social structure. Historically, Warli paintings were created mainly by

women during special occasions such as weddings, harvest celebrations, and religious rituals. One of the most prominent motifs is the Tarpa dance, in which villagers form a circular pattern around a musician playing a wind instrument called the tarpa. This dance symbolizes unity, cooperation, and harmony within the community.

Over the past few decades, the increasing interest of tourists, researchers, and art collectors has brought Warli culture into the global spotlight. What was once a ritualistic form of expression confined to village walls has now become an internationally recognized art style. Artists such as Jivya Soma Mashe played a significant role in popularizing Warli art beyond tribal communities by adapting the paintings to canvas and paper for wider audiences.

Tourism has played a crucial role in this transformation. Visitors travel to Warli villages to experience tribal culture, purchase artwork, and participate in workshops and cultural festivals. As a result, tourism has created employment opportunities and enhanced income for many tribal families. Infrastructure such as roads, communication networks, and local markets has also improved in some areas due to tourism development.

However, the expansion of tourism also introduces challenges. Commercialization of sacred art forms, imitation of designs by non-tribal producers, and exposure to modern lifestyles may gradually weaken traditional values and practices. Cultural performances sometimes become staged for visitors rather than authentic expressions of community life.

Therefore, it becomes important to examine the relationship between tourism and the Warli tribe in a balanced manner. While tourism can stimulate economic growth and cultural visibility, it must also be managed carefully to ensure that the cultural heritage of the Warli community remains preserved and respected.

Objectives

1. To analyze the impact of tourism on the economic development of the Warli tribe.
2. To examine how tourism influences the cultural traditions and artistic practices of the Warli community.
3. To evaluate whether tourism promotes cultural preservation or leads to cultural commercialization.

Research Methodology

The present study adopts a qualitative research approach to understand the relationship between tourism and the Warli tribe. The research is primarily based on secondary data collected from academic books, research articles, government reports, and project documents related to Warli culture and tourism development.

Information was also gathered from case studies, cultural documentation, and reports highlighting the social and economic conditions of the Warli community. Descriptive analysis has been used to interpret the collected data and examine how tourism affects economic activities, cultural traditions, and environmental conditions in Warli settlements.

The study also draws insights from field project documentation and cultural descriptions related to Warli art, architecture, lifestyle, and community practices. Through comparative analysis, the research identifies both positive and negative impacts of tourism on the Warli tribe and suggests ways to balance development with cultural preservation.

Details of the Study

The Warli tribe represents one of the most culturally rich indigenous communities in India. Their lifestyle reflects a deep connection with nature, agriculture, and communal living. Traditionally, the Warli people depended on subsistence farming, fishing, and forest resources for survival. Their houses were built using natural materials such as bamboo, mud, wood, and thatch, demonstrating sustainable architectural practices suited to their environment.

Warli houses are carefully designed structures made from wooden posts, mud walls, and organic materials like bamboo and paddy straw. The construction process involves natural techniques that ensure ventilation, durability, and harmony with the surrounding landscape. These houses are not merely shelters but sacred spaces associated with rituals and spiritual beliefs.

Art plays a central role in Warli culture. The paintings traditionally depict scenes of farming, hunting, fishing, and community celebrations. These artworks serve as a visual record of the tribe's social life and environmental surroundings. The Tarpa dance, harvest rituals, and nature worship frequently appear in the paintings, reflecting the tribe's respect for natural forces such as the sun, moon, forests, and animals.

With the growth of tourism, Warli villages have become important cultural destinations. Visitors are attracted by the unique artistic traditions, rural lifestyle, and cultural performances. Tourism has generated several economic benefits for the Warli community.

First, tourism has created employment opportunities. Warli artists now sell paintings, handicrafts, and decorative products to tourists and art collectors. Workshops and exhibitions allow visitors to learn about Warli painting techniques directly from tribal artists. Women artisans in particular have gained

financial independence through the sale of handmade artwork.

Second, tourism has promoted cultural recognition. Warli art has become a global symbol of tribal creativity and appears in modern design, advertising, and fashion. This recognition has increased cultural pride among community members and encouraged younger generations to learn traditional art forms.

Third, tourism contributes to infrastructure development. Increased tourist interest often leads to improved roads, electricity, and communication networks in tribal areas. Educational and training programs for artisans also help enhance skills and create opportunities for entrepreneurship.

However, tourism also presents several challenges that may threaten the cultural integrity of the Warli tribe.

One major concern is the commercialization of sacred art. Warli paintings were originally created as ritualistic expressions associated with marriage ceremonies, harvest festivals, and spiritual beliefs. As tourism expands, many artworks are produced purely for commercial purposes, sometimes losing their symbolic meaning and cultural context.

Another issue is cultural exploitation. Non-tribal traders and companies often reproduce Warli designs without acknowledging the original artists. These imitations reduce the economic benefits for tribal communities and distort the authenticity of the art form.

Tourism also introduces lifestyle changes. Exposure to urban culture, consumer goods, and modern technologies influences younger members of the community. While modernization brings certain advantages, it may gradually weaken traditional practices such as storytelling, folk rituals, and customary dress.

Environmental impact is another significant concern. Warli culture is deeply connected with forests, rivers, and agricultural land. Unregulated tourism can lead to deforestation, pollution, and construction of resorts that disrupt the natural ecosystem. Such environmental changes directly affect the livelihoods and cultural traditions of the tribe.

To address these challenges, several initiatives have been introduced. Community-based tourism models encourage Warli villagers to manage tourism activities themselves. In such models, visitors participate in guided village tours, art workshops, and cultural programs organized by local cooperatives. This approach ensures that the economic benefits remain within the community.

Government and non-government organizations also play an important role in protecting Warli heritage. Legal protection through Geographical Indication (GI) status helps safeguard Warli art from imitation. Training programs and financial assistance for artisans further strengthen the sustainability of the art form.

Overall, tourism has the potential to support both economic development and cultural preservation if it is managed responsibly. Sustainable tourism practices that prioritize community participation, cultural education, and environmental protection can ensure that the Warli tribe continues to benefit from tourism without losing its cultural identity.

Recommendation and Conclusion

The study demonstrates that tourism has a dual impact on the Warli tribe. On one hand, it creates employment opportunities, increases income levels, and promotes the global recognition of Warli art and culture. On the other hand, excessive commercialization and cultural exploitation may threaten the authenticity of traditional practices.

To maintain a balance between economic growth and cultural preservation, a community-centered tourism approach should be encouraged. Warli villagers must be actively involved in planning and managing tourism activities so that they retain control over their cultural heritage. Community-based tourism initiatives can ensure that profits remain within the tribe and are distributed fairly among artists and households.

Government agencies and non-government organizations should strengthen legal protections for Warli art through effective enforcement of the Geographical Indication (GI) tag. Financial assistance, skill-development programs, and marketing support for tribal artisans can further enhance their economic stability.

Educational programs should also be introduced to raise awareness among tourists about the cultural and spiritual significance of Warli traditions. Visitors should be encouraged to respect local customs and support authentic tribal products rather than mass-produced imitations.

Environmental sustainability must remain a priority in tourism development. Eco-tourism practices that protect forests, rivers, and agricultural lands are essential for preserving the natural environment that forms the foundation of Warli culture.

In conclusion, tourism can act as a powerful tool for economic empowerment and cultural promotion when implemented responsibly. By adopting sustainable and community-driven tourism models, it is possible to ensure that the Warli tribe benefits from development while preserving the cultural

heritage and identity that make their community unique.

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