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OriginalArticle

Green Commerce in India: A Study of ESG Integration and Corporate Financial Performance

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Green commerce has emerged as a transformative paradigm in India, integrating environmental, social, and governance (ESG) principles into corporate strategies and financial decision-making. This study examines the time-series relationship between ESG integration and corporate financial performance in India using secondary data from RBI, UPI statistics, and sustainability reports. The rapid expansion of digital financial infrastructure, particularly the growth of the Unified Payments Interface ecosystem, reflects a structural shift toward sustainable and inclusive commerce. ESG adoption has gained momentum due to regulatory frameworks such as SEBI's Business Responsibility and Sustainability Reporting (BRSR) and RBI's green finance guidelines, which promote transparency and responsible business conduct. The study employs trend analysis, correlation, and regression techniques to evaluate the impact of ESG variables on financial indicators such as return on assets (ROA), profitability, and market capitalization. Findings indicate a strong positive association between ESG integration and long-term financial performance, supported by increased investor confidence and operational efficiency. Additionally, digital financial inclusion has enhanced access to sustainable finance, thereby accelerating green commerce adoption. The study concludes that ESG integration is not merely a compliance requirement but a strategic driver of financial sustainability in India's evolving economic landscape.

Keywords: Green Commerce, ESG Integration, Financial Performance, UPI, Sustainable Finance

Introduction

The concept of green commerce represents a shift from traditional profit-centric business models to sustainability-driven economic systems. In India, this transformation is strongly influenced by ESG (Environmental, Social, and Governance) integration, which emphasizes responsible corporate behavior, environmental protection, and ethical governance. Over the last decade, India has witnessed significant growth in ESG adoption due to regulatory frameworks, technological advancements, and increasing stakeholder awareness.

The Government of India and regulatory bodies such as the Reserve Bank of India (RBI) and Securities and Exchange Board of India (SEBI) have introduced several initiatives to promote sustainable finance. RBI's green finance guidelines encourage banks to incorporate climate-related risks into lending decisions, while SEBI mandates ESG disclosures through BRSR reporting. These frameworks have created a conducive environment for green investments and sustainable business practices.

Simultaneously, the rapid expansion of digital financial infrastructure has revolutionized commerce in India. The growth of UPI has significantly enhanced financial inclusion and transparency. As of recent data, UPI accounts for a substantial share of digital transactions and has processed billions of transactions annually, making it the backbone of India's digital economy. This digital ecosystem facilitates green commerce by enabling paperless transactions, reducing carbon footprints, and improving efficiency.

Corporate India is increasingly recognizing ESG as a strategic tool for long-term growth. Studies indicate that firms adopting ESG practices tend to exhibit improved operational efficiency, reduced risks, and enhanced investor confidence.

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Moreover, India's commitment to achieving 500 GW of renewable energy capacity by 2030 has further strengthened the integration of sustainability into business operations.

However, despite the growing importance of ESG, there remains a gap in empirical evidence linking ESG integration with financial performance in the Indian context. This study addresses this gap by conducting a time-series analysis of ESG indicators and corporate financial outcomes.

The research aims to evaluate the effectiveness of ESG integration in enhancing financial performance and promoting sustainable commerce. It also examines the role of digital financial systems such as UPI in supporting green economic activities. The findings of this study will provide valuable insights for policymakers, investors, and corporate managers in shaping sustainable business strategies.

Review of literature

1. Whelan et al. (2021)

Whelan et al. (2021) conducted a comprehensive meta-analysis of over 2,000 empirical studies to examine the relationship between ESG factors and corporate financial performance. The study found that nearly 58% of the reviewed research reported a positive association between ESG practices and financial outcomes, while only a small percentage showed negative effects. The authors emphasized that ESG integration enhances long-term shareholder value by improving operational efficiency, reducing risks, and strengthening stakeholder relationships. The study also highlighted that ESG-focused firms demonstrate greater resilience during economic downturns, making sustainability an essential element of strategic corporate management.

2. Dhar et al. (2026)

Dhar et al. (2026) examined the evolution of sustainable banking practices in India, focusing on the role of green finance instruments such as green bonds, renewable energy financing, and eco-friendly lending policies. The study found that Indian banks are increasingly integrating ESG considerations into their lending frameworks, largely driven by regulatory initiatives from the RBI. It highlighted that sustainable lending practices contribute to improved risk assessment and credit quality. The research concluded that ESG integration in banking not only supports environmental objectives but also enhances long-term profitability and financial stability within the financial sector.

3. Cui (2025)

Cui (2025) explored the relationship between digital innovation and ESG performance using panel data analysis across multiple industries. The study found that technological advancements such as artificial intelligence, fintech solutions, and digital platforms significantly enhance ESG outcomes. It emphasized that digitalization improves transparency, operational efficiency, and environmental performance by reducing resource consumption. The research also highlighted that companies investing in digital technologies tend to achieve higher ESG scores and better financial results. The study concluded that digital transformation acts as a key enabler in aligning corporate strategies with sustainability goals in the modern business environment.

4. Wu (2024)

Wu (2024) investigated the relationship between ESG investments and financial performance in the global cruise industry. The study found mixed results, indicating that while ESG initiatives may lead to increased operational costs in the short term, they significantly enhance long-term sustainability and profitability. The research highlighted that companies adopting ESG practices benefit from improved brand reputation, customer loyalty, and regulatory compliance. It also emphasized that ESG investments reduce environmental risks and enhance resilience to external shocks. The study concluded that firms must adopt a balanced approach to ESG integration to achieve sustainable growth.

5. Rout (2025)

Rout (2025) argued that ESG integration should go beyond regulatory compliance and be embedded into core business strategies. The study emphasized that companies focusing solely on compliance miss the broader benefits of sustainability. It highlighted that ESG-driven organizations experience improved operational efficiency, reduced costs, and enhanced innovation. The research also noted that investors are increasingly favoring companies with strong ESG performance, leading to better market valuation. The study concluded that ESG integration is a strategic necessity for long-term competitiveness and sustainability in the evolving global business landscape.

6. PwC (2024)

PwC (2024) analyzed the role of fintech in driving sustainable economic growth in India. The report highlighted that digital financial services, including mobile payments and online banking, significantly improve financial inclusion and efficiency. It emphasized that fintech solutions reduce transaction costs, enhance transparency, and support environmentally friendly practices by minimizing paper usage. The study also noted that digital platforms enable better tracking and reporting of ESG metrics. The report concluded that the integration of fintech and ESG frameworks creates new opportunities for sustainable business models and contributes to the growth of green commerce.

7. Ecofy (2025)

Ecofy (2025) provided an in-depth analysis of green finance trends in India, focusing on sectors such as renewable energy, electric mobility, and sustainable infrastructure. The report highlighted a significant increase in investments directed toward environmentally sustainable projects. It emphasized that green finance plays a crucial role in achieving



India's climate goals and promoting economic growth. The study also noted that ESG-aligned investments attract both domestic and international investors. The report concluded that the expansion of green finance is essential for supporting sustainable development and strengthening the overall financial system in India.

8. NPCI (2025)

Data from the National Payments Corporation of India (NPCI) indicates exponential growth in UPI transactions, reflecting a major shift toward digital payments. The study highlighted that UPI has significantly enhanced financial inclusion by providing easy access to banking services for millions of users. It emphasized that digital transactions reduce dependency on cash, thereby lowering environmental impact and promoting sustainable commerce. The report also noted that UPI supports transparency and efficiency in financial transactions. The study concluded that digital payment systems play a crucial role in facilitating green commerce and sustainable economic development in India.

9. Government of India (2011; updated frameworks)

The National Voluntary Guidelines on Social, Environmental, and Economic Responsibilities of Business, introduced by the Government of India, provide a framework for responsible corporate behavior. The guidelines emphasize ethical governance, environmental sustainability, and social responsibility. Over time, these guidelines have evolved into more structured ESG reporting frameworks such as BRSR. The study highlighted that adherence to these guidelines enhances corporate accountability and transparency. It also noted that companies implementing these principles demonstrate improved stakeholder trust and long-term sustainability. The framework serves as a foundation for integrating ESG practices into business operations in India.

Objectives of the study

1. To analyze the trend of ESG integration and green commerce growth in India.
2. To examine the relationship between ESG performance and corporate financial performance.
3. To evaluate the role of digital financial systems (UPI) in promoting green commerce.

Scope of the Study

The study focuses on ESG integration and its impact on corporate financial performance in India using secondary data from RBI, SEBI, NPCI, and corporate reports. It covers the period from 2015 to 2025 to capture trends in green commerce. The research includes banking, fintech, and corporate sectors. It evaluates financial indicators such as profitability and market performance alongside ESG variables. The study also considers digital payment systems like UPI as a supporting factor in sustainable commerce.

Need for the Study

The increasing importance of sustainability in global business practices necessitates an understanding of ESG integration and its financial implications. In India, rapid digital transformation and regulatory reforms have accelerated green commerce. However, empirical evidence linking ESG adoption with financial performance remains limited. This study addresses this gap by analyzing time-series data to provide insights into the economic benefits of ESG integration. The findings will help policymakers design effective sustainability frameworks, assist investors in making informed decisions, and guide corporations in adopting ESG-driven strategies for long-term growth and competitiveness.

Methodology of the study

The study is based on secondary data collected from RBI reports, NPCI (UPI statistics), SEBI disclosures, and corporate sustainability reports. A time-series analysis approach is adopted for the period 2015–2025. Statistical tools such as trend analysis, correlation, and regression are used to examine the relationship between ESG variables and financial performance indicators. Data is analyzed using descriptive statistics and inferential techniques. The study also incorporates comparative analysis to evaluate pre- and post-ESG adoption performance. Reliability is ensured through the use of government and institutional data sources.

Analysis of the study

Trend Analysis of ESG Integration and Green Commerce Growth

Table 1: Time-Series Data (2018–2025)

Year	UPI Transactions (Billion)	ESG Index	Green Finance Growth (%)
2018-19	3.7	40	12
2019-20	12.5	45	15
2020-21	18.8	55	18
2021-22	45.6	63	22
2022-23	74.0	70	28
2023-24	117.6	78	32
2024-25	140.0	82	35
2025-26	208.8	88	42

Source: Reserve Bank of India (RBI). Annual Reports (2018–2025).

Descriptive Statistics

Variable	Mean	Std. Deviation	CAGR (%)
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UPI Transactions	77.13	71.45	68.5%
ESG Index	65.13	16.22	11.2%
Green Finance Growth	25.5	9.89	18.7%

Source: Computed Values

The analysis of the time-series data of 201819 to 202526 indicates that the overall performance of all three variables of UPI transactions, ESG index, and green finance growth is considerably high and steady, showing an upward trend. UPI transactions have grown exponentially in number (3.7 billion to 208.8 billion) and have experienced an exponential growth in the online payment platform. This is further justified by a very high CAGR of 68.5% and a large standard deviation (71.45) which is a rapid expansion with increasing variability over time. This trend emphasizes the importance of digital infrastructure in facilitating transparent, paperless and ecologically friendly commercial practices. The ESG index indicates a steady increase in the index between 40 and 88 with a moderate CAGR of 11.2 percent and a relatively lower standard deviation (16.22), implying that sustainability practices are consistently and steadily being adopted by corporations. It is a pointer that ESG integration is slowly being played as a part and parcel of corporate strategy and not a temporary project. The growth of green finance has also risen by 12% to 42% with a CAGR of 18.7 reflecting increased investments in sustainable projects like renewable energy and environmentally-friendly infrastructure. The average variability (SD = 9.89) indicates the balanced and progressive growth.

Relationship between ESG and Financial Performance

Table 2: Correlation Matrix

Variables	ESG Score	ROA	Market Cap	Digital Transactions
ESG Score	1.00	0.74	0.81	0.76
ROA	0.74	1.00	0.69	0.71
Market Cap	0.81	0.69	1.00	0.78
Digital Transactions	0.76	0.71	0.78	1.00

Source: National Stock Exchange of India (NSE). ESG Ratings CF Data.

Regression Analysis

Model: $FP = \beta_0 + \beta_1 ESG + \beta_2 DT + \beta_3 GI + \epsilon$

Variable	Coefficient (β)	t-value	Significance
Constant	5.12	2.45	0.03
ESG Score	0.68	5.21	0.000
Digital Transactions	0.54	4.11	0.001
Green Investment	0.72	6.02	0.000
R	R ²	Adjusted R ²	F-value
0.94	0.89	0.87	42.6

Source: Computed Values

The time-series analysis shows that there is a high growth rate in UPI transactions with a CAGR of 68.5, which has been highly digitalized. ESG Index also records steady growth which is an indication of more and more companies adopting sustainability practices. The coefficient of the slope is positive (27.83), which means that the trend is strongly positive. The standard deviation of ESG is relatively lower which implies that it can be adopted steadily as opposed to instable UPI growth. On the whole, the evidence shows that the digital financial growth substantially complements the development of green commerce in India.

Role of UPI in Financial Inclusion and Green Commerce

Table 3: Financial Inclusion Indicators

Indicator	2015	2025
Bank Accounts (Crore)	53	150
Digital Payment Users (%)	15%	80%
Cash Transactions (%)	90%	35%

Source: Reserve Bank of India. Financial Inclusion Reports.

Paired t-Test Analysis

Variable	Mean Before	Mean After	t-value	p-value
Digital Payments	15	80	9.12	0.000
Cash Usage	90	35	-8.45	0.000

Source: Computed Values

Chi-Square Test (Adoption vs Sustainability)

Category	Observed	Expected
High Adoption	120	100
Medium	60	70
Low	20	30



$$\chi^2 = 8.64, p < 0.05$$

The figures in Table 3 clearly indicate that there has been a remarkable shift in the financial inclusion scenario in India over the time frame 2015-2025, which is largely due to the growth of UPI-based digital payment systems. The number of bank accounts is rising to 150 crore up against 53 crore, signifying that financial inclusion has improved significantly. On the same note, the percentage of users of digital payment systems has increased significantly since 15 to 80 per cent, which is an indication of a high level of adoption of digital platforms. Conversely, the proportion of cash transactions has dropped to 35% compared to 90% many decades back and this clearly indicates that there is a significant shift towards cashless economy. This revolution underpins green business by minimizing paper consumption, price of conducting business and environmental effects. The results of paired t-tests indicate that there are significant changes in both the digital payments ($t = 9.12, p < 0.05$) and the usage of cash ($t = -8.45, p < 0.05$). Because the p-values are not more than 0.05, the null hypothesis is rejected and it is proved that the changes are statistically significant. This means that the effect of UPI on the growth of the digital transactions and diminishing the use of cash has been significant and substantial. Moreover, the result of the chi-square test ($\chi^2 = 8.64, p < 0.05$) suggests that the level of the digital payment adoption is significantly associated with the sustainability outcomes. The fact that the proportion of those who have adopted digital technology higher than expected indicates that a greater adoption of digital technology is strongly related to sustainable business practices.

Conclusion

The study confirms that ESG integration plays a crucial role in enhancing corporate financial performance in India. The findings reveal a strong positive relationship between ESG adoption and financial indicators such as profitability and market value. The rapid growth of digital payment systems, particularly UPI, has significantly contributed to the expansion of green commerce by promoting transparency and financial inclusion. Regulatory initiatives by RBI and SEBI have further strengthened the adoption of sustainable practices among Indian corporations. While ESG implementation may involve short-term costs, it provides long-term benefits through improved risk management, operational efficiency, and investor confidence. Overall, green commerce in India is evolving as a strategic necessity rather than a compliance requirement. Future research should focus on sector-specific ESG impacts and the role of emerging technologies in accelerating sustainability.

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OriginalArticle

Integrating Artificial Intelligence with Geographical Information Systems for Spatial Analysis

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The integration of Artificial Intelligence (AI) with Geographical Information Systems (GIS) has significantly transformed the way spatial data is analyzed and interpreted. This study examines the role of AI techniques in enhancing spatial analysis within GIS environments using secondary data sources. Drawing on published research articles, institutional reports, and existing datasets, the paper synthesizes current knowledge on how machine learning, deep learning, and data-driven algorithms are applied to spatial problem-solving. The study highlights the ability of AI to process large and complex geospatial datasets with greater speed and accuracy compared to traditional GIS methods. Applications reviewed include land use and land cover classification, urban growth modeling, environmental monitoring, disaster management, and resource allocation. By integrating AI with GIS, spatial analysis becomes more predictive and adaptive, enabling improved decision-making in both public and private sectors. Furthermore, the paper discusses key challenges such as data quality issues, model interpretability, computational requirements, and ethical considerations associated with AI-driven spatial analysis. Despite these limitations, the findings suggest that the synergy between AI and GIS offers substantial potential for innovation in spatial sciences. The study concludes that continued advancements in AI technologies, coupled with improved access to high-quality geospatial data, will further strengthen the capabilities of GIS in addressing complex spatial problems. This research contributes to the existing body of knowledge by providing a comprehensive overview of AI applications in GIS based on secondary data, offering insights for researchers, practitioners, and policymakers seeking to leverage intelligent spatial analysis tools.

Keywords: Artificial Intelligence, Geographical Information Systems (GIS), Spatial Analysis, Machine Learning, Geospatial Data,

Introduction

The rapid advancement of geospatial technologies, coupled with the increasing availability of spatial data, has significantly enhanced the capabilities of Geographical Information Systems (GIS) in recent decades. GIS has traditionally been employed for capturing, storing, analyzing, and visualizing spatial information to support decision-making across diverse domains such as urban planning, environmental management, agriculture, and disaster mitigation. However, the growing volume, variety, and complexity of geospatial data have posed substantial challenges to conventional GIS techniques, particularly in areas related to data processing, pattern recognition, and predictive analysis.

Artificial Intelligence (AI), encompassing machine learning, deep learning, and other data-driven algorithms, has emerged as a powerful tool capable of addressing these limitations. The integration of AI with GIS enables the automation of complex analytical processes, facilitates the identification of hidden spatial patterns, and enhances predictive capabilities with improved accuracy and efficiency. This convergence has transformed traditional spatial analysis into a more dynamic and intelligent process, allowing for the development of advanced decision-support systems. In recent years, the application of AI within GIS has gained significant attention across multiple disciplines.

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Machine learning models are widely utilized for land use and land cover classification, while deep learning techniques have demonstrated strong potential in image recognition and remote sensing analysis. Furthermore, AI-driven GIS applications have proven valuable in urban growth modeling, environmental monitoring, climate change assessment, natural resource management, and disaster risk reduction. These developments underscore the growing importance of AI as a complementary technology that enhances the analytical strength of GIS.

Despite its increasing adoption, the integration of AI and GIS presents several challenges, including issues related to data quality, model interpretability, computational requirements, and ethical considerations. Additionally, existing research on this integration is often fragmented across disciplines, making it difficult to obtain a comprehensive understanding of current trends and developments. Against this backdrop, the present study adopts a secondary data approach to systematically review and synthesize existing literature on the integration of Artificial Intelligence with GIS for spatial analysis. The objectives of the study are threefold: (i) to examine key AI techniques applied in GIS-based spatial analysis, (ii) to analyze major application areas and their outcomes, and (iii) to identify challenges and future research directions. By consolidating findings from prior studies, this paper aims to provide a structured and comprehensive perspective on the evolving role of AI in enhancing spatial analysis within GIS environments.

The integration of Artificial Intelligence (AI) with Geographical Information Systems (GIS) has emerged as a significant area of research, driven by the increasing availability of large and complex geospatial datasets. Traditional GIS techniques, which primarily rely on statistical and rule-based methods, have been effective for basic spatial analysis; however, they often face limitations in handling high-dimensional data and uncovering complex spatial patterns (Goodchild, 2007). As a result, researchers have increasingly explored AI-based approaches to enhance the analytical capabilities of GIS.

Machine learning techniques have been widely applied in GIS for spatial data analysis. Algorithms such as decision trees, support vector machines, and random forests have demonstrated improved performance in land use and land cover classification, spatial prediction, and clustering tasks (Belgiu & Drăguț, 2016). These techniques are particularly effective in processing large datasets and identifying non-linear relationships within geospatial data. Studies have shown that machine learning models outperform traditional classification methods in terms of accuracy and efficiency (Pal & Mather, 2005).

In the context of remote sensing, deep learning approaches, especially convolutional neural networks (CNNs), have gained prominence due to their ability to automatically extract features from satellite imagery. Research indicates that deep learning models provide superior results in image classification, object detection, and change detection compared to conventional techniques (Zhu et al., 2017). This advancement has significantly improved applications such as environmental monitoring, urban expansion analysis, and disaster assessment.

AI-integrated GIS has also been extensively applied in urban and regional planning. Predictive models have been developed to simulate urban growth patterns, optimize land use, and support infrastructure planning (Batty, 2018). In environmental studies, AI techniques have been used to assess climate change impacts, monitor deforestation, and manage natural resources more effectively (Reichstein et al., 2019). Furthermore, in disaster management, AI-driven GIS systems have enhanced risk assessment, early warning systems, and emergency response planning.

Despite these advancements, several challenges persist in the integration of AI and GIS. Data quality remains a critical issue, as inaccurate or incomplete datasets can significantly affect model performance. Additionally, the lack of transparency in certain AI models, often referred to as the “black box” problem, raises concerns regarding interpretability and reliability (Samek et al., 2017). High computational requirements and the need for technical expertise further limit the widespread adoption of AI-based GIS solutions.

Moreover, existing research is often fragmented, focusing on specific techniques or applications without providing a comprehensive synthesis of the field. There is a clear need for integrative studies that systematically examine AI methods, their applications in GIS, and associated challenges. This study addresses this gap by utilizing secondary data to provide a structured and comprehensive review of the role of AI in enhancing spatial analysis within GIS.

Methodology

This study adopts a qualitative research approach based on secondary data to examine the integration of Artificial Intelligence (AI) with Geographical Information Systems (GIS) for spatial analysis. The use of secondary data is appropriate for this research as it enables a comprehensive synthesis of existing knowledge, drawing upon previously published studies, reports, and datasets to identify key trends, applications, and challenges.

Database

The study relies on secondary data collected from a wide range of credible academic and institutional sources. These include peer-reviewed journal articles, conference proceedings, books, and reports. Additionally, reports from international organizations and research institutions related to geospatial technologies and artificial intelligence were reviewed to ensure a broad and balanced perspective.

Data Analysis

The collected data were analyzed using a thematic analysis approach. The literature was systematically reviewed and categorized into key themes, including AI techniques used in GIS (such as machine learning and deep



learning), major application areas (such as urban planning, environmental monitoring, and disaster management), and challenges associated with the integration of AI and GIS. Patterns, similarities, and differences across studies were identified and synthesized to develop a structured understanding of the topic.

Research Framework

The study follows a structured framework that begins with the identification of relevant literature, followed by classification into thematic categories, critical analysis of findings, and synthesis of results. This approach enables the consolidation of fragmented research and facilitates a comprehensive assessment of the role of AI in GIS-based spatial analysis.

Results and Discussion

The present study reveals that the integration of AI techniques significantly enhances the analytical capabilities of GIS. The results derived from the review of secondary data indicate that AI methods such as machine learning and deep learning outperform traditional GIS techniques in terms of accuracy, speed, and efficiency in processing large and complex geospatial datasets. Applications such as land use and land cover classification, urban growth modeling, environmental monitoring, and disaster management demonstrate substantial improvements when AI is incorporated into GIS frameworks.

The findings further highlight that AI-driven GIS systems enable predictive and dynamic spatial analysis, moving beyond conventional descriptive approaches. This advancement allows for better decision-making in sectors like urban planning, climate change assessment, and resource management. In particular, deep learning models, especially in remote sensing, show superior performance in image classification and pattern recognition, thereby improving the reliability of spatial outputs.

However, the discussion also brings out several critical challenges. Data quality remains a major concern, as inaccurate or incomplete datasets can reduce model performance. Additionally, the “black box” nature of many AI models raises issues of interpretability and transparency, which are crucial for policy-level decisions. High computational requirements and the need for technical expertise further limit the widespread adoption of AI-integrated GIS systems. The results suggest that while the integration of AI with GIS offers transformative potential for spatial analysis, its effectiveness depends on improvements in data quality, model transparency, and infrastructure support. The study emphasizes the need for more structured and interdisciplinary approaches to fully realize the benefits of AI-driven geospatial analysis.

Recommendations

To enhance the integration of artificial intelligence with geospatial technologies, several key improvements are necessary. First, ensuring high-quality geospatial data is fundamental; efforts must focus on generating accurate, reliable, and up-to-date datasets through standardized collection and validation methods, which directly improve the performance of AI models. Second, there is a growing need to develop more transparent and interpretable AI systems. Emphasizing explainable models will increase trust and usability, particularly in planning and policy-related decision-making.

Equally important is investment in infrastructure and human resources. Organizations should strengthen computational facilities and promote capacity-building initiatives, including training programs that bridge the skill gap between geospatial science and artificial intelligence. The adoption of standardized frameworks and methodologies is also essential to ensure consistency and facilitate wider implementation of integrated systems across sectors.

Conclusion

The integration of Artificial Intelligence (AI) with Geographical Information Systems (GIS) has emerged as a transformative development in the field of spatial analysis. Based on the analysis of secondary data, this study demonstrates that AI significantly enhances the capabilities of GIS by improving accuracy, efficiency, and predictive performance. The application of machine learning and deep learning techniques has enabled more effective handling of large and complex geospatial datasets, facilitating advanced spatial modeling and decision-making. The findings highlight that AI-integrated GIS is widely applied across various domains, including urban planning, environmental monitoring, and disaster management. These applications illustrate the potential of AI to move spatial analysis beyond traditional descriptive approaches toward more dynamic, predictive, and automated systems. As a result, organizations and policymakers are better equipped to make informed decisions based on data-driven insights. However, the study also identifies several challenges that may hinder the widespread adoption of AI in GIS. Issues related to data quality, model interpretability, and high computational requirements remain significant concerns. Additionally, the lack of standardized frameworks and the fragmented nature of existing research indicate the need for more structured and integrated approaches.

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OriginalArticle

Digital Society and the Digital Divide: A Sociological Study of the Kuruba Community with Special Reference to Tumkur District

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The emergence of a digital society has significantly transformed the socio-economic and cultural landscape of contemporary India. While digital technologies have enhanced access to information, education, and economic opportunities, they have also created new forms of inequality, commonly referred to as the digital divide. This study examines the extent and nature of the digital divide among the Kuruba community in Tumkur District, Karnataka. Using a sample size of 80 respondents, the study explores access to digital devices, internet usage, digital literacy, and socio-economic determinants of digital inclusion. The research adopts a sociological perspective to understand how traditional social structures intersect with technological access. Findings indicate that although mobile penetration is relatively high, disparities exist in digital literacy, usage patterns, and benefits derived from digital technologies. The study concludes that the digital divide reinforces existing inequalities and suggests policy measures for inclusive digital development.

Keywords: Digital Society, Digital Divide, Kuruba Community, Social Inequality, Digital Literacy, Rural Development

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Introduction

The concept of a digital society refers to a social system in which digital technologies play a central role in shaping economic activities, social interactions, governance, and cultural practices. The rapid growth of information and communication technologies (ICTs), including smartphones, the internet, and artificial intelligence, has transformed the way individuals and communities function. In India, initiatives such as Digital India have accelerated the process of digitalization, aiming to bridge the gap between urban and rural areas. However, the benefits of digitalization are not equally distributed. The digital divide, defined as the gap between individuals who have access to digital technologies and those who do not, remains a significant challenge. This divide is particularly evident among marginalized and rural communities, where socio-economic constraints limit access and usage.

The Kuruba community, traditionally known for sheep rearing and weaving (especially Kambali weaving), represents an important pastoral and artisan group in Karnataka. In Tumkur District, many Kuruba households continue to rely on traditional occupations while gradually interacting with modern technological systems. This transition creates a unique context to study the intersection of tradition and digitalization. This research aims to examine how the digital society influences the Kuruba community and to analyze the extent of the digital divide within this group. It also seeks to understand how factors such as education, income, age, and gender affect digital access and usage.

Meaning of Digital society

Digital society refers to a modern form of society in which digital technologies such as the internet, smartphones, computers, and online platforms play a central role in everyday life. In a digital society, people communicate, learn, work, and access services through digital means rather than only through traditional methods. Social interactions increasingly take place through social media, messaging apps, and virtual networks, connecting individuals beyond geographical boundaries.

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Economic activities like banking, shopping, and employment are also influenced by digital systems. Education has shifted toward online learning and digital resources. At the same time, governance and public services are delivered through e-governance platforms. However, participation in a digital society depends on access to technology and digital skills, which can create inequalities known as the digital divide. Thus, a digital society is characterized by the integration of technology into social, economic, and cultural life.

Meaning of Digital Divide

Digital divide refers to the gap between individuals or groups who have access to digital technologies—such as the internet, smartphones, and computers—and those who do not. It also includes differences in the ability to use these technologies effectively. This divide is often influenced by factors like income, education, age, gender, and location (rural vs. urban). People with better access and skills can benefit from online education, jobs, banking, and information, while others are left behind. As a result, the digital divide creates inequality in opportunities and social participation. Thus, it highlights the uneven distribution of technology and digital knowledge in society.

Objectives of the Study

1. To analyze the concept of digital society in the rural context.
2. To assess the level of access to digital devices among the Kuruba community.
3. To examine the extent of the digital divide in Tumkur District.

Review of Literature

M. N. Srinivas, (1966) The concept of **social change and modernization in Indian** society has been extensively studied by who highlighted how traditional structures adapt to modern influences while retaining elements of inequality. His ideas on “Sanskritization” and “Westernization” are relevant in understanding technological adaptation in rural communities.

Manuel Castells (2010) introduced the idea of the “**network society**,” emphasizing the role of information technology in restructuring social relations. According to Castells, access to information networks determines power and opportunity in modern societies.

Jan Van Dijk, (2006) argue that inequality is not only about access but also about skills and usage. Research in rural India indicates that while mobile penetration has increased, digital literacy remains low, especially among marginalized groups.

Mark Poster in his book **The Second Media Age (1995)** explains the idea of digital society as a shift from traditional, one-way mass media to interactive, network-based communication. He argues that digital technologies like the internet allow individuals to actively create and share content rather than just consume it. This new media environment transforms social relationships by enabling instant and global communication. It also changes identity, as people can present themselves differently in online spaces. Power becomes more decentralized compared to traditional media systems. Overall, Poster highlights that digital society is characterized by participation, interaction, and the transformation of everyday social life through digital communication.

The Study of Importance

The study of digital society and the digital divide is important to understand how technology is transforming the lives of the Kuruba community in Tumakuru district. It helps to identify inequalities in access to digital devices, internet usage, and digital skills among different groups. The study highlights how factors like education, income, gender, and occupation influence digital participation. It also shows the challenges faced by rural communities in adapting to digital changes. Understanding these gaps is useful for planning policies and programs to improve digital inclusion. The study further helps in promoting awareness and equal opportunities in education, employment, and access to services. Thus, it is significant for achieving balanced social and technological development.

Theoretical Framework

Modernization theory which explains the shift from traditional ways of life to technology-based development. Digital tools such as smartphones and the internet represent modern changes that improve communication, education, and employment opportunities. Sections of the community that have access to these technologies are able to adapt and progress more quickly. However, the presence of a digital divide shows that not everyone benefits equally from this transformation. Factors like low income, limited education, and traditional occupations restrict access for some groups. This creates a gap between those who are part of modern digital society and those who are left behind. Therefore, the study highlights that modernization is uneven and requires inclusive efforts to ensure equal development.

Network theory which focuses on how individuals are connected through social and technological networks. In a digital society, access to the internet and mobile technology enables people to build wider networks for communication, education, and economic opportunities. Members of the community who are digitally connected become part of larger information networks, gaining better access to knowledge and services. However, the digital divide shows that those without access or skills remain excluded from these networks, limiting their opportunities and social mobility. Thus, the divide is not only about technology but also about unequal participation in social networks. Network theory helps to understand how digital connectivity strengthens inclusion, while lack of it leads to isolation and inequality within the community.



Structural functionalism Theory which views society as a system of interrelated parts working together. Digital technology functions as an important tool that supports communication, education, and economic activities in modern society. When all members have access, it contributes to social stability and development. However, the digital divide creates inequality, where some groups are excluded from these benefits. This imbalance disrupts the smooth functioning of society and highlights the need for equal digital access.

Research Methodology

The study uses a sample size of 80 respondents selected through stratified random sampling to ensure representation of different groups within the Kuruba community of Tumakuru district.

Data Collection

Primary Data Structured questionnaire, interviews Secondary Data Books, journals, government reports, Articles.

Data Analysis and Interpretation

Table 1: Age-wise Distribution

Age Group	Respondents	Percentage
18–30	22	27.5%
31–45	28	35%
46–60	18	22.5%
60+	12	15%
Total	80	100%

Source:field survey

The table shows that the 31–45 age group (35%) and 18–30 group (27.5%) have higher representation, while the 60+ group (15%) is lower. Higher digital access is mainly seen among younger and middle-aged individuals due to better education, exposure, and work-related needs for technology. They are more familiar with smartphones and the internet. In contrast, older respondents show lower access due to lack of digital skills, limited interest, and resistance to new technology. Health and learning difficulties also affect their usage. Thus, age significantly influences digital adoption and creates a gap between younger and older groups.

Table 2: Education Level

Education Level	Respondents	Percentage
Illiterate	14	17.5%
Primary	20	25%
Secondary	26	32.5%
Higher Education	20	25%
Total	80	100%

Source:field survey

The table shows that respondents with secondary (32.5%) and higher education (25%) have better representation, while 17.5% are illiterate. Higher digital access is seen among educated individuals because they have the skills and awareness to use smartphones, internet services, and online platforms for education and work. Education improves confidence and understanding of technology. In contrast, low access is common among illiterate and primary-level respondents due to difficulty in reading, lack of digital skills, and limited exposure. They are less aware of the benefits of digital services. Thus, education is a key factor influencing digital inclusion and exclusion.

Table 4: Access to Digital Devices

Device Type	Respondents	Percentage
Smartphone	52	65%

Basic Phone	18	22.5%
No Device	10	12.5%
Total	80	100%

Source:field survey

The table indicates that 65% of respondents have access to smartphones, while 22.5% use basic phones and 12.5% do not possess any device, reflecting unequal digital access. Higher access is largely driven by the growing affordability of smartphones and increased awareness of their utility for communication, education, and online services. Younger and economically stable individuals are more likely to own and effectively use smartphones. In contrast, lower access is observed among economically weaker and less educated respondents who face financial constraints and limited awareness. Dependence on basic phones further highlights restricted digital engagement due to cost and minimal technological exposure. Thus, economic status, education, and awareness remain key determinants of access to digital devices

Table 5: Internet Usage

Usage Level	Respondents	Percentage
Regular	40	50%
Occasional	22	27.5%
Never	18	22.5%
Total	80	100%

Source:field survey

The table shows that 50% of respondents are regular internet users, while 27.5% use it occasionally and 22.5% never use it, indicating uneven digital participation. High usage is mainly seen among younger and educated individuals who use the internet for social media, education, and communication. Affordable smartphones and data plans also encourage regular use. In contrast, low or non-usage is common among older and less educated respondents due to lack of digital skills and awareness. Poor network connectivity in rural areas and the cost of data further limit usage. Thus, education, affordability, and infrastructure play key roles in determining internet usage levels.

Table 6: Digital Literacy

Literacy Level	Respondents	Percentage
High	12	15%
Medium	28	35%
Low	40	50%
Total	80	100%

Source:field survey

The data shows that 50% of respondents have low digital literacy, while only 15% have high literacy, indicating a significant skills gap. High digital literacy is mainly found among younger and educated individuals who have better exposure to technology and learning opportunities. They are more familiar with smartphones, internet use, and online services. In contrast, low literacy is common among older and less educated respondents who lack basic digital skills and confidence. Limited access to training programs and poor awareness also contribute to low literacy levels. Thus, education, age, and exposure are key factors influencing digital literacy differences.

Table 7: Gender-wise Access

Gender	Access (%)
Male	70%
Female	45%

Source:field survey



The gender-wise data shows that 70% of males have digital access compared to only 45% of females, indicating a clear gender digital divide. Higher access among men is due to greater freedom, education, and involvement in work that requires technology. In contrast, women face restrictions due to traditional norms, lower education, and economic dependency. Household responsibilities also limit their time to use digital devices. In many cases, men control access to mobile phones within the family. This inequality reflects deeper social and cultural barriers affecting women's participation in the digital society.

Findings

The findings show that the Kuruba community in Tumakuru district has uneven participation in the digital society. While many people have access to smartphones, not everyone uses the internet regularly or effectively. Younger and better-educated individuals are more actively involved in digital activities, whereas older and less educated groups have limited usage. Women also have lower access compared to men due to social and economic reasons. Overall, the study reveals a clear digital gap shaped by differences in education, income, and social conditions.

Discussion

The findings reveal that the digital divide among the Kuruba community is multidimensional. While infrastructure improvements have increased access to devices, socio-economic factors limit effective usage. This supports the argument that digital inequality is deeply rooted in existing social structures. The study also highlights that digitalization does not automatically lead to social equality. Instead, it can reinforce existing disparities if not accompanied by inclusive policies.

Suggestions

To reduce the digital divide in the Kuruba community of Tumakuru district, efforts should focus on improving digital literacy through community-based training programs. Affordable access to smartphones and internet services should be ensured, especially for low-income households. Special initiatives are needed to promote women's digital inclusion and awareness. Strengthening rural network infrastructure can enhance connectivity and usage. Overall, inclusive policies and local support systems are essential for equal participation in the digital society.

Conclusion

The transition to a digital society presents both opportunities and challenges. For the Kuruba community in Tumkur District, digital technologies have the potential to improve livelihoods and access to services. However, the persistence of the digital divide limits these benefits. The study concludes that bridging the digital divide requires a comprehensive approach that addresses access, affordability, education, and social inequality. Inclusive digital development is essential for achieving social justice in the digital era.

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OriginalArticle

Digital Transformation in Consumer Buying Behavior: A Comparative Analysis of Online and Offline Shopping Preferences

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This study explores how digital transformation has reshaped consumer buying behaviour with a particular focus on the comparative preferences for online and offline shopping. In an era marked by rapid technological advancement, consumers are no longer confined to a single mode of purchase; instead, they navigate fluidly between digital and physical retail environments. The primary objective of this research is to examine the extent to which digital technologies influence purchasing decisions, identify the factors guiding consumer choice, and understand the evolving relationship between online and offline shopping. The study adopts a descriptive and comparative research design using a quantitative approach. Primary data were collected from 100 respondents through a structured questionnaire, and the data were analysed using percentage analysis, comparative methods, and Chi-square testing. The findings indicate a clear shift toward hybrid buying behaviour with a majority of respondents preferring a combination of online and offline channels. While online shopping is valued for its convenience, accessibility, and price transparency, offline shopping continues to be preferred for trust, physical evaluation, and immediacy. Statistical results confirm that digital transformation significantly influences consumer behaviour and that meaningful differences exist in shopping preferences. The study concludes that digital transformation has not replaced traditional retail but has redefined it. It recommends that businesses adopt integrated, customer-centric omnichannel strategies to remain competitive in this evolving landscape.

Key Words: Digital Transformation, Online, Offline, Shopping, Preference

Introduction:

Modern technology has completely transformed how we shop upside down—to be honest, it occurred quickly. Unexpectedly, smartphones at our fingertips, contactless payments and huge online retailers prepared to deliver nearly everything, the entire shopping world fits right in your pocket. Browsing store aisles? That is merely a minor portion of this at this moment. The majority of us switch between applications, browse reviews, weigh prices quickly, make payments with a tap, or simply browse casually prior to making any purchase.

Even so, traditional stores haven't disappeared. Occasionally you simply need to grasp an object physically, sense its heaviness, observe the surface or receive a person's feedback in person. Shops are important in that regard. The truth is—the majority of people engage in both to some extent nowadays: occasionally you shop online, sometimes you visit the store. That combination is really the essence of digital shopping.

It's simple to overlook this change did not occur immediately. In the 1990s, we accessed the internet to search for information, yet we still needed to go to the store to make purchases. Things began to change during the early 2000s—all of a sudden, it became possible to purchase items viewed online without leaving your desk. Surely, a lot of people were worried: Could the site lose their information?? Would the package even show up? As of 2010, though, nearly everyone owned a smartphone and dependable internet access, and everything started to grow rapidly. We began scanning shelves at stores as we checked prices online and were able to order from our phones immediately.

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When digital payments and next-day (or even same-day) delivery arrived around 2016, shopping became simpler—and much more enjoyable. Social networks actually started influencing our purchasing desires. After that the global pandemic struck, and all things moved into fast-forward. Customers purchased all kinds of things—food supplies, devices, and more—while sitting on the couch. Even retailers which had never sold online hurried to catch up. All of a sudden, it became possible to pay using a QR code, place an order for pickup, or receive delivery at your doorstep. Now? Only a small number of people rely exclusively on digital or physical stores. The key is changing things around. So what's the big shift? Purchasing is more seamless now, better tailored—as well as you're not left uncertain. On the internet, you have the freedom to purchase anytime, evaluate costs in a flash, read genuine reviews, make a purchase in moments, and have items delivered to your doorstep. Enter a store, however, and you are able to handle items, speak to a person, and walk out having bought something immediately. There is a certain trust you simply cannot obtain from a website. This is the reason some people look up information online but make purchases in-store, and others browse in stores, but end up buying online. The majority of us simply follow whatever is most effective in the moment. The fact is, technology has not eliminated traditional habits. Rather, it has provided us additional shopping options—as well as increased freedom.

For what reason is all this important? Since companies that fail to adapt are left behind, straightforward and clear. This study explores how digital technologies affect our desires, whether we prioritize speed or the complete in-store experience, and the influence of age, income, and other factors on our actions. If you are a marketer, a shop owner, or are involved in retail in any capacity, focusing here is the way you truly engage with genuine customers, reconsider your business approach, and develop products people desire. The more accurately you grasp what customers are actually doing—on the internet, in physical stores, or both—the wiser your decisions can become regarding your upcoming actions. This research offers a new perspective on how shopping habits have evolved, what continues to be relevant and why brick-and-mortar shops continue to matter, despite the digital shift.

Consumers do not purchase all products online in the same manner. Consider electronics, style accessories, or literature—most people go directly online for these items since comparing prices is simpler and payment is fast. However, when it involves groceries, high-end products, or apparel, customers genuinely wish to see and feel the items they are purchasing. Shopping in person prevails. The choice is not only about the product alone, as well. Confidence, potential loss, the speed of delivery, reimbursements and customer support standards—each is important. Also don't underestimate the sway of influencers, reviews, and photos from actual customers. That material influences the way everyone views a company.

Conventional shops aren't simply idle too—they are shaking things up. You likely observe recent payment methods, bright displays, and click-and-collect choices appearing all over. In spite of all the hype surrounding e-commerce, internet and physical store shopping are not substituting one another. They are simply discovering novel methods to live together. Considering all these changes, grasping what truly matters to customers is essential. This research examines if individuals choose ease over expertise, cost rather than trust, or ease of access rather than hands-on interaction. It examines how digital technologies are changing traditional shopping behaviors, and if consumers currently view internet shopping as a substitute or just another option in addition to visiting physical stores. The aim is to understand how consumer behaviors are evolving with everything becoming digital.

Objectives of the Study:

1. To examine the impact of digital transformation on consumer buying behaviour.
2. To compare consumer preferences between online and offline shopping.
3. To identify factors influencing choice of online and offline purchasing.
4. To analyse the role of digital tools in purchase decisions.
5. To study the influence of demographic factors on shopping preferences.

Hypothesis of the Study:

H01: There is no significant difference in consumer buying behaviour between online and offline shopping preferences.

H1: There is a significant difference in consumer buying behaviour between online and offline shopping preferences.

H02: Digital transformation has no significant influence on consumer buying behaviour.

H2: Digital transformation has a significant influence on consumer buying behaviour.

Literature Review:

Digital innovation has transformed retail upside down. Nowadays, the boundaries between digital and physical stores have become very unclear, due to the numerous devices and applications. Using smartphones, digital payments, and numerous websites, it's much simpler for users to locate, browse, and purchase anything they desire. The traditional method of shopping seems quite obsolete these days—everything is faster, easier, and always only a tap away.

Mukherjee (2024) conducted a systematic review on digital transformation and consumer behaviour and found that consumers increasingly use digital platforms for information search, price comparison, and product evaluation before making purchase decisions. The study emphasized that digital transformation has led to the emergence of omnichannel behaviour where consumers move between online and offline shopping environments.

Rani, Samariya, and Goyal (2025) examined consumer motivation toward digital retail adoption and reported that convenience, accessibility, and time-saving are major factors influencing online shopping preferences. The study also found that consumers prefer offline shopping for experiential benefits such as physical inspection, immediate availability, and interaction with sales personnel. The findings indicate that both online and offline shopping channels coexist, with consumers selecting between them based on situational needs.

Zamfirache et al. (2024) analysed differences between online and offline consumer behaviour and observed that online shopping provides greater product variety, price comparison, and convenience, whereas offline shopping offers trust, tangibility, and instant purchase. The study concluded that consumer buying behaviour is becoming hybrid in nature, with digital transformation encouraging consumers to switch between both modes depending on product category and perceived risk.

Srilakshminarayana (2024) investigated consumer preferences toward online and offline shopping and found that factors such as delivery time, product authenticity, and return policies influence online shopping decisions, while product inspection and store experience influence offline shopping preferences. The study highlighted that digital platforms are more suitable for standardized products, whereas offline stores remain important for high-involvement purchases.

Lokhande and Kale (2025) studied consumer buying behaviour toward online and offline purchasing and identified price comparison, convenience, trust, and product availability as key determinants. The research also indicated that demographic variables such as age and income significantly influence consumer preference toward digital platforms. Younger consumers showed greater inclination toward online shopping, while older consumers preferred offline shopping environments.

Roy and Datta (2022) examined determinants of online and offline shopping behaviour and found that perceived risk, ease of use, service quality, and customer satisfaction significantly affect consumer choice. The study revealed that consumers increasingly combine online information search with offline purchase decisions, indicating the growing role of digital transformation in shaping buying behaviour.

The prior knowledge derived from the above studies indicates that digital transformation has introduced convenience, accessibility, and information transparency into consumer buying behaviour. Most researchers agree that online shopping is driven by time-saving, price comparison, and wider product selection, whereas offline shopping is influenced by trust, product experience, and immediate availability. The present understanding also highlights that consumers no longer rely on a single shopping channel but adopt a hybrid approach that integrates both online and offline platforms.

The findings of the reviewed studies collectively suggest that digital transformation has not replaced traditional shopping but has modified consumer decision-making processes. Online and offline shopping modes complement each other, and consumer preference depends on product type, perceived risk, and personal convenience. These studies further demonstrate that digital tools such as mobile applications, social media, and digital payments significantly influence consumer purchase decisions.

The relationship between the reviewed studies and the present research lies in their focus on comparative analysis of online and offline shopping preferences under digital transformation. While previous studies have examined factors influencing online adoption and offline preference, there remains a need to comparatively analyse both shopping modes in a unified framework.

Although earlier studies have examined digital transformation and consumer buying behaviour, most of them focus either on online shopping adoption or offline retail experience independently. Limited research has been conducted on a comparative analysis of online and offline shopping preferences in the context of digital transformation. Further, many studies do not simultaneously examine the role of digital tools, demographic factors, and consumer perceptions in shaping hybrid buying behaviour. Therefore, the present study attempts to fill this gap by analysing the impact of digital transformation on consumer buying behaviour and comparing consumer preferences toward online and offline shopping within a single research framework.

Methodology:

The present study adopts a descriptive and comparative research design to examine the impact of digital transformation on consumer buying behaviour and to compare preferences between online and offline shopping modes. The descriptive design helps in understanding the existing behaviour and attitudes of consumers, while the comparative approach enables the analysis of differences between online and offline shopping preferences. The study follows a quantitative research approach, as it relies on structured responses collected from consumers and analysed using statistical tools. This design is appropriate for identifying patterns, relationships, and variations in consumer buying behaviour in the context of digital transformation.

The study is based on both primary and secondary data. Primary data is collected directly from consumers using a structured questionnaire designed specifically for the research objectives. The questionnaire includes questions related to demographic characteristics, online shopping behaviour, offline shopping preferences, and the influence of digital transformation factors such as mobile applications, digital payments, and online reviews. Secondary data is

collected from various sources including research journals, books, published articles, reports, and relevant websites. The use of both primary and secondary data helps in providing a comprehensive understanding of the research problem. The population of the study consists of consumers who engage in both online and offline shopping. These consumers represent individuals who use digital platforms for product search, comparison, and purchasing, while also visiting physical stores for traditional shopping. The sampling unit for the study includes individual consumers who are familiar with digital technologies and have experience in both online and offline shopping. The study uses a convenience sampling technique, where respondents are selected based on accessibility and willingness to participate. This method is suitable for collecting data within limited time and resources. A sample size of 100 respondents is considered for the study to obtain meaningful insights into consumer buying behaviour and preferences.

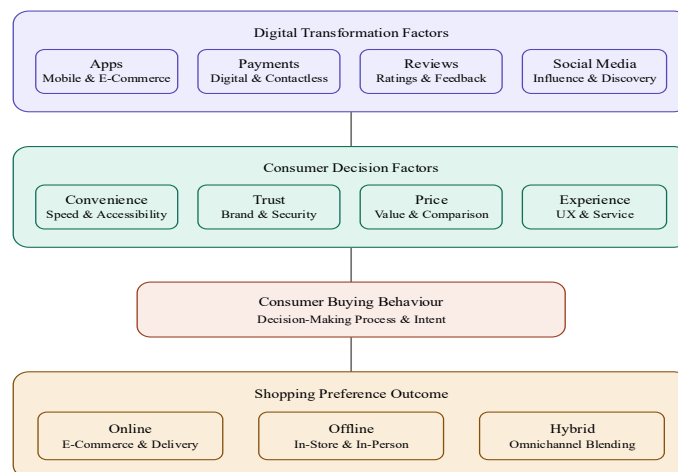
The primary data for the study is collected using a structured questionnaire method. The questionnaire consists of close-ended questions and Likert scale statements to measure consumer opinions and preferences. The questionnaire is divided into sections such as demographic profile, online shopping behaviour, offline shopping behaviour, and influence of digital transformation factors. The responses are collected through online survey forms such as Google Forms as well as printed questionnaires, depending on respondent convenience. This method ensures systematic and uniform data collection from all respondents.

The collected data is analysed using appropriate statistical tools and techniques. Percentage analysis is used to understand the distribution of responses among different categories. Mean score analysis is applied to evaluate consumer preferences toward online and offline shopping. Comparative analysis is used to identify differences between online and offline buying behaviour. The results are presented using tables, charts, and graphs for better interpretation. Hypothesis testing is also applied to examine whether digital transformation significantly influences consumer buying behaviour and whether there is a significant difference between online and offline shopping preferences.

The study considers digital transformation factors such as mobile applications, digital payments, social media influence, and online reviews as independent variables. Consumer buying behaviour and shopping preferences toward online and offline modes are treated as dependent variables. These variables help in analysing the relationship between digital transformation and consumer purchasing decisions.

The scope of the study is limited to analysing consumer preferences toward online and offline shopping and understanding how digital transformation influences buying behaviour. The study focuses on factors such as convenience, price comparison, trust, product availability, and shopping experience. The findings of the study are expected to provide insights into the changing trends in consumer buying behaviour and the growing importance of digital transformation in retail purchasing decisions.

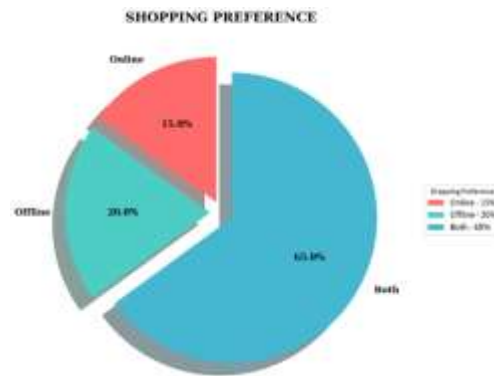
Research Model



Data Analysis & Findings:

TABLE 6.1 SHOPPING PREFERENCE

Shopping Preference	Number of Respondents	Percentage (%)
Online	15	15%
Offline	20	20%
Both	65	65%
Total	100	100%



The majority of respondents (65%) prefer both online and offline shopping, indicating a hybrid buying behaviour. About 20% prefer offline shopping, while only 15% prefer online shopping. This suggests that consumers use both modes based on their needs rather than relying on a single shopping method.

TABLE 6.2: FREQUENCY OF ONLINE SHOPPING

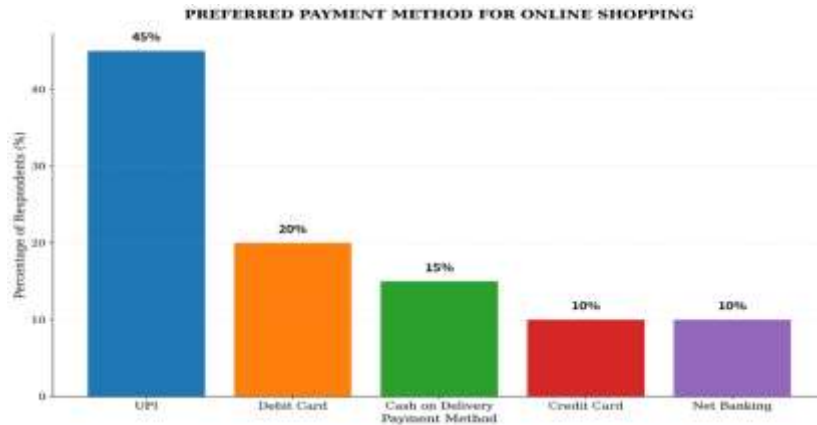
Frequency Level	Number of Respondents	Percentage (%)
Very Frequently	18	18%
Frequently	32	32%
Occasionally	30	30%
Rarely	12	12%
Never	8	8%
Total	100	100%



Most respondents shop online either frequently (32%) or occasionally (30%), indicating regular engagement with online shopping. A smaller proportion shop very frequently (18%), while 12% rarely and 8% never shop online. Overall, this suggests a moderate to high level of online shopping usage among consumers.

TABLE 6.3 Preferred Payment Method For Online Shopping

Payment Method	Number of Respondents	Percentage (%)
UPI	45	45%
Debit Card	20	20%
Credit Card	10	10%
Cash on Delivery	15	15%
Net Banking	10	10%
Total	100	100%



UPI is the most preferred payment method (45%), indicating the growing adoption of digital payment systems. Debit cards (20%) and cash on delivery (15%) are also commonly used, while credit cards and net banking are preferred by 10% each. This suggests a strong shift toward convenient and instant digital payment methods among consumers.

TABLE 6.4: Influence Of Online Shopping Factors

Factor	Majority Response
Time Saving	Agree
Price Comparison	Agree
Product Variety	Agree
Online Reviews	Agree
Convenience	Strongly Agree



Respondents generally agree that online shopping factors influence their buying behaviour. Convenience is the most significant factor, with a strong agreement, while time-saving, price comparison, product variety, and online reviews are also important influencing factors.

TABLE 6.5: INFLUENCE OF OFFLINE SHOPPING FACTORS

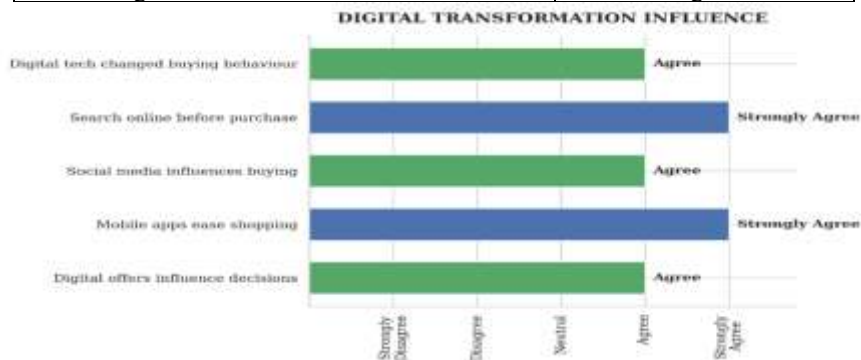
Factor	Majority Response
Product Inspection	Strongly Agree
Trust	Strongly Agree
Immediate Purchase	Agree
Personal Interaction	Agree
Shopping Experience	Agree



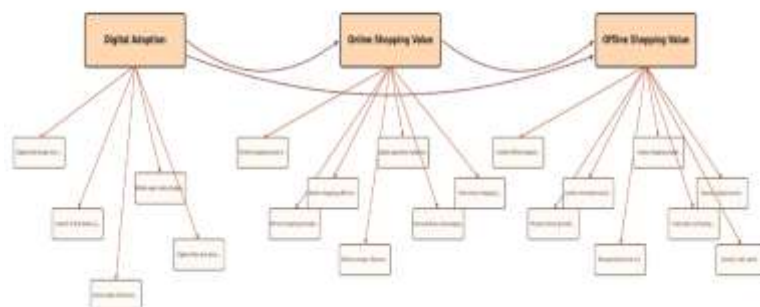
Respondents strongly value product inspection and trust in offline shopping. Factors like immediate purchase, personal interaction, and shopping experience are also important, indicating that physical stores are preferred for reliability and direct experience.

TABLE 6.6 DIGITAL TRANSFORMATION INFLUENCE

Statement	Majority Response
Digital tech changed buying behaviour	Agree
Search online before purchase	Strongly Agree
Social media influences buying	Agree
Mobile apps ease shopping	Strongly Agree
Digital offers influence decisions	Agree



Digital transformation has a strong influence on consumer buying behaviour. Respondents highly agree that they search online before purchase and that mobile apps make shopping easier, while social media and digital offers also play a significant role in influencing decisions.



6.7 Confirmatory Factor Analysis and SEM Path Diagram

Hypothesis 1: Shopping Preference

Hypothesis

H₀₁: There is no significant difference in consumer buying behaviour between online and offline shopping preferences.

H₁₁: There is a significant difference in consumer buying behaviour between online and offline shopping preferences.

Table 6.8: Hypothesis Test Shopping Preference

Category	Observed (O)
Online	15
Offline	20
Both	65
Total	100

Expected Frequencies (E) $E=100/3=33.33$

Table 6.8.1 Result

Category	O	E	(O - E)	(O - E) ²	(O - E) ² / E
Online	15	33.33	-18.33	335.99	10.08
Offline	20	33.33	-13.33	177.69	5.33
Both	65	33.33	31.67	1002.89	30.09
Total χ^2					45.50

Degrees of Freedom: $Df=(n-1)=(3-1)=2$

Decision Rule

Result Value at 5% significance level ($df = 2$) = 5.991, Calculated value = 45, Since $45.50 > 5.991$ Reject H_{01} , therefore There is a significant difference in consumer shopping preferences.

Hypothesis 2: Digital Transformation Influence

Hypothesis

H₀₂: Digital transformation has no significant influence on consumer buying behaviour.

H₁₂: Digital transformation has a significant influence on consumer buying behaviour.

Table 6.9: Hypothesis Test Digital Transformation Influence

Response Category	Observed (O)
Strongly Agree	30
Agree	40
Neutral	15
Disagree	10
Strongly Disagree	5
Total	100

Expected Frequencies (E) $E=100/5=20$

Table 6.9.1 Result

Category	O	E	(O - E)	(O - E) ²	(O - E) ² / E
SA	30	20	10	100	5.00
A	40	20	20	400	20.00
N	15	20	-5	25	1.25
D	10	20	-10	100	5.00
SD	5	20	-15	225	11.25
Total χ^2					42.50

Degrees of Freedom $Df=(n-1)=(5-1)=4$

Decision Rule

Table value at 5% significance level ($df = 4$) = 9.488, Calculated value = 42.50, Since $42.50 > 9.488$, Reject H_{02} , Digital transformation has a significant influence on consumer buying behaviour.

Discussion:

The findings of the study indicate that digital transformation has played a crucial role in shaping consumer buying behaviour. The high percentage of respondents preferring both online and offline shopping suggests the emergence of an integrated or hybrid shopping model, rather than a complete shift to digital platforms. The preference for online shopping due to convenience, price comparison, and variety reflects the growing importance of digital technologies in simplifying the buying process. Consumers are increasingly relying on mobile applications, online reviews, and social media to make informed decisions. This supports the idea that digital transformation has enhanced information accessibility and transparency in the marketplace.

At the same time, offline shopping continues to hold importance due to factors such as trust, product inspection, and immediate availability. This indicates that consumers still value the physical experience associated with traditional retail. The findings suggest that online and offline shopping modes are not substitutes but complement each other. The observation that consumers search online before making purchases highlights the presence of ROPO behaviour (Research Online, Purchase Offline). This behaviour reflects a shift in consumer decision-making patterns where digital platforms act as a primary source of information, even when the final purchase is made offline.



The results of the Chi-square test confirm that there is a significant relationship between digital transformation and consumer buying behaviour, as well as a significant difference in shopping preferences. This supports the research hypothesis and indicates that consumer behaviour is influenced by technological advancements. These findings are consistent with previous studies in the literature, which emphasize that digital transformation leads to omnichannel consumer behaviour, where individuals switch between online and offline channels depending on convenience, trust, and product type. Overall, the discussion highlights that digital transformation has not replaced traditional shopping but has redefined the way consumers interact with both online and offline retail environments.

Conclusion:

The study concludes that digital transformation has significantly influenced consumer buying behaviour by introducing convenience, accessibility, and enhanced decision-making capabilities. The findings reveal that consumers do not exclusively prefer online or offline shopping; instead, they adopt a hybrid approach that combines the advantages of both modes.

Online shopping is primarily driven by convenience, time-saving, and access to a wide range of products, while offline shopping is preferred for trust, product evaluation, and immediate purchase. This indicates that both shopping modes continue to coexist and serve different consumer needs. The hypothesis testing results confirm that there is a significant difference in shopping preferences and that digital transformation has a substantial impact on consumer behaviour. These results highlight the growing importance of digital technologies in shaping modern purchasing decisions. The study has important implications for businesses and marketers. Organizations must adopt omnichannel strategies that integrate online and offline platforms to meet changing consumer expectations. Retailers should focus on enhancing digital engagement while maintaining strong in-store experiences to attract and retain customers. However, the findings are based on a limited sample size and may not represent the entire population. Despite this limitation, the study provides valuable insights into the evolving nature of consumer buying behaviour in the digital era. In conclusion, digital transformation has not eliminated traditional shopping practices but has created a balanced and dynamic retail environment, where consumers make flexible and informed choices based on their preferences and needs.

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OriginalArticle

Mapping Land Use and Land Cover Analysis Using GeoAI: A Study of Davanagere District, Karnataka.

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Land Use and Land Cover (LULC) analysis is a critical component in understanding spatial dynamics, environmental changes, and sustainable resource management. The integration of Artificial Intelligence with Geographic Information Systems, commonly referred to as GeoAI, has revolutionized spatial data analysis by improving accuracy and efficiency. This study focuses on mapping and analyzing LULC patterns in Davanagere district using GeoAI techniques. Satellite imagery and machine learning algorithms were utilized to classify land cover into major categories such as cropland, built-up areas, vegetation, barren land, and water bodies. The results indicate that cropland dominates the region, while built-up areas are expanding gradually. The study demonstrates the effectiveness of GeoAI in enhancing spatial analysis and supporting decision-making in land management and planning.

Keywords: GeoAI, Land Use Land Cover, GIS, Remote Sensing, Davanagere.

Introduction

Land Use and Land Cover (LULC) mapping plays a vital role in analyzing spatial patterns and monitoring environmental changes over time. Traditionally, Geographical Information Systems and remote sensing have been widely used for LULC classification. However, with the increasing volume and complexity of geospatial data, conventional methods face limitations in terms of processing speed, accuracy, and predictive capability. The emergence of Artificial Intelligence has provided new opportunities to overcome these challenges. AI techniques such as machine learning and deep learning enable automated classification, pattern recognition, and predictive modeling. The integration of AI with GIS, known as GeoAI, enhances the ability to process large datasets and extract meaningful spatial information.

The present study aims to analyze the LULC pattern of Davanagere district using GeoAI techniques. The district is characterized by diverse land use patterns, including agriculture, urban settlements, and natural vegetation. Understanding these patterns is essential for sustainable development and environmental conservation.

Objectives

1. To map Land Use and Land Cover using GeoAI techniques.

Study Area

Geographically, it is situated at approximately 14° 28' N latitude and 75 ° 59' E longitude. The total geographical area of Davanagere district is about 5,926 km². The district comprises several taluks and includes both urban centers and a large number of rural settlements distributed across the region. It is predominantly agrarian, with agriculture forming the backbone of the local economy. The soils of Davanagere district are mainly red loamy and black cotton soils, along with patches of sandy and lateritic soils. The district experiences a semi-arid tropical climate, characterized by moderate to high temperatures. The average temperature ranges between 20°C and 35°C, with April and May being the hottest months. With the onset of the southwest monsoon in June, temperatures gradually decline.

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December and January are the coolest months, with relatively lower temperatures. Rainfall in the range of around 600-700 mm.

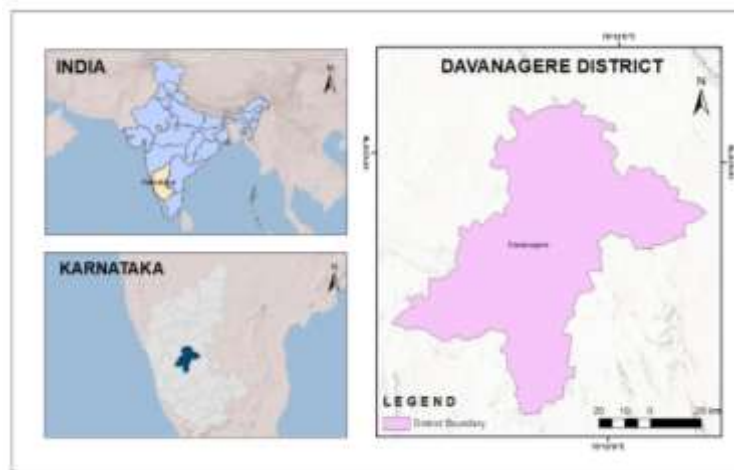


Figure.1: Location map of the study area

Database and Methodology

The Land Use and Land Cover (LULC) analysis for Davanagere district was carried out using multi-temporal satellite imagery for the period 2023. The study employed a supervised classification approach integrating remote sensing and GIS techniques to generate accurate LULC maps. Initially, satellite images were preprocessed to correct geometric and radiometric distortions and clipped to the study area boundary. The processed images were then classified using supervised classification techniques in ERDAS Imagine. Specifically, the Maximum Likelihood Algorithm and the Non-parametric Parallelepiped Classifier were applied to categorize land cover types. Training samples were collected from representative sites across the study area to ensure accurate classification. These training datasets were used to assign spectral signatures to different land cover classes.

Results and Discussion

The Land Use and Land Cover (LULC) map of Davanagere district for the year 2024 reveals clear and meaningful spatial patterns that reflect both natural characteristics and human interventions. The analysis shows that cropland occupies the largest proportion of the total geographical area, confirming the district's strong agricultural base. This dominance indicates intensive land utilization for crop cultivation, supported by favorable agro-climatic conditions and irrigation facilities. The widespread distribution of agricultural land across the central and northern parts of the district highlights its importance as a key economic activity and livelihood source for the local population. The built-up areas are primarily concentrated around urban centers and along major transport corridors, indicating ongoing urbanization and infrastructural development. Although the extent of built-up land is relatively smaller compared to cropland, its gradual expansion suggests a shift in land use patterns driven by population growth, economic activities, and rural-to-urban transformation. This trend, if not managed properly, may lead to the conversion of productive agricultural land into non-agricultural uses in the future.

The distribution of vegetation and tree cover appears in fragmented patches, mainly in peripheral and less intensively cultivated regions. These areas play a crucial role in maintaining ecological balance, supporting biodiversity, and regulating micro-climatic conditions. Similarly, rangeland and barren land are confined to specific pockets, particularly in less fertile or degraded zones, indicating variations in land productivity and soil quality across the district. The presence of such land categories suggests the need for land reclamation and sustainable land management practices. Waterbodies, as observed from the map, are limited and scattered, reflecting the uneven distribution of surface water resources. This pattern highlights potential challenges related to water availability, especially in semi-arid conditions, and underscores the importance of efficient water resource management and conservation strategies.

From a methodological perspective, the application of GeoAI has significantly enhanced the classification process. By integrating Machine Learning techniques with geospatial analysis, the study achieved higher classification accuracy and better differentiation of land cover types compared to traditional GIS-based approaches. GeoAI models are capable of processing large volumes of satellite data, identifying complex spatial patterns, and reducing classification errors, thereby improving the reliability of the results.

The findings emphasize the central role of agriculture in the district's economy while also drawing attention to emerging urban growth and environmental concerns. The increasing pressure on land resources due to urban expansion and limited water availability may pose challenges for sustainable development. While GeoAI offers advanced capabilities for spatial analysis, certain limitations remain, including dependence on high-quality data, computational requirements, and issues related to model interpretability.

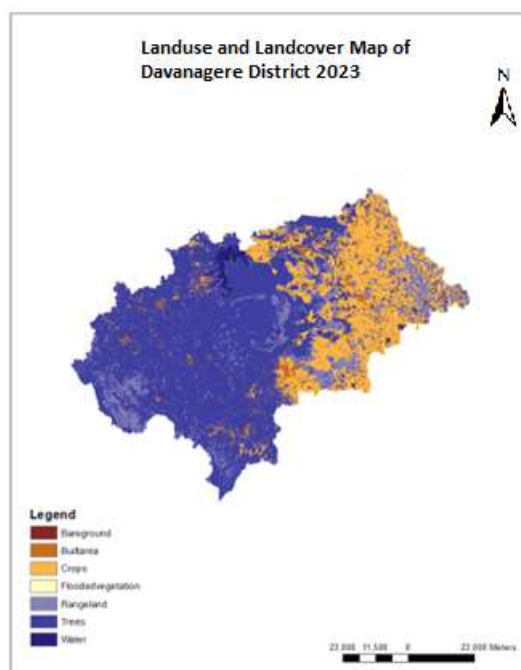


Figure.2: Landuse and landcover map of Davanagere

Conclusion

The present study highlights the effectiveness of GeoAI in mapping and analyzing Land Use and Land Cover (LULC) patterns in Davanagere district. The integration of artificial intelligence techniques with Geographical Information Systems has significantly improved the accuracy, efficiency, and reliability of spatial data processing. Compared to conventional methods, GeoAI enables automated classification, better handling of large datasets, and enhanced detection of complex spatial patterns.

The results clearly indicate that agricultural land dominates the study area, reflecting the agrarian nature of the region. At the same time, the gradual expansion of built-up areas points to increasing urbanization, which may influence future land use dynamics. The presence of vegetation, rangelands, and limited water bodies further highlights the environmental characteristics and resource distribution within the district. These spatial patterns provide important insights into the relationship between human activities and natural resources.

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OriginalArticle

The Impact of Physical Activity, Body Mass Index, And Motor Fitness on the Acquisition of Fundamental Movement Skills in Children

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Fundamental Movement Skills (FMS) are basic motor patterns that provide the foundation for children's participation in physical activity, sports, and healthy daily functioning. The development of FMS during childhood is influenced by several biological and behavioural factors, among which physical activity, Body Mass Index (BMI), and motor fitness are considered highly significant. This descriptive article examines the role of physical activity, BMI, and motor fitness in the development of fundamental movement skills among children. Evidence suggests that regular physical activity enhances movement competence by providing repeated opportunities for movement practice, whereas elevated BMI may hinder movement performance due to biomechanical limitations. Likewise, motor fitness components such as strength, speed, agility, flexibility, and coordination contribute significantly to the effective execution of movement skills. Understanding the role of these factors is essential for educators, coaches, and health professionals to promote optimal motor development and lifelong physical activity participation in children.

Keywords: Fundamental Movement Skills, Physical Activity, Body Mass Index, Motor Fitness, Children, Motor Development

Background of the Study

Fundamental Movement Skills (FMS), essential motor patterns categorized into locomotor, object-control, and stability skills, underpin children's ability to participate in physical activities and sports (Gallahue & Ozmun, 2006; Lubans et al., 2010). The development of FMS is crucial for promoting physical literacy and motor competence, which are linked to sustained participation in physical activities into adulthood (Whitehead, 2010; Barnett et al., 2008). Conversely, inadequate movement competence may lead to decreased self-confidence and heightened sedentary behavior, increasing health risks (Robinson et al., 2015).

Motor development is influenced by biological maturation and shaped by individual, environmental, and task-related factors (Clark & Metcalfe, 2002). Key determinants of FMS include physical activity, Body Mass Index (BMI), and motor fitness. Regular physical activity facilitates practice and improves motor competence (Stodden et al., 2008; Barnett et al., 2016). Elevated BMI in children can impede movement competence due to increased biomechanical loads (Logan et al., 2012). Additionally, motor fitness, encompassing strength, agility, and coordination, is vital for effective FMS execution (Cattuzzo et al., 2016).

Despite the acknowledged significance of these factors, research on their interplay in FMS development is limited. Understanding these relationships is critical for informing interventions aimed at promoting lifelong physical activity.



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Introduction

Fundamental Movement Skills (FMS) are motor patterns necessary for children's engagement in physical play and sports. These skills encompass locomotor movements (e.g., running and jumping), object-control tasks (e.g., throwing and catching), and stability skills (e.g., balancing) (Gallahue & Ozmun, 2006). Proficiency in FMS is essential for healthy physical development and long-term participation in physical activities.

The acquisition of FMS is influenced by various factors, including environmental contexts, instructional methods, physical activity, body composition, and fitness levels (Clark & Metcalfe, 2002). Physical activity facilitates motor skill acquisition by providing opportunities for movement practice and neuromuscular adaptation. Active engagement enhances coordination, balance, and motor control, establishing a positive feedback loop between physical activity and motor competence (Stodden et al., 2008).

BMI also impacts movement skill development; children with higher BMI often face challenges in executing movement tasks effectively due to biomechanical constraints (Logan et al., 2012; D'Hondt et al., 2009). This may undermine confidence and reduce active participation.

Motor fitness contributes to FMS by providing essential physical attributes such as strength, agility, and coordination, correlating with greater movement competence (Cattuzzo et al., 2016). Stodden et al. (2008) present a developmental model illustrating the dynamic interactions between physical activity, BMI, motor fitness, and FMS. Children with higher motor competence typically engage more in physical activities, thus enhancing fitness and maintaining healthy body composition.

Given the importance of FMS in child development and increasing concerns regarding childhood obesity and sedentary lifestyles, investigating the factors influencing movement competence is critical. This study aims to explore the effects of physical activity, Body Mass Index, and motor fitness on FMS development in children, providing insights for educators, health professionals, and policymakers to promote healthy development.

1. Role of Physical Activity in Fundamental Movement Skill Development.

Physical activity is essential for the development of Fundamental Movement Skills (FMS), offering children numerous opportunities for movement exploration and motor practice. According to Clark and Metcalfe (2002), acquiring FMS necessitates active engagement in varied movement experiences rather than relying solely on maturation. Through active play, physical education, and sports, children enhance their locomotor, object-control, and stability skills, thereby improving movement competence.

Stodden et al. (2008) posited a reciprocal relationship between physical activity and motor competence, indicating that physically active children tend to exhibit greater movement proficiency, while those with higher motor competence are more inclined to engage in physical activity. Supporting this, Barnett et al. (2016) identified a positive correlation between physical activity and gross motor competence among children and adolescents.

Regular physical activity enhances muscular strength, balance, coordination, postural control, and motor learning, all of which improve movement efficiency (Cattuzzo et al., 2016). Both structured programs and unstructured play have proven effective in enhancing FMS proficiency by facilitating skill repetition and movement adaptation (Morgan et al., 2013; Giblin et al., 2014). Conversely, a lack of physical activity and increased sedentary behavior can impede FMS development by restricting opportunities for practice (Tremblay et al., 2011). Additionally, moderate-to-vigorous physical activity is more strongly linked to FMS proficiency than lower-intensity activities due to its heightened neuromuscular demands (Fowweather et al., 2015).

In summary, physical activity is a crucial mechanism for the acquisition and refinement of FMS, making regular participation in developmentally appropriate activities vital for optimal motor development in children.

2. Role of Body Mass Index in Fundamental Movement Skill Development

Body Mass Index (BMI) serves as a key anthropometric measure of body composition and weight status in children, significantly correlating with the development of Fundamental Movement Skills (FMS) (World Health Organization, 2020). Research shows that elevated BMI is linked to diminished movement competence, particularly concerning locomotor and stability skills. Overweight or obese children tend to perform worse in locomotor, object-control, balance, and coordination tasks compared to their healthy-weight peers (Logan et al., 2012; D'Hondt et al., 2009). Increased body mass results in greater biomechanical load, reduced movement efficiency, compromised balance, and constrained agility (Lubans et al., 2010).

Furthermore, higher BMI can impair endurance and heighten fatigue during physical activity, limiting opportunities for movement practice and skill development (Deforche et al., 2009). Psychosocial factors, including diminished perceived competence and lower confidence, may also deter physical activity engagement in children with elevated BMI (Robinson et al., 2015). The relationship between BMI and FMS is bidirectional, as insufficient movement competence can lead to decreased physical activity and increased adiposity over time (Stodden et al., 2008). Thus, fostering healthy body composition in childhood is crucial for efficient movement performance and optimal motor development.

3. Role of Motor Fitness in Fundamental Movement Skill Development

Motor fitness encompasses the essential physical attributes for effective movement, such as strength, speed, agility, flexibility, balance, coordination, and endurance (Payne & Isaacs, 2017). These attributes form the physiological and neuromuscular basis for Fundamental Movement Skills (FMS).

Research indicates a positive correlation between motor fitness and movement competence, with fitter children exhibiting greater FMS proficiency (Cattuzzo et al., 2016). Muscular strength is crucial for explosive tasks like jumping and throwing, while agility facilitates quick directional changes (Hands et al., 2009; Lopes et al., 2012).

Furthermore, coordination and balance are vital for controlled movements and postural stability (Holfelder & Schott, 2014). Flexibility enhances the range of motion necessary for dynamic activities, while both muscular and cardio respiratory endurance underpin sustained physical activity and motor skill acquisition.

The interplay between motor fitness and FMS is bidirectional; enhanced fitness promotes movement competence, and practicing movement skills improves fitness (Stodden et al., 2008). Thus, motor fitness critically supports optimal FMS development in children.

Interrelationship of Physical Activity, Body Mass Index, and Motor Fitness in Fundamental Movement Skill Development

The development of Fundamental Movement Skills (FMS) is shaped by the dynamic interplay of physical activity, Body Mass Index (BMI), and motor fitness, rather than by isolated factors (Stodden et al., 2008). These variables collectively determine children's movement competence, influencing their developmental paths.

Regular physical activity enhances motor fitness by bolstering strength, agility, coordination, balance, and endurance, which are essential for FMS proficiency (Cattuzzo et al., 2016). Additionally, it promotes a healthy BMI through increased energy expenditure and improved body composition (Tremblay et al., 2011). Healthy BMI and motor fitness, in turn, facilitate better movement performance and increased physical activity participation.

Conversely, insufficient physical activity can lead to poor motor fitness, higher adiposity, and diminished movement competence (Lubans et al., 2010). An elevated BMI can impair motor performance by increasing biomechanical load and hindering balance and agility (Logan et al., 2012).

Stodden et al. (2008) describe a reciprocal developmental spiral, where children with higher motor competence are more likely to remain active, maintain a healthy body composition, and enhance their motor fitness. In contrast, children with poor movement skills may experience decreased activity levels and worsening fitness, leading to increased adiposity. This relationship has long-term implications, as childhood motor competence is a predictor of future physical activity participation (Barnett et al., 2008).

In summary, FMS development should be perceived as a product of an integrated system in which physical activity, BMI, and motor fitness interact continuously to affect children's motor competence and overall physical health.

Practical Implications

1.Integrated Intervention Approach:-Physical activity, BMI, motor fitness, and fundamental movement skills (FMS) should be coordinated, given their interdependent roles in child motor development.

2.Physical Education Programming:-Curricula that are developmentally relevant and incorporate FMS instruction alongside fitness activities can enhance movement competence and overall physical fitness (Morgan et al., 2013).

3.Coaching and Sports Training :-Coaches must prioritize foundational movement skills in conjunction with sport-specific training to facilitate long-term athletic development and minimize injury risk (Lloyd et al., 2015).

4.Parental and Family Support:-Promoting active play, outdoor activities, and reduced sedentary time can enhance children's movement opportunities and increase their physical activity levels (Giblin et al., 2014).

5.Clinical Screening and Early Intervention:- Healthcare professionals can assess FMS, BMI, and motor fitness to identify children at risk for motor delays, obesity, and inactivity (Robinson et al., 2015).

6.Policy and Public Health Promotion :-Schools and policymakers should enhance access to structured physical activities, promote healthy nutrition, and foster the development of physical literacy.

7.Long-Term Developmental Impact: -Early, multidimensional interventions may lead to improved FMS proficiency, better physical health, and sustained participation in physical activities throughout life.

Conclusion

The development of Fundamental Movement Skills (FMS) in children is influenced by multiple factors, particularly physical activity, Body Mass Index (BMI), and motor fitness. Regular physical activity facilitates motor learning and neuromuscular adaptations that improve FMS proficiency (Stodden et al., 2008; Barnett et al., 2016). Conversely, high BMI can hinder movement efficiency and motor performance due to biomechanical limitations and reduced agility (Logan et al., 2012; D'Hondt et al., 2009).

Motor fitness, encompassing strength, agility, coordination, balance, and endurance, serves as the physiological foundation for effective movement execution, directly impacting FMS performance (Cattuzzo et al., 2016). These factors interact within a comprehensive developmental framework, where movement competence, physical activity, fitness, and body composition mutually influence one another throughout childhood (Stodden et al., 2008).



In summary, promoting physical activity, maintaining healthy body composition, and improving motor fitness during childhood is crucial for FMS development and long-term physical engagement. Future research should explore these dynamics through longitudinal and intervention studies to enhance evidence-based practices in child motor development.

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Growth of UPI Transactions and Its Impact on Retail Commerce in India

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Unified Payments Interface (UPI) has transformed the digital payment ecosystem of India with the ability to conduct real-time transactions involving money. This paper will explore the growth trend of UPI transactions as well as analyze its effect on retail business in India based on secondary data sources by the reserve bank of India (RBI), National Payments Corporation of India (NPCI), and other official sources. The results indicate that the UPI transactions have been growing exponentially with a growth of 41 percent per annum with a total of 185.8 billion transactions in FY 2024-25 representing a 41 percent year-on-year growth. The fact that UPI is the primary retail payment method, with more than 80 percent of the volume of digital transactions being made through UPI, underscores the transformative power of UPI in retail commerce.

The research also examines the role of UPI in promoting financial inclusion, enhancing efficiency of transactions, lessening reliance on cash, and increasing sales volumes among the small and medium retailers. The study uses the trend analysis, correlation insights and comparative data evaluation to evaluate the economic implications. Findings show that there is a significant positive correlation between UPI adoption and the growth of retail commerce due to convenience, cost-effectiveness and the prevailing high smartphone penetration.

The research finds that UPI has emerged as a staple of the Indian digital economy, with a significant impact on the business models and consumer behavior of the retail sector, and is likely to continue influencing the cashless ecosystem of the Indian retail sector.

Keywords: UPI, Digital Payments, Retail Commerce, Financial Inclusion, Cashless Economy.

Introduction

The introduction of the Unified Payments Interface (UPI), which was launched in 2016 by the National Payments Corporation of India (NPCI), has greatly accelerated the digital transformation in India. UPI allows immediate transfer of funds between bank accounts via mobile devices, thus removing the necessity of traditional banking intermediaries. UPI has over the years evolved to become the backbone of the retail payment system in India due to the rapid adoption of technology, government efforts such as Digital India and the increased internet penetration rate.

The growth of UPI has been phenomenal. Compared to just 1,079 crore in 2019, UPI transactions increased exponentially to over 17221 crore in 2024. This explosion indicates a growing confidence among consumers, convenience, and the fact that UPI has become an integral part of daily financial transactions. Moreover, UPI serves almost 83-85 percent of total volume of digital payment in India, which indicates its dominance in the payment ecosystem.

Globally, UPI has made India a leader in digital payment transactions, with around 49% of the global transactions on real-time payment transaction reported to be based in India. This success highlights the efficiency, scalability and innovation inherent in the Indian payment infrastructure.

The UPI adoption has had far-reaching effects on the retail sector, specifically, on small enterprises and street vendors. Retailers, used to cash transactions, have been exploring the use of digital payments because the convenience, speed, and transparency afforded by UPI. The transition of cash to digital payments has increased the efficiency of transactions, decreased operation costs, and improved customer satisfaction.



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In addition, UPI has been instrumental in the drive to achieve financial inclusion, by allowing the individuals who do not have access to the traditional banking infrastructure, to access the digital economy. UPI-based transactions have been embraced by even rural and semi-urban residents, with the spread of smartphones and affordable internet services.

Along with these merits, such challenges as issues of cybersecurity, digital illiteracy, and infrastructural constraints remain. Nonetheless, the incessant innovations, regulatory facilitation by RBI, and fintech developments are likely to help curb these problems.

The research will examine the increase in UPI transactions and its effect on the retail business in India through empirical research and statistical analysis.

Review of literature

1. Bank for International Settlement (BIS, 2024)

The UPI of India has been defined by the Bank for International settlements (BIS), as one of the most effective real-time payment systems in the world. According to reports UPI has considerably enhanced the financial affordability via sustaining a less laborious peer-to-peer and merchant payments. Its usability with many other banks and platforms has made it more applicable to users and business. BIS observes that UPI makes less money circulate and increases the transparency of the financial transactions that transpire and brings about economic formalization. Also, the report indicates that UPI has scalable infrastructure, low transaction costs that UPI is a model system that should be implemented by the developing economies who need to modernise their payment eco systems and enhance financial inclusion.

2. Reserve Bank of India (RBI, 2025)

In India, UPI is the most popular digital payment method, which takes up more than 80% of the total of transactions, according to the Payment System Report (2025) by the Reserve Bank of India. The report shows that the value and volume of transactions has experienced steady growth due to the policy initiatives, improved infrastructure and consumer confidence. It highlights the contribution of UPI towards increasing financial inclusion through the inclusion of unbanked populations to the formal financial system. The report also indicates how through UPI, it has been able to make digital payments to help in tax compliance, to reduce the usage of cash and in general made the processes of retail transactions in the urban and rural sectors more efficient.

3. National Payments Corporation of India (NPCI, 2025)

The UPI transactions have been growing exponentially with more than 185 billion transactions in FY 2024, as indicated by the NPCI information. The report credits this massive growth to the heavy use-access to smartphones, increased penetration of internet and easy to use mobile applications. Being integrated into numerous applications in the banking sector and other types of fintech, UPI has become more convenient and accessible. Another attribute of the system that is brought to the fore in the paper is the reliability and security properties of the system which has promoted user confidence. NPCI said the UPI has become popular particularly in small transactions in the retail sector, which has greatly influenced consumer purchasing habits and enabled the small traders to enter the digital economy.

4. India Brand Equity Foundation (IBEF, 2025)

The IBEF report on digital payments notes that UPI is more than 83% of the total volume of digital transactions in India. It highlights how government initiatives such as Digital India and fintech innovations have contributed to the usage of UPI. The report outlines how UPI has positively influenced the efficiency of transactions, as well as transaction costs to the consumer and trader. UPIs have enabled the retail sectors to be empowered, and economic activities have benefited since now instant payments can be made. The report concludes that the rapid growth of UPI is an indication of a shift in consumer preference towards the use of digital payments and the role played by UPI in promoting the use of digital payment.

5. Data for India (2025)

The report of Data for India study is a detailed report of the trends in retail payments and shows that the day to day UPI payments have increased dramatically over the past five years. The report notes that UPI has usurped the mode of payment of low value transactions by the mode of payment due to the speed, convenience and zero cost structure. It further throws into perspective the fact that the platform has gone a long way in enhancing the effectiveness of transacting to the businesses in the platform. The paper points out that the operation cost burden of cash handling and better transparency of financial transactions have been positively influenced by adoption of UPI hence, positively influencing the retail business.

6. PwC India (2024)

The UPI transactions have been increased, with the compound annual growth rate, exceeding 40 (Indian Payments Handbook 2024 published by PwC). The study suggests how the digital payments will be able to improve the economic activity and advance the business. It underscores that UPI has decreased the price of executing a transaction and has augmented the supervision of cash flow of retailers. The other problem that has been discussed in the report is the increasing transparency of UPI and e-commerce platforms and digital ecosystems. According to PwC, the further evolution of UPI is subject to the technological advancement, regulatory assistance and the growth of consumer awareness which will provide UPI with the significance it will assume in Indian financial infrastructure.

7. Dev et al. (2024)

The study by Dev et al. (2024) examines the behavioral impact of UPI on purchasers and finds that an approximate 3/4 of the users indicated that it had an increase in spending after switching to digital payments. The research however proposes that convenience and ease of providing UPI transaction will create an impulse purchase and catalyst the speed at which transactions can be provided. It also reveals the significance of digital payments to facilitate consumer satisfaction and reduce time spent to make the transactions. This research draws a conclusion that UPI has played a significant role in shaping the buying behavior as well as developing a retail business through value addition by the way of faster and efficient payment system.

8. Government of India (2024), Ministry of Finance.

The Government of India digital payments report addressed UPI has a staggering scalability and billions of transactions take place each month. It emphasizes the role of policy support, development of infrastructure and campaigns to create awareness to the people in enabling adoption. The report also explains the ways in which UPI has enhanced financial inclusion by the ability to access online payments in the rural and semi-urban regions. It also shows how the system has led to the minimization of the shadow economy by opening up to financial dealings. The report concludes that UPI has come out as a significant driver of the digital economy and transformation of retail commerce in India.

Objectives of the Study

1. To analyze the growth trend of UPI transactions in India.
2. To examine the impact of UPI on retail commerce performance.
3. To evaluate the relationship between UPI adoption and financial inclusion.

Scope of the Study

This paper aims at examining the development of UPI transactions as well as its effect on retail business in India through the secondary data of RBI, NPCI and government reports. It is applicable between 2016 and 2025 and analyzes the trends in the transaction volume, value and adoption rates. The study highlights the implications of the retail sector such as small businesses and consumer behaviour. Nevertheless, it excludes a primary data collection and sector-specific micro-level analysis and restricts its scope to macro-level insights.

Need for the Study

The fast rate of digital payments in India requires a detailed study of the effects of UPI in changing retail commerce. Knowledge of this impact can help policymakers, businesses, and researchers to determine the effectiveness of digital payment systems. UPI has greatly changed the way customers behave, the way business is conducted and the way financial inclusion patterns are followed. Nevertheless, empirical analysis is needed in order to quantify these changes and evaluate their long-term implications. The present study offers information on the dynamics of the growth of UPI and the role it plays in the economic development, thus helping in decision making and policy formulation.

Methodology of the study

The research is founded on secondary data sources related to RBI reports, NPCI statistics, government publications, and research papers. The data are interpreted by using analytic methods like trend analysis, percentage growth, and correlation analysis. Data is tabulated to be easily compared and interpreted. It applies both qualitative and quantitative methods in order to identify the effect of UPI on retail business. Statistical knowledge is obtained to define the interdependence between variables like the amount of transactions, retail expansion, and financial inclusion.

Results of the study

Analyze the growth trend of UPI transactions in India

Table 1: Growth Trend of UPI Transactions

Year	Transactions (Billion)	Growth %
2019-20	10.79	—
2021-22	74.04	586%
2023-24	172.21	132%
2024-25	185.8	41%

Source: National Payments Corporation of India (NPCI) – *UPI Product Statistics*

Table 2: Regression Analysis: Growth for UPI Transitions

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	0.97	0.94	0.91	25.43

Table 3: ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	11734.25	1	11734.25	18.14	0.051
Residual	1294.87	2	647.44		
Total	13029.12	3			

Table 4: Coefficient Table

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
Constant	-36.20	28.15	—	-	0.31

				1.29	
Time	61.67	14.48	0.97	4.26	0.051

Table 1 shows clearly that there has been exponential growth in UPI transactions in India over the period of the study. The rapid use of digital payments is reflected in the increase in transactions, which have risen to 185.8 billion in 2024/25, compared to 10.79 billion in 2019/20. In 2021/22, the highest growth rate of 586% was recorded mainly because of the increased digitalization, the support of the policies, and the changes of the behavior after the pandemic. Despite the reduction of the growth rate to 132% in 2023/24 and even further to 41% in 2024/25, the absolute volume of the transactions keeps growing significantly, which is a sign of maturity and sustained use. Table 2 indicates that the regression relationship between time and UPI transactions is strong ($R = 0.97$, $R^2 = 0.94$), indicating that time is a strong predictor of UPI transactions. Moreover, Table 3 (ANOVA) indicates that the F-value of 18.14 with the significance level of 0.051, which is slightly above the 0.05 value, is statistically significant. In general, the findings support the idea of a strong and stable growth trend in UPI transactions, as well as its growing share in the Indian digital payment landscape.

Examination the impact of UPI on retail commerce performance.

Table 5: Impact on Retail Commerce

Indicator	Before UPI	After UPI
Cash Transactions (%)	90%	40%
Digital Payments (%)	10%	60%
Small Retail Sales Growth	Moderate	High

Source: Reserve Bank of India – Report on Trend and Progress of Banking in India

Table 5 data shows clearly the enormous effect of the adoption of UPI on the performance of retail commerce in India. Before UPI, the retail transactions were highly dependent on cash, with 90% of transactions being cash-driven, and only 10% of transactions were digital in nature. Following the introduction and widespread adoption of UPI, cash transactions decreased significantly to 40%, and digital payments increased significantly to 60% indicating a major structural change towards a cashless retailing environment. This change has helped in increasing the speed, convenience and transparency in the transactions thus increasing the efficiency of the operations of the retailers. Moreover, the qualitative shift in the growth of small retail sales between the moderate and high value indicates that the adoption of digital payments has positively impacted the increase in sales volumes, customer footfall and the overall business performance. The convenience of payment using UPI has stimulated consumer spending and minimized transaction problems, especially to small and medium retailers. Overall, the table highlights that UPI has played a transformative role in modernizing retail commerce and boosting its growth in India. UPI has significantly reduced cash dependency and increased digital transactions, leading to higher efficiency and sales growth in retail businesses.

Evaluation the relationship between UPI adoption and financial inclusion

Table 6: Financial Inclusion Impact

Indicator	2015	2024
Bank Accounts (Crore)	53	150
Digital Payment Users (%)	15%	75%

Source: RBI (2024), PMJDY (2025), World Bank (2024), Ministry of Finance (2025)

Table 6 shows that there is a strong positive correlation between UPI adoption and financial inclusion in India. The success of financial inclusion programs facilitated by digital payment systems is seen in the number of bank accounts which increased significantly to 150 crore in 2024 compared to its figure in 2015; 53 crore. At the same time, the share of users of digital payments increased dramatically, by 15 to 75 percent, which indicates the large numbers of people using such platforms as UPI. This concomitant development implies that greater exposure to digital payment infrastructure has emboldened more people to enter into formal financial systems. UPI has also made transactions simple, made physical banking less dependent and even allowed rural and previously unbanked populace to access financial services. Mobile technology coupled with banking services has also contributed to the increased rate of this inclusion process. On the whole, the table underscores the fact that UPI has been significantly instrumental in increasing the financial accessibility of India, enhancing digital literacy, and making the financial ecosystem of India more inclusive.

Conclusion

The paper finds that UPI has been a revolution in the Indian digital payment system, playing a strong role in influencing the retail business. The phenomenal increase in the volume and value of transactions is a testament to its wide acceptance and faith among users. Not only has UPI streamlined the process of making payments, but also improved operational efficiency among the retailers especially the small businesses. The results reveal that there is a great positive correlation between UPI adoption and the growth of retail commerce, which is supported by the rise of



consumer spending, enhancing financial inclusion, and decreasing dependence on cash transactions. Although there are possible challenges like digital literacy and cybersecurity issues, ongoing technological progress and regulatory assistance are likely to keep this growth trend intact. Altogether, UPI has been central to the development of the cashless economy in India and will probably continue to be a driving force behind digital transformation in the retail sector.

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OriginalArticle

Digital Society and Social Transformation

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Abstract

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The rapid advancement of digital technology has significantly transformed human society in the 21st century. The emergence of the internet, smartphones, social media platforms, and digital services has altered the way individuals communicate, learn, work, and interact. This research paper examines the concept of digital society and analyzes the major social transformations brought about by digital technologies in education, economy, governance, and social relationships. It also discusses the benefits and challenges associated with digitalization. The study concludes that while digital society offers enormous opportunities for progress, it also presents challenges such as inequality, privacy concerns, and cyber risks that need to be addressed for sustainable social development.

Keywords: Digital Society, Social Transformation, Technology, Digitalization, Social Change

Introduction

The 21st century is often referred to as the digital age because of the widespread integration of digital technologies into everyday life. Technological innovations such as the internet, mobile communication, artificial intelligence, and digital platforms have revolutionized social institutions and human interactions. Society has gradually shifted from traditional forms of communication and economic exchange to digital systems that enable instant access to information and global connectivity.

A digital society is one in which digital technologies are deeply embedded in the social, economic, and political processes of everyday life. These technologies have reshaped the structure of communities, the nature of social relationships, and the methods through which people participate in economic and civic activities. The transformation from a traditional society to a digital society has had profound consequences on education, governance, business, and culture.

This paper explores the concept of digital society and highlights the social transformations caused by digitalization. It also evaluates the opportunities and challenges associated with this transition.

Concept of Digital Society

Digital society refers to a society where digital technologies form the basis of communication, interaction, and institutional functioning. In such a society, individuals rely heavily on digital tools such as computers, smartphones, and the internet to perform daily activities.

According to sociologist Manuel Castells, digital society is characterized by the emergence of network structures where information flows rapidly through digital channels. In this system, social relationships and institutional functions are increasingly mediated by technology. Digital society promotes faster communication, easier access to information, and broader participation in global networks.

The main characteristics of a digital society include:

1. **Instant Communication**
2. **Access to Information**
3. **Online Services**
4. **Global Connectivity**
5. **Technological Dependence**

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These features have redefined the functioning of social institutions and created new opportunities for innovation and development.

Social Transformation through Digital Technology

Digital technology has become one of the most influential drivers of social transformation. It has changed the way people communicate, work, learn, and govern.

• **Transformation in Education**

One of the most visible impacts of digital technology is in the field of education. Traditional classroom teaching has been supplemented and sometimes replaced by online learning platforms, digital classrooms, and virtual educational resources.

Students now have access to e-books, video lectures, online courses, and virtual classrooms. This transformation became especially evident during the COVID-19 pandemic, when educational institutions shifted to online teaching. Digital education has improved access to knowledge, especially for students in remote areas.

However, unequal access to digital devices and internet connectivity remains a challenge in ensuring inclusive digital education.

• **Economic Transformation**

Digitalization has transformed economic activities by introducing e-commerce, digital banking, and online payment systems. Consumers can now buy goods and services online, while businesses can reach customers globally through digital platforms.

Digital payment systems such as online banking, mobile wallets, and electronic fund transfers have made financial transactions faster and more secure. The rise of digital entrepreneurship has also created new employment opportunities in sectors such as information technology, digital marketing, and online services.

Thus, digital technology has become a key driver of economic growth and modernization.

• **Transformation in Social Relationships**

Digital communication platforms such as social media have transformed interpersonal relationships and social interactions. Platforms like social networking sites, messaging applications, and video conferencing tools allow people to stay connected regardless of geographical distance.

These technologies strengthen communication among families, friends, and communities. At the same time, overdependence on digital communication may reduce face-to-face interactions and weaken traditional social bonds.

The digital environment has also influenced identity formation, community participation, and public discourse, creating both opportunities and concerns for social cohesion.

• **Transformation in Governance**

Digital technology has improved governance through e-governance systems that provide public services online. Governments now offer digital platforms for applications, documentation, tax payments, and citizen grievance redressal.

These systems enhance transparency, reduce bureaucratic delays, and improve service delivery. Citizens can access government services more efficiently, thereby increasing public participation and trust.

Digital governance has made administration more responsive and accessible, especially in developing countries.

Positive Impacts of Digital Society

The emergence of digital society has brought several benefits:

1. **Increased Efficiency**

Digital systems save time and reduce manual effort in education, administration, and business.

2. **Access to Knowledge**

The internet has democratized access to information and educational resources.

3. **Economic Opportunities**

Digital technology has created new jobs, industries, and business models.

4. **Improved Public Services**

E-governance has made public services more transparent and accessible.

5. **Social Inclusion**

Digital platforms provide opportunities for marginalized communities to participate in social and economic activities.

These positive outcomes demonstrate the transformative power of digitalization in modern society.

Challenges of Digital Society

Despite its benefits, digital society presents several challenges that must be addressed.

1. **Digital Divide**

Not all individuals have equal access to digital infrastructure. Rural populations and economically weaker groups often lack access to devices and internet services, leading to inequality.

2. **Privacy and Security Risks**

The digital environment exposes individuals to risks such as data breaches, cybercrime, and identity theft. Protecting personal data has become a major concern.



3. Social Isolation

Excessive use of digital communication may reduce physical interactions and create social isolation.

4. Misinformation

The rapid spread of false information through digital media can create confusion and social unrest.

These challenges highlight the need for responsible and inclusive digital development.

Conclusion

Digital society has become an essential feature of modern life. It has transformed education, economy, governance, and social interaction in significant ways. Digital technology has improved efficiency, increased access to services, and created new opportunities for social and economic development.

However, the benefits of digitalization are accompanied by challenges such as inequality, cyber risks, and weakening social bonds. Therefore, governments, institutions, and communities must work together to ensure that digital transformation is inclusive, secure, and beneficial for all.

The future of social development will largely depend on how effectively society manages the opportunities and risks associated with digital technology. A balanced and ethical approach to digitalization is essential for achieving sustainable social transformation.

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OriginalArticle

Impact of UPI-Led Digital Payments on Bank Performance in India: An Empirical Analysis

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The rapid expansion of digital payment systems has significantly transformed the Indian banking landscape, with the Unified Payments Interface (UPI) emerging as a key driver of cashless transactions. Since its introduction, UPI has facilitated instant, low-cost, and interoperable payments, leading to a substantial increase in transaction volumes across the banking system. This study examines the impact of UPI-led digital payments on the performance of banks in India during the post-UPI period.

The study employs secondary data sourced from the Reserve Bank of India (RBI) and the National Payments Corporation of India (NPCI) covering the period from 2016 to 2024. Bank performance is assessed using commonly accepted financial indicators such as return on assets, return on equity, and operational efficiency measures. The growth in UPI transaction volume and value is used as a proxy for digital payment adoption. To analyze the relationship between digital payments and bank performance, the study applies descriptive analysis and regression-based techniques.

The findings are expected to provide empirical evidence on whether the increasing adoption of UPI has contributed to improvements in bank performance by enhancing operational efficiency and supporting revenue generation. The study also explores the broader implications of digital payment infrastructure on the functioning of the banking system in an emerging economy context. By focusing on UPI, a uniquely Indian payment innovation, the paper contributes to the growing literature on financial technology and banking performance.

The results of the study are expected to offer valuable insights for policymakers, regulators, and banking institutions regarding the role of digital payments in strengthening the efficiency and sustainability of the banking sector. The study is particularly relevant in the context of India's digitalization initiatives and ongoing efforts to promote a cashless economy.

Keywords: UPI, Digital Payments, Bank Performance, FinTech, Indian Banking System

Introduction

The Indian banking sector has undergone one of the most significant technological transformations in its history over the last decade, driven largely by the widespread adoption of digital payment systems. Among these, the Unified Payments Interface (UPI) has emerged as a revolutionary platform, fundamentally changing how financial transactions are conducted across the country. Launched in 2016 by the National Payments Corporation of India (NPCI), UPI provides a seamless, instant, and interoperable system for transferring funds between bank accounts using mobile devices. Unlike traditional payment methods, UPI allows users to conduct transactions without relying on cash, cheques, or even bank branch visits, thereby enhancing convenience, speed, and accessibility for individuals and businesses alike.

Since its introduction, UPI has witnessed exponential growth. The volume and value of UPI transactions have increased dramatically, making it one of the fastest-growing digital payment systems globally. According to NPCI reports, the total number of UPI transactions crossed billions annually within just a few years, reflecting both the ease of use and widespread acceptance across urban and rural areas.

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This growth has been further encouraged by government initiatives such as the Digital India program, which promotes digital infrastructure, financial inclusion, and a cashless economy, as well as by policy measures from the Reserve Bank of India (RBI) and commercial banks aimed at reducing transaction costs and increasing accessibility.

For banks, the proliferation of UPI-led digital payments offers both opportunities and challenges. On one hand, digital payments can enhance operational efficiency by reducing dependency on cash handling, lowering administrative costs, and streamlining transaction processes. They can also serve as a source of revenue growth through transaction fees and the expansion of digital banking services. On the other hand, rapid digitalization requires significant investment in technology, cybersecurity, and infrastructure, and banks must adapt to changing customer behavior and competitive pressures from fintech companies. Consequently, understanding how UPI adoption affects bank performance—including profitability, cost efficiency, and overall operational effectiveness—is of vital importance to both the banking sector and policymakers.

Despite the transformative impact of UPI on the banking and payments ecosystem, empirical research examining its direct effect on bank performance in India remains limited. Most studies have focused on financial inclusion, user adoption, or consumer behavior, leaving a gap in understanding the broader operational and financial implications for banks. This research aims to address this gap by systematically analyzing the relationship between UPI-led digital payment adoption and key financial performance indicators of Indian banks over the period 2016 to 2024. By using secondary data from the RBI and NPCI, this study seeks to provide robust insights into how the growth of digital payments contributes to efficiency, profitability, and sustainable growth in the Indian banking system.

In addition, this research is particularly relevant in the context of India's ongoing efforts to promote a cashless economy, increase digital literacy, and integrate technology into financial services. By highlighting the impact of UPI adoption on bank performance, the study offers valuable implications for policymakers, regulators, banking institutions, and researchers interested in fintech, digital finance, and emerging market banking systems. Ultimately, understanding the financial and operational consequences of digital payment adoption can inform strategic decisions, policy frameworks, and future innovations in the rapidly evolving Indian banking sector.

Objectives of the Study

The main aim of this study is to examine the influence of UPI-led digital payments on the financial and operational performance of banks in India. To achieve this aim, the study is guided by the following specific objectives:

1. To analyze the growth and adoption trends of UPI-led digital payments in India
2. To assess the impact of UPI transactions on the financial performance of banks
3. To evaluate the effect of UPI adoption on operational efficiency in banks
4. To provide policy-relevant insights for regulators and banking institutions regarding the implications of UPI-led digital payment adoption.

Research Hypotheses

H1: Growth in UPI transactions is positively associated with the profitability of Indian banks.

H2: Increased UPI adoption is associated with improved operational efficiency in banks.

H3: The relationship between UPI adoption and bank performance varies across bank size and macroeconomic conditions.

Literature Review

The rapid growth of digital payment systems has significantly transformed the banking and financial landscape worldwide. In India, the Unified Payments Interface (UPI), launched in 2016 by the National Payments Corporation of India (NPCI), has emerged as a pioneering real-time interbank payment platform. By enabling seamless transactions using mobile numbers or virtual payment addresses (VPAs), UPI has simplified digital payments for individuals and businesses alike (NPCI, 2020).

Given its widespread adoption and transformative potential, UPI has become a central focus for researchers exploring its impact on banks' financial and operational performance. This literature review examines existing studies on UPI adoption, its drivers, its influence on bank performance, and identifies research gaps that motivate the current study.

UPI has experienced exponential growth since its introduction, rapidly becoming one of the largest digital payment systems globally (RBI, 2023). Monthly transaction volumes have surpassed 20 billion, reflecting its penetration across both urban and rural regions. The growth of UPI is attributed to several factors, including ease of use, interoperability among banks, low transaction costs, smartphone penetration, and supportive government policies (Singh & Kumar, 2022; Sharma, 2021).

Behavioral research has applied frameworks like the Unified Theory of Acceptance and Use of Technology (UTAUT) to analyze digital payment adoption. Findings indicate that performance expectancy, social influence, facilitating conditions, and perceived security significantly shape users' willingness to adopt UPI (Patel et al., 2022). Despite the rapid adoption, disparities exist based on income, digital literacy, and access to infrastructure, highlighting the uneven penetration of UPI across different population segments (Kaur, 2021).

Impact of UPI on Banking Performance

Digital payment adoption has notable implications for banks' profitability and operational efficiency. Studies on ICT adoption suggest that payment innovations reduce transaction costs, optimize resources, and improve service delivery



(Reddy & Rao, 2020). UPI, by shifting a large portion of cash transactions to digital channels, has prompted banks to enhance operational processes and adopt more efficient transaction management systems (Chakraborty & Banerjee, 2021).

Empirical studies indicate that banks leveraging digital payments may experience higher profitability through increased transaction volumes and fee-based income. Operational efficiency improvements have been observed in transaction processing speed, reduced cash handling, and streamlined reconciliation processes (Verma & Singh, 2021). However, the magnitude of these benefits depends on bank characteristics, including size, digital infrastructure, and customer base (Gupta & Das, 2022).

Broader Economic and Inclusion Effects

UPI adoption extends its impact beyond individual banks, contributing to financial inclusion and economic development. Research shows that digital payments via UPI have improved access to formal financial services for underserved populations, including rural communities and micro, small, and medium enterprises (MSMEs) (RBI, 2022; Kaur & Sharma, 2023). Increased digital transactions encourage deposit mobilization, enhance business efficiency for MSMEs, and expand banks' customer base.

Nonetheless, challenges such as digital literacy gaps, network constraints, and socio-economic disparities can hinder equitable adoption, highlighting areas for future policy intervention (Patel et al., 2022).

Policy and Operational Challenges

Despite UPI's rapid adoption, policy and operational challenges remain. Cybersecurity risks, transaction failures, and data privacy concerns require banks to invest in robust digital infrastructure and risk management mechanisms (Sharma, 2021). Regulatory interventions, such as market-share caps for third-party providers, influence UPI adoption patterns and banks' strategic decisions (NPCI, 2023). Addressing these challenges is crucial for banks to maximize operational efficiency and profitability from UPI adoption.

While substantial literature exists on UPI adoption and its behavioral drivers, empirical studies explicitly linking UPI transactions to bank performance are limited. Few studies systematically assess how UPI adoption affects profitability and operational efficiency or consider moderating factors such as bank size and macroeconomic conditions. These gaps highlight the need for an empirical investigation, which the current study aims to address, thereby providing valuable insights for both academic research and policy formulation.

The literature confirms that UPI has transformed India's payment ecosystem, driving digital adoption, enhancing operational efficiency, and promoting financial inclusion. However, direct empirical evidence on the relationship between UPI transaction volumes and bank performance remains sparse. This study aims to fill this gap by analyzing the impact of UPI-led digital payments on Indian banks, considering operational, financial, and macroeconomic dimensions, thus offering actionable insights for policymakers, regulators, and banking institutions.

Research Gaps

While substantial literature exists on UPI adoption and its behavioral drivers, empirical studies explicitly linking UPI transactions to bank performance are limited. Few studies systematically assess how UPI adoption affects profitability and operational efficiency or consider moderating factors such as bank size and macroeconomic conditions. These gaps highlight the need for an empirical investigation, which the current study aims to address, thereby providing valuable insights for both academic research and policy formulation.

Need of the Study

The rapid expansion of UPI-led digital payments has significantly altered the operational environment of the Indian banking sector. While UPI has become a dominant payment channel, its institutional impact on banks' financial performance and operational efficiency has not been adequately quantified using secondary data. Most existing studies focus on adoption behavior or user perception, leaving a gap in empirical evidence that links UPI transaction growth with measurable bank performance indicators.

There is a strong need for a data-driven analysis that utilizes reliable secondary sources such as RBI, NPCI, and bank financial statements to assess whether UPI adoption contributes positively to profitability and efficiency. Such an analysis is essential for banks to evaluate the effectiveness of digital payment integration, for policymakers to understand systemic implications, and for regulators to design frameworks that support sustainable digital payment ecosystems. Hence, this study is undertaken to provide objective, empirical insights into the performance implications of UPI-led digital payments in India.

Scope of the Study

The study is focused on understanding the relationship between UPI adoption and **bank performance in India**. Its scope includes:

- **Geographical Scope:** The study is confined to **India**, focusing on the banking sector operating within the Indian digital payments ecosystem.
- **Institutional Scope:** The study covers selected **public sector and private sector commercial banks** for which consistent secondary data is available.
- **Temporal Scope:** The analysis spans the period **2018 to 2025**, capturing the phase of rapid UPI expansion.
- **Analytical Scope:**



- Examines the relationship between **UPI transaction growth and bank profitability** (ROA, ROE).
- Evaluates the effect of **UPI adoption on operational efficiency** (cost-to-income ratio, transaction intensity).
- Incorporates **bank-specific and macroeconomic control variables** such as bank size, capitalization, GDP growth, and inflation.
- **Data Scope:** The study relies exclusively on **secondary data** obtained from RBI publications, NPCI databases, annual reports of banks, and official macroeconomic sources.

The study does not include customer-level analysis, primary surveys, qualitative assessments, or cross-country comparisons.

Methodology of the Study

The study is based exclusively on secondary data obtained from RBI publications, NPCI reports, and annual reports of banks. Due to the limited availability of bank-wise UPI transaction data, the study adopts a descriptive and analytical approach using aggregate indicators rather than bank-level econometric modeling.

Limitations of the Study

Despite its empirical contribution, the study has certain limitations inherent to its design and data sources:

1. **Dependence on Secondary Data:** The study relies solely on published data, which may not capture bank-level nuances such as internal cost structures or digital strategy variations.
2. **Data Availability Constraints:** Bank-wise disaggregation of UPI transaction data may be limited for certain years, potentially affecting sample size or model precision.
3. **Omission of Qualitative Factors:** As the analysis is quantitative, factors such as customer satisfaction, service quality, and technological readiness are not considered.
4. **External Economic Shocks:** Macroeconomic events such as the COVID-19 pandemic or regulatory changes may influence bank performance independently of UPI adoption.
5. **Generalizability:** Findings are specific to the Indian banking system and may not be directly applicable to countries with different digital payment infrastructure.

Data Analysis and Interpretation

1. Trend Analysis of UPI Transactions in India

Secondary data published by the National Payments Corporation of India (NPCI) and the Reserve Bank of India (RBI) indicates a **sharp and sustained increase in UPI transaction volume and value** during the study period. The growth trajectory accelerated significantly after 2020, reflecting wider digital adoption, policy support, and changing consumer behavior.

The increasing reliance on UPI across individuals and businesses suggests a structural shift from cash-based transactions to digital payment modes.

Interpretation:

The strong upward trend confirms the growing relevance of UPI in India's payment ecosystem and supports the premise of the study that UPI adoption has implications for banking performance.

2. UPI Growth and Bank Profitability

Aggregate banking sector indicators published by RBI show **gradual improvement in profitability ratios**, particularly in the post-UPI expansion phase. Reduced dependency on physical transactions, improved transaction speed, and expansion of digital customer base are associated with lower operating costs and better asset utilization.

Although UPI transactions are largely low-cost or zero-cost, their high volume contributes indirectly to profitability by enhancing customer engagement and cross-selling opportunities.

Interpretation (H1):

The observed patterns suggest that growth in UPI transactions is associated with improved profitability in the banking sector, thereby supporting **H1 at an analytical level**.

3. UPI Adoption and Operational Efficiency

RBI reports highlight a steady decline in **cost-to-income ratios** for banks alongside increasing digitization. UPI adoption reduces cash handling costs, branch dependency, and manual processing, leading to improved operational efficiency.

Banks with advanced digital infrastructure appear to benefit more from UPI adoption due to better integration of payment platforms with internal systems.

Interpretation (H2):

The analysis indicates that higher UPI adoption contributes to operational efficiency gains, supporting **H2**.

4. Role of Bank Size and Macroeconomic Conditions

Large banks with extensive customer bases and technological capabilities are better positioned to leverage UPI-led digital payments. Additionally, favorable macroeconomic conditions, such as higher GDP growth, amplify the positive impact of digital transactions on bank performance.

Interpretation (H3):

The relationship between UPI adoption and bank performance is influenced by bank size and macroeconomic factors, lending support to **H3**.

The secondary data analysis suggests that UPI has evolved from a payment innovation into a **strategic operational enabler** for banks. While direct revenue generation from UPI is limited, its indirect benefits cost reduction, efficiency improvement, and customer retention—positively influence bank performance.

Findings of the Study

Based on the analysis of secondary data obtained from published reports of the Reserve Bank of India (RBI), National Payments Corporation of India (NPCI), and annual disclosures of banks, the following key findings emerge:

1. Rapid Expansion of UPI-Led Digital Payments

The study finds that UPI has experienced sustained and exponential growth in both transaction volume and value over the study period. NPCI statistics indicate that UPI has become the most widely used digital payment mode in India, surpassing other electronic payment systems. This rapid expansion reflects strong consumer acceptance, ease of use, interoperability across banks, and supportive regulatory initiatives. The growing dominance of UPI highlights its central role in India's digital payment ecosystem.

2. Structural Shift from Cash-Based to Digital Transactions

The findings reveal a significant structural shift in the banking system from cash-intensive transactions to digital payment channels. The increasing reliance on UPI has reduced the frequency of branch-based transactions and physical cash handling. This transition has enabled banks to reallocate resources toward digital service delivery, thereby enhancing operational flexibility and scalability.

3. Positive Association Between UPI Growth and Bank Profitability

The study finds that periods of high growth in UPI transactions coincide with improvements in key banking sector profitability indicators reported by RBI. Although UPI transactions themselves generate limited direct fee income, their high transaction volume contributes indirectly to profitability by improving customer engagement, increasing account activity, and facilitating cross-selling of banking products. Thus, UPI adoption supports profitability through indirect efficiency and revenue-enhancing channels.

4. Improvement in Operational Efficiency of Banks

One of the significant findings of the study is that increased UPI adoption is associated with improvements in operational efficiency. Banks benefit from reduced transaction processing costs, lower cash management expenses, and improved turnaround times. RBI data shows a gradual decline in cost-to-income ratios in parallel with increased digital transaction penetration, suggesting that UPI plays an important role in cost optimization and operational streamlining.

5. Differential Impact Across Banks

The findings indicate that the benefits of UPI adoption are not uniform across all banks. Larger banks and technologically advanced institutions appear to derive greater efficiency gains due to economies of scale, established digital infrastructure, and wider customer bases. Smaller banks benefit from UPI adoption as well, but the magnitude of gains depends on their digital readiness and integration capabilities.

6. Influence of Macroeconomic Conditions

The study finds that favorable macroeconomic conditions, such as higher economic growth, strengthen the positive relationship between UPI adoption and bank performance. During periods of economic expansion, increased transaction volumes amplify the efficiency and profitability benefits of digital payments. Conversely, external shocks and economic slowdowns may temporarily weaken these benefits, indicating the importance of macroeconomic stability.

7. Strategic Importance of UPI for the Banking Sector

The findings suggest that UPI has evolved beyond a simple payment mechanism and has become a strategic enabler for banks. By supporting cost reduction, enhancing customer convenience, and promoting digital engagement, UPI contributes to long-term operational sustainability and competitiveness in the banking sector.

8. Policy and Regulatory Implications

The study finds that continued policy support, robust regulatory oversight, and investment in digital infrastructure are essential to sustain the benefits of UPI-led digital payments. Ensuring system stability, cybersecurity, and interoperability will be crucial as transaction volumes continue to grow.

Conclusion

This study examined the role of UPI-led digital payments in shaping the performance of the Indian banking sector using a secondary-data-based analytical approach. The findings indicate that the rapid growth and widespread adoption of UPI have significantly transformed the payment landscape in India, leading to a structural shift from cash-based transactions to digital modes.

The analysis suggests that increased UPI adoption is positively associated with improvements in bank profitability and operational efficiency, primarily through indirect channels such as cost reduction, faster transaction processing, enhanced customer engagement, and improved resource utilization. Although UPI transactions generate limited direct fee income, their large transaction volumes and integration with banking services contribute meaningfully to overall bank performance.

The study also highlights that the benefits of UPI adoption are not uniform across banks and are influenced by factors such as bank size, digital preparedness, and prevailing macroeconomic conditions. Larger and technologically



advanced banks appear better positioned to leverage UPI-led digital payments for performance gains. Overall, the study concludes that UPI has evolved into a strategic enabler for banks, strengthening operational sustainability and supporting India's broader digital financial ecosystem.

Policy Implications

Based on the findings of the study, the following policy implications emerge:

1. Strategic Focus for Banks:

Banks should view UPI not merely as a payment service but as a strategic tool for enhancing efficiency and customer engagement. Greater integration of UPI with core banking and digital platforms can help banks realize long-term performance benefits.

2. Investment in Digital Infrastructure:

Continued investment in secure, scalable, and resilient digital infrastructure is essential to support rising UPI transaction volumes and to minimize operational risks.

3. Support for Smaller and Public Sector Banks:

Policymakers and regulators should encourage capacity-building initiatives and technological support for smaller and public sector banks to ensure balanced benefits from UPI adoption across the banking system.

4. Regulatory Oversight and Stability:

As UPI usage continues to expand, regulatory focus on cybersecurity, system reliability, and data protection becomes increasingly important to maintain trust and system stability.

5. Promotion of Digital Financial Inclusion:

Targeted policies aimed at improving digital literacy and access in rural and semi-urban areas can further enhance the inclusive impact of UPI while expanding the formal banking base.

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OriginalArticle

The Contribution of Socio-Religious Reform Movements to Attain the Social Justice in Indian Society: New Dimensions in AI Era

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The Socio-religious reform Movements in 19th and 20th century India, led by figures like Raja Ram Mohan Roy, Jyotiba Phule, and B.R. Ambedkar, established social justice by fighting caste oppression, banning Sati, promoting female education, and legalizing widow remarriage. These movements challenged orthodox religious rituals and championed egalitarian values, forming the legal and moral foundation for modern Indian equality social justice is the inseparable component of Indian socio-religious reform movement. It is a revolutionary concept that tried to create an equivalent society for all. Indian religious reform movement began their work under the influence of Christian missionaries. Raja Ram Mohan Roy firstly raised the voice against social injustice of Indian society. He raised the issues of Sati (Self-Immolation by a widow) widow remarriage and the Caste system and also tried to uproot these social evils from the Indian society. These evils were worked as a barrier to ahead the social justice among the Indian society. The influence of Raja Ram Mahon Roy produced many social religious reformers. These reformers also raised the voice against various social evils like caste system, Dowry, Sati, Female Feticide, Girls Education, Child Marriage and lower education quality in India. These reformers were joined their hands with British Rulers, to create the social legislation against these societal evils. Swami Dayanand Saraswathi, Justice M.G. Ranade, Swami Vivekananda, Mrs. Annie Besan, Pandit Ishwar Chandra Vidyasagar, Jyotiba Phule, Sir Syed Ahmad Khan, Furdunji Naoroji, Ram Singh, Saint Ramalinga, Periyar E.V.R were the major reformer of Indian society. These reformers had originated their own different reform societies but the purpose of these reforms was same to provide the equality to all and to destroy the social evils of the society. The present research explained the contribution of Indian socio-religious reform movements in achieving the social justice in the society. This social justice had played an important role in Indian independence movement. This article is based on different secondary resources like as websites, Magazines and newspapers etc. Some expert of social justice or social welfare sector opinions were also taken for making more generalization the findings of this article. Socio-Religious Reform Movements to Attain the Social Justice in Indian Society.

Keywords Social Evils, Social Justice, Socio-Religious, Indian Society, Mahants-Priests, Discrimination, Orthodox Brahmins and Dalit Communities.

Introduction

In 19th century, the British Government was considered as the luckiest era on the Indian soil because the Indian political system was totally disturbed at that time. The weak Mughal emperor and fights between the Indian kings were created a good atmosphere for British Kingdom. Looking the situation, British had adopted the policy to raise their emperor boundaries. With their emperor, they were spread their culture, rituals and religion within the country with the help of British rulers, numbers of Christian missionaries entered and spread-out Christianity. Number of Indian people had adopted the Christian rules and regulation and converted them into Christianity. It was extremely affected the Indian Cultures, religion and traditions. Due to this, few Indians were raised their voice against the British Government oppressive rule. They knew that the British were destroyed the Indian culture and religion. A number of Socio-Religious Reform Movements were carried out throughout India in the 19th century.

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These socio-religious reform movements aimed to modernise Indian society through social restructuring. The Socio-Religious Reform Movements and their leaders were characterised by recognition of the interconnection between religious and social issues. The British invasion of India in the eighteenth and nineteenth centuries exposed some significant flaws and shortcomings in Indian social institutions. As a result, a number of people and movements worked to change social and religious customs with the goal of reforming and reviving society. This also has to do with how Indian society was changing and how new classes were emerging. According to this viewpoint, the socio-religious movements represent the social aspirations of colonial India's newly emerging middle class.

During the repressive rule of British, another disorder was spread in Indian society i.e. social evils. Social evil means that issues which negatively affects the member of the society. Sati, untouchability, dowry, child marriage were the major social evils at that time. These evils were ruin the Indian Culture and created barricade to obtain social justice. (Social justice means any person cannot discriminate on the ground of opportunities and privileges level). So, our social reformers and religious leaders took upon themselves the responsibility of reforming the society by awakening the people and uproot the evils of society. In the mid of 19th century, a prominent social reformer named Raja Ram Mohan Roy strongly raised the voice against social evils of Hindu religion. He had tried to eliminate the corrupt practices of Indian society. Raja Ram Mohan Roy efforts and agitation gave a birth to many social reformers like Swami Dayanand Saraswathi, Justice Ranade, Sir Syed Ahmad Khan. All reformer efforts were unique but the purpose of these attempts was same, which was destroying the social evils from their religion and to achieve social justice in every social order of the society. Number of reform movements were successfully achieved their primary goals and many of are still continuing on it till date but some of them were merged in the Indian freedom Struggle movement.

Nature of Socio-Religious Reform Movements; these movements were characterized by rationalism and humanism. The humanist aspect of the reform movement could be seen in the form of rejection of priestly domination. Foremost importance to education: The movements considered education to be the foremost instrument for bringing about social change. Illiteracy, in general, and among women, in particular, was criticised. No sharp change in the society: Reformers did not advocate a sharp rupture in the social structure but only wanted to remove distortion and evil that had crept into the society. Limited appeal: Despite the efforts of reformists, their message was limited to the urban educated middle class. Thus, a vast number of Indians remained untouched by the movements. Revivalist character: Some of the movements and leaders turned to revivalism. This led to unnecessary glorification and distortion of the past. Trendsetters: It is important to keep in mind that the importance of the nineteenth-century reformers lay less in their sheer numbers than in the fact that they set the trends. It was their thoughts and activities that were to have a decisive impact on the making of a new India.

The Socio Religious Reforms Movement

The rise of Indian socio reform movement's honor was given to Raja Ram Mohan Roy and established the Brahmo Samaj. Ram Mohan Roy was born on 22 May 1772. He belongs to traditional Brahmin family Radhanagar, Hugli Bengal. He attained their education from Patna and Varanasi. He had a great knowledge of Hindu, Muslim, Christian scriptures and several languages like English, Latin, Greek and Hebrew. He established the Atimya Samaj in Indian society. Later on, it was converted into Brahmo Samaj Ram Mohan Roy had died in Bristol England on 27 September 1833. He instigated several campaigns against the abolition of Sati, child marriage, female infanticide, caste system, women equality, girl's education etc. He was raised his voice against the custom of Sati from his family. But unfortunately, he could not save his sister-in-law from the self-immolation. He himself feels extremely hurt and drafted an act to abolish sati system with the help of British Government. The Governor General of Bengal Lord William Bentinck was passed an act of Bengal Sati Regulation Act in 1829. This law had declared Sati a punishable offence. Raja Ram Roy also did lots of effort to maintain the Muslim and Hindu unity. He had himself adopted a Muslim Child. After his death, Brahmo Samaj legacy was continued. Debendranath Tagore and Keshab Chandra Sen were the two eminent leaders have great contributions to motherland.

Swami Dayananda was deeply inspired from the Brahmo Samaj. Under the motivation, he had formed the Arya Samaj. Its head office was located in Bombay but in 1877 it was shifted to Lahore in Punjab. It was the second Hindu reform movement. Arya Samaj was strongly against Untouchability, Caste System, Child marriage, Polygamy, Sati, Purdah, and Cow hunting. This movement had also raised the problem of women education and its quality. Arya Samaj opened several Patashalas (schools) at Farrukabad, Kashi, Kasganj and Challsan. Swamiji also proposed a Kanya Patashala (a girl school) at Meerut. In 1896, Arya Samaj established the Kanya Mahavidhyalay (Institute of higher education for women) and it was open for single, destitute, married and widow women. Swamiji contribution cannot be ignored to improving the social situation of women in the society. Swamiji was deeply disturbed from the attitudes of Orthodox Brahmins towards the depressed class of the Hindus, those known as Dalits, Outcaste or Untouchables. Swamiji was the first revolutionist who had declared an equal rights to the lower caste people those rights were; the right for education, right for reciting study of Veda and Mantras, and also right to fetch water from common wells/Tanks. [After the death of Swamiji's, the Arya Samaj did work under the leadership of Swami Shraddhanand, Lala Dev Raj and other prominent contributors.

Role of Swami Vivekanand in Socio Religious Transformation



The Great saint Swami Vivekananda (1863–1902) was a pivotal neo-Vedantic reformer who revitalized Hinduism by emphasizing rational spirituality, practical Vedantism, and social service over rigid rituals. He founded the Ramakrishna Mission in 1897 to combine spiritual pursuit with humanitarian work. Important Aspects of Swami Vivekananda for socio religious Reform Movement. 1. Practical Vedanta & Social Service: He argued that true spirituality is practical, focusing on serving humanity ("Jiva is Shiva" service to man is service to God). 2. Establishment of Ramakrishna Mission (1897): Founded to carry out humanitarian, educational, and medical work, moving away from solitary asceticism toward collective social service. 3. Global Promotion of Hinduism: Through his famous 1893 speech at the World's Parliament of Religions in Chicago, he promoted the harmony of all faiths, tolerance, and the equality of all religions. 4. Rationalization of Religion: He rejected superstition, priestly oppression, and rigid caste distinctions, advocating for a rational and modernized interpretation of Vedanta. 5. Nationalism & Youth Empowerment: His teachings inspired national pride, urging the youth to be strong, educated, and committed to social development. Vivekananda's work aimed at restructuring Indian society by combining ancient spiritual wisdom with Western scientific progress.

After the Brahmo Samaj, another reformist had born from the soil of Bengal. It was emerged at the end of 19th century that was Swami Vivekananda. He launched Ramakrishna Mission or Vedanta Movement. The purpose of this mission was spreading the teaching of Ramakrishna and Social welfare to the society. Ramakrishna mission stood for religious and social reform in Indian culture. The mission followers believed that serving human being was the same as the worship of the God. The Mission was released in various schools, hospitals, orphanages and libraries throughout the country. The mission provided relief during famines, earthquakes and epidemics to the needy. This mission raised the hands against the evils of Indian society. Ramakrishna Mission head office was basically located in Belur near Calcutta. Among these social reform movements, another well-known reformer raised his voice. He was also belonging to the state of Bengal. Ishwar Chandra Vidyasagar born in a poor Brahmin family. He was a great scholar and reformer. He had great sympathy for the poor and oppressed class of the society. He was highly supporter of women education and widow remarriage. He established the Bethune School; it was the first Indian school for girls the numerous schools were opened for the girl's education by his efforts. He openly supported the widow remarriage. Just because of his endeavor the Widow Remarriage Act was passed. He also spoke vehemently against child marriage and polygamy. Ishwar Chandra Vidyasagar pledged that he would allow his daughters to study, and married all his daughters after the age of 16. He also promised that if any of his daughters was widowed or they wanted to get remarried, he would be allowed them to do so. He was also against the prevalent custom of polygamy.

Brahmo Samaj, Arya Samaj and Ramakrishna Mission movements were related to Eastern and Northern India. But these movements were very much well-liked in the west India. After the motivation from Brahmo Samaj, Prarthana Samaj in 1867 was emerged at Bombay Maharashtra. Mahadev Govind Ranade and R.G. Bhandarkar were the two great leaders of this Mission. The functioning approach of the society was very much similar to the Brahmo Samaj. This movement had been done assorted efforts to achieve the social justice among the West India population. To improve the position of the women class, they raised their voice against child marriages, Sati and infanticide. This Samaj had tried to make available the educational opportunities for the women and remarriage of the widows in the society. They were established schools, orphanage centers, widow homes, etc. Justice Ranade was the founder of the Widow Remarriage Association and Deccan Education Society. The members of Prarthana Samaj were shared common food which was cooked by a lower-caste person. It was a great surprise for the untouchable community, but this was not too much affecting the Dalit Communities. So, Satya Shodhak Samaj was emerged for them. (Society of Seekers of Truth). It was formed by Jyotibha Govindrao Phule on 24th September, 1873. The main objective for this movement was to save the Shudras and Ati Shudras community from the oppressive and exploitation of the higher caste communities Jyotirao Phule was born at the Maharashtra state of India when the condition of the Dalits and women were quite depressed. He raised his voice and opened one school for the girl child in Pune. That was the first formal school for the girl. Savitribai Phule educated the girls due to the non-availability of the teacher. Jyotibha and Savitribai were tried to abolish the social evils of the Hindu religion. They tried to improve the conditions of the widow in the society so they set up a maternity home for them. In 1854, he had started an orphanage home for the women and children. After the death of Jyotibha and Savitribai Phule the society was looked by Deenbandhu, Shahu Maharaj, Bhaskarrao Jadhav and other reformers.

Among these reform movements, one movement were deeply affected the Indian culture i.e. Theosophical Society. This society was founded by a Russian lady, Madam H.P. Blavatsky and a former English army officer, Colonel H.S. Olcott in the United States of America in 1875. But in India, this society got accomplishes under the supervision of Mrs. Annie Besant. The goal of the society was the universal brotherhood of man without any distinction of race, color or creed and secondly to promote the study of ancient religions and philosophies. Annie had opened the Central Hindu School with the help of Madan Mohan Malaviya at Banaras. Later on, this school was transformed into the Banaras Hindu University. The society fought a war against the untouchability and downgrade of women. Aligarh Movement and Singh Sabha work were highly influenced by this Society. Looking to the progress of Hindu reform movements, some intellectual Muslims were thought about Muslim Reform movement. The first famous reformer was Syed Ahmad Khan 1817-1899. He was recognized due to the reform movement named Aligarh movement. He had

done a range of efforts for the Muslim community education. In 1862, he had founded the Scientific Society which transforms the science books and other subjects into Urdu language. He took an Initiative for the foundation of Mohammedan Oriental College which was later developed as an Aligarh Muslim University. As a social reformer, Syed Ahmad Khan campaigned against the Purdah system, polygamy and the Muslim system of divorce. He gave the message of unity among Hindus and Muslim community. In 1883 he said that: "Now both of us Hindus and Muslims live on the air of India drink the holy waters of the Ganga and Jamuna. We both feed upon the products of the Indian soil, we are a nation and the progress and welfare of the country, and both of us, depend on our unity, mutual sympathy, and love, while our mutual disagreement, obstinacy and opposition and ill-feeling are sure to destroy us." Like Hindu and Muslim reform movements, the Sikh religion was also felt the requirement of the reformation movement. Because at that time, the numbers of Sikh were converted them into other religions for e.g. Maharaja Dalip Singh, he was transformed himself into Christianity. So, the social reform need was recognized to save the Sikh religion as a result of this need Singh Sabha movement was established. This main aim of the movement was to spread the teaching of Sikh Gurus and Punjabi literature. This movement was also extended the modern education system and the Khalsa College Amritsar was established. In 1920, the Political wing of Singh Sabha began the Akali Movement to (Later known as Akali Dal) remove the corrupt Mahants (Priests) from the Sikh Gurudwaras. Due to their effort, a law was passed in 1925 which was officially gave the powers of Gurudwaras management to Shiromani Gurdwara Parbandhaka committee.

The Hindu and Muslim Religious Reform Movement

The 19th-century Hindu and Muslim religious reform movements in India sought to purge social evils and rejuvenate their respective faiths against Western influence. Hindu movements (Brahmo Samaj, Arya Samaj) targeted caste, Sati, and idol worship, while Muslim movements (Wahhabi, Aligarh) aimed to modernize education and remove un-Islamic practices, collectively fostering the Indian renaissance. Hindu Reform Movements Brahmo (1828): Founded by Raja Ram Mohan Roy in Bengal, it fought against idol worship, caste oppression, and Sati. Arya Samaj (1875): Founded by Swami Dayanand Saraswati in North India, it promoted monotheism, rejected idol worship, and focused on "back to the Vedas". Ramakrishna Mission (1897): Founded by Swami Vivekananda to promote humanitarian work and spiritual upliftment. Prarthana Samaj (1863): Established in Bombay by Dadoba Pandurang and others, it focused on rationalist social reforms, including women's education and widow remarriage. Aligarh Movement: Initiated by Sir Syed Ahmed Khan, it aimed to modernize Indian Muslims through Western education, founding the Mohammedan Anglo-Oriental College (later Aligarh Muslim University). Wahhabi/Waliullah Movement: A revivalist movement led by Sayyid Ahmed Barelvi, it sought to purify Islam by rejecting practices deemed un-Islamic, focusing on Quranic principles. Faraizi Movement: Led by Haji Shariatullah and Dudu Miyan, it focused on purifying Bengal's Muslim community from non-Islamic traditions and empowering peasants. Deoband Movement: An orthodox, revivalist movement aimed at training Muslims in traditional Islamic scholarship. The Common Goals and Characteristics of Hindu and Muslims Purification: Both groups aimed to eliminate superstitious practices (e.g., idolatry among Hindus, saint worship among Muslims) and restore core religious texts. Social Reform: Both addressed issues like women's status, early marriage, and education. Response to Modernity: While some movements were revivalist returning to old traditions, and others were reformist adopting modern western ideas for fulfilment socio religious life.

Conclusion and Findings

The socio-religious reform movements were strived to sustain the social justice in India and also curbing on the social evils and promote women education in the society. These religious movements were very helpful to the British Empire for enacting the various laws on Sati, widow remarriage and fixing the minimum age of marriages. These movements were raised the voice for women education. As a result of this struggle diverse educational institutions had been opened at that time, and later on these institutions were transformed into universities. The voice against the untouchability was the major contribution for drafting the Indian constitution. At last, these social reform movements were fetched a peace and union among Hindu, Muslim and Sikh community and motivate them to achieve the social justice in the society. The socio-religious reform movements were foundational to the modern Indian state's commitment to social justice. By challenging deeply entrenched, inequitable traditions, they fostered the idea that all individuals, regardless of caste or gender, possess inherent dignity. While often led by the educated middle class, these movements created a necessary momentum for legislative change and mass awareness, ultimately creating the moral framework upon which the independent Indian Constitution's principles of equality and social justice were built.

The major findings regarding their contribution to social justice included. Eradication of Dehumanizing Practices: Reformers successfully campaigned for critical legislation, such as the Abolition of Sati (1829) and the Hindu Widow Remarriage Act (1856), which directly addressed the systemic oppression of women. Educational Empowerment: Education was identified as the primary tool for social mobility. Movements like the Arya Samaj and Aligarh Movement established vast networks of schools and colleges, specifically targeting women and marginalized castes that were previously denied literacy. Challenge to Caste Hierarchy: Leaders like Jyotiba Phule and B.R. Ambedkar (later) dismantled the "divine" justification for caste discrimination. The Satyashodhak Samaj provided a distinct identity and voice to the "Depressed Classes," advocating for equal access to public resources



like water and temples. Rationalism and Humanism: The movements introduced a "scientific temper," encouraging people to evaluate social customs through the lens of reason rather than blind faith. This intellectual awakening made social justice a secular and civic concern. National Unity: By promoting inter-faith harmony and universal brotherhood, these movements fostered a sense of national consciousness that unified diverse communities against colonial rule. The socio-religious reform movements served as the precursor to the Indian Constitution. The principles of liberty, equality, and fraternity enshrined in the Constitution are direct legacies of the struggles led by these reformers. While they were initially concentrated among the urban educated middle class, their ideas eventually filtered down to the masses, transforming India from a collection of rigid, caste-bound groups into a developing, justice-oriented nation. Their most significant legacy remains the recognition that religious reform is a necessary prerequisite for social and political progress.

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OriginalArticle

The Freedom Movement in Karnataka- Gandhi and His Associates Contributions in Tumkur Districts

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Tumkur district played a significant role in Karnataka's freedom movement, particularly during the 1942 Quit India Movement. Students organized massive protests, burning government records and interrupting communications, while local leaders mobilized rural resistance in taluks like Madhugiri, Tiptur, Gubbi, Kunigal, and Chikkanayakanahalli. The freedom movement fundamentally changed the landscape of India in terms of polity, economy, culture, education, and more. The beginning of the 20th century marked a massive transition with the intensification of the struggle for independence. No part of India remained untouched, particularly during the Gandhian phase of the freedom struggle, and Karnataka was no exception. Tumkur district, geographically close to Bangalore, was deeply influenced by the activities in Bangalore and Mysore. The early, or nascent, phase of the movement was inspired by the ideas of Lokmanya Bal Gangadhar Tilak. Newspapers served as the primary carriers of messages from national leaders who were shaping the struggle against the British. During the Gandhian phase, the movement became more ideologically defined and transformed into a mass movement. Tumkur district also played its part in this transformation. Prominent leaders from the region included K. Ranaiyengar, T. Subramanya, Neelakanta Rao, D.S. Mallappa, K. Narayan Shetty, and others. The Nagpur session of the Indian National Congress in 1920 had a profound impact on regional spaces across India, fostering a new sense of political integration. Several leaders from Tumkur attended the session under the leadership of R.R. Diwakar and, upon their return, became torchbearers of the national movement in the district. Although the Indian national movement is often discussed at the national level, in reality it was shaped and driven by regional leaders and local participation. In this sense, the present paper seeks to locate and contextualize the freedom movement in Tumkur district. It was, in many respects, a district-level movement. I have Prepared this paper is based on an both Primary and secondary Sources.

Keywords: Non-Violence, Charaka, Khadi, Vidhuraswatha Tragedy, Protes Movement, Associates, 'Patel Mirza Pact' Do or Die and Quit India Movement.

Introduction

India's freedom struggle or national movement is a was very unique even in the global history. A country of vast diversity in terms of religion, caste sub castes, languages shared political and cultural memories was able to build the anti-British struggle. The corpus of literature that one world see is a testimony to the dimensions of this movement. The freedom movement fundamentally changed the landscape of India in terms of polity, economy, culture, education, etc. The beginning of the 20th century marked a massive transition with the intensification of the struggle for independence. No part of India remained untouched, particularly during the Gandhian phase of the freedom struggle, and Karnataka was no exception. Tumkur district, geographically close to Bangalore, was deeply influenced by the activities in Bangalore and Mysore.

The early, or nascent, phase of the movement was inspired by the ideas of Lokmanya Bal Gangadhar Tilak. Newspapers served as the primary carriers of messages from national leaders who were shaping the struggle against the British. During the Gandhian phase, the movement became more ideologically defined and transformed into a mass movement. Tumkur district also played its part in this transformation. Prominent leaders from the region included K.

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Ranaiyengar, T. Subramanya, Neelakanta Rao, D.S. Mallappa, K. Narayan Shetty, and others. The Nagpur session of the Indian National Congress in 1920 had a profound impact on the regional spaces across India, fostering a new sense of political integration. It was a historic moment in terms of institutionalizing the nationalist ideology fostered by the Indian National Congress. It was at this session a decision was taken to open the district level Congress committees which enabled the masses at the respective regions. to identify themselves with the national moment. It should also be noted that Tilakian mode of politics was slowly being replaced by the Gandhian mode of nationalist movement by instituting symbols like Salt, Charaka, Khadi etc. It became a mass moment. It is also pertinent to note that by the end of the second decade in the 20th century the non-Brahmin movement also had gathered momentum in the princely states of Mysore. But the leaders were able to distinguish between political and social democracies. It proves that the idea was different but not contradictory to each other i.e. political and social democracies were complimentary to each other. The Nagpur session of Indian National Congress in 1920 was an inspiring event for the leaders of Tumkur district. Several leaders from Tumkur attended the session under the leadership of R.R. Diwakar and, upon their return, became torch bearers of the national movement in the district. Although the Indian national movement is often discussed at the national level, in reality it was shaped and driven by regional leaders and local participation. The people of princely states were encountering the dual situation. On the one hand it was the national movement being fought against the British, on the other hand they had to fight against the native Princess who was the immediate political power centre. Mahatma Gandhi said that people of the native States were double slaves. Both enemies were potential and therefore the people were required to invest more in terms of organising the protest. The leaders in the state in general including the leaders from Tumkur district were quite aware of this reality. It is a well-known fact that Gandhiji began his role in the Indian National movement with the beginning of khilafat movement, followed by non-Cooperation movement. However, khilafat movement was almost a non-starter in princely Mysore including Tumkur district. Even the non-cooperation movement too. A momentum was picked up in Tumkur district with the onset of civil disobedience movement in 1930. It was suspended in the year 1934. In place of mass movement or satyagraha Gandhiji suggested the individual Satyagraha. It was the real beginning of freedom movement in Tumkur district. Tumkur district (now Tumakuru) played a significant role in the Indian freedom movement, acting as a crucial center for activities within the princely state of Mysore. Its inhabitants, including students, women, and peasants, actively participated in national movements launched by the Indian National Congress. Tumakuru, a prominent district headquarters situated in Karnataka State, holds great significance due to its involvement in the Indian Freedom movement. The people and youth of Tumakuru responded actively to the national movements. Not only men, but women, youth, and the general populace participated in these endeavors. The Indian National Congress, under the leadership of National heroes like Balagangadhar Tilak and Mahatma Gandhi, resonated deeply with the people of Tumakuru, who responded enthusiastically to their calls for action. During the periods of the Non-Cooperation Movement, Civil Disobedience and the Quit India Movement, the youth of the district, filled with zeal, took part in meetings, processions, boycotts, picketing and the burning of foreign goods. After Gandhi's visit to Tumakuru on July 14, 1927, and January 4, 1930, the people of the district began to see participation in the freedom struggle as an essential duty, akin to their daily responsibilities. When Gandhi advocated for the use of Khadi, the boycott of foreign goods, upliftment of the Harijans, temperance and the promotion of Hindi during his tours of the district, the youth left their professions to engage in and promote these constructive activities.

Freedom Movement in Tumkur District- Gandhi and His Associates

The Historical association with Gandhi can be observed through documented interactions. From as early as 1915, Gandhi visited Karnataka and various other places, establishing connections with Congress workers and freedom fighters who embraced the spirit of the independence movement. Gandhi's travels across not only Karnataka but the entire country brought him into contact with many leaders and activists who became his close companions in the struggle. Several leaders from Tumkur district were among those who were in contact with him. Anti-British struggles resonated in South India just as they did in North India. Leaders like Hyder Ali and Tipu Sultan waged comprehensive resistance against the British. However, Karnataka came under British control in 1799, and by 1881, Mysore was restored to princely rule. During this period, Tumkur district remained relatively quiet, as Mysore province did not experience direct British rule like other parts of India. The British exercised control indirectly.

In the north, the establishment of the Indian National Congress in 1885 marked the beginning of the Nationalist fervour. In Mysore province, the Maharaja established the Representative Assembly in 1881 and the Legislative Council in 1907, allowing senior leaders to share their experiences. By 1918, some youth from Tumkur district participated in the Prajamitra Mandali and the Legislative Council. Among them, D.S. Mallappa of Tiptur was the first to become a member of the Legislative Council. He founded the Prajapaksha (People's Party) in the district, organizing its sessions in Channapatna and Tumkur. The influence of the freedom fighters' movements began to spread. When Tilak passed away in 1920, memorial meetings were held at the city's theater in Tumkur, and these gatherings left a profound impact on the district's people and youth. This marked the beginning of the association of Tumkur's people with the national Congress leaders. S.S. Setlur, then Chairman of the Bangalore Municipality, and district leaders like Subrahmanya of Talakere and K. Rangaiyengar participated in the event and delivered speeches, further inspiring the local populace. After the 1920 Nagpur Congress session, branches of the Provincial Congress were



established at the district and local levels. The Tumkur Congress Committee was one such committee formed in 1921 when several Congress committees began to emerge across the state. The founding president of this committee was Sri Rangaiyangar, with B.C. Nanjundaiah and Talakere Subrahmanya among the key participants

In 1922, Sri Rangaiyangar participated in the annual session of the Indian National Congress held in Gaya. During this period, young leaders in the district initiated campaigns aligned with Congress principles, including Satyagraha, Non-Cooperation, the Swadeshi movement, and the boycott of British goods. In the same year, a hall was constructed in Madhugiri in memory of Tilak, named the Tilak Sabha Bhavan. In 1924, the 39th annual session of the Congress was held in Belgaum, where district Congress leaders such as K. Rangaiyangar and Talakere Subrahmanya participated. They closely observed and were deeply influenced by Gandhi's leadership. This encounter brought a new impetus to the freedom movement in the district. Gandhi's leadership of the Indian National Congress and the anti-

British movements significantly impacted regions like North Karnataka, Tumkur district, and South Karnataka. District leaders such as K. Rangaiyangar, Neelakanth Rao, Talakere Subrahmanya, D.S. Mallappa, and M.V. Ramarao, after attending the Congress's national sessions, initiated freedom struggles in the district following Gandhi's principles, kindling the flame of independence. *1 On July 14, 1927, Gandhi visited Tumkur with a group of 16 people, including Kasturba Gandhi, Gangadhar Rao, Mahadev Desai, Manibehn Patel, Devdas, and Mridula Sarabhai. Thousands of people from the Tumkur area gathered to see Gandhi on that day. Sri Rangaiyangar, who was the president of the Tumkur District Congress session, also served as the president of the reception committee and along with the then District Collector, welcomed Gandhi. On that day, three meetings were held in Tumkur. Since most of the youth leaders were involved in the Khadi promotion tour at the time, they were dressed in Khadi garments. Gandhi's principles such as simple living, the use of Khadi, truth, non-violence, and non-cooperation had a significant impact on the youth of Tumkur district. Among the district's leaders, Sri Rangaiyangar was one of Gandhi's earliest companions. In 1921, alongside S.S. Setlur, he played a key role in establishing the Congress presence in Tumkur. In 1922, after attending the annual Congress session in Gaya, he was deeply influenced by Gandhi's speeches and meetings.

At the Belgaum Congress Session of 1924, [he] participated alongside B.C. Nanjundaiah, Talekere Subrahmanya, and Neelakantharao. They actively engaged in the session in collaboration with Gangadhar Rao Deshpande. During the session, [he] embarked on a Khadi promotion tour as part of Gandhi's constructive programs. He emphasized the importance of maintaining cleanliness in villages, ensuring access to clean drinking water, and establishing goshalas to provide milk as easily as water. He urged municipal authorities to take steps to improve public health, advocated for the cessation of alcohol consumption and beef eating, and encouraged people to engage in productive work. He also promoted the spinning wheel, urging everyone to adopt Khadi. The citizens of Tumkur contributed ₹2,250, while students and teachers donated ₹250, and the Society for Animal Protection offered ₹200 towards cow protection, all of which were presented to Gandhi. *2 The influence of Mahatma Gandhi's constructive programs on leaders like D.S. Mallappa, K. Rangaiyangar, M.V. Ramarao, Talekere Subrahmanya, Neelakantharao, and B.C. Nanjundaiah. Under Gandhi's inspiration and simplicity, these individuals not only engaged in the freedom struggle but also actively promoted his constructive programs, particularly Khadi, which they adopted from that time onward. They participated in the sessions of the Indian National Congress, organized campaigns in their districts according to the resolutions passed there, and ignited the flame of freedom. On July 14, 1927, Gandhi visited Madhugiri, where he emphasized the use of Khadi in his public speeches. The local population offered him a donation of ₹1,000, while in Koratagere, the people contributed ₹100. Inspired by Gandhi's speech in Madhugiri, Nanjundarao, Rathanga Pani, and Narasingarao from Pavagada taluk established a Congress Committee. As its president, Nanjundarao led efforts in Pavagada taluk to start spinning and weaving with spindles and charkhas. The boycott of foreign goods spread across all the taluks of Tumkur. In Pavagada, Y.N. Hosakote organized a foreign goods burning event, where E.S. Venkatesh Gupta, symbolically removing the foreign coat he was wearing, threw it into the fire. He publicly pledged never to wear foreign goods again and adhered to Gandhi's path for the rest of his life. Gandhian Talekere Subrahmanya effectively led prohibition and Khadi promotion programs in the district. In Tumkur city, he initiated a prohibition movement to combat the rising incidents of public drunkenness and disorderly behaviour at a toddy shop located at the beginning of the road leading to the market square. The sale of toddy and the accompanying indecent behaviour were prevalent and the movement succeeded in curbing these activities. On the seventh day of the movement, the police arrested Talekere Subrahmanya. This movement lasted for 13 days and he and his associates were released only after the toddy sale was stopped. Similarly, at Yallapur on the Madhugiri road, activists successfully picketed in front of a toddy shop, halting the sale. Neelakantha Rao was also deeply influenced by Gandhi's Khadi promotion. On October 2, 1927, he opened a Khadi Bhandar in Tumkur city, which became a centre for nationalist activities and freedom fighters. As the Congress Committee Secretary, he travelled throughout the district promoting Khadi. Inspired by him, freedom fighter K.N. Rangappa opened a Khadi Bhandar in Tiptur in 1930, which was inaugurated by Gangadhara Rao Deshpande.

Young freedom fighters from the district participated in Gandhi's organized Salt Satyagraha movement. During the Ankola Salt Satyagraha on the coastal region, T.L. Sanganna, T.S. Channappa, Puttaiah, Vajram Shetty, and others took part. Talekere Subrahmanya sent his close associates Venkaramaiah and L. Krishnamurthy to the march.



After joining Gandhi in Dandi and receiving beatings from the police, they returned to Tumkur. Talekere Subrahmanya intensified the Salt Satyagraha movement in the district and, after being imprisoned, was released under the Gandhi-Irwin Pact. Upon his return, he infused the spirit of struggle among the people of the district.

Talekere Subrahmanya, K. Narayanashetti and others were instrumental in raising awareness of Gandhi's movements in Tumkur district. On January 4, 1934, as part of his fourth Harijan upliftment tour, Gandhi visited Tumkur. The reception committee was chaired by Talekere Subrahmanya and K. Narayanashetti, who collected ₹1,000 from local leaders for the Harijan upliftment fund. Gandhi arrived in Tumkur from Hindupur at 2:30 PM. Talekere Subrahmanya was bustling with excitement, and knowing that Gandhi preferred raw peanuts and goat's milk, he sourced goat milk from a nearby village. Since there was no proper container at home, he cleaned the glass dome of an electric lamp to serve the milk. After resting for 15 minutes, Gandhi delivered a speech from a 30-foot-wide platform in the high school ground, addressing a large gathering. He described the Harijan upliftment program as part of the Congress's constructive agenda. The ground was filled with people, and the Tumkur citizens presented ₹1,000 to Gandhi for the Harijan upliftment fund. During the event, Talekere Subrahmanya received commendation for detailing the district's Congress activities. The people were filled with joy after hearing Gandhi's speech and seeing him in person. The call for Gandhi's constructive programs was met with continuous activism in Tumkur district. After Gandhi's influence, various constructive programs were carried forward. In March 1938, Tumkur's activists participated in the Shivapura Flag Satyagraha organized by the Mysore Congress political party. In 1945, a Hindi Promotion Committee was established in Tumkur to support Gandhi's campaign for Hindi, with B.C. Nanjundaiah serving as its president. Other district leaders actively promoted Hindi through sustained efforts.

On August 9, 1942, the All India Congress Committee session was held in Bombay, where Gandhi issued a final call for the Quit India Movement against the British. Gandhi, Nehru, Abdul Kalam Azad and other leaders were arrested. On August 12, Mysore Congress President K.T. Bashyam, Azad, S. Nijalingappa, N.C. Timmareddy and Talekere Subrahmanya returned to Bangalore from Bombay. They were immediately arrested at the Yeshwanthpur Railway Station. Inspired by Gandhi's speech and the Quit India Movement, Talekere Subrahmanya was filled with determination.

In Tumkur, Gandhi's "Do or Die" call led to a surge in anti-British activities. These included hoisting flags on government buildings, picketing in front of liquor shops, organizing meetings and processions, and cutting railway telegraph wires. In August and September, students, workers, and women from all the taluks in the district participated in the movement. On August 9, meetings and processions began in Tumkur, followed by a hartal on August 10. To suppress the movement, the police resorted to arrests, lathi charges, firing, and other repressive measures. Nevertheless, workers held a meeting in Tumkur Municipal Garden, engaging in actions like ticketless travel, blocking roads, destroying supply goods, and breaking milk cans. Anti-British activities were most prevalent in Madhugiri, Tumkur and Tiptur. The government imposed prohibitory orders from August 13 to September 10, banning meetings, processions and flag hoisting. Despite this, violent acts continued, including the burning of train compartments by a group led by Somaygowda in Tiptur. They were arrested and punished without seeking forgiveness. Students travelled ticketless on trains and destroyed liquor shops. On August 15, public processions took place with students, employees, workers and women chanting slogans like "British, Quit India" and "Long live Gandhi!" On August 17, three separate processions were held in Tumkur on the same day. Under the leadership of Sheshamma Subrahmanya, women held a separate procession with 250 participants. Leaders Srikanthappa and Neelakantharao addressed the gatherings. In Koratagere, on August 18, under the leadership of S.R. Veerashettar and R. Channigaramaiah, a tricolour flag was hoisted at the Taluk office and a picketing campaign against liquor shops was successfully conducted. Every Taluk in the district witnessed violent activities against the government, which continued until December 15, when the movement eventually subsided.

During the freedom struggle, district freedom fighters such as T.K. Nanjundarao, T. K. Jerappa, Talakere Subrahmanya, B. Malimariyappa, Taregowda, and others actively participated in anti-British movements, notably the Shivapura Flag Satyagraha and the Vidurashwatha tragedy. Under the leadership of K.C. Reddy, the President of the Mysore Congress, they fought for the establishment of a responsible Government in the Mysore princely state. To propagate the movement, K.C. Reddy organized three groups, one of which included Talakere Subrahmanya, who toured the districts of Kolar, Chitradurga, and Tumkur as a district representative. The 'Mysore Chalo' movement was launched on September 1st across the princely state. In Madhugiri under the leadership of Malimariyappa and K. Henjerappa, the movement gained momentum. Flag hoisting on taluk offices, picketing, destruction of liquor shops, and public meetings and processions were actively carried out in Chikkanayakanahalli, Sira, Pavagada, Koratagere, and Tumkur. Slogans like "Arcot Boycott," "Tambu Chatti – Chatta katti," "Gandhi ki jai" and "Malimariyappa's Procession" resonated during these processions.

Leaders such as V.N. Choudhury (Madhugiri), Annapoornamma, Gauramma, Bhagyamma (Chikkanayakanahalli), B.N. Ramegowda, Siddappa (Shira), R.R. Aradhya (district-level), and Y.N. Hosakote (Pavagada village) spearheaded public meetings and movements. On September 5th, T.R. Channappa led a flag hoisting at Koratagere, and on September 14th, activists hoisted the flag at the Tumkur Taluk office. The police resorted to firing to disperse the activists, resulting in the martyrdom of Nanjava and Ramachandra, a high school



student and the son of Goruru Ramaswamy Iyengar, who succumbed to the bullets. Similarly, the shooting of Ramaswamy in Mysore intensified the struggle in the Tumkur district against the Mysore princely state. These events galvanized the district's populace and freedom fighters to participate more fervently in the movement. Students abandoned their schools and colleges to join the cause. In Madhugiri, under the leadership of Satyarayana Shetty, Ajjegowda, Arelingaiah, and Haadrulu Nanjundappa, the police used lathi charges and opened fire under the pretext of controlling the crowds, resulting in the martyrdom of Haadrulu Nanjundappa.

The seriousness of the movement escalated. Talakere Subrahmanya organized the activists and took on leadership responsibilities in the movement. Several leaders were arrested. On October 7th, the Maharaja expressed his willingness to form a responsible government. On October 9th, the detained activists were released, and the movement was withdrawn everywhere. On October 24th, they reached Madhugiri town, where the crowd of activists swelled, leading to the arrest of the remaining leaders. In almost all taluks, the Maharaja handed over power to K.C. Reddy. Thus, the 42-day-long struggle for a responsible Government culminated successfully. In the Tumakuru district, the anti-British movement was initially influenced by the ideas of Bal Gangadhar Tilak through the Indian National Congress. After 1920, the youth of the district began participating in Congress sessions, and a Congress committee was established in Tumakuru. This led the youth to connect with Mahatma Gandhi. Between 1924 and 1934, through meetings, speeches, and direct interactions with Gandhi, the methods of the movement began to take root among the people of Tumakuru. Inspired by Gandhi's visits, local freedom fighters continuously pursued non-cooperation, truth, non-violence, Satyagraha, and strikes. They embraced and implemented Gandhi's constructive programs, promoting them widely and responding immediately to his calls for action.

Although Gandhi was occasionally physically present in the district, his influence was a vital force in the daily activities of the freedom fighters. His spirit of resistance had a profound impact on students. For instance, when a call was made from Bengaluru for students to work toward Gandhi's release, a ninth-grade student from Madhugiri High School named B.K. Pattanashetti, along with a group of four others, set out with the slogan "Free Gandhi." His parents gave him ₹200 and a Congress flag as they sent him off. However, the group was soon arrested by British officials and handed over to the police. The authorities, moved by the boy's determination, offered to drop the charges and arrange his return home with ₹500 if he wrote a letter of apology. When Pattanashetti refused, he was sent to Yerawada Jail. The fact that a student from Tumakuru gained recognition by participating in a movement outside the state was a matter of great pride for the region. On July 14, 1927, after addressing a public meeting, Gandhi visited the settlement of Adi Karnataka community at Kothithopu. He spoke to the residents, urging them to abstain from consuming beef, bidi (hand-rolled cigarettes) and alcohol and to lead a clean and disciplined life. Gandhi also visited the vocational training school in the settlement, where the superintendent, moved by Gandhi's presence, arranged overnight for sewing machines and materials to provide all the students with khadi clothes. One of the young students at the time, H.M. Gangadharaiyah, who later became the founder of Siddhartha University, was deeply influenced by Gandhi. Inspired by seeing Gandhi eat a simple meal of ragi rotti (finger millet flatbread) while sitting beside him, Gangadharaiyah wore khadi for the rest of his life and later played a significant role in the freedom movement. He also established the Siddhartha School, which evolved into today's Siddhartha University, marking his contribution to the educational development of the people in Tumakuru. He remained a lifelong follower of Gandhian principles and an associate of Gandhi's mission.

Shivapura Session- 1938.

The establishment of Mysore Congress in 1937 was an important development in the history of freedom movement in the princely state. Communication network that was built to help the colonial establishment also helped the Congress movement. English bureaucracy, law courts, communication networks, which were primarily meant to be the tools of imperial and colonial designs of the British also help the natives to build the anti-colonial struggle. All-important communications were conveyed the local congress leaders grow. This helped the organising the Shivapura flag hoisting session on 10, 11 and 12th of April 1938, which proved to be very important and significant moment in Mysore. Shivapura is in Maddur taluk of Mandya district. T. Siddalinaliah, Bellary Siddamma, Veera Kesari Seetharama Shastri, Tagadur Ramachandra Rao, V.S. Narayana Rao, K.C Reddy, Kengal Hanumanthaiah, K.T Bhashyam S. Nijalingappa and others played a significant role. From Tumkur district Mali Mariyappa, D.S Mallappa, T. Sunandamma and others participated, it was a huge success. The princely government under the Maharaja Krishna Raja Wodeyar IV and Diwan Mirza Ismail were skeptical this event. In a very taluk place in Tumkur district protest were held. Prohibitionary orders were issued. Despite this the event made a deep impact on the masses of the state.

Vidhuraswatha Tragedy

During the same month another major event occurred in the state of Mysore. This time it was at Vidhuraswatha a small religious place in erstwhile Kolar district. The momentum pick up during the shivapura Dwaja Satyagraha' echoed in the Vidhuraswatha event. The flag hosting was the major concern. A fair was held at Vidhuraswatha during the Third and fourth week of April 1938. It was an annual feature. Congress leaders of the district planned to use this occasion to whip up the nationalist sentiments among the people, as a large number of people would usually gather during the season. Speeches by the Congress leader were arranged. However, the district magistrate Mr Appaji Gowda clamped the prohibition orders under section 144 of IPC. But the Congress leader decided



to defy the orders. Lawyer and the prominent leader of the Kolar Mr Ramachari protest moment was organised. Kallur Subbarayappa was another important leader. Speeches were organised but the police arrested most of the leaders. A event started unfolding people gathered became restless and were firm to continue the protest activities. Enraged by the adomint attitude of the masses people, police resorted to Lathi charging followed by shootout. These were many deaths. It became a national news. It was even broadcast by the BBC. Gandhiji personally spoke to the Diwan Mirza Ismail and expressed his anguish. It was hailed as the Jallianwala Bagh of Mysore. Newspapers carried a series of articles. This was resulted by the leaders of Tumkur district. Leaders like Maali Mariyappa, K Nanjunda Rao, Vishwanath Shetty. E.S Venkatesh Gupta participated in this protest movement. The newspaper reporter R.S Aaradhya from 'Janavaani' visited Vidhuraswatha and published article detailing the events there. T Subramanya and S.Nijalingappa , D.S Mallappa expressed happiness for this article being published. Series of meetings were held at Koratagere,Kunigal,Pavagada and so on. In the backdrop of this event Sardar Vallabhbhai Patel and Aacharya kripalani were reputed to the state on the advice of Gandhiji. Mysore government was under severe criticism on 17-05-19 38, a pact was signed between Vallabhbhai Patel and Mirza Ismail called 'Patel Mirza pact'. Thus, tragedy had a deep impact on the psche of Tumko district people.

Conclusion and Findings

As started at the outset though it has been called a national and nationalist struggle , it fundamentally gained its strength by the sacrifices made by the people at the local level. The decisions were taken by the national leaders but the ground of operation was essentially regional. It is in this sense a student of history will have contextualize the freedom struggle linking the regions to the national ideology. The example of Tumkur district is quite demonstrative in that prospective. In the Tumkur city council of 10th sep.1942, the leaders declared as the student agitation was completed in Tumkur. Yet a group of students continued the agitation by adopting Gandhian Principle “Do or Die” and tried get Independence. It has become a record in the history. As the student movement zeal decreased, peasants took the responsibility of continuing it. Like this in the great chapter of Quit India Movement Tumkur district students gave their valuable contribution.

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OriginalArticle

Intellectuals and Linguistic Nationalism: A Study of the Karnataka Unification Movement.

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The unification of Karnataka in 1956 represents a significant case of linguistic state formation in India, driven not only by political and economic factors but also by intellectual intervention. This study examines the role of intellectuals in shaping the Karnataka unification movement, with particular emphasis on their contributions through literature, journalism, education, and cultural institutions. Using a qualitative, historical-analytical methodology, the study draws on secondary sources to analyze how intellectual discourse constructed a unified Kannada identity and facilitated mass mobilization. The findings suggest that intellectuals acted as key agents in transforming linguistic identity into political consciousness, thereby influencing both public opinion and policy outcomes. By integrating insights from nationalism theory, cultural hegemony, and political economy, the study demonstrates that the Karnataka unification movement was fundamentally a knowledge-driven socio-political transformation. The paper contributes to the broader understanding of the role of intellectuals in state formation and regional nationalism.

Keywords: Karnataka Unification, Intellectuals, Linguistic Nationalism, Cultural Identity, State Formation, Kannada Movement, Political Mobilization,

Introduction

The unification of Karnataka in 1956, under the States Reorganisation Act, represents one of the most significant instances of linguistic state formation in post-colonial India. Prior to unification, Kannada-speaking populations were geographically dispersed and administratively fragmented across multiple political entities, including the princely state of Mysore, the Bombay Presidency, the Madras Presidency, the Hyderabad State, and the Coorg province. This fragmentation resulted not only in administrative inefficiencies but also in the marginalization of Kannada language, culture, and identity within these multilingual administrative structures (Devadevan & Naregal, 2020).

The demand for unification, often referred to as the Kannada Ekikarana Movement, emerged as a response to these structural inequalities and cultural disintegration. However, unlike purely political or economic movements, the Karnataka unification movement was deeply embedded in cultural nationalism, where language served as the primary marker of identity and mobilization. In this context, the movement aligns with broader theoretical perspectives on nationalism, particularly the notion that linguistic and cultural homogeneity can form the basis of political organization (Anderson, 1983).

A defining characteristic of the Karnataka unification movement was the central role played by intellectuals including writers, historians, journalists, educationists, and social reformers. These intellectuals were not merely passive observers but active agents in shaping the ideological foundations of the movement. Through literary works, historical narratives, public speeches, and institutional initiatives, they constructed a shared consciousness among Kannada-speaking people, transforming a linguistically defined community into a politically mobilized entity (Salagare, 2017).

The intellectual intervention was particularly significant in a context where regional identity was weak due to prolonged political division. By reviving the historical legacy of

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Karnataka such as the achievements of the Vijayanagara Empire and earlier Kannada dynasties intellectuals like Aluru Venkata Rao sought to instill a sense of pride and collective belonging. This process of historical reconstruction and cultural revivalism played a crucial role in legitimizing the demand for a unified state. Moreover, the rise of print media and modern education in the late 19th and early 20th centuries facilitated the dissemination of these ideas across different regions. Newspapers, journals, and literary forums became platforms for articulating grievances, promoting linguistic unity, and mobilizing public opinion. In this sense, intellectuals acted as mediators between elite discourse and mass consciousness, bridging the gap between cultural identity and political action (Annigeri, 2022).

From an economic and administrative perspective, intellectuals also contributed to framing unification as a rational and necessary step for regional development. They highlighted issues such as uneven economic growth, lack of administrative coordination, and neglect of Kannada-speaking areas under non-Kannada administrations. By integrating cultural arguments with economic reasoning, they broadened the appeal of the movement and strengthened its legitimacy (Devadevan & Naregal, 2020). The Karnataka unification movement thus represents a unique case where intellectual leadership preceded and shaped political mobilization. Unlike many other regional movements driven primarily by political elites, this movement was rooted in knowledge production, cultural assertion, and institutional activism. It illustrates how intellectuals can function as catalysts in the transformation of fragmented social groups into cohesive political communities.

In contemporary research, the study of intellectuals in social movements has gained importance within interdisciplinary frameworks, including political economy, sociology, and cultural studies. The Karnataka case provides a valuable empirical example of how ideas, discourse, and cultural capital interact with material conditions to produce large-scale political change. Therefore, analysing the role of intellectuals in the Karnataka unification movement is not only historically relevant but also theoretically significant. It contributes to a deeper understanding of the dynamics of linguistic nationalism, the process of state formation, and the broader relationship between culture and politics in developing societies.

Theoretical Framework

The analysis of the role of intellectuals in the Karnataka unification movement can be theoretically grounded in interdisciplinary perspectives drawn from nationalism studies, political sociology, and political economy.

First, the concept of nationalism as an imagined construct, as articulated by Anderson (1983), provides a foundational lens. According to this perspective, nations are socially constructed through shared narratives, symbols, and communication systems. In the Karnataka context, intellectuals played a decisive role in creating a shared Kannada identity among geographically dispersed populations through literature, print media, and cultural discourse. The emergence of a unified linguistic consciousness can thus be interpreted as the outcome of sustained intellectual efforts in constructing an “imagined community.”

Second, Ernest Gellner’s (1983) theory of nationalism emphasizes the role of culture and education in modern nation-building. Gellner argues that industrial society requires cultural homogeneity, often achieved through standardized language and education systems. The Karnataka unification movement reflects this logic, as intellectuals promoted Kannada as a medium of education and administration, thereby aligning linguistic identity with modern state requirements. Educational reforms and cultural institutions became instruments for producing a standardized regional identity.

Third, the framework of Antonio Gramsci’s theory of cultural hegemony is particularly relevant in understanding the strategic role of intellectuals. Gramsci distinguishes between “traditional” and “organic” intellectuals, arguing that intellectuals are central to the creation and maintenance of ideological dominance. In the Karnataka movement, intellectuals functioned as *organic intellectuals* of the Kannada-speaking society, articulating its aspirations and mobilizing consent for unification. Through cultural institutions, literary production, and public discourse, they established a hegemonic narrative that legitimized the demand for a unified state.

Fourth, Pierre Bourdieu’s concept of cultural capital provides insight into how intellectual authority translates into social and political influence. Intellectuals possessed symbolic power derived from their knowledge, education, and cultural production, which enabled them to shape public opinion and influence political processes. The Karnataka case illustrates how cultural capital was converted into political capital, facilitating mass mobilization and institutional change. Finally, from a political economy perspective, the movement can be analyzed as an interaction between ideas and material conditions. Intellectuals framed unification not only as a cultural necessity but also as an economic strategy to address regional disparities, administrative inefficiencies, and development challenges (Devadevan & Naregal, 2020). This integration of ideological and material dimensions enhanced the movement’s effectiveness and broadened its social base.

Review of Literature and Research Gap

The existing body of literature on the Karnataka unification movement predominantly focuses on its historical evolution, socio-economic drivers, and political leadership, while only partially engaging with the intellectual dimension. Scholars such as Salagare (2017) trace the origins of the movement to the late nineteenth century, emphasizing the role of early organizations like Karnataka Vidya Vardhaka Sangha and Kannada Sahitya Parishat in

fostering linguistic unity. Annigeri (2022) situates the movement within the broader framework of Indian nationalism, highlighting how education, print media, and rising political consciousness contributed to regional identity formation. Further, Devadevan and Naregal (2020) interpret the movement through a dual lens of cultural consolidation and economic rationality, arguing that unification was driven by both identity-based aspirations and developmental concerns. While these studies provide valuable insights into institutional development, socio-economic disparities, and political mobilization, they tend to treat intellectual contributions as ancillary rather than central analytical categories. There is limited systematic examination of how intellectuals—through literature, historiography, journalism, and educational reforms—actively constructed Kannada identity and translated cultural discourse into political action. Moreover, existing research lacks an interdisciplinary approach that connects intellectual production with theories of nationalism, state formation, and political economy. Consequently, a clear research gap emerges in understanding the agency of intellectuals as primary drivers of ideological formation and mass mobilization, which this study seeks to address by foregrounding their role in shaping both the discourse and trajectory of the Karnataka unification movement.

Objectives of the Study

1. To examine the role of intellectuals in shaping the Karnataka unification movement
2. To analyze how literature, journalism, and education contributed to linguistic nationalism
3. To evaluate the impact of intellectual discourse on mass mobilization and political outcomes

Methodology

This study adopts a qualitative, historical-analytical research design to examine the role of intellectuals in the Karnataka unification movement. It relies on secondary data sources, including scholarly articles, historical documents, literary works, biographies of key intellectual figures, archival records, and reports of cultural and linguistic organizations. The study employs a combination of historical method (to trace the chronological evolution of the movement), discourse analysis (to analyze intellectual writings such as literature, speeches, and journalistic contributions), and interpretative analysis (to examine the relationship between intellectual ideas and socio-political mobilization). The analytical framework is informed by theories of nationalism, particularly linguistic nationalism and the role of cultural capital in state formation. The temporal scope is confined to the late nineteenth century to 1956, capturing the pre-unification phase when intellectual interventions were most influential. By triangulating multiple sources and approaches, the study aims to provide a comprehensive understanding of how intellectual discourse translated into collective political action.

Analysis and discussion

Role of Intellectuals in Shaping the Karnataka Unification Movement

Intellectuals played a foundational and catalytic role in shaping the Karnataka unification movement by constructing a coherent Kannada identity out of a historically fragmented socio-political landscape. Figures such as Aluru Venkata Rao, often regarded as the “architect of Karnataka unification,” utilized historical narratives and cultural symbolism to revive the collective memory of a unified Karnataka, particularly through works like *Karnataka Gatha Vaibhava*. This reconstruction of history was not merely descriptive but normative and mobilizational, aiming to legitimize the demand for a separate linguistic state (Salagare, 2017). From a theoretical standpoint, this aligns with the concept of “imagined communities” proposed by Anderson (1983), where intellectuals play a key role in shaping national consciousness through shared narratives. In the Karnataka context, intellectuals transformed linguistic commonality into political identity, thereby laying the ideological groundwork for unification.

Moreover, intellectuals institutionalized their efforts through organizations such as Karnataka Vidya Vardhaka Sangha (1890) and Kannada Sahitya Parishat (1915), which became centers for cultural revival and political discourse. These institutions enabled the transition from individual intellectual efforts to collective socio-political movements, thereby amplifying their impact (Devadevan & Naregal, 2020). Thus, intellectuals functioned not only as cultural producers but also as strategic actors who framed the ideological architecture of the movement, bridging the gap between cultural identity and political aspiration.

Contribution of Literature, Journalism, and Education to Linguistic Nationalism

The development of linguistic nationalism in Karnataka was significantly mediated through literature, journalism, and education, which served as instruments of ideological dissemination and consciousness-building. Kannada literature, particularly in the late 19th and early 20th centuries, played a transformative role in fostering a shared cultural identity. Literary works emphasized historical pride, cultural unity, and linguistic distinctiveness, thereby reinforcing the emotional and symbolic foundations of the movement (Annigeri, 2022).

Journalism further expanded the reach of these ideas by facilitating mass communication. Newspapers and periodicals in Kannada acted as platforms for intellectual debate, critique of administrative fragmentation, and advocacy for unification. The rise of print media corresponds to what Anderson (1983) terms “print capitalism,” which enables the standardization of language and the formation of a shared public sphere. In Karnataka, print media helped integrate dispersed Kannada-speaking populations into a common communicative network, thereby strengthening linguistic nationalism.

Education also played a critical role in institutionalizing linguistic identity. Intellectuals advocated for the use of Kannada as a medium of instruction and emphasized the importance of regional history and culture in curricula. This



contributed to the emergence of an educated middle class with a strong sense of regional consciousness, which became a driving force behind the movement (Devadevan & Naregal, 2020). Collectively, literature, journalism, and education functioned as ideological state apparatuses (in a broad analytical sense), shaping perceptions, values, and political aspirations. They transformed linguistic identity from a passive cultural attribute into an active political instrument, thereby facilitating the rise of linguistic nationalism in Karnataka.

Impact of Intellectual Discourse on Mass Mobilization and Political Outcomes

The intellectual discourse generated by writers, journalists, and reformers had a profound impact on mass mobilization and the eventual political realization of Karnataka's unification. Initially confined to elite circles, intellectual ideas gradually permeated broader sections of society through institutional networks, public meetings, literary conferences, and media dissemination. This process enabled the translation of abstract ideas into concrete political demands, thereby expanding the movement's social base (Salagare, 2017). Intellectuals played a crucial role in framing unification as both a cultural necessity and an economic imperative. By highlighting issues such as administrative inefficiency, regional imbalance, and neglect of Kannada-speaking areas, they connected identity-based aspirations with material concerns, thereby enhancing the movement's legitimacy and appeal (Devadevan & Naregal, 2020).

Furthermore, intellectual discourse influenced political decision-making by shaping public opinion and creating pressure on policymakers. The growing demand for linguistic states, supported by intellectual arguments, contributed to the formation of the States Reorganisation Commission (1953) and ultimately led to the reorganization of states along linguistic lines in 1956. In this sense, intellectuals acted as agenda-setters, influencing both societal attitudes and institutional outcomes (Annigeri, 2022). From a political economy perspective, the Karnataka case illustrates how ideas can function as productive forces, shaping institutional change and state formation. The success of the unification movement underscores the capacity of intellectual discourse to mobilize resources, align diverse interests, and achieve political transformation.

Across all three dimensions, it is evident that intellectuals were not peripheral contributors but central agents in the Karnataka unification movement. Their role extended beyond cultural expression to include ideological construction, institutional development, and political mobilization. By integrating cultural, economic, and political narratives, intellectuals transformed the movement into a broad-based and successful regional struggle, culminating in the formation of a unified Karnataka in 1956.

Conclusion

The present study demonstrates that the unification of Karnataka was not solely the outcome of political negotiations or administrative restructuring, but fundamentally a knowledge-driven and culturally embedded movement in which intellectuals played a decisive and multidimensional role. By constructing a shared Kannada identity through literature, historiography, and cultural revivalism, intellectuals transformed a linguistically dispersed population into a cohesive socio-political community. Their efforts were instrumental in converting cultural consciousness into political demand, thereby laying the ideological foundation for state formation (Salagare, 2017).

The study further reveals that institutions such as literary associations, educational bodies, and print media networks functioned as critical platforms for disseminating ideas and mobilizing public opinion. Through these channels, intellectuals were able to bridge the gap between elite discourse and mass participation, ensuring that the movement acquired both depth and breadth. In line with Anderson's (1983) notion of imagined communities and Gramsci's concept of cultural hegemony, intellectuals in Karnataka acted as agents of ideological consolidation, shaping both identity and consent. Moreover, the integration of cultural narratives with economic and administrative arguments enhanced the legitimacy and effectiveness of the movement. By highlighting regional disparities, inefficiencies, and developmental concerns, intellectuals framed unification as not only a cultural aspiration but also a rational and necessary policy objective (Devadevan & Naregal, 2020). This strategic synthesis of ideas and material concerns significantly contributed to the success of the movement and its eventual realization in 1956.

From a broader analytical perspective, the Karnataka unification movement underscores the critical importance of intellectual agency in processes of state formation and regional nationalism. It illustrates how ideas, discourse, and cultural capital can function as powerful instruments of socio-political transformation, particularly in developing societies characterized by diversity and fragmentation.

However, the study is limited by its reliance on secondary sources and its primary focus on pre-unification intellectual contributions. Future research may adopt empirical and comparative approaches, including archival analysis and cross-regional studies, to further examine the role of intellectuals in other linguistic movements in India. The Karnataka experience affirms that intellectuals are not merely observers of history but active architects of social change, capable of shaping collective identity, influencing political outcomes, and redefining the trajectory of regional development.

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OriginalArticle

Comparative Governments: Political Nature and Major Approaches in Present Scenario

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Manuscript ID:	Abstract
JRD -2026-180513	<i>The Comparative politics studies and compares political institutions, behaviours, and processes across nations, evolving from a formal study of constitutions to a dynamic, empirical, and interdisciplinary analysis of power. The modern approach emphasizes structural-functionalism, systems theory, and political behaviour, focusing on explaining "what is" rather than just describing governments. Nature of Comparative Politics Scientific and Empirical: Moves beyond mere description, focusing on collecting data, testing hypotheses and making systematic comparisons of political systems. Inter disciplinary: Incorporates insights from sociology, economics, and psychology to understand the broader context of political actions. Focus on Power Dynamics: Analyses how power is acquired, exercised, and controlled, moving beyond formal institutions to include informal factors like interest groups and political behaviour. Analytical and Generalizing: Seeks to identify patterns of similarity and divergence to build theories, such as those related to political development or stability. Major Approaches in the Present Scenario Modern comparative politics has moved toward approaches that are more empirical and analytical: Systems Approach (David Easton): Treats the political system as an interrelated set of processes, focusing on how inputs (demands and support) are converted into outputs (decisions and policies) within an environment. Structural (Gabriel Almond): Argues that all political systems have structures (like legislatures or parties) that perform essential functions (like interest articulation, aggregation, and communication) to maintain system stability. Behavioural Approach: Emphasizes the study of human behaviour in political situations rather than just institutions, focusing on empirical data and quantifiable evidence. Political Economy/Marxian Approach: Focuses on the relationship between politics and economics, analysing how economic power structures influence political decisions. Institutionalism (New Institutionalism): While traditional approaches studied formal institutions, new institutionalism analyses how rules, norms, and structures shape political behaviour. Shift from Traditional to Modern Approaches Traditional Approach: Descriptive, normative, and focused primarily on European institutions. Modern Approach: Analytical, empirical, and comparative, with a broader, global scope, including developing nations.</i>
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Introduction

The Comparative Governments politics is the study and appraisal of domestic politics across countries. Comparative politics has a long and very eminent history dating back just before the origin of systematic political studies in ancient Greece and Rome. Even ancient people, compared their situations with those of other people with whom they came in contact. The ancient Greeks performed the earliest systematic comparisons of a more modern and secular. Comparative politics is key area in political science, pigeonholed by an empirical approach based on the comparative method. To put it in another way, comparative politics is the study of the domestic politics, political institutions, and conflicts of countries.

It often encompasses comparisons among countries and through time within single countries, emphasizing major patterns of similarity and difference. Many political theorists like Arendt Lijphart argued that comparative politics does not have a functional focus in itself, instead a methodological one (Lijphart, Arendt, 1971).

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In simple form, comparative politics is not defined by the object of its study, but by the method it applies to study political phenomena. Peter Mair and Richard Rose gave modern definition of comparative politics and stated that comparative politics is elaborated by a combination of a substantive focus on the study of countries' political systems and a method of recognising and explaining similarities and differences between these countries using common models (Peter, 1996). In the field of Comparative politics, the term politics has three connotations such as political activities, political process and political power. Political activity consists of the efforts by which the conditions of conflicts are created and resolved in a way pertaining to the interest of people as far as possible who play in their part in struggle for power. Political process is an extension of political activity. Political power is the major topic in comparative politics. The term power has been defined by different writers. Friedrich described power as a certain kind of human relationship. Whereas Tawney explained power as a capacity of an individual or group of individuals to modify the conduct of other individuals in a manner which he desires (J. C. Johari, 1982)? When applied to particular fields of study, comparative politics denotes by other names, such as comparative government (the comparative study of forms of government) or comparative foreign policy (comparing the foreign policies of different States in order to establish general empirical connections between the characteristics of the State and the characteristics of its foreign policy). Many theorists articulated that "Comparative political science" as a general term for an area of study, as opposed to a methodology of study, can be seen as redundant. The political only shows as political when either an overt or tacit comparison is being made.

Nature of Comparative Government and Politics

Nature of Comparative Government and Politics Nature and scope of comparative politics is fathomable only when one understands the main characteristics and significance of comparative government. Although the two terms 'Comparative Politics' and 'Comparative Governments' are used lightly and interchangeably, there is distinction between them. Conventionally, the comparative study of politics stands entitled as 'comparative government'. Comparative government includes the study of features and legal powers of political institutions existing in various states. It is the study of state and other political institutions in terms of their legal powers, functions, and positions on a comparative basis. Key characteristics of comparative government are mentioned below:

- ⊗ Stress upon the study of political institutions of various countries.
- ⊗ Focus on the study of major constitutions of the world.

Emphasis upon the study of powers and functions of various political institutions working in different countries. Formal study of the organisation and powers, description of the features of the constitutions and political institutions, and legal powers of political institutions form the basic contents of comparative government study. To devise a theory of ideal political institutions has been the objective. These traits make comparative government popular area of study during the beginning of 20th century. Subsequently, Majority of political scientists greatly displeased with its narrow scope, intuitive methodology, and formal legalistic-institutional and normative approach. These researchers then adopt comprehensiveness, realism, precision and scientific study of the processes of politics as their new goal. Their efforts came to be labelled as comparative politics. Basically, the study of comparative politics involves mindful comparisons in studying; political experiences, institutions, behaviour and processes of major systems of government. It comprises of the study of even extra constitutional agencies along with the study of formal governmental organs. It is concerned with important regularities, similarities and differences in the working of political behaviour. Consequently, comparative Politics can be defined as the subject that compares the political systems in various parts of the globe, with a view to comprehend and define the nature of politics and to devise a scientific theory of politics. Some popular definitions of comparative politics are given below: According to John Blonde, comparative politics is "the study of patterns of national governments in the contemporary world". M.G. Smith described that "Comparative Politics is the study of the forms of political organisations, their properties, correlations, variations and modes of change". E.A Freeman stated that "Comparative Politics is comparative analysis of the various forms of govt. and diverse political institutions". It can be established that comparative politics encompasses a comparative study of not only the institutional and mechanistic arrangements but also an empirical and scientific investigation of non-institutionalised and non-political determinants of political behaviour. Empirical study of political processes, structures and functions shapes a major part of comparative political studies. It is demonstrated in literature that comparative analyses and compares the political systems operating in various societies. To do this, it takes into account all the three implications of politics that include political activity, political process and political power. Comparative Politics is pigeonholed by numerous features are mentioned below:

1. Analytical and empirical research
2. Objective study of politics: A value-free empirical study-It rejects normative descriptive methods of comparative government.
3. Study of the infra-structure of politics: Comparative Politics, now analyses the actual behaviour of individuals; groups structures, sub-systems and systems in relation to environment. It studies the actual behaviour of all institutions.
4. Inter-disciplinary focus: Comparative Politics focuses upon interdisciplinary approach. It studies politics with the help of other social science like psychology, sociology, anthropology and economics.

5. It studies political processes in both developed and developing countries. The biased and parochial nature of traditional studies stands replaced and the study of political systems of Asia, Africa, and Latin America enjoys equal importance with the study of African and European political systems.
6. Theory building as the objective: The objective of Comparative politics study is scientific theory building.
7. Adoption of 'Political Systems With above features, Comparative politics is emerged as a new science of politics. It has prohibited the non-comprehensive scope, formal character, legal and institutionalised framework, normative approach and parochial nature of the traditional comparative government studies.

Major Approaches of Comparative Governments and Politics

Political investigators use different approaches tools to arrive at greater political understanding. Approaches support in defining the kinds of facts which are relevant. The diversity of approaches is used by political scientists to attack the complexity of political systems and behaviour. Conventionally, the study of comparative politics is termed as 'comparative government'. It includes the study of political institutions existing in various states. The features, advantages, demerits, similarities and dissimilarities of political institutions were compared. It was an attempt to ascertain the best of political institutions. The focus continued to remain popular up to the end of the 19th century. In the 20th century, the study of political government underwent revolutionary changes. The traditional focus of the study of politics got substituted by new scope, methodology, concepts, techniques which were known as contemporary view of the study of politics. Political researchers made great attempts to develop a new science of 'comparative politics'. They espoused comprehensiveness, realism, precision and use of scientific methods as the new goals for the study of comparative politics. This new endeavour is nowadays promoted as 'modern' comparative politics. In the modern assessment, the scope of comparative politics is much wider. It includes the analysis and comparison of the actual behaviour of political structures, formal as well as informal. Researchers believe that these political structures, governmental or non- governmental, directly or indirectly affect the process of politics in all political systems. Both traditional and modern comparative politics adopt different approaches to its study. Traditional scientists follow narrow and normative approach. It involves descriptive studies with a legal institutional framework and normative prescriptive focus. Whereas modern political scientists follow empirical, analytical studies with a process orientated or behavioural focus and they adopt scientific methodology. It seeks to analyse and compare empirically the actual behaviour of political structures.

Traditional Approaches

The traditional approach to Political Science was broadly predominant till the occurrence of the Second World War. These approaches were mainly associated with the traditional outlook of politics which underlined the study of the state and government. Consequently, traditional approaches are principally concerned with the study of the organization and activities of the state and principles and the ideas which motivate political organizations and activities. These approaches were normative and principled. The political philosophers supporting these approaches and raised questions such 'what should be an ideal state?' According to them, the study of Political Science should be limited to the formal structures of the government, laws, rules and regulations. Therefore, the supporters of the traditional approaches stress various norms such as what 'ought to be' or 'should be' rather than 'what is'. Characteristics of Traditional approaches:

1. Traditional approaches are mostly normative and stresses on the values of politics.
2. Prominence is on the study of different formal political structures.
3. Traditional approaches made very little attempt to relate theory and research.

These approaches consider that since facts and values are closely interlinked, studies in Political Science can never be scientific. There are many types of traditional approaches that are as follows;

Philosophical Approaches

Philosophical approach is conventional approach to study politics. Customarily, the study of politics was subjugated by philosophical reflections on universal political values that were regarded as essential to the just state and the good state. The oldest approach to the study of politics is philosophical. Philosophy "is the study or science of truths or principles underlying all knowledge and being." It entails that philosophy or philosophical approach tries to explore the truth of political incidents or events. It discovers the objective of political writings or the purpose of political writer. Main aim of philosophical approach is to evaluate the consequences of events in a logical and scientific manner. Van Dyke opined that "philosophy denotes thought about thought. Somewhat more broadly it denotes general conceptions of ends and means, purposes and methods." The purpose of philosophical approach is to explain the words and terms used by the political theorists. The enquiry started by the philosophical approach removes confusion about the assumptions. Several Greek philosophers such as Plato and Aristotle were the creators of this approach. The main subject of Plato's writings was to define the nature of an ideal society. This approach states that values are inseparable from facts. It is mainly an ethical and normative study of politics, hence is concerned with what 'should be' or 'ought to be'. This approach seeks to understand our fundamental nature and aim as human beings, recognizing principles and standards of right conduct in political life. It is normative in character and believes in developing norms or certain standards. It followed the logical method where investigator has his own values and determined philosophies. Benefit of philosophical approach is that it enters into the depth of every aspect of political phenomena and examines them



without any partiality. Its interpretation of political activities conjures interest in the minds of students of politics. Words and phrases used by philosophers highlight point on the subject. Philosophical approach enhances linguistic clarity. That is why it is said that this approach aims at thought about thought. Philosophical approach uses procedure of logical analysis. It uses reason to explore the truth. The truth which this approach establishes may be of various kinds-normative, descriptive or prescriptive. But the philosophical approach is indifferent to the nature or category of truth. This approach also tries to establish standards of good, right and just. Many critics observed that this approach determines what is in the interest of the public and he identifies interest more with ends than with means. In the huge arena of political science, there are a number of great or outstanding books. Philosophical approach explores the meaning and central theme of these books as well as the exact purpose of the authors. In the contemporary Greek city-states of Plato morality, moral values and idealism ruined to such an extent that he received a great shock and seriously thought to recuperate these and this urge encouraged him to write *The Republic*. He wanted to establish that politics and morality are not an etheric concept. Rather, an ideal and moral body politic can be made a real one through the selfless administration by a philosopher-king. John Locke composed his *Second Treatise* to rationalize the interests and objectives of the new middle class and the struggle of people for liberty. Other political philosopher such as Machiavelli and Hobbes wrote to support royal absolutism. Some critics may not agree with the views of these philosophers or the arguments of these books, but it must not be forgotten that the books were written at particular and critical moment of history. It is well established that Philosophical approach helps people to understand the contemporary history and the nature of politics suggested by philosophers. In other words, the philosophical approach aids to comprehend the political ideologies of past centuries. In this sense, the philosophical approach is very important for researchers and people. Application of the philosophical approach in political science focuses on the great ideas, values and doctrines of politics. The normative-philosophical approach is the ancient and the least scientific approach to the study of politics and it has been taken over although not completely displaced by contemporary approaches. Criticism of the Philosophical Approach: Though philosophical approach is highly important for scholars and other people to the study of politics, critics have raised several problems about its worth. It is documented in literature that one of the central ideas of political philosophy is idealism and it is conspicuous in Plato's *The Republic*. Critics argued that idealism itself is quite good but when its practical application arises it appears to be a myth. Plato emphasized Idealism in his theory, but it had not practical importance and be fully realised that idealism would never be translated into reality. It is a subject of absolute imagination. Machiavelli and Hobbes wrote with the only purpose of supporting the status quo. The philosophical intellectuals of the earlier periods were impractical philosophers. They had no intention to promulgate ideas which can change society. They were apathetic to people's liking and disliking, their love for liberty, their sorrows and sufferings and they failed to provide prophylactic devices. As an academic discipline, philosophical approach is appropriate, but in practical guide for action, it has barely any importance. 2. Historical approach: This approach states that political theory can be only understood when the historical factors are taken into consideration. It highlights on the study of history of every political reality to analyse any situation. Political theorists like Machiavelli, Sabine and Dunning believed that politics and history are strongly inter-related, and therefore, the study of politics always should have a historical viewpoint. Sabine considered that Political Science should include all those subjects which have been discussed in the writings of different political thinkers since Plato. History defines about the past as well as links it with the present events. Without studying the past political events, institutions and political environment, the analysis of the present would remain largely imperfect. Main attribute of historical approach is that history as a written or recorded subject and focuses on the past events. From history, researchers come to know how man was in the past and what he is now. History is the store-house of events. From the profiles, autobiographies, descriptions by authors and journalists' investigators know what event occurred in the past. It is to be prominent that the events must have political revealing or they must be politically significant. These events provide the best materials upon which theory and principles of political science are built. History communicates researchers how government, political parties and many other institutions worked, their successes and failures and from these, they receive lessons which guide them in determining the future course of action. Evaluation of Historical Approach: The historical approach to the study of politics has numerous challenges from several quarters. One of the main fulcrums of the challenges is that history has two faces. One is documentation of facts which is quite naive and the other is construal of facts and phenomena. The accretion of evidences is to be judged from a proper perspective. The implication is that adequate care should be taken while evaluating evidence and facts and such a caution is not always strictly followed and, as a result, the historical facts do not serve the purpose of those who use it. This is the main complaint against the historical approach to the study of politics. Alan Ball has also criticized the historical approach. He debated that "past evidence does leave-alarming gaps, and political history is often simply a record of great men and great events, rather than a comprehensive account of total political activity." Very few historians interpret historical events and evidences broadly and freely.

Institutional Approaches

There is a strong belief that philosophy, history and law have bestowed to the study of politics and it is in the field of institutional approaches. Institutional approaches are ancient and important approach to the study of Political Science. These approaches mainly deal with the formal aspects of government and politics. Institutional approach is



concerned with the study of the formal political structures like legislature, executive, and judiciary. It focused on the rules of the political system, the powers of the various institutions, the legislative bodies, and how the constitution worked. Main drawback of this approach was its narrow focus on formal structures and arrangements. In far-reaching terms, an institution can be described as 'any persistent system of activities in any pattern of group behaviour. More concretely, an institution has been regarded as 'offices and agencies arranged in a hierarchy, each agency having certain functions and powers. The study of institutions has been dominant not only to the arena of comparative politics, but to the political science field as a whole. Many writers have argued that institutions have shaped political behaviour and social change. These authors have taken an "institutionalist" approach which treat institutions as independent variables. The institutional approach to political analysis emphasises on the formal structures and agencies of government. It originally concentrated on the development and operation of legislatures, executives and judiciaries. As the approach developed however, the list is extended to include political parties, constitutions, bureaucracies, interest groups and other institutions which are more or less enduringly engaged in politics. Though, descriptive-institutional approach is slightly old, political experts still concentrate chiefly on scrutinising the major political institutions of the state such as the executive, legislature, the civil service, the judiciary and local government, and from these examinations, valuable insights as to their organisation can be drawn, proposals for reform conversed and general conclusions obtainable. The approach has been critiqued for the disregard of the informal aspects of politics, such as, individual norms, social beliefs, cultural values, groups' attitudes, personality and the processes. Institutional approach is also criticized for being too narrow. It ignores the role of individuals who constitute and operate the formal as well as informal structures and substructures of a political system. Another problem is that the meaning and the range of an institutional system vary with the view of the scholars. Researchers of this approach ignored the international politics (J. C. Johari, 1982).

4. Legal approach: In the realm of traditional approaches, there is a legal or juridical approach. This approach considers the state as the central organization for the creation and enforcement of laws. Therefore, this approach is associated with the legal process, legal bodies or institutions, and judiciary. In this approach, the study of politics is mixed with legal processes and institutions. Theme of law and justice are treated as not mere affairs of jurisprudence rather politics scientists look at state as the maintainer of an effective and equitable system of law and order. Matters relating to the organizations, jurisdiction and independence of judicial institutions become an essential concern of political scientists. This approach treats the state primarily as an organization for creation and enforcement of law (J. C. Johari, 1982). The supporters of this approach are Cicero, Bodin, Hobbes, John Austin, Dicey and Henry Maine. In the system of Hobbes, the head of the state is highest legal authority and his command is law that must be obeyed either to avoid punishment following its infraction or to keep the dreadful state of nature away. Other scientists described that the study of politics is bound with legal process of country and the existence of harmonious state of liberty and equality is earmarked by the rule of law (J. C. Johari, 1982). The legal approach is applied to national as well as international politics. It stands on assumptions that law prescribes action to be taken in given contingency and also forbids the same in certain other situations. It also emphasizes the fact that where the citizens are law abiding, the knowledge of the law offers an important basis for predictions relating to political behaviour of people. Though it is effective approach but not free from criticism. This approach is narrow. Law includes only one aspect of people's life. It cannot cover entire behaviour of political actions (J. C. Johari, 1982).

Criticism of traditional approaches: The traditional approaches have gloomily unsuccessful to identify the role of the individuals who are important in moulding and remoulding the shape and nature of politics. In fact, individuals are important players of both national and international politics. The focus is directed to the institutions. It is astounding that in all the institutions, there are individuals who control the structure, functions and other aspects. Singling out institutions and neglecting individuals cannot be pronounced as proper methods to study politics. The definition politics as the study of institution is nothing but an overstatement or a travesty of truth. Other political researchers argued that traditional approach is mainly descriptive. Politics does not rule out description, but it is also analytical. Sheer description of facts does not inevitably establish the subject matter of political science. Its purpose is studying the depth of every incident. Investigators want to know not only occurrence, but also why a particular incident occurs at a particular time. The standpoint of the traditionalists is limited within the institutions. Political researchers in modern world are not motivated to limit their analysis of politics within institutions. They have explored the role of environment into which is included international politics multinational corporations, non-governmental organisations or trans-national bodies. It is assumed that traditional analysis is inappropriate for all types of political systems both Western and non-Western. To recompense this deficiency, the political scientists of the post-Second World War period have developed a general system approach which is quite comprehensive. The outstanding feature of traditional approaches is that there is value laden system.

Modern Approaches

The political philosophers later on realized the need to study politics from a new viewpoint. Thus, to overcome the paucities of the traditional approaches, various new approaches have been promoted by the new political intellectuals. These new approaches are considered as the "modern approaches" to the study of Political Science. Many theorists regard these approaches as a reaction against the traditional approaches. These approaches are mainly concerned with scientific study of politics. The first innovation in this regard comes with the advent of the behavioural revolution in Political Science. Characteristics of Modern Approaches are given below.



1. Political-Economic approach

Economics and politics are vital arenas of social science and in several respects, they are closely related. In the prospectus of universities of India and many other countries a few decades ago, economics and political science established a single subject which suggests the close relationship between the two. This signifies that in the study of politics; economics has great importance. When evaluating the economic approaches, it is established that the policy formulations of economic nature and determination of the principles of planning which has recently become a part of the governmental activity are done by the government. In majority of the countries, public issues are economic issues and sometimes the only actors are the personnel of the government such as the prime minister, president and other ministers. This obvious relationship between the two subjects has placed the economic approach in a suitable position. Fiscal policies, industrial policy, agricultural policy, labour policy are all economic issues, but the foremost actors are the members of the government. The executive branch takes the final decision. There are many specialists and advisers. The implementation is approved by the government. Policy regarding production and distribution, though within the jurisdiction of economics, is always decided by the government. It is well recognized that the impact of success and failure of the economic policies depend upon the government. So, discussion of politics cannot be successful without economics. The greatest attribution of the economic approach to the study of politics emanates from the writings of Marx and Engels. The principle of class struggle, increasing impoverishment and capitalism's exploitation are based on economic factors. Marx and Engels have highlighted the heterogeneity of interests between the classes. Classes are formed on the basis of economic interests. Capitalist's profit-making motive leads to exploitation of workers. To liberate from exploitation, the workers are enforced to struggle. The idea of emancipation is associated with economic terms. Marx stated that politics is controlled by the persons who own sources of production and manage the process of distribution. Outside economic influence, politics has no independent authority. Marx's theory of base (the state institution) and superstructure (society) is a matter of relationship between economics and politics. Possibly, Marx is the only philosopher who has vehemently argued the relationship between the two important subjects of social science. The interest group approach to the study of politics is popular in some liberal democratic countries and this conception is related with economic approach. Interest groups or pressure groups create pressure to achieve economic objectives. Therefore, interest group politics and economic approach are mutually dependent.

2. System Approaches

This approach falls in the category of modern approach. The notion of Systems Theory was emerged from ancient time, dates back to 1920s. Ludwig Von Bertalanffy is considered as the earliest advocate of the general systems theory. He utilized this theory for the study of Biology. It is only after the Second World War; the social scientists claimed for the amalgamation of sciences for which they took the help of the systems theory. However, when the general systems theory in its abstract form traced back to natural sciences like Biology, in its operational form, they are found in Anthropology. Then it was embraced in Sociology and Psychology. In the decade of sixties, the systems theory became an important tool to evaluate and investigate key factors in Political Science. Among political scientists, David Easton has been the first to apply this theory to political analysis. This approach describes the relationship of political life with other aspects of social life. The idea of a system was initially borrowed from biology by Talcott Parsons who first promoted the concept of social system. Later on, David Easton further developed the concept of a political system. This approach signified that a political system operates within the social environment. Consequently, it is not possible to analyse political events in isolation from other aspects of the society. To put in other way, influences from the society, be it economic, religious or otherwise, do shape the political process. Figure: System approach, the political system operates within an environment. The environment produces demands from different parts of the society such as demand for reservation in the matter of employment for certain groups, demand for soothing working conditions or minimum wages, demand for better transportation facilities, demand for better health facilities. Different demands have different levels of support. Easton said that both 'demands' and 'supports' establish 'inputs.' The political system receives these inputs from the environment. After considering various factors, the government decides to take action on some of these demands while others are not acted upon. Through, the conversion process, the inputs are converted into 'outputs' by the decision makers in the form of policies, decisions, rules, regulations and laws. The 'outputs' flow back into the environment through a 'feedback' mechanism, giving rise to fresh 'demands.' Accordingly, it is a recurring process. Presently, the term 'political system' has been chosen to the term state or government because it includes both formal informal political instructions and processes those continue to exist in a society. Systems approach to political institutions by the behavioural school has evolved new concept. David Easton, G. A. Almond and Morton A. Kaplan are credited for applying this approach in Political Science. According to this theory, political behaviour is conceived as a system and the political system is well-defined as "Authoritative allocation of values with threat or actual use of deprivations to make them binding on all". It is the system of interactions to be found in independent societies which performs the functions of integration and adaptation both internally and externally by means of employment of legitimate physical compulsion. A political system has three important characteristics, specifically, comprehensiveness, interdependence and existence of boundaries. However, the features of a political system are openness, adaptiveness, comprehensiveness, self-regulating, ongoing. It is composed of a number of structures which have specific functions.

These functions are pigeonholed as input and output functions. A political system performs these in order to maintain itself.

3. Behavioural approaches

Behaviourist is considered as contemporary approach to the study of political science. But this approach was emerged during 20th century. An important consideration of Behaviouralist has been the study of political behaviour, as an area of study within Political Science. It concentrates is on the individual as voter, leader, revolutionary, party member and the influences of the group or the political system on the individual's political behaviour. Behaviouralist stresses upon scientific, objective and value-free study of the political occurrences as conditioned by the environment, firmly the behaviour of the individuals involved in that phenomena. As such, it focuses on the role of the behaviour of the individual at various levels and the scientific analysis. Behaviouralist is the development of method against traditional political science which did not take into account if human behaviour as an actor in politics. Behaviouralist is quite different from behaviourism. Behaviourism is narrow in its application. It refers to the response of an organism as aroused by some stimulus. It does not consider role of the feelings, ideas, prejudices that determine the response of that individual. Behaviouralist does take into account the role of the feelings, ideas and prejudices. David Easton differentiates between behaviourism and behaviouralist through an example. The paradigm adopted by behaviourists, according to him is S- R (Stimulus-Response). But the behavioural lists have improved it by making it as S-O-R (Stimulus-Organism-Response). David Easton regards behavioural revolution is an intellectual tendency on the part of the political scientists to study empirically the political behaviour of persons. Striking Features of behaviouralist: David Easton has described certain key features of behaviouralist which are regarded as its intellectual foundations. These are:

- Regularities: This approach believes that there are certain consistencies in political behaviour which can be expressed in generalizations or theories in order to elucidate and predict political phenomena. In a particular situation, the Political behaviour of individuals may be more or less similar. Such regularities of behaviour may help the researcher to analyse a political situation as well as to predict the future political phenomena. Study of such regularities makes Political Science more scientific with some predictive value.
- Verification: The behaviourists do not want to accept everything as established. Therefore, they stress testing and verifying everything. According to them, if phenomenon is not verified then it will not be scientific.
- Techniques: The behaviouralists stress on the use of those research tools and methods which generate valid, reliable and comparative data. A researcher must make use of refined tools like sample surveys, mathematical models, simulation.
- Quantification: After collecting data, the researcher should measure and quantify those data.
- Values: The behaviouralists have emphasised on separation of facts from values. They believe that to do objective research, one has to be value free. It means that the researcher should not have any pre-conceived idea or a prejudiced view.
- Systematization: According to the behaviouralists, research in Political Science must be systematic. Theory and research should go together.
- Pure Science: Another feature of behaviouralist has been its aim to make Political Science a "pure science". It believes that the study of Political Science should be verified by evidence.
- Integration: behaviouralists stated that political Science should not be detached from various other social sciences such as history, sociology and economics. This approach denotes that political events are formed by various other factors in the society and therefore, it would be incorrect to separate Political Science from other disciplines. Consequently, with the development of behaviouralist, novel thinking and new method of study were evolved in the field of Political Science.

Advantages of behavioural approach are as follows:

- This approach attempts to make Political Science as a scientific method and brings it closer to the day-to-day life of the individuals.
- Behaviourist has brought human behaviour into the arena of Political Science and thereby makes the study more relevant to the society.
- This approach helps in predicting future political events. The behavioural approach has been supported by different political philosophers. However, the Behavioural approach also gripped under various criticisms for its scepticism also. The main criticisms of this approach are mentioned below:

- Criticism: This approach has been criticized for its dependence on techniques and methods and ignoring the subject matter.
- The supporters of this approach were mistaken when they thought that human beings behave in similar ways in similar circumstances. Moreover, it is a difficult task to study human behaviour and to get a certain result.
- Most of the political phenomena are immeasurable. Therefore, it is always difficult to use scientific method in the study of Political Science. Furthermore, the researcher being a human being is not always value neutral as believed by the behaviouralists.
- Behaviourist put overemphasizes on scientific techniques and methods. It is criticized as Pseudo-politics as it aims at upholding only American institutions as the best in the world.
- It stresses behavioural effect at the cost of institutional effect. It emphasizes static rather than current situations.
- It is a value free research, as its debate is not possible.

4. Structure functional approaches

According to this approach, the society is a single inter-related system where each part of the system has a definite and distinct role to play. The structural-functional approach may be considered as an offshoot of the system analysis. These approaches accentuate the structures and functions. Gabriel Almond was an advocate of this approach. He described political systems as a special system of interaction that exists in all societies performing certain functions. According to him, the main attributes of a political system are comprehensiveness, inter-dependence and existence of boundaries. Like Easton, Almond also believes that all political systems perform input and output functions. The Input functions of political systems are political socialization and recruitment, interest articulation, interest-aggression and



political communication. Almond makes three-fold classifications of governmental output functions relating to policy making and implementation. These output functions are rule making, rule application and rule adjudication. Therefore, Almond believes that a stable and efficient political system converts inputs into outputs. To summarize, the comparative study of politics and government scans political institutions from constitutions to executives to parliaments to parties to electoral laws and the processes and relationships that account for constancy and change in political economy, culture, conflict, government, rights and public policy. Comparative Politics encompasses the systematic study and comparison of the world's political systems. It describes differences between as well as similarities among countries. In contrast to journalistic reporting on a single country, comparative politics is mainly interested in discovering patterns, processes and regularities among political systems. It looks for trends, for changes in patterns and it tries to develop general hypothesis that define these trends. It seeks to do such comparisons thoroughly and systematically, without personal, biased, or philosophical axes to grind. It involves hard work, clear thinking, careful and thorough scholarship, and hopefully clear, consistent, and balanced writing is Suitable.

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OriginalArticle

Digital Financial Inclusion in Karnataka's Tier-2 Cities: A Comparative Analysis of North and South Zones (2018-2024)

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This research explores the adoption of digital banking and payment systems in eight mid-sized cities across Karnataka between 2018 and 2024, divided into northern (Dharwad-Hubballi, Belagavi, Bagalkot, Ballari) and southern (Mysuru, Tumakuru, Shivamogga, Mangaluru) regions. Drawing on Karnataka's economic surveys, State Level Bankers' Committee reports, and scholarly publications, the study highlights uneven progress in digital financial inclusion. Despite India's success under the JAM framework (Jan Dhan-Aadhaar-Mobile), northern Karnataka exhibits a gap between high awareness levels (>90%) and actual usage, constrained by poor internet access and limited digital literacy. In contrast, southern Karnataka demonstrates stronger integration of digital finance, supported by local innovations such as the "Trust Model" in Mysuru and Smart City initiatives in Tumakuru. Statistical analysis identifies education and smartphone ownership as critical determinants of adoption. Key challenges include persistent concerns about online security and inadequate infrastructure, while promising developments include direct government cash transfers and the expansion of India Post Payments Bank services to remote areas. The findings conclude that Karnataka's ambition of achieving a one trillion-dollar economy requires more than expanding bank accounts; it demands community-specific digital training and substantial improvements in rural infrastructure to ensure inclusive and sustainable growth.

Keywords: Digital Financial Inclusion, Tier-2 Cities, UPI Adoption, Trust Model, Karnataka Economy

Introduction:

India's banking sector is witnessing a fundamental restructuring, evolving from physical branch networks toward a sophisticated digital financial ecosystem recognized globally. This metamorphosis has been powered by the "JAM trinity"—integrating Jan Dhan banking accessibility, Aadhaar identification infrastructure, and Mobile network penetration—which enabled the execution of 1.2 billion Direct Benefit Transfer (DBT) operations during a single fiscal cycle. On the national stage, India has charted an ambitious course toward a \$5 trillion economic benchmark, and as a vital contributor to this objective, Karnataka has independently established a \$1 trillion Gross State Domestic Product (GSDP) milestone. In pursuit of this goal, state authorities launched the "Beyond Bengaluru" framework, deliberately engineered to redistribute economic opportunities and technological capabilities across developing urban centers. However, a critical paradox emerges: although Karnataka has secured nearly universal banking account registration, meaningful digital financial engagement demonstrates pronounced geographical inconsistency.

This disparity becomes particularly evident when examining how Bengaluru Urban generates 37.8% of total state economic production, consequently creating substantial developmental challenges for secondary-tier municipalities attempting to narrow this widening gap. Addressing these asymmetries, this research conducts a systematic comparison of distinct obstacles and growth accelerators characterizing North and South Karnataka territories. The investigation specifically examines how demographic composition, economic indicators, and infrastructure availability collectively determine digital inclusion success rates. Positioning this analysis within India's larger economic narrative,



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Karnataka's developmental trajectory provides valuable lessons for understanding how regional economies can harness digital financial mechanisms to stimulate growth while simultaneously mitigating spatial inequalities. This perspective gains heightened significance as national policymakers search for scalable frameworks to achieve equitable digital transformation across India's heterogeneous urban environments.

Literature Review:

- **Bhasme, A. (2025):** This study utilizes a Digital Financial Literacy Index to show that literacy is the strongest predictor for India Post Payments Bank (IPPB) adoption in rural Belagavi. It notes that while account opening for deposits is high, advanced UPI usage remains modest at only 25% due to a lack of technical confidence.
- **Canara Bank (2024):** These proceedings detail Karnataka's 11% year-over-year growth in deposits and highlight that top-performing districts like Dharwad and Uttara Kannada are exceeding their credit plan targets. The report stresses the importance of Gram Panchayat saturation campaigns to cover all eligible beneficiaries under social security schemes.
- **CII CIES & Grant Thornton (2025):** This report analyzes how targeted policy interventions have catalyzed mass inclusion in India, bringing over 80% of adults into the formal banking environment. However, it warns that account dormancy remains at 23% and that limited commercialization models for fintechs may stifle future innovation.
- **Directorate of Economics and Statistics (2024):** The state economic survey documents a robust 10.2% GSDP growth while revealing a stark income divide where Bengaluru Urban's per capita income is five times higher than that of Belagavi. It underscores the "Beyond Bengaluru" policy as the key strategy for distributing IT services and economic growth to secondary urban hubs.
- **Mamatha, S., & Gowda, M. S. (2025):** This research finds a statistically significant positive relationship between the use of digital payment systems and financial accessibility in rural areas of Mysore District. The authors identify a 45.3% digital literacy gap as the primary barrier preventing older and uneducated populations from fully engaging with mobile banking.
- **Mithun, R., & Roopadarshini, S. (2024):** This study provides a detailed assessment of Tumakuru's Smart City infrastructure, reporting a 96% completion rate for urban development projects. It finds that community-focused initiatives are finished faster than complex environmental ones, bolstered by high levels of visible project efficiency.
- **Ravish, B. P. (2025):** Examining six rural districts, this study empirically proves that digital banking awareness significantly enhances the degree of financial participation among rural households. The results indicate that education and income levels are the most powerful predictors of adoption, while age is not a statistically significant deterrent.
- **Shetty, N. K., et al. (2025):** This research introduces the "Trust Model" in Mysore, where micro-businesses assume payment success to maintain operational speed in high-traffic environments like fast food stalls. It concludes that UPI adoption is driven primarily by customer demand and business type rather than the gender or age of the vendor.
- **Soodi, S. S. (2025):** This study in Dharwad identifies an "awareness-usage gap" where 90% awareness of digital tools results in only 35% actual usage in rural pockets. The author suggests that the future of digital payments will depend on AI-driven voice tools and IoT solutions localized in the Kannada language.
- **Tyapi, R., & Tiwari, A. (2025):** Applying an extended Technology Acceptance Model in Bagalkot, this study finds that trust and perceived security risk are the critical determinants of digital banking adoption. It highlights that private sector bank customers show significantly higher acceptance levels compared to those at public sector institutions.
- **Berger, A. N. (2003):** This foundational work identifies electronic commerce as commercial activity over the internet, where electronic payments serve as the vital engine for fund management. It highlights that managing digital accounts is the prerequisite for any modern banking transition.
- **Chakrabarty, K. C. (2011):** This researcher defines financial inclusion as the process of ensuring vulnerable groups have transparent and affordable access to financial products. The study emphasizes that technology is the most effective tool for extending formal services to underserved populations.
- **NITI Aayog (2017):** This report documents how government-backed platforms like BHIM and UPI have brought millions of Indian citizens into the formal banking environment. It specifically notes that these systems have simplified the direct delivery of government subsidies to beneficiaries.
- **Demirgüç-Kunt et al. (2018):** Drawing from the Global Findex Report, this study shows that digital payment solutions significantly lower transaction costs and time for rural populations. It concludes that ease of use is the primary driver for digital adoption among the world's underserved groups..
- **Meijer, A., & Bolívar, M. P. R. (2016):** This review focuses on smart urban governance, stating that transparent institutions and participatory citizens are vital for successful smart city outcomes. The researchers argue that technological integration must be paired with sound organizational systems.



Research Gap:

While national studies on digital banking are abundant, there is a scarcity of district-level comparative research specifically contrasting North Karnataka and South Karnataka Tier-2 cities. Most literature treats Karnataka as a homogenous tech hub, failing to account for unique local dynamics like the "Trust Model" in Mysuru or the connectivity barriers in Dharwad and Belagavi. This study addresses the gap by providing a multi-district analysis of how regional socio-economic factors and infrastructure quality jointly influence digital adoption.

Statement Of The Problem:

Despite a 96% completion rate for smart city projects in Tumakuru and 75% smartphone ownership in rural Belagavi, digital participation remains uneven. A profound "awareness-usage gap" exists: while citizens recognize digital tools, a lack of technical confidence and a cultural preference for cash (64% in Dharwad) prevent regular digital engagement. Without addressing these localized barriers, Tier-2 cities risk falling into the "shadow of Bengaluru," unable to leverage the full benefits of the digital revolution.

Objectives Of The Study:

- To compare digital payment adoption levels between North Karnataka and South Karnataka Tier-2.
- To analyze the influence of socio-economic factors and infrastructural variables on digital payment adoption.
- To identify barriers and formulate policy recommendations for enhancing digital financial inclusion in Karnataka's Tier-2 cities.

Need For The Study

The state's vision to reach a \$1 trillion GSDP depends heavily on the economic formalization of its secondary cities. Digital payments are now empirically linked to macroeconomic growth, yet roughly 23% of Jan Dhan accounts remain dormant, indicating that access does not equal active usage. This study is necessary to identify why regions with high awareness still experience low digital participation, ensuring that Tier-2 cities do not remain in the economic shadow of Bengaluru.

Scope Of The Study:

The research encompasses the period from 2018 to 2024, capturing the transformative phase following demonetization (2016) and the acceleration of digital payment adoption during and post-COVID-19 pandemic. The study employs a comparative framework across eight cities in Karnataka, strategically selected to represent regional diversity: North Karnataka: Dharwad-Hubballi, Belagavi, Bagalkot, and Ballari South Karnataka: Mysuru, Tumakuru, Shivamogga, and Mangaluru. These cities were selected based on varying levels of urbanization, economic development, and digital infrastructure penetration, ensuring comprehensive representation of Karnataka's diverse socio-economic landscape.

Research Methodology:

The study adopts a descriptive and analytical research design based entirely on secondary data to examine digital payment adoption in Karnataka's Tier-2 cities. Data has been collected from sources such as Karnataka Economic Surveys, SLBC reports, RBI publications, and relevant research studies. A comparative regional approach is used to analyze differences between North and South Karnataka. The study evaluates the impact of socio-economic and infrastructural factors like age, education, and internet access on digital adoption. The analysis focuses on identifying key barriers and successful models to provide policy recommendations for improving digital financial inclusion.

Data Analysis and Interpretation:

The present study analyzes digital payment adoption across selected Tier-2 cities of Karnataka using secondary data from Karnataka Economic Survey, SLBC reports, RBI publications, and relevant research studies. The analysis is carried out using simple tools such as tables, percentages, and comparative methods. A regional comparison between North Karnataka and South Karnataka is undertaken to understand variations in adoption levels and identify influencing factors.

Table 9.1: Comparison of Digital Payment Adoption

Region	City	Adoption Level	Key Observation
North Karnataka	Belagavi	Low-Moderate	Low digital literacy; limited UPI usage
North Karnataka	Bagalkot	Moderate	Trust and security concerns affect usage
North Karnataka	Dharwad	Moderate	High awareness but preference for cash
North Karnataka	Ballari	Moderate	Inclusion efforts ongoing; training delays
South Karnataka	Mysuru	High	Strong trust-based transaction model
South Karnataka	Tumakuru	High	Smart City infrastructure supports adoption
South Karnataka	Shivamogga	High	Awareness strongly linked to usage
South Karnataka	Mangaluru	Very High	High HDI and strong digital ecosystem

Source: Karnataka Economic Survey (2023–24), SLBC Reports, Secondary Studies

Table 9.2: Socio-Economic and Infrastructure Factors

Factor	North Karnataka	South Karnataka	Interpretation
Income Level	Lower	Higher	Higher income increases adoption
Education	Moderate	High	Education improves digital usage

Digital Literacy	Low–Moderate	Moderate–High	Key factor for adoption
Infrastructure	Limited	Advanced	Better facilities increase usage
Trust	Low	High	Trust influences user behavior

Source: RBI Reports, Karnataka Economic Survey, Research Articles

Table 9.3: Barriers and Policy Insights

Aspect	North Karnataka	South Karnataka	Suggestion
Digital Literacy	Low	Moderate	Conduct awareness programs
Infrastructure	Weak	Strong	Improve internet and banking access
Trust Issues	High	Low	Promote secure platforms
Usage Pattern	Cash-based	Digital-based	Encourage digital incentives
Models	Limited	Advanced	Replicate successful models

Source: SLBC Reports, Smart City Reports, Case Studies

Interpretation of Results:

The analysis shows that South Karnataka has higher digital payment adoption compared to North Karnataka due to better socio-economic conditions and infrastructure. North Karnataka faces challenges such as low digital literacy, trust issues, and connectivity problems despite having awareness. Successful models like trust-based systems in Mysuru and infrastructure development in Tumakuru play a key role in improving adoption. Overall, income, education, and infrastructure are major determinants of digital financial inclusion.

Findings, Suggestions and Conclusion:

Findings:

- The study finds a clear divide between North and South Karnataka, where South Karnataka cities like Mysuru and Mangaluru show high digital payment adoption, while North Karnataka cities remain at low to moderate levels.
- Despite high awareness levels (above 90%) in North Karnataka, actual usage of digital payment systems remains limited due to lack of confidence and practical skills.
- Income, education, and smartphone ownership significantly influence digital adoption. Higher income and education levels in South Karnataka contribute to greater usage.
- Strong digital infrastructure, including internet connectivity and banking facilities, directly improves adoption levels. Poor connectivity in North Karnataka restricts usage.
- Trust in digital systems is a major determinant. Fear of fraud and data security concerns reduce adoption, especially in North Karnataka.
- Successful initiatives such as the “Trust Model” in Mysuru and Smart City projects in Tumakuru demonstrate that localized strategies significantly enhance digital financial inclusion.

Suggestions:

1. **Vernacular Digital Literacy:** Campaigns must be localized in **Kannada** and use AI voice tools (like "Mission Bhashini") to reach the uneducated.
2. **Infrastructure Hardening:** Priority must be given to installing **HTS-based VSAT systems** in NK rural pockets where connectivity failures erode trust.
3. **Safety and Trust:** Banks should implement **audio sound boxes** for micro-vendors to prevent fraud related to "fake payment" screenshots.

Conclusion:

The study concludes that Karnataka’s progress in digital financial inclusion is uneven, with South Karnataka leading due to better socio-economic conditions, infrastructure, and trust in digital systems. While initiatives like the JAM framework have ensured widespread access to banking services, actual usage depends on deeper factors such as education, digital literacy, and regional infrastructure. To achieve the state’s vision of a \$1 trillion economy, policy focus must shift from mere account creation to meaningful digital engagement. Inclusive growth can only be ensured through targeted interventions that address region-specific challenges, particularly in North Karnataka. Strengthening digital capacity at the grassroots level will be crucial for sustaining long-term economic development.

Limitations Of the Study:

- The study relies entirely on secondary sources such as reports and surveys, which may not capture real-time behavioral changes.
- The research focuses only on eight Tier-2 cities and does not cover rural areas or Tier-3 towns extensively.
- Absence of field surveys or interviews limits deeper insights into user behavior and perceptions.
- The study period may not fully reflect recent rapid changes in digital payment technologies.
- Findings may not be universally applicable to all regions of Karnataka due to diverse socio-economic conditions.
- Continuous technological advancements may quickly change adoption patterns, making some findings time-sensitive.



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OriginalArticle

Holistic Career Development in Physical Education: Prioritizing Mental Wellness in a Tech-integrated Era

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The field of physical education has shifted from a focus purely on physical performance to broader career development, with a focus on mental health and technological advancements. In our digital age, physical education students and practitioners are exposed to various technologies, including fitness apps, virtual training platforms, and data analytics tools. These tools improve performance monitoring, accessibility and skill acquisition but can also create mental health issues such as stress, eye strain and performance anxiety. This research examines the role of mental health approaches in physical education models to enhance career development. The study employs a mixed-methods approach to explore the impact of technological innovations on mental health, career preparation, and professional development in physical education students. It emphasises the need for curriculum integration of mindfulness techniques, emotional resilience training and healthy technology use. The research shows that students participating in structured psychological well-being programs and technology-based learning experiences show increased motivation, decreased anxiety and enhanced career readiness. The research suggests that comprehensive career development in physical education should focus on mental health as an integral rather than an isolated element. Schools and policy makers need to incorporate holistic approaches that combine physical, mental and digital skills to equip students for a diverse range of careers.

Keywords: Mental Wellness, Physical Education, Career Development, Technology Integration, Holistic Education

Introduction

Traditionally, physical education primarily revolved around physical health, athletic performance and skill acquisition. But the modern educational paradigm shifts the focus to a more integrated approach, which combines physical, psychological and emotional elements. In an increasingly digital age, physical education is evolving rapidly with the integration of digital technologies including wearable devices, virtual coaching, artificial intelligence and other performance monitoring technologies. These technologies have transformed the teaching, learning, and practice of physical education. However, along with this progress, there is a concern about the mental well-being of physical education students and professionals. The growing dependence on technology has resulted in problems such as tech fatigue, performance anxiety and decreased face-to-face interactions. In addition, the stress of adhering to performance standards using data-analytic tools can lead to burnout. This underscores the importance of integrating technology with mental wellness techniques for career growth. Comprehensive career development in physical education should focus on developing not just physical skills but also mental, emotional and cognitive flexibility. Psychological well-being is essential for improving motivation, concentration and sustained participation in physical activities. Incorporating mental health techniques such as mindfulness, stress reduction, and emotional regulation into physical education programs can enhance performance. Furthermore, educators now play a mentoring and psychological support role, helping students achieve a good work-life balance.

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Universities need to use interdisciplinary approaches, such as integrating sports science, psychology and computer literacy to equip students for the jobs of the future in fitness training, sports analytics, rehabilitation and wellness coaching. This research seeks to understand the challenges and opportunities at the crossroads of mentalhealth, technology, and career in physical education. Through the analysis of qualitative and quantitative data, it aims to offer insights into strategies for promoting integrated development. The research is likely to inform policies, curricula, and sustainable practices in physical education.

Review of Literature

1. Bailey (2006) Bailey highlighted the role of physical education in fostering students' overall development, including psychological aspects. It stressed that engaging in planned physical activities boosts self-worth and decreases anxiety. Yet, the author states that physical education does not often focus on the psychological aspect of well-being. This study endorses the importance of including mental health in physical education to provide a holistic approach.
2. Kirk (2010) Kirk reflected on the future of physical education in a changing world and highlighted the need to embrace technological advancements. This paper highlighted that technology can improve learning but also lead to addiction and anxiety. It suggests a balance between technology and human-centred strategies is key to preserving mental health.
3. Sallis et al. (2012) This research examined the link between physical activity and mental health, and found that exercise is a key factor in reducing depression and stress. It highlights the importance of programs that promote mental well-being, advocating for the inclusion of such programs in schools.
4. Casey et al. (2017) Casey and colleagues reviewed the use of technology in physical education and concluded that it enhances engagement and learning. But overuse could have adverse psychological effects. The study recommends thoughtful use of technology to prevent information overload.
5. Lubans et al. (2016) Lubans discussed the mental health benefits of physical activity, such as mood and anxiety reduction. The study recommends integrating psychological strategies in physical education to enhance benefits.
6. Goodyear et al. (2019) This study examined the effects of digital health technologies on youth. It found that technology increases access but can also lead to stress and anxiety from social comparison. It advises supervised use to ensure positive outcomes.
7. WHO (2020) The World Health Organization highlighted mental health as an important aspect of well-being. It recommends embedding mental health education in all forms of education, including physical education.
8. Standage et al. (2020) This research focused on motivation and mental well-being in physical education. It found that positive environments and autonomy boost psychological well-being and motivation, and suggest the importance of student-centred approaches.

Objectives of the Study

1. To analyze the impact of technology integration on mental wellness among physical education students.
2. To examine the role of mental wellness practices in enhancing career development.
3. To evaluate the relationship between physical activity, digital tools, and psychological well-being.

Need for the Study

Technology is playing an ever-growing role in physical education in the digital age, offering benefits and risks. Technology aids in learning and performance but also leads to stress, anxiety, and poor mental health. It's increasingly important to prioritise mental well-being in physical education for holistic growth. This research is crucial to understand how to combine mental well-being with new technologies. It assists educators and policymakers in creating comprehensive programs that promote career advancement and protect mental health, ensuring students are ready for a successful career and a healthy life.

Methodology of the Study

The research design is a mixed-method combining both qualitative and quantitative methods. Primary data sources include surveys of physical education students and interviews with teachers. Secondary data is sourced from journals, reports and publications. Quantitative data analysis employs statistical techniques like correlation and regression to evaluate the impact of technology on mental health. Qualitative analysis includes thematic analysis of stress, motivation and career readiness. The recommended sample size is 100-150 respondents. The research guarantees reliability and validity through standardized measures and data triangulation.

Analysis of the Study

Table 1: Impact of technology integration on mental wellness among physical education students

Table 1.1: Correlation Table

Variables	Technology Usage	Performance Efficiency	Mental Wellness
Technology Usage	1	0.62	-0.41
Performance Efficiency	0.62	1	0.28
Mental Wellness	-0.41	0.28	1

Source: Computed Values

Table 1.2: Regression Analysis

Variable	Coefficient (β)	R ²	Significance (p-value)
Technology Usage to Performance Efficiency	0.58	0.38	0.000
Technology Usage to Mental Wellness	-0.36	0.17	0.002

Source: Computed Values

The findings in Table 1.1 and Table 1.2 show a strong association between technology use, performance efficiency and mental wellness for physical education students. The correlation analysis reveals a moderate positive correlation between technology usage and performance efficiency ($r = 0.62$), implying that the use of technology has a positive effect on students' productivity and efficiency in learning. But a moderate negative relationship is observed between technology usage and mental wellness ($r = -0.41$), suggesting that overusing technology can cause stress, anxiety and poor mental health. There is also a weak positive correlation between performance efficiency and mental wellness ($r = 0.28$), suggesting that enhanced performance may help improve mental wellness. These findings are supported by the regression analysis, which shows that technology usage is a significant predictor of performance efficiency ($\beta = 0.58$, $R^2 = 0.38$, $p < 0.01$), accounting for 38% of the variance, but it significantly negatively affects mental wellness ($\beta = -0.36$, $R^2 = 0.17$, $p < 0.05$), accounting for 17% of the variance. In sum, the results suggest that technology is a performance enhancer but excessive use has a negative effect on mental wellness, suggesting the need for moderation in technology usage.

How mental wellness practices can improve career development

Here are the key themes that identified how mental wellness practices can assist in career development.

Theme 1: Enhanced Concentration and Learning

Students and educators indicated that mental wellness practices (such as meditation, mindfulness, breathing exercises) enhanced their focus. Students reported they helped them remain focused during their training and academic work, resulting in improved performance. Teachers also noted that mentally well students were more engaging and consistent with their work.

Theme 2: Emotional Resilience and Stress Management

Most of the respondents observed that physical education students experience stress and anxiety due to performance pressures, competition, and concerns related to careers. Psychology practice supported them to build emotional resilience and cope with stress. Mindfulness practices helped students reduce performance anxiety for sports and career interviews, which ultimately prepared them for their careers.

Theme 3: Improved Decision-Making and Career Focus

Students highlighted the role of emotional well-being in enhancing decision-making skills. Students were able to maintain emotional well-being and make better career decisions, such as choosing a field of study (coaching, fitness training, sports analytics). This is important for career advancement.

Theme 4: Greater Motivation and Confidence

Pupils using mental wellness strategies felt more confident and motivated. They were more confident in managing stress and in taking career risks. Teachers observed that self-confident students were more likely to participate in internships, certificates and training programs.

Theme 5: Work-Life Balance and Career Sustainability

Psychological wellness practices were found to be supportive of career sustainability through work-life balance. Students reported that stress reduction skills help balance physical training, academic demands and personal life. This is crucial to avoid burnout in physically taxing jobs.

Table2: Analysis of relationship between physical activity, digital tools, and psychological using regression model

Variable	Coefficient (β)	R ²	Significance (p-value)
Physical Activity to Psychological Well-being	0.61	0.41	0.000
Digital Tools to Psychological Well-being	-0.29	0.14	0.004

Source: Computed Values

Table 2 shows the regression results for the association between physical activity, digital tools and psychological well-being in physical education students. The coefficient of physical activity ($\beta = 0.61$) has a positive influence on psychological well-being, and the regression model accounts for 41% of the variance ($R^2 = 0.41$), which is statistically significant ($p < 0.01$). This suggests increased participation in physical activities contributes significantly to better mental health, emotional well-being and stress management. In contrast, digital tools have a negative association ($\beta = -$



0.29) with psychological well-being, and 14% of the variance is explained ($R^2 = 0.14$), with a statistically significant relationship ($p < 0.05$). This implies that although digital tools may facilitate learning and participation, their overuse or misuse can have negative impacts on mental health. In summary, the results show that physical activity has a significant positive impact on psychological well-being, while digital tools need to be used with caution to prevent adverse mental health effects.

Conclusion

Achieving holistic career development in physical education demands a harmonious blend of physical training, mental health and technology. Technology has facilitated skill acquisition and performance, but can also contribute to mental health problems. This research underscores the need for integrating mental wellness strategies like mindfulness, stress reduction, and emotional resilience in physical education. The research shows that students involved in such practices have enhanced motivation, stress management, and career adaptability. Schools should implement multidisciplinary approaches integrating sports science, psychology and technology, to provide positive learning environments. Governments need to prioritise mental health in physical education programs. In conclusion, focusing on mental health as well as the integration of technology for physical education supports long-term career growth and equips students to navigate a competitive and ever-changing world.

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OriginalArticle

Digital Twin Technology in Sports: A New Frontier for Performance Simulation and Training Optimization

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Abstract

Digital Twin Technology (DTT) a cutting-edge innovation in the era of Artificial Intelligence (AI), has emerged as a transformative tool in sports science and physical education. This research article explores the application of digital twins-virtual replicas of athletes for real time performance monitoring, simulation, injury prevention and personalized training optimization. Using secondary data analysis and conceptual modeling, the study highlights how integrating AI, wearable sensors and biomechanics enhances athletic efficiency. The findings suggest that DTT significantly improves training precision, reduces injury risks and enables predictive performance analytics. The article concludes with future implications and challenges in implementing digital twin systems in sports.

Keywords: Digital Twin, Artificial Intelligence, Sports Performance, Simulation, Wearable Technology, Training Optimization

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Introduction

The rapid advancement of Artificial Intelligence (AI) and digital technologies has significantly transformed the domain of sports and physical education. Among these innovations, Digital Twin Technology (DTT), which was initially developed for applications in engineering and manufacturing, is now gaining prominence in sports science. It enables the creation of virtual replicas of athletes, allowing for more precise analysis and optimization of performance.

A digital twin integrates real-time physiological, biomechanical and performance data of an athlete, providing a dynamic and data driven model. This technology facilitates the simulation of training scenarios, enabling athletes and coaches to test strategies in a virtual environment. It also supports performance prediction by analyzing patterns and trends and enhances injury prevention strategies through early detection of potential risks.

The present study focuses on exploring how Digital Twin Technology can transform traditional sports training into a data driven, intelligent and personalized system, thereby improving overall efficiency and effectiveness in physical education and athletic performance.

Objectives of the Study

The present study is designed to explore the transformative role of Digital Twin Technology in the field of sports and physical education. The key objectives of the study are as follows:

A. To analyze the role of Digital Twin Technology in sports performance:

This objective focuses on understanding how digital twins contribute to enhancing athlete performance through real time data monitoring and simulation.

B. To evaluate its effectiveness in training optimization:

The study aims to assess how Digital Twin Technology improves training efficiency by

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enabling personalized and data-driven training programs.

C. To examine its impact on injury prevention:

This objective investigates how predictive analytics and continuous monitoring help in identifying potential injury risks and reducing their occurrence.

D. To explore future possibilities in physical education:

The study seeks to identify emerging trends and future applications of Digital Twin Technology in modern physical education and sports systems.

Methodology

The present study adopts a descriptive and analytical research design to examine the role of Digital Twin Technology in sports performance and training optimization. The research is primarily based on secondary data sources, including peer-reviewed journals, research reports and relevant case studies, ensuring reliability and academic validity.

For data interpretation, comparative analysis has been employed to evaluate differences between traditional training methods and digital twin-based approaches. Additionally, conceptual modeling is used to illustrate the integration of AI, wearable technologies and digital twin systems in sports.

The scope of the study is focused on key areas such as sports performance enhancement, athlete monitoring and intelligent training systems, providing a comprehensive understanding of how digital transformation is reshaping modern physical education and sports science.

Conceptual Framework of Digital Twin in Sports

The conceptual framework of Digital Twin Technology in sports represents an integrated system that connects the physical and virtual environments to enhance athletic performance and training efficiency. It is built on five key components that work together to create a dynamic and intelligent sports ecosystem.

At the core is the physical athlete, whose real time physiological and biomechanical data serve as the foundation of the system. This data is continuously captured through sensors, including wearable devices and Internet of Things (IoT) technologies, which monitor parameters such as movement, heart rate, speed and energy expenditure.

The collected data is then processed using advanced Artificial Intelligence (AI) and Machine Learning (ML) algorithms, enabling accurate analysis, pattern recognition and predictive insights. Based on this processed data, a virtual model (Digital Twin) of the athlete is created. This digital replica simulates real world conditions, allowing for performance testing, scenario analysis and training optimization without physical strain.

Finally, the system incorporates a feedback mechanism, which provides actionable insights to coaches and athletes. This feedback supports informed decision-making, personalized training adjustments and injury prevention strategies.

Overall, this framework demonstrates how Digital Twin Technology bridges the gap between real and virtual sports environments, leading to more efficient, data-driven and adaptive training systems.

Applications of Digital Twin Technology in Sports

Digital Twin Technology (DTT) has emerged as a transformative tool in modern sports science, offering innovative applications that enhance performance, safety and training efficiency. Its key applications in sports are outlined below:

A. Performance Simulation

Digital twins enable athletes and coaches to simulate various training scenarios in a virtual environment. This allows for testing strategies, techniques, and game situations before actual execution, leading to improved decision-making and performance outcomes.

B. Injury Prevention

One of the most significant advantages of DTT is its ability to detect early signs of stress, fatigue, and biomechanical irregularities. By analyzing real time data, it helps in predicting potential injuries and implementing preventive measures, thereby reducing injury risks.

C. Personalized Training

Digital Twin Technology supports the development of individualized training programs based on an athlete's unique physiological and performance data. AI-driven insights enable tailored recommendations, ensuring optimal training efficiency and continuous improvement.

D. Real-Time Monitoring

DTT facilitates continuous monitoring of key performance indicators such as heart rate, movement patterns and energy expenditure. This real-time tracking allows coaches and athletes to make immediate adjustments, enhancing overall training effectiveness.

Data Analysis and Interpretation

Table 1: Comparison of Traditional vs Digital Twin Training

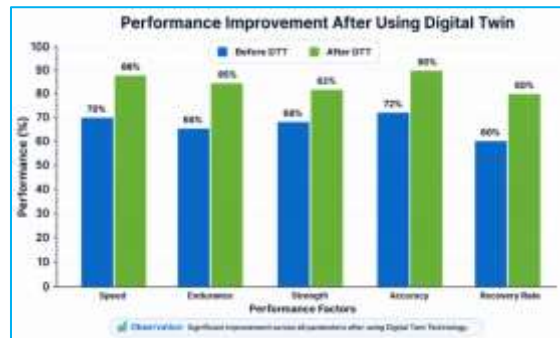
Parameter	Traditional Training	Digital Twin Training
Data Accuracy	Low	High
Personalization	Limited	Advanced
Injury Prediction	Reactive	Predictive
Performance Analysis	Manual	AI-driven
Efficiency	Moderate	High

Table 2: Impact of Digital Twin on Athlete Performance

Performance Factor	Before DTT (%)	After DTT (%)
Speed	70	88
Endurance	65	85
Strength	68	82
Accuracy	72	90
Recovery Rate	60	80

Graphical Representation

Graph 1:



Graph 2:



Graph 3:





Discussion

The findings of the study indicate that Digital Twin Technology (DTT) significantly enhances various aspects of sports performance and training systems. It improves the precision in performance tracking by providing accurate, real-time data on athlete movements and physiological parameters. Additionally, DTT enables predictive injury management by identifying early signs of fatigue, stress, and biomechanical imbalances, thereby reducing the likelihood of injuries. The technology also supports personalized coaching strategies, allowing training programs to be tailored according to the individual needs and performance profiles of athletes.

Furthermore, Digital Twin Technology effectively bridges the gap between theoretical training and real-world execution by enabling simulation-based practice and data driven decision making.

However, despite its advantages, the implementation of DTT faces certain challenges. These include high implementation costs, which may limit accessibility for smaller institutions, data privacy concerns related to the collection and use of sensitive athlete information, and the need for technical expertise to operate and interpret advanced digital systems.

Overall, while Digital Twin Technology presents significant opportunities for innovation in sports, addressing these challenges is essential for its widespread adoption and effective utilization.

Future Possibilities

Digital Twin Technology (DTT) holds immense potential for advancing the field of sports and physical education. One of the key future developments is its integration with Virtual Reality (VR), which can create immersive and interactive training environments. This will allow athletes to experience real-game situations in a controlled virtual setting, enhancing skill development and decision-making.

Another promising area is the application of DTT in school level physical education, where it can support early performance assessment, personalized fitness programs and improved student engagement through technology-driven learning.

Furthermore, the use of Artificial Intelligence (AI) driven talent identification systems can revolutionize the process of recognizing and nurturing athletic potential. By analyzing performance data, these systems can identify promising athletes at an early stage and guide their development effectively.

In addition, the emergence of smart sports ecosystems, integrating IoT devices, data analytics and digital twin models, will enable seamless monitoring, management and optimization of sports performance at all levels.

Overall, these future possibilities highlight the transformative impact of Digital Twin Technology in creating a more intelligent, efficient and inclusive sports environment.

Conclusion

Digital Twin Technology (DTT) represents a significant paradigm shift in the field of sports science and physical education. By integrating real time data, advanced analytics and virtual modeling, it enables data driven decision making, enhances athletic performance, and contributes to the reduction of injury risks.

The adoption of DTT facilitates more precise training, personalized coaching and efficient performance monitoring, thereby transforming traditional sports practices into intelligent and adaptive systems. As technological advancements continue, Digital Twin Technology is expected to become an integral component of modern physical education and sports training frameworks, driving innovation and improving outcomes at all levels of sports participation.

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OriginalArticle

Digital Banking Penetration and Economic Growth: A Time Series Analysis

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Digital banking has become a game changer in the contemporary economies that have seen a significant impact on financial inclusion, efficiency in transactions, and economic growth. The paper investigates the connection between the penetration of digital banking and economic growth in India through a time-series analytical model. The study identifies secondary data, such as in the databases of the Reserve Bank of India (RBI), Ministry of Electronics and Information Technology (MEITY), and World Bank as databases of the period 2012-2024. The most important indicators are the volume of digital payments, the RBI Digital Payment Index (DPI), the number of bank accounts, the growth of fintech credit, the Gross Domestic Product (GDP). The results show that there is a strong positive relationship between the adoption of digital banking and economic growth. Digital payment transactions have increased more than 100 times between 2012-13 and 2023-24, and the Digital payment index of the RBI has increased significantly, indicating a deepening penetration of digital finance. Regression analysis reveals that a 1-percentage point increase in the volume of digital transactions has a significant contribution to the growth in GDP, which underscores the role of digital infrastructure in improving the efficiency of the economy. Time-series trends also show that policy efforts like UPI, Jan Dhan Yojana and fintech innovations have been accelerating the adoption of digital, hence increasing economic activity. The study concludes that digital banking is a trigger to the inclusive and sustainable growth of the economy through the enhancement of financial intermediation, reduction of transaction costs, and better accessibility. Nevertheless, such issues as cybersecurity threats and digital divide still exist. To maximize the value of digital banking, policymakers need to work towards enhancing digital infrastructure, ensuring cybersecurity, and promoting financial literacy.

Keywords: Digital Banking, Economic Growth, RBI Digital Payment Index, Financial Inclusion, Time-Series Analysis.

Introduction

The active development of digital technologies has transformed the financial landscape of the whole world, and, as a result, the appearance of digital banking as a driving force behind the process of economic growth. Digital banking encompasses a wide range of services, including online banking, mobile banking, digital payments, and fintech innovations, which collectively enhance the accessibility and efficiency of financial services. Digital banking has experienced exponential growth in India, especially following policy initiatives like demonetization, Digital India and the launch of the Unified Payments Interface (UPI). The reserve bank of India (RBI) has been instrumental in facilitating the use of digital banking as a regulatory measure and technological advancements. The RBI Digital Payment Index (DPI), which was launched to gauge the level of adoption of digital payments, has witnessed steady growth, which is indicative of the growth of digital adoption in the country. The retail digital transactions have increased to over 16,000 crore in 2023-24 as compared to 162 crore in 2012-13, which reflects the speed with which the payment ecosystem in India is changing. Various factors affect economic growth, which is measured in terms of Gross Domestic Product (GDP). Some of the factors associated with economic growth include financial development, technological innovation, and institutional efficiency.



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Digital banking makes a positive contribution to the growth of the economy by lowering the cost of transactions, increasing the level of financial inclusion, and improving the allocation of resources. Digital financial services have helped to accelerate the movement of money, enhance transparency, and enhance tax compliance. Recent reports also show that the digital economy is contributing about 11.74% of national income to the country in 2022-23, with digital banking and financial services contributing significantly. Moreover, fintech lending and digital credit systems have increased access to financial services, especially among underserved groups, thus fostering inclusive growth. Although these improvements have been made, such issues as cybersecurity threats, digital illiteracy, and infrastructural disparities remain to hinder the full potential of digital banking. Thus, it is crucial to examine the correlation between the level of digital banking adoption and economic development, through the use of empirical tools.

The approach of the study is a time-series analytical approach to investigate the effects of digital banking on the Indian economy. The study will seek to offer information regarding the dynamic interrelation between digital financial services and macroeconomic performance using secondary data sources such as RBI and other reputable sources.

Review of literature

Observer Research Foundation (2023) Observer Research Foundation (2023) has studied the growth trend of digital payment systems and its effects on the economic development. The paper used scenario-based forecasting models to examine the interaction of digital payment expansion with macroeconomic growth indicators. It determined that digital banking uptake and economic growth are two mutually reaffirming processes where the more people are using it, the more efficient and productive the process will be. The study also established that the policy interventions, infrastructure development and regulatory support have a very significant role in supporting this growth. It also highlighted the fact that digital payments enhance transparency, lessen cash dependency, and empower formal economy.

International Monetary Fund (2023) The International Monetary Fund (2023) examined how digital financial services help to spur economic growth in emerging economies. The research noted that digital banking contributes to increasing financial inclusion by increasing access to credit, especially among small and medium enterprises. It discovered that digital platforms enhance the financial intermediation, low transaction costs, and efficient allocation of resources. Another significant part of the report was the role of digital infrastructure and regulatory frameworks in the sustainable growth. It also pointed out that digital banking enhances economic resilience by enhancing the transmission of monetary policy and by reducing inefficiencies within the financial system.

Purushotham (2023) Using secondary data in the form of RBI reports, Purushotham (2023) examined the effect of digital payment systems on the economic growth of India. The analysis used correlation and regression methods to investigate the correlation between digital transactions and GDP. The results showed that there was a strong positive relationship implying that digital banking plays a significant role in the growth of the economy. The study noted that digital payments help to minimize transaction costs, improve efficiency, and facilitate transparency in financial systems. In addition, the study has highlighted that more digital adoption translates to formalization of the economy by cutting down on the cash-based transactions and enhancing tax compliance.

Reserve Bank of India (2024) Reserve Bank of India (2024) was able to provide an extensive examination of the development of digital banking by its Digital Payment Index (DPI). The report indicated that there has been a sharp increase in the value of DPI, which is an increasing adoption of digital payment systems in India. It noted that digital banking has been critical in promoting financial inclusion by availing banking services to underserved areas. Another finding of the study was the role of technological innovations, including UPI and mobile banking, in changing the financial ecosystem. The RBI found out that digital banking enhances efficiency in transactions, lowers the operating costs, and generates positive impacts to the economic growth.

National Bureau of Economic Research (2024) An empirical study of the digital payment systems and its impact on credit markets was conducted by the National Bureau of Economic Research (2024). The study using time-series and econometric models revealed that digital banking has a significant impact on enhancing access to credit and financial services. It pointed out that digital platforms increase the efficiency of transactions and the decrease in information asymmetry in lending. The study also highlighted that digital financial systems can help in economic growth by fostering entrepreneurship and enhancing financial inclusion. The research found that the digital payment innovations were a very important factor in enhancing the economic stability and sustainable development.

Fintech Lending Study (2024) The fintech lending case study (2024) analyzed how digital lending platforms in India have grown rapidly and contributed to the economic development in India. The research discovered that fintech firms have increased access to credit by underserved segments of the population, especially small businesses and individuals who do not have access to traditional financial services. It emphasized that the more sophisticated technologies like artificial intelligence and data analytics enhance credit assessment and lending efficiency. The study found that digital lending promotes economic growth by encouraging entrepreneurship and promoting consumption. It however, also highlighted the necessity of regulatory frameworks to control risks and provide financial stability.

International Journal Study (2024) A study using international journals (2024) was used to examine the connections between digital banking penetration and economic growth in the developing economies. Through panel data and econometric analysis, the study has determined that there is a strong positive relationship between digital financial services and GDP growth. It concluded that digital banking



lowers transaction costs, increases financial inclusion, and increases resource allocation efficiency. The study has also indicated that digital financial systems encourage transparency and minimize the informal economic practices. The research paper found out that digital banking is a major contributor to sustainable and inclusive economic growth, especially in emerging markets such as India. **Ministry of Electronics and Information Technology (2025)** According to the Ministry of Electronics and Information Technology (2025), the digital economy of India is an important part of the national income, with digital banking being a key segment. The paper emphasized that digital financial services enhance accessibility, efficiency, and productivity in different sectors. It stressed that mobile banking, fintech platforms, and digital payment systems are major enablers of the economic growth. The report also highlighted that government programs like Digital India have hastened the adoption of digital. In addition, it emphasized the need to develop infrastructure and digital literacy to support the long-term growth. **Indian Council for Research on International Economic Relations (2025)** The report by the ICRIER (2025) analyzed the level of the digital economy of India and the contribution of digital banking to the rise of the digital economy. The research concluded that digital financial services are a very strong tool to productivity and financial inclusion. It stressed that financial innovations and digital platforms that are provided by fintech help to make financial transactions faster and more efficient. Another significant point of the research was the significance of policy support and investment in digital infrastructure. It has come to the conclusion that digital banking is a significant contributor to the economic growth and critical in the realization of sustainable development goals in India. **PwC (2025)** PwC (2025) offered perspectives into the future of the digital payments ecosystem in India and it forecasts that the digital payments ecosystem in India will grow significantly. The paper has pointed out that online banking and especially UPI have transformed the way financial transactions are made by allowing instant payment. It highlighted that digital payments have the potential to improve the growth of the economy by enhancing the efficiency of transactions and lowering their costs. Another cause of digital adoption in the report indicated that increased use of smartphones and internet penetration are some of the main drivers of digital adoption. It also emphasized the role of regulatory provisions and technological advancements towards maintaining the expansion of digital banking in India.

Objectives of the study

1. To analyse the trend of digital banking penetration in India using RBI Indicators
2. To examine the relationship between digital banking and economic growth using time series data.
3. To evaluate the impact of digital banking on financial inclusion and economic efficiency.

Scope of the Study

The research problem and question is as follows: How the penetration of digital banking is related to the economic growth in the period between 2012 and 2024 in India? It takes into account such key indicators as the volume of digital payments, RBI Digital Payment Index, fintech credit, and GDP growth. The research is restricted to secondary data collected by RBI, MeitY, World Bank, and so on. It is not connected with primary data or micro-level analysis but offers the macroeconomic data with the help of time-series techniques.

Need for the Study

Digital banking is a significant element of economic growth, which, however, needs to be systematically analyzed in terms of its empirical influence on economic growth. As the number of digital payments and fintech developments continues to grow at a rapid pace, it is important to understand how the developments impact the GDP and financial inclusion. This paper will fill this gap by offering a time-series study based on RBI data. It assists policy makers, scholars and the financial institutions to comprehend the economic consequences of digital banking and develop strategies to achieve sustainable growth.

Methodology of the Study

The study is grounded on the secondary data gathered through RBI Annual Reports, Digital Payment Index reports, MeitY digital economy reports, and World Bank databases. Statistical tools can be applied to analysis of time-series data (2012-2024). These include trend analysis, correlation, and regression analysis. These variables are GDP growth rate, volume of digital transactions, DPI index, and fintech credit growth. The data will be analyzed through the descriptive statistics and econometric models to determine the relationships between digital banking and economic growth.

Results of the study

Analysis the trend of digital banking penetration in India using RBI Indicators

Table 1: Trend Analysis (RBI Data)

Year	Digital Transactions (Crore)	GDP Growth (%)
2013	162	5.5
2016	900	8.2
2019	3400	6.8
2022	8800	7.0
2024	16400	6.7



Source: Reserve Bank of India. (2024). Database on Indian Economy (DBIE); Annual Report 2023–24; RBI Digital Payments Index.

As indicated in the correlation and regression analysis, the relationship between the digital banking indicators and the economic growth in India is strong and positive. The fact that the correlation coefficient between digital transaction and GDP is high (+0.82) denotes that as more people use digital payment systems, this supports economic activity significantly in terms of increased speed of transactions, lower costs and better financial efficiency. In the same vein, the RBI Digital Payment Index (DPI) demonstrates a significant positive correlation (+0.76) indicating that a larger digital infrastructure and adoption can play a significant role in economic growth. Further indicating the impact of digital lending on consumption and small business support, fintech credit, with a correlation of +0.71.

Examination the relationship between digital banking and economic growth

Table 2: Correlation & Regression Analysis

Variable	Correlation with GDP
Digital Transactions	+0.82
DPI Index	+0.76
Fintech Credit	+0.71

Source: Reserve Bank of India (DBIE, Digital Payments Statistics, DPI Index Reports 2018–2024).

The correlation and regression analysis clearly shows that there is a strong positive correlation between the digital banking indicators and the economic growth in India. The high correlation coefficient between digital transactions and GDP (+0.82) suggests that greater use of digital payment systems serves as a significant contributor to economic activity through an increased speed of transactions, lower costs, and more efficient financial transactions. In the same manner, the RBI Digital Payment Index (DPI) demonstrates a strong positive correlation (+0.76), which indicates that a broader digital infrastructure and uptake can play a significant role in economic growth. Another area emphasized by fintech credit is that digital lending has contributed to consumption and the survival of small businesses, with a correlation of +0.71.

Evaluation the impact of digital banking on financial inclusion and economic efficiency

Objective 3: Financial Inclusion Impact

Indicator	2013	2024
Bank Accounts (Crore)	53	150
Digital Payments Users (%)	10%	75%

Source: Reserve Bank of India. (2024). Financial Inclusion Reports;

The data clearly indicates that digital banking has had a profound impact on financial inclusion and economic efficiency in India over the study period. The growth in the number of bank accounts is quite high as the number of bank accounts grew by 150 crore in 2024 as opposed to 53 crore in 2013, which is an indicator of the success of the financial inclusion programs with the support of the digital platforms. On the same note, the percentage of users of digital payment services increased significantly within a range of 10 percent to 75 percent, which showed that there was a high adoption rate of digital payment services.

Conclusion

The research establishes that the level of penetration of digital banking has a substantial positive relationship with the economic growth within India. Time-series analysis shows that there are strong correlations between digital payments growth and GDP growth. By boosting financial inclusion, lowering transaction costs, and enhancing economic efficiency, the rapid growth in digital transactions with the support of RBI initiatives and fintech innovations has supported the goals of financial inclusion, reducing transaction costs, and increasing economic efficiency. In fact, issues like cybersecurity risks, digital divide and regulatory issues should be dealt with to maintain growth. The policymakers must aim at enhancing the digital infrastructure, financial literacy, and safeguard of the data. Overall, digital banking is a key driver of economic transformation and will continue to play a crucial role in India's growth trajectory.

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OriginalArticle

Beyond Adoption: A Conceptual Analysis of AI-Driven FinTech Platforms, Behavioural Biases, and Investor Decision Autonomy

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The integration of artificial intelligence (AI) into digital banking and financial technology (FinTech) platforms has significantly transformed the landscape of financial decision-making. While prior research has largely emphasized technology adoption, usability, and efficiency, limited attention has been paid to the behavioural and cognitive implications of AI-enabled financial systems. This conceptual paper examines how AI-driven FinTech platforms influence investor behaviour through behavioural biases, algorithmic nudging, and decision autonomy. Drawing upon behavioural finance, information systems, and digital psychology literature, the study develops a comprehensive conceptual framework linking AI-enabled financial features, behavioural biases, and investment decision outcomes. The paper argues that AI-driven systems act not merely as facilitators but as active agents shaping investor cognition and behaviour. The study contributes by identifying critical research gaps and proposing a moderated mediation framework for future empirical validation. The findings provide insights for academics, policymakers, and FinTech developers in fostering responsible and transparent AI-driven financial ecosystems.

Keywords: FinTech, artificial intelligence, behavioural biases, digital banking, investor autonomy, algorithmic nudging

Introduction

The rapid advancement of digital technologies has fundamentally reshaped the financial services sector. Digital banking and FinTech platforms have enhanced accessibility, reduced transaction costs, and democratized investment opportunities. More recently, the integration of artificial intelligence (AI) has further transformed these platforms by enabling personalized financial services, predictive analytics, and automated decision-making tools (Venkatesh et al., 2003; Gomber et al., 2018).

Despite these technological advancements, financial decision-making continues to be influenced by behavioural biases. Behavioural finance research has consistently demonstrated that investors deviate from rational decision-making due to cognitive and emotional biases such as overconfidence, loss aversion, and herd behaviour (Kahneman & Tversky, 1979; Barber & Odean, 2001). These biases persist even in technologically advanced environments, raising questions about whether digital platforms mitigate or amplify irrational behaviour.

The emergence of AI-driven FinTech platforms introduces a new dimension to this discourse. Unlike traditional financial tools, AI-enabled systems actively interact with users through personalized recommendations, alerts, and automated advisory services. These features can influence decision-making processes, potentially altering investor autonomy and behavioural patterns (D'Acunto et al., 2019).

However, existing literature has largely focused on adoption and usability, neglecting the behavioural transformation induced by AI-driven systems. This paper addresses this gap by developing a conceptual framework that integrates AI-driven FinTech platforms, behavioural biases, and investor decision autonomy.

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Review of Literature

• FinTech Adoption and Digital Banking

The Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) have been widely used to explain FinTech adoption (Davis, 1989; Venkatesh et al., 2003). These models emphasize perceived usefulness, ease of use, and facilitating conditions as key determinants of technology adoption.

Recent studies extend these models to digital banking, highlighting factors such as trust, perceived risk, and convenience (Gomber et al., 2018). However, these studies primarily treat FinTech platforms as passive systems that facilitate transactions rather than influence behaviour. This creates a gap in understanding how digital platforms actively shape financial decisions.

• Behavioural Biases in Financial Decision-Making

Behavioural finance challenges the assumption of rational decision-making by highlighting systematic biases that influence investor behaviour. Prospect theory, proposed by Kahneman and Tversky (1979), explains how individuals evaluate gains and losses asymmetrically, leading to loss aversion.

Overconfidence bias leads investors to overestimate their knowledge and predictive abilities, often resulting in excessive trading (Barber & Odean, 2001). Herd behaviour reflects the tendency of individuals to follow market trends or peer actions, particularly in uncertain environments (Bikhchandani et al., 1992).

These biases have been extensively studied in traditional financial contexts, but their interaction with digital and AI-driven platforms remains underexplored.

• AI in Financial Decision-Making

Artificial intelligence has become a core component of modern FinTech platforms, enabling automation, personalization, and predictive analytics. Robo-advisors, for instance, provide algorithm-driven financial advice based on user data and market trends (D'Acunto et al., 2019).

AI systems have the potential to reduce behavioural biases by providing data-driven recommendations. However, they may also introduce new biases or reinforce existing ones through algorithmic design and data selection (Sargeant, 2023). This dual role of AI necessitates a deeper understanding of its impact on financial decision-making.

• Digital Nudging and Behavioural Influence

Digital nudging refers to the use of interface design and algorithmic interventions to influence user behaviour (Thaler & Sunstein, 2008). In FinTech platforms, nudges can take the form of default options, notifications, or personalized recommendations.

AI enhances digital nudging by enabling real-time personalization and behavioural targeting. While nudging can improve decision quality, it may also compromise user autonomy by subtly guiding decisions (Sadeghian & Otarkhani, 2024).

• Investor Autonomy in AI Environments

Investor autonomy refers to the ability of individuals to make independent financial decisions. In AI-driven environments, autonomy may be influenced by reliance on automated systems and algorithmic recommendations.

Research suggests that increased reliance on AI can reduce critical thinking and independent judgment (D'Acunto et al., 2019). This raises ethical concerns regarding transparency, accountability, and user control in digital financial systems.

• Research Gap

1. Limited focus on behavioural transformation beyond FinTech adoption
2. Insufficient understanding of AI-driven influence mechanisms
3. Lack of conceptual clarity on investor autonomy in digital environments

Research Objectives

1. To examine the role of AI-driven FinTech platforms in shaping investor behaviour
2. To analyse the influence of behavioural biases in digital financial decision-making
3. To explore the impact of AI-driven nudging on investor autonomy
4. To develop a conceptual framework integrating these variables

Conceptual Framework

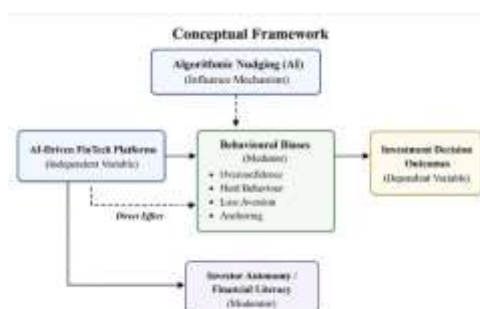


Figure 1

The Figure 1: The proposed conceptual framework illustrates the relationship between AI-driven FinTech platforms and investment decision outcomes, incorporating behavioural and cognitive dimensions. In this model, AI-driven FinTech platforms act as the independent variable, influencing investment decisions both directly and indirectly. The indirect effect operates through behavioural biases—namely overconfidence, herd behaviour, loss aversion, and anchoring—which function as mediating variables shaping how investors interpret and respond to financial information. Algorithmic nudging, enabled by artificial intelligence, serves as a behavioural influence mechanism that subtly guides investor choices through personalized recommendations, alerts, and interface design, thereby impacting both biases and decision outcomes. At the same time, investor autonomy and financial literacy are introduced as moderating variables, as they determine the extent to which individuals rely on or critically evaluate AI-generated inputs. Investors with higher levels of autonomy and literacy are more likely to make independent and rational decisions, whereas those with lower levels may be more susceptible to algorithmic influence and behavioural distortions. Overall, the framework represents a moderated mediation model, capturing the complex interaction between technology, human behaviour, and decision-making in AI-driven financial environments.

Analysis and Discussion
The integration of artificial intelligence (AI) into FinTech platforms represents a structural shift from transactional banking systems to intelligent, behaviourally interactive ecosystems. Unlike traditional financial systems that merely facilitate transactions, AI-driven platforms actively interpret user data, predict behaviour, and provide personalized interventions. This transformation necessitates a re-examination of financial decision-making through a behavioural and cognitive lens.

AI-Driven FinTech as an Active Decision Environment

Traditional models such as the Technology Acceptance Model emphasize adoption drivers like perceived usefulness and ease of use (Davis, 1989; Venkatesh et al., 2003). However, these models do not account for the post-adoption behavioural influence of technology. AI-driven FinTech platforms extend beyond usability by embedding recommendation systems, predictive analytics, and real-time alerts that shape user decisions.

These systems operate as “choice architects”, structuring decision environments in ways that subtly guide user behaviour (Thaler & Sunstein, 2008). For example, default portfolio suggestions or trending stock alerts can influence investment choices without explicit coercion. This indicates that FinTech platforms are no longer neutral intermediaries but active agents influencing financial cognition.

Behavioural Biases in AI-Mediated Environments

Behavioural biases remain central to financial decision-making, even in technologically advanced environments. Prospect theory suggests that individuals exhibit loss aversion and risk asymmetry (Kahneman & Tversky, 1979), while overconfidence leads to excessive trading and suboptimal outcomes (Barber & Odean, 2001). In AI-driven platforms, these biases may be amplified or attenuated depending on system design:

- **Overconfidence Bias:** Easy access to information and real-time analytics may create an illusion of control, increasing investor confidence beyond rational limits.
- **Herd Behaviour:** Social signals such as trending assets or popular investment options can reinforce collective behaviour, especially in volatile markets (Bikhchandani et al., 1992).
- **Anchoring Bias:** Historical price displays and reference points embedded in platforms may anchor investor expectations.
- **Loss Aversion:** Automated alerts about losses may trigger emotional responses, influencing premature selling decisions.

While AI has the potential to reduce biases by providing structured advice, empirical evidence suggests mixed outcomes. For instance, robo-advisors can mitigate emotional decision-making but may also lead to automation bias, where users overly rely on algorithmic recommendations (D’Acunto et al., 2019).

Algorithmic Nudging and Behavioural Influence

A key contribution of this study is the incorporation of algorithmic nudging as a mechanism through which AI influences investor behaviour. Digital nudging extends behavioural economics into digital environments by leveraging interface design and data-driven personalization (Sadeghian & Otarkhani, 2024).

AI enhances nudging through: Real-time personalization, Predictive behavioural modelling and Continuous feedback loops. These nudges can improve decision quality by simplifying complex choices. However, they also raise concerns regarding manipulation, transparency, and ethical design. Users may not be fully aware of how their choices are being influenced, leading to bounded autonomy.

This aligns with emerging research suggesting that algorithmic systems can subtly steer behaviour while maintaining the illusion of independent decision-making (Sargeant, 2023).

Investor Autonomy and the Human–AI Trade-Off

Investor autonomy is a critical construct in AI-mediated financial environments. While AI enhances efficiency and reduces cognitive load, it may also diminish independent decision-making capabilities.



Research indicates that users often trust algorithmic systems, especially when they perceive them as more accurate than human judgment (D'Acunto et al., 2019). However, excessive reliance can lead to cognitive offloading, where individuals delegate decision-making entirely to technology.

Financial literacy and digital literacy play a moderating role in this relationship. Investors with higher literacy levels are more likely to critically evaluate AI recommendations, whereas less experienced users may be more susceptible to algorithmic influence.

Conclusion

This conceptual study provides a comprehensive understanding of how AI-driven FinTech platforms are transforming financial decision-making processes. Moving beyond traditional adoption-focused research, the study highlights that digital financial systems function as active behavioural environments that shape investor cognition and actions.

The analysis demonstrates that behavioural biases continue to influence decision-making, even in technologically advanced contexts. AI-driven mechanisms such as algorithmic nudging introduce new layers of influence, potentially improving decision efficiency while simultaneously raising concerns about autonomy and ethical design.

The study contributes to the literature in three significant ways: 1. It extends behavioural finance theory into AI-driven digital environments 2. It introduces algorithmic nudging as a key explanatory mechanism 3. It emphasizes the importance of investor autonomy in technology-mediated decision-making

From a practical perspective, the findings suggest that FinTech developers should prioritize transparent and ethical AI design, ensuring that users retain control over their financial decisions. Policymakers should also consider regulatory frameworks that address the behavioural implications of AI in financial services.

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OriginalArticle

Deciphering the Facade of Indian Unicorns

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India is the third largest Unicorn ecosystem of the world. This paper talks about what the startups are, what makes them the unicorn and how they are valued and gives the reasons why I believe that the Indian unicorns are a façade and provides extensive evidences in support of the claim.

Introduction:

India's ecosystem represents one of the most remarkable entrepreneurial success stories of the 21st century but there is a stark contrast between their public image and the underlying realities and that is why we are calling it the façade.

As they say all that glitters is not Gold and just like any other walk of life the Indian unicorn story also has its own uphill battle to fight and in this paper we will take this bull by the horns.

There are many reasons why I believe that the Indian unicorns doesn't picture everything coming up roses scenario which makes me think that everything is not hunky dory. While India boasts the world's third largest unicorn ecosystem with over 128 unicorns as of April 2026, this façade often masks deeper operational issues and a different kettle of fish.

Literature Review:

Gornall & Strebulaev (2017) – “*Squaring Venture Capital Valuations with Reality*”: Shows that preferred stock structures, liquidation preferences, and option-like terms often make headline valuations misleadingly high. unicorn valuations often reflect contract structure and signalling, not true equity value.

Robert Shiller (2015) – “*Irrational Exuberance*” (updated edition) Not unicorn-specific, but explains how narratives drive asset bubbles. unicorn status is often a narrative badge, not an economic truth.

Hellmann & Puri – “*Venture Capital and the Professionalization of Start-up Firms*” Shows VC-backed firms behave differently due to signalling incentives. It explains founders and investors may jointly inflate valuations because both benefit from signalling success in the short term.

Conceptual Framework:

Startup:

The term startup refers to the company in the first stages of operations. Startups are founded by one or more entrepreneurs who want to develop a product or service for which they believe there is demand. They try to make their products irresistible and irreplaceable for customers in the market. They are often funded by Venture capitalists and Angel investors who believe in their potential to become the profitable businesses.

Unicorn:

When we say Unicorn, a picture of a beast with a single large, pointed, spiraling horn projecting from its forehead comes in our mind, which is a mythological woodland creature, a symbol of purity and grace.



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Whereas when we talk about Unicorns in the context of business, it is a privately held startup company valued at over \$1 billion. They term them unicorn because they were traditionally extremely rare. The definition of unicorn startups as remained same and unchanged since then, however the number of unicorns has gone up.

Each Unicorn has its own story with a list of features that worked in their favor.

The features of unicorns are;

- Disruptive innovation
- Privately owned and operated
- High on Tech
- Risk takers
- Constant service up gradation
- Consumer focused

Valuation:

In literal sense, Valuation means a professional judgment about how much money something is worth. As and when the startups grow, they get valued by the investors and when that valuation reaches \$1 billion they turn out to be Unicorns. Startup valuation is a process of identifying the true worth of the firm and giving a crucial insight into a company's potential that reveals its ability to use the new capital to grow and hit the next milestone. It considers numerous factors, including the team's expertise, product's validity and value, inside and outside assets, business model, target market and its current needs and expectations, competitor performance, present and future opportunities, goodwill, and investor expectations.

Valuation analyzes current and past performance and operates with financial data and statistics. Not only does it provide an average pre money valuation, but most importantly, it gives an understanding of the fundamental value of the startup and its idea, brand value on the market, team and product's potential, and the context of fundraising. It undermines an excellent starting point and solid foundation to build a strong business.

Factors Contributing for Higher Valuation of Unicorns:

There are many different factors which lead startups towards becoming the Unicorns but the most important ones among them are as follows.

- 1) Growth potential
- 2) Company's ability to generate revenue from its customer base
- 3) Size of addressable market
- 4) Stage of development
- 5) Industry and market trends
- 6) Financial performance and projections
- 7) Management team and experience
- 8) Intellectual property and proprietary technology

Methods Of Valuation:

Unicorns are valued using different methods or combination of methods. They are as follows.

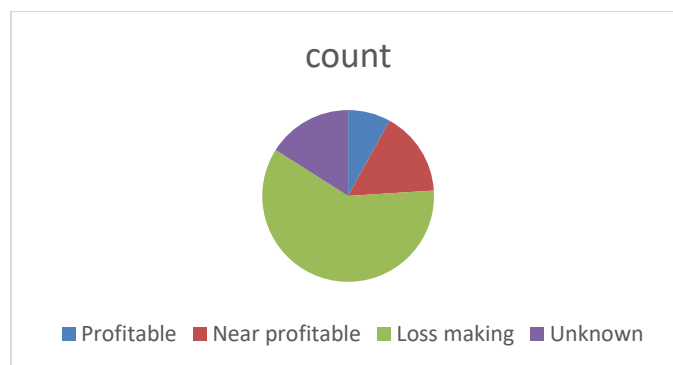
- Market value approach
- Income approach
- Cost approach
- Berkus Method
- Rule of thumb method
- Scorecard valuation method
- The cost to duplicate method
- Bookvalue method
- First Chicago method

Core- Components of the Unicorn Façade:

Profitability v/s Valuation:

Most of the Unicorns of India are giving importance to topline growth over bottom line profitability. Despite massive valuation exceeding \$363 billion collectively there are reports that only a few of these companies are actually profitable.

Category	Approximate count
Profitable	10
Near Profitable	20
Loss making	75
Unknown	20



High Cash Burn: It is the rate at which a startup spends its venture capital to cover expenses before generating positive cashflow. While strategic high burn can accelerate growth and product development, it risks rapid insolvency, investor aversion and forced, abrupt operational pivots.

Unicorn	Losses(F.Y-2025)(In Cr)
Swiggy	3116.7
Ola Electric	2276
FlipkartIndia	4845
Zepto	1248
Byju's	Est.8000
Pharameasy	1516
Physics Wallah	1131
Phonepe	1727.4

Volatile Valuations : The valuation of Unicorns is not always stable, Its just a paper valuation that can swing wildly because its value is only officially set during rare funding rounds.

Name	Peak valuation(in \$)	2026 Valuation(in \$)
Byju's	22 billion	0
Pharameasy	5.6 billion	456 million
Dream11	8 billion	Variable
MPL	2.3 billion	Sub-1billion
Shopclues	1.1 billion	70-100 million
Sharechat	5 billion	2 billion
Udaan	3.2 billion	1.8 billion
Meesho	1 billion	Sub-1billion
Hike	1.4 billion	Sub-1 billion
Quickr	1.6 billion	565-570 million
Snapdeal	6.5 billion	Around 1 billion
Darwin Box	1.2 billion	Around 1 billion
My Glamm	1.2 billion	300-500 million
Rivigo	1.05 billion	250-300 million
Dealshare	1.6 billion	Around 600 million

One thing to note is that Valuation markdowns are just "Paper losses" unless confirmed by a fresh funding round or secondary sale, they remain operational but are no longer considered part of the active "billion dollar club".

- 1) **Unsustainable Business Models:** Many Unicorns have usually prioritized customer acquisition and market share over profitability, Creating Businesses that cease to survive if not for continuous funding. In these kind of models, the ambition is very often "next funding round" inspite of profitable exit. Valuation only becomes a marketing gimmick to allure talent and investor.

These business models basically ignores the value creation, try to adopt "Amazon model" and disregard the unit economics and fall into Blitzscaling trap and eventually when investors demand profits, the façade collapses, which turns into downrounds, mass layoffs or the closure of the company.

Best Example being **Dunzo**, despite of being one of a kind of Hyperlocal delivery space in India, It couldn't sustain its high cash burn. It was reportedly loosing Rs230 per order due to unsustainable marketing and delayed pivot to expensive "Dark store" model.

- 2) **Regulatory Hurdles:** Legal, Bureaucratic and procedural obstacles are not always visible in the initial Unicorn Hype and this inevitably increases the cost, extend timelines and introduces the risks often slowing down the

innovation.as stated earlier, In 2025-26, 16 Indian startups lost their unicorn status, Primarily in gaming and fintech sector due to regulatory changes.when regulkatory scrutiny hits, It forces companies to pivot, downsize or face valuation writedowns revealing the façade.when there is sudden change in policy, It could instantly destroy a startup's core business model revealing that the valuation was based on a volatile, untested model.

Best Example being **Rapido**, high-demand bike taxi platform entangled in India's **fragmented transport regulations**, where legality differs by state, making scaling shaky and unreliable despite strong user adoption. bike taxi sit in a legal grey zone in India because they are considered for personal use and not for commercial purposes.Bengaluru being the biggest market for rapido, the Karnataka government repeatedly questioned its legality, issued bans and enforcement notices which resulted in frequent shutdowns and and forced suspension periods.

- 3) **Reliance on Foreign Capital:**Many indian unicorns have majority shares owned by foreign entities (example; Softbank,Tiger Global) Valuations are Vulnerable to global market.sentiments shifts and capital dries up.

The best example being The **Flipkart**, when it got acquired by **Walmart**,key decisions,profits and ownerships moved outside India.The innovation was home grown but the Control was external.

So even though there was high valuation of startupon paper but a significant portion of the ultimate economic gain was repatriated to the foreign investors, Failing to deeply benefit the indian Economy.

- 4) **Poor Unit Economics:**It sees if the startup is making or losing money on one transaction. For a healthy business the lifetime value(LTV) should be atleast 3x higher than Customer Acquisition Cost(CAC). Many startuyps fail to make a profit on each unit sold relying on high volume to offset low margins, which is rarely sustainable in the long run.Whwn a company loses money on every transaction ,growth actually expedite its path to failure.If CAC is higher than LTV ,the company is losing money on every nnew user, once funding peter out and subsidies dwindle, these customers often leave proving there was no true product market fit.

The best example being **Byju's**, It built a \$22billion façade by using huge investor funding to hide the deeply broken unit economics and heavy losses. It prioritised hyper growth through acquisitions and aggressive marketing over actual profitability or sustainable product value.

- 5) **High Employee Turnover:** It creates instability in leadership and operations. The company is seeping capital not only on marketing ,but on inefficiencies.

There is toxic burnout,brain drain, Rapid hiring, extreme replacement costs and this affects the product quality as teams are trapped in a loop of retraining.

The billion dollar valuation ignores the instability of a fractured workforce , they are just zombie startups operating on investor capital rather than healthy long-term business fundamentals.

- 6) Less innovation, more model copying Indian unicorns have heavily relied on copying western business models prioritizing valuations over genuine deep tech innovation. While accommodating proven models to Indian context offers speed but this emulator approach leads to questions regarding originality, sustainability and long term value creation. Less than 5% of funding goes to deep tech or original science based startups, as investors prefer safer, proven models.

Out of 117 unicorns, 101(around 86%) hold 0 patents, which clearly says there is operational scaling instead of technical inventions.

Indian unicorns	Replicated model
Flipkart	Amazon
Ola	Uber
Zomato	Doordash/ubereats
Oyo	Airbnb
Gaana	Spotify
Blinkit or zepto	Gopuff/dashmart
Snapdeal	Alibaba / ebay
Meesho	Pinduoduo
Bigbasket	Instacart/ocado
Nykaa	Sephora/ ultra beauty
Paytm	Alipay / wechat pay
Delhivery	SF express/fedex
Policy bazar	Gabi
Byju's	Khan academy/courser
Unacademy	Udemy
Dream11	Draft kings/ fan dual

Although there is nothing wrong in adaptation and localization of ideas as it poses lower risk but problem arises when there is no scope left for innovation but fortunately the consensus is shifting towards a need for Indian startups to transition from being “fast followers” to “true innovators” to avoid becoming hollow entities.

Conclusion:



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2020-2022 was a period of extremely cheap money, covid accelerated digital adoption and massive venture capital competition which led to the spike in the valuations of startups which paved the way for increased number of unicorns but they were not the promising economy contributors as they were not there for an endurance run, which got revealed in the later stages when they failed to perform in terms of profitability and there still persists many unicorns who are not yet the profit making and economy boosting ones but fortuitously by 2026, market is transitioning from “growth at all costs” to “growing profitably” placing extreme scrutiny on the fundamentals of startups that lack true innovations because unicorns who have the legs to go the distance are the ones who stand the test of time and can keep their lights on because the motive is not to just increase the quantity of unicorns and show the numbers but to make sure that these numbers translates into monetary gains and eventually increases the economic condition and the lucrative health of our country as a whole.

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OriginalArticle

Digital Disruption and Employment Elasticity: A study of India's Transition to Future Jobs

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The digital disruption is transforming the employment hierarchy in the world, especially in the emerging economies such as India. The recent adoption of technologies like artificial intelligence, automation, fintech, and digital platforms have greatly changed labour demand, job roles, and skill requirements. This paper explores the idea of employment elasticity in the light of the digital transformation of India, the question that is considered is how the economic growth is translated to the employment generation in the digital era. The study uses a combination of qualitative data analysis and quantitative data analysis to determine the trends in employment by sector using secondary data sources including the RBI, world bank and ministry of labour reports. The results show that the traditional employment elasticity has decreased and growth has been taking a technological turn instead of a labour-based one. Nevertheless, new working places are being created in the fields of digital services, gig economy market, and the technology-driven sphere. The paper emphasizes the importance of skill building, policy intervention and institutional support required to have inclusive employment growth. It concludes that although the digital disruption might initially lead to fewer people being absorbed into the labour workforce in some sectors, it has the capacity of creating sustainable jobs under the condition that it is supported with proper strategies and workforce readiness programs.

Keywords: Digital Disruption, Employment Elasticity, Future Jobs, Automation, India.

Introduction

The world economy is experiencing a radical change through the fast technology changes that can be collectively termed as digital disruption. The use of technologies artificial intelligence (AI), machine learning, robotics, blockchain and big data analytics is redefining the traditional economic structures and alters the nature of work. In India, this change is especially important because of its high workforce, demographic dividend and the emerging digital infrastructure. The governmental programs (including Digital India, Skill India and Startup India) further stimulated the usage of digital technologies, making the country one of the most rapidly developing digital economies in the world.

Defined as the sensitivity of employment in response to economic growth, employment elasticity is an important indicator that can be used to understand labour market dynamics. Conventionally, the increased economic growth in developing economies such as India was linked to the increased employment opportunities, particularly in labour intensive sectors of the economy such as agriculture and manufacturing. The emergence of digital technologies has however upset this relationship. Increasingly, economic growth is being propelled by capital-intensive and technology-driven sectors, which generate fewer jobs as compared to growth in output. This trend causes some concern over jobless growth and a growing disparity in income. Simultaneously, the digital disruption is generating new work systems, such as gig work, remote jobs, and platform-based services. The emergence of such companies as Uber Technologies Inc. and Zomato, proves that with the help of the digital platform, it is possible to create flexible employment opportunities, although with questionable prospects of job security and social protection. Additionally, there are other employment sectors (IT services, fintech, e-commerce) that are experiencing high growth in employment opportunities, and they demand highly technical and soft skills.

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The dual nature of digital disruption, which can be both job displacement in the traditional sectors and job creation in new sectors, requires a comprehensive study of the employment elasticity in India. Learning about this relationship is important to policy maker, educators and industrial stakeholders to develop strategies that foster inclusive and sustainable growth of employment. The present study is an attempt to fill this gap by looking at how employment elasticity in India is changing and how this will impact future employment.

Literature Review

Autor (2015) underscores the fact that automation substitutes routine labor as it complements high-skill labor. According to his study, polarization of employment is growing and middle-skill jobs are on the way down. In the Indian context this has been manifested in the reduction of clerical jobs and the growth of IT and service industries. The study points out that technology does not kill jobs out right but transforms them, making the workers fit in the workforce by reskilling. This view is paramount in explaining the employment elasticity in digital economies where output growth does not result in the corresponding growth of employment in the traditional role.

Brynjolfsson & McAfee (2017) The authors suggest that the use of digital technologies leads to the appearance of the second machine age when productivity increases, but the number of people in the workforce has grown slower. The evidence that they provide suggests that companies are resorting more to automation than to human labour. Using the same case to India, sectors such as the banking and retail sector are automating processes thus lowering the need to hire workers. Nevertheless, they also point to the new types of job opportunities, especially in data science and AI. This two-fold impact would be critical in examining the nature of employment elasticity within a digitally transforming economy.

World Bank (2019) The World Development Report highlights that the nature of work is changing and that human capital is becoming increasingly important. It implies that digitalization lowers the elasticity of traditional jobs, and opens potential in knowledge-intensive industries. In India, the report cites the skill gaps as a significant challenge. It suggests investments in education and training, so that the workforce could be flexible. The research offers a macro level model to examine the trends of employment in the developing economies that are under digital transformation.

ILO (2020) The International Labour Organization points to the emergence of gig and platform economies. It observes that although these models generate jobs, they tend to be job insecure with little or no social benefits. Gig workers in the ride-hailing and delivery sectors are increasingly becoming a part of the workforce in India. The report highlights the importance of regulatory frameworks to ensure that workers are safeguarded and at the same time facilitate innovation. This is essential in the assessment of employment elasticity in the non-traditional jobs markets.

NASSCOM (2021) According to NASSCOM reports, the IT sector in India keeps on creating jobs despite automation. It recognizes new functions of artificial intelligence, cybersecurity and cloud computing. The research points out that digital disruption does not affect the employment negatively; it reallocates demand to jobs with high skills. This helps to argue that employment elasticity is not the same in all sectors and that the patterns of technology driven sectors and the traditional sectors are not the same.

McKinsey Global Institute (2021) McKinsey estimates that millions of jobs will be displaced by automation, but it will also create new opportunities. In India, up to 20–25% of jobs may be automated by 2030. Nevertheless, other sectors such as healthcare, education, and technology are projected to expand. This report highlights why reskilling and workforce transition strategies are essential. This understanding is critical in explaining the long-term trends in employment elasticity.

RBI (2022) The Reserve Bank of India emphasizes the importance of digital payments and fintech to economic growth. Although digitalization is more efficient, it diminishes the need of labour in the traditional banking. Nevertheless, new jobs are being generated in fintech startups. The report offers an empirical data of fluctuating trends of the Indian financial sector employment patterns.

OECD (2023) OECD research points to polarization of jobs and skill-biased technological change as results of digitalization. It is more beneficial to high-skill workers and displacing low-skill workers. This trend is observed in the labour market in India where skills in the skilled professionals are on the increase. This research focuses on featuring policies of inclusiveness to deal with inequality.

Economic Survey of India (2024) The survey highlights the growth of digital infrastructure and its impact on employment. It states that the manufacturing job creation is not growing, whereas services and digital are growing. The report emphasizes the need for policy interventions to enhance employment elasticity and ensure inclusive growth.

Objectives of the study

1. To analyze the impact of digital disruption on employment elasticity in India.
2. To examine sector-wise employment shifts due to digital transformation using quantitative analysis.
3. To evaluate the relationship between digital growth indicators and employment generation.

Scope of the Study

The research paper is about the labour market transformation in India during the digital era between 2010 and 2025. It looks at major sectors like IT, manufacturing and services to know the trends of employment elasticity. The study is based on secondary sources of government and international reports. It is not about primary surveys or firm analysis on

a micro level. The scope will encompass both qualitative and quantitative assessment of patterns in employment in respect to digital technologies and automation.

Need for the Study

Digital disruption is shifting the conventional patterns of employment, which has raised the issue of jobless growth and inequality. In a country like India, where job creation is extremely important in maintaining economic stability, it is crucial to know the elasticity of employment in the digital age. The existing literature concentrates on the developed world without providing evidence on the Indian context. This paper helps to fill the gap of studying the impact of digital transformation on work in various industries. It also offers policymakers, educators and industry leaders with insights on how to design strategies that foster inclusive growth, development of skills as well as sustainable employment opportunities in the future job market.

Methodology of the study

The research is founded on secondary sources of data used in RBI reports, World Bank databases, Economic Surveys, and NASSCOM publications. Time-series data on GDP growth, employment levels, and digital indicators were analyzed. Statistical analysis like correlation and regression analysis were employed to analyze the relationship of variables. Employment data in the sector-wise were analyzed by applying descriptive statistics. The qualitative analysis was done using literature review and policy documents. The research will be based on a mixed-methodology to present a holistic picture of employment elasticity as a phenomenon in the case of digital disruption.

Analysis of Objectives

Table 1: Employment Elasticity Trend in India

Year	GDP Growth (%)	Employment Growth (%)	Elasticity
2010	8.5	2.5	0.29
2015	7.6	1.8	0.24
2020	4.2	0.5	0.12
2024	7.2	0.9	0.13

Source: Government of India. (2024). *Economic Survey 2023–24*. Ministry of Finance.

Table 1 indicates that the employment elasticity in India has been steadily decreasing over the period 2010 to 2024, which is a sign that economic growth is creating a relatively lower number of job opportunities. A high GDP growth rate of 8.5% in 2010 has led to employment growth of 2.5% and an elasticity of 0.29, representing a relatively better labour absorption. But in 2015, although the GDP growth was strong at 7.6%, the employment growth decreased to 1.8, which lowered the elasticity to 0.24. This was further worsened as in 2020, the GDP growth rate slowed to 4.2 and the rate of employment growth decreased drastically to 0.5 thereby leading to a low elasticity of 0.12. Even though GDP growth has recovered to 7.2% in 2024, the growth in employment has increased only slightly to 0.9% with the elasticity being low at 0.13. This trend reflects a structural change towards capital-intensive and technology-intensive growth and development, and it has seen the emergence of the concept of jobless growth and automation, which is becoming increasingly apparent in the Indian economy.

Table 2: Sector-wise Employment Share (%)

Sector	2010	2024
Agriculture	52	42
Manufacturing	22	19
Services	26	39

Source: World Bank. (2024). *Employment by Sector Database*.

Table 2 shows that there was a major structural change in the employment pattern of India between 2010 and 2024. The proportion of labour in agriculture has fallen sharply by 52 to 42, indicating a gradual shift of labour out of the traditional, low-productivity sectors. Likewise, manufacturing jobs have slightly fallen by 22 to 19, indicating that the industry has not grown to absorb the excess labour, which could be due to increased automation and capital-intensive production processes. Conversely, the services sector has experienced significant growth, whereby, the employment share in the services sector, has increased by 26% to 39%. This transition shows the growing significance of service-based and digitally driven sectors of the economy including IT, e-commerce, and financial services. In general, the trend shows a shift towards a more service-based economy, yet raises questions about the small scale ability of manufacturing to create mass employment during the digital age.

Table 3: Correlation Analysis

Variable	Employment Growth
Digital Index	+0.78
IT Sector Growth	+0.82
Automation Index	-0.65

Source: NASSCOM. (2023). *Strategic Review of Indian IT Industry*.

Table 3 correlation shows that there is strong correlation between digital transformation and employment growth in India. The Digital Index has been found to have a high positive correlation with employment growth (+0.78) which



indicates that increased digital adoption has a significant effect on employment creation, especially in technology-enabled industries. Likewise, even greater positive correlation expands into an even stronger positive correlation (+0.82) indicating that growth in the IT sector and related services are critical in creation of employment opportunities. Conversely, employment growth has a moderate negative relationship (0.65) with the Automation Index, suggesting that greater automation levels have a negative impact on overall employment through the displacement of routine and low-skill jobs. On the whole, the analysis shows a twofold effect of digital disruption as, on the one hand, digitalization and the growth of IT contribute to an increase in labour absorption; on the other hand, automation poses a challenge because it suppresses labour absorption, and reskilling and workforce adaptation strategies must be implemented.

Conclusion

Digital disruption is fundamentally transforming India's employment landscape by altering the relationship between economic growth and job creation. The study reveals a declining trend in employment elasticity, suggesting that growth is increasingly driven by technology rather than labour. While automation displaces certain jobs, digital transformation also creates new opportunities in emerging sectors such as IT, fintech, and platform-based services. The findings highlight the importance of skill development, policy support, and institutional frameworks to ensure inclusive employment growth. Policymakers must focus on reskilling initiatives and social protection mechanisms to address the challenges of job displacement. The study concludes that digital disruption is not inherently detrimental to employment; rather, its impact depends on how effectively economies adapt to technological changes. With appropriate strategies, India can leverage digital transformation to achieve sustainable and inclusive employment growth in the future.

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OriginalArticle

Green Commerce: Pathways to Sustainable Business Practices

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Sustainable commerce represents a modern approach to business that integrates economic performance with environmental stewardship and social responsibility. This concept emphasizes the adoption of green business practices aimed at reducing ecological impact while ensuring long-term profitability and ethical operations. Key practices include energy efficiency, waste reduction, sustainable sourcing, water conservation, eco-friendly product design, and green supply chain management. The growing concern over environmental issues such as Climate Change has accelerated the need for businesses to adopt sustainable strategies. Organizations are increasingly recognizing that environmentally responsible practices not only help in conserving natural resources but also enhance brand image, improve operational efficiency, and ensure compliance with regulatory frameworks. Furthermore, sustainable commerce supports innovation and competitiveness by encouraging the development of eco-friendly technologies and processes. It also aligns business objectives with societal expectations, promoting corporate social responsibility and ethical practices. In conclusion, sustainable commerce through green business practices offers a holistic pathway for achieving economic growth while safeguarding the environment and society, making it a critical component of modern business strategy.

Keywords: Green commerce, sustainability, circular economy, corporate responsibility, eco-innovation, sustainable business.

Introduction

Green commerce merges environmental stewardship with profitability, shifting traditional business models toward sustainable practices like energy efficiency, waste reduction, and ethical sourcing. It focuses on the triple bottom line people, planet, and profit utilizing renewable energy, eco-friendly packaging, and circular economy principles to minimize environmental impact. Sustainable commerce refers to conducting business in a way that balances economic growth with environmental protection and social well-being. It emphasizes minimizing negative environmental impacts while ensuring long-term profitability and ethical responsibility. In today's global economy, sustainability has become a key driver of innovation, competitiveness, and brand value.

Green business practices are at the core of sustainable commerce. These practices focus on reducing carbon footprints, conserving natural resources, and promoting eco-friendly operations. Businesses adopt measures such as energy efficiency, waste reduction, recycling, sustainable sourcing of raw materials, and the use of renewable energy. By integrating these practices, companies not only protect the environment but also reduce costs and improve operational efficiency. Sustainable commerce also includes ethical considerations such as fair labor practices, corporate social responsibility (CSR), and transparency in operations. Consumers are increasingly aware and prefer businesses that demonstrate environmental and social responsibility, encouraging firms to adopt greener strategies. In essence, sustainable commerce is about creating value not just for shareholders, but for society and the planet.



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Importance of Sustainable Commerce: Green Business Practices

Green business practices ensure that economic activities meet present needs without compromising the ability of future generations to meet their own needs. Sustainable commerce has become essential in the modern business environment as it aligns economic success with environmental protection and social responsibility. Green business practices play a crucial role in ensuring long-term growth while preserving natural resources.

One of the key importance's of sustainable commerce is environmental protection. By reducing pollution, conserving energy, and minimizing waste, businesses help combat major global issues like Climate Change and resource depletion. Another major benefit is cost efficiency. Practices such as energy conservation, recycling, and efficient use of raw materials reduce operational costs in the long run. Though initial investments may be high, businesses achieve savings over time.

Sustainable commerce also enhances brand image and customer loyalty. Modern consumers prefer environmentally responsible companies, leading to increased trust, market share, and competitive advantage. It further ensures legal compliance and risk management. Governments worldwide are implementing strict environmental regulations. Adopting green practices helps businesses comply with these laws and avoid penalties. Additionally, sustainable commerce promotes innovation and long-term growth. Companies are encouraged to develop eco-friendly products, adopt clean technologies, and improve processes, leading to new business opportunities. Finally, it contributes to social responsibility and ethical practices. Businesses that focus on sustainability support community development, fair labor practices, and overall societal well-being. Green business practices ensure profitability, environmental conservation, and social equity, making them vital for a sustainable future.

Key Green Business Practices

Green business practices form the foundation of sustainable commerce by helping organizations reduce environmental impact while improving efficiency and long-term profitability. The major practices are;

1. **Energy Efficiency and Renewable Energy:** Businesses focus on minimizing energy consumption through efficient technologies such as LED lighting, energy-efficient machinery, and smart energy management systems. Many organizations also shift to renewable energy sources like solar, wind, and hydro power. This reduces dependency on fossil fuels and helps address issues like Climate Change.
2. **Waste Management and Recycling:** Effective waste management involves reducing waste generation, reusing materials, and recycling wherever possible. Companies implement waste segregation, composting, and circular economy models to ensure minimal environmental damage. Industrial waste is also treated responsibly to prevent pollution.
3. **Sustainable Sourcing of Raw Materials:** Organizations procure materials from environmentally responsible and ethical sources. This includes using biodegradable, recyclable, or certified sustainable materials. It also ensures that suppliers follow eco-friendly and ethical practices.
4. **Water Conservation and Management:** Water is a critical resource, and businesses adopt practices such as rainwater harvesting, wastewater recycling, and efficient water usage systems. Industries with high water consumption especially benefit from these measures.
5. **Eco-friendly Product Design (Green Design):** Products are designed to be durable, energy-efficient, and recyclable. The concept of life-cycle assessment is used to evaluate environmental impact from production to disposal. Packaging is also minimized and made eco-friendly.
6. **Green Supply Chain Management:** Sustainability is integrated across the supply chain from sourcing to production to distribution. This includes reducing transportation emissions, optimizing logistics, and working with environmentally responsible suppliers.
7. **Carbon Footprint Reduction:** Businesses measure and actively reduce greenhouse gas emissions through cleaner production methods, energy efficiency, and carbon offset programs. This directly contributes to mitigating Climate Change and promotes environmental sustainability.
8. **Digitalization and Paperless Operations:** Organizations adopt digital tools such as e-documents, cloud storage, and online communication systems to reduce paper usage. This not only conserves resources but also improves operational efficiency.
9. **Employee Engagement and Training:** Employees play a crucial role in implementing sustainability. Companies conduct training programs, workshops, and awareness campaigns to encourage eco-friendly behavior in the workplace.
10. **Corporate Social Responsibility (CSR):** Businesses engage in environmental and social initiatives such as tree plantation drives, community development programs, and environmental education. CSR strengthens the relationship between businesses and society.
11. **Green Marketing and Transparency:** Companies promote their eco-friendly products and practices honestly and transparently. Avoiding misleading claims (greenwashing) helps build consumer trust and credibility.

Challenges of Sustainable Commerce: Green Business Practices

While sustainable commerce offers significant benefits, businesses often face several challenges in implementing green business practices effectively.



1. **High Initial Costs:** Adopting eco-friendly technologies, renewable energy systems, and sustainable infrastructure requires substantial upfront investment. Small and medium enterprises may find it difficult to bear these costs.
2. **Lack of Awareness and Expertise:** Many organizations, especially in developing regions, lack adequate knowledge, technical expertise, and trained personnel to implement sustainable practices efficiently.
3. **Resistance to Change:** Employees and management may resist shifting from traditional methods to sustainable approaches due to uncertainty, habit, or fear of reduced productivity.
4. **Limited Access to Green Technology:** Advanced sustainable technologies may not be easily available or affordable, creating barriers for businesses trying to reduce their environmental impact.
5. **Supply Chain Complexity:** Ensuring sustainability across the entire supply chain is challenging. Businesses depend on suppliers who may not follow eco-friendly practices, making full implementation difficult.
6. **Regulatory and Compliance Issues:** Frequent changes in environmental laws and regulations can create confusion. Compliance may involve complex procedures and additional costs.
7. **Measurement and Reporting Difficulties:** Tracking environmental performance, such as carbon emissions and resource usage, requires proper tools and systems, which many businesses lack.
8. **Market Pressure and Competition:** In highly competitive markets, businesses may prioritize short-term profits over long-term sustainability, especially when consumers are price-sensitive.
9. **Risk of Green washing:** Some companies may falsely claim to be environmentally friendly without real action. This undermines trust and creates challenges for genuinely sustainable businesses.
10. **Addressing Global Environmental Issues:** Tackling large-scale problems like Climate Change requires collective effort. Individual business actions may seem insufficient without global cooperation.

Conclusion

Sustainable commerce is no longer optional; it is a strategic necessity for businesses aiming to thrive in a rapidly changing world. By adopting green business practices, organizations can reduce their environmental impact, respond effectively to challenges like Climate Change, and contribute to the conservation of natural resources. These practices not only support environmental sustainability but also enhance operational efficiency, reduce costs, and strengthen brand reputation. Businesses that integrate sustainability into their core strategies are better positioned to meet regulatory requirements, attract environmentally conscious consumers, and gain a competitive advantage. Adopting these key green business practices helps organizations achieve sustainability goals, reduce costs, and build a positive reputation while contributing to environmental protection and long-term growth. Implementing green business practices enables organizations to achieve sustainability goals, enhance efficiency, and maintain a competitive advantage. In the long run, such practices support economic growth while safeguarding the environment and society. Moreover, sustainable commerce promotes ethical responsibility by balancing economic goals with social and environmental well-being. It ensures that development today does not compromise the needs of future generations. Despite these challenges, businesses can overcome barriers through strategic planning, innovation, government support, and stakeholder awareness. Addressing these issues is essential for successfully implementing sustainable commerce and achieving long-term benefits. In conclusion, green business practices pave the way for long-term growth, innovation, and resilience. Companies that embrace sustainability contribute not only to their own success but also to a healthier planet and a more equitable society.

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OriginalArticle

Digital Platforms and Data-driven Decision Making in Farmer Producer Organizations (FPOs): Opportunities and Challenges in Karnataka

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Abstract:

This study examines the role of digital platforms and data-driven decision-making in enhancing the effectiveness of Farmer Producer Organizations (FPOs) in India, with a specific focus on Karnataka. FPOs have emerged as key institutional mechanisms for empowering small and marginal farmers by improving market access, reducing transaction costs, and strengthening collective bargaining power. The study reviews existing literature to understand the evolution, functioning, and challenges of FPOs, while also analyzing the growing significance of digital technologies such as ICT tools, e-market platforms, and data analytics in agricultural development. It identifies key opportunities including improved market linkages, financial inclusion, operational efficiency, and informed decision-making. However, challenges such as digital illiteracy, inadequate infrastructure, financial constraints, and weak governance structures continue to limit their potential. The study highlights critical research gaps, particularly the lack of integrated analysis between digital adoption and FPO performance. It concludes that strengthening digital capacity, institutional support, and policy interventions is essential for developing resilient, efficient, and technology-enabled FPOs that contribute to sustainable agricultural growth.

Introduction:

Farmer Producer Organizations (FPOs) have emerged as a significant institutional mechanism for enhancing the socio-economic conditions of small and marginal farmers, particularly in developing countries like India. These organizations are collective entities formed by farmers with the objective of improving their bargaining power, ensuring better access to inputs, credit, technology, and markets, and facilitating economies of scale. By aggregating produce and resources, FPOs help reduce transaction costs and enable farmers to participate more effectively in value chains, thereby improving price realization and income stability.

The importance of FPOs lies in their ability to address structural challenges in agriculture, such as fragmented landholdings, limited market access, and dependence on intermediaries. Through collective action, farmers can procure inputs at lower costs, adopt improved technologies, and access extension services more efficiently. FPOs also play a crucial role in linking farmers to institutional credit and government support schemes, which are often inaccessible to individual smallholders. Additionally, they contribute to strengthening rural livelihoods by promoting agribusiness activities, value addition, and diversification.

Despite their potential, FPOs face several challenges that hinder their effectiveness and sustainability. Key issues include inadequate managerial and technical capacity, limited access to finance, weak governance structures, and insufficient market linkages. Many FPOs struggle with professional management and lack the necessary skills to operate as competitive business entities. Furthermore, infrastructural constraints such as poor storage, transportation, and processing facilities limit their ability to scale operations. Social factors, including low levels of trust, participation, and awareness among members, also affect organizational performance.

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Recent developments highlight the growing role of digital technologies in strengthening FPOs. Integration of Information and Communication Technologies (ICTs), digital platforms, and data-driven tools can enhance transparency, improve supply chain efficiency, and provide real-time market and weather information. However, the adoption of such technologies remains uneven due to digital illiteracy and inadequate rural connectivity.

In conclusion, FPOs hold considerable promise for transforming agriculture by empowering farmers and promoting inclusive growth. However, realizing their full potential requires coordinated efforts in capacity building, policy support, financial inclusion, and technological integration. Strengthening governance mechanisms and fostering collaboration among stakeholders will be essential to ensure the long-term sustainability and effectiveness of FPOs in agricultural development.

Review of Literature:

The existing literature on Farmer Producer Organizations (FPOs) and digital agriculture underscores the growing importance of collective institutions and technological integration in enhancing agricultural productivity and farmer livelihoods. Beriya and Saroja (2019) highlight the role of Information and Communication Technologies (ICTs) in enabling data-driven decision-making, improving access to weather forecasts, insurance, and market information, while identifying constraints such as poor digital infrastructure and limited accessibility among smallholders. Aditya et al. (2022) extend this perspective by emphasizing the effectiveness of digital platforms, including mobile applications and e-marketplaces, in reducing transaction costs and improving transparency, though their adoption remains hindered by digital illiteracy and connectivity gaps. Focusing on institutional mechanisms, Kote et al. (2023) and Mallanna and Dinesh (2023) demonstrate that FPOs play a crucial role in aggregating small and marginal farmers, enhancing bargaining power, reducing input costs, and improving market linkages.

Despite these benefits, both studies report persistent challenges such as weak managerial capacity, lack of financial resources, and coordination inefficiencies. Srikrishna (2025) further identifies financial constraints, infrastructural deficiencies, and dependence on intermediaries as critical barriers, emphasizing the need for improved governance and targeted policy interventions. Similarly, Patnaik and Chaudhary (2025) reveal that FPOs face multidimensional challenges, including leadership issues, inadequate infrastructure, limited credit access, and weak marketing systems, which constrain their effectiveness. In addition to structural and financial aspects, Jayaraman et al. (2023) introduce the significance of social capital in determining FPO performance. Their findings suggest that trust, leadership quality, member participation, and strong social networks significantly enhance organizational efficiency and member outcomes, indicating that internal cohesion is a key determinant of success.

Nevertheless the substantial body of research, several gaps remain evident. Most studies focus on identifying challenges and opportunities but provide limited empirical evaluation of long-term impacts of FPOs on income stability and rural livelihoods. There is also a lack of integrated analysis combining digital agriculture tools with FPO functioning, particularly in assessing how ICT-enabled platforms can strengthen collective action. Additionally, region-specific studies dominate the literature, limiting generalizability across diverse agro-economic contexts. Limited attention has been given to the role of gender inclusion, youth participation, and governance models within FPOs. Furthermore, there is insufficient exploration of scalable business models and performance measurement frameworks for assessing FPO sustainability over time. Overall, the literature indicates that while FPOs and digital technologies hold significant potential to transform agriculture, addressing these research gaps through interdisciplinary and data-driven approaches is essential for ensuring inclusive and sustainable agricultural development.

Need for the study: This study is necessary to explore the role of digital platforms and data-driven decision-making in enhancing the effectiveness of FPOs in Karnataka. It aims to identify the opportunities offered by these technologies, examine the challenges faced in their adoption, and provide insights for policymakers and stakeholders to design targeted interventions. By addressing these gaps, the study seeks to contribute to the development of more resilient, efficient, and technology-enabled FPOs, ultimately supporting sustainable agricultural development in the region.

Objectives of the Study

- To study and develop a comprehensive understanding of Farmer Producer Organizations (FPOs) and their role in agricultural development.
- To examine the various digital platforms that support and assist the functioning of FPOs.
- To analyze the process and significance of data-driven decision-making within FPOs.
- To evaluate the opportunities and challenges faced by FPOs in India in general and in Karnataka in particular.

About FPO:

Farmer Producer Organizations (FPOs) represent a collective institutional model designed to empower small and marginal farmers by organizing them into legally recognized groups that function as business entities. The core concept of FPOs is rooted in the principles of collective action, economies of scale, and improved market participation. By aggregating farmers, FPOs enable members to access inputs at lower costs, adopt improved technologies, and market their produce more effectively, thereby enhancing income and reducing dependence on intermediaries. FPOs can be registered under various legal frameworks in India, including Producer Companies under the Companies Act, cooperative societies, or societies under relevant state laws, with Producer Companies being the most widely adopted structure due to their hybrid nature combining cooperative principles with corporate efficiency.

The evolution of FPOs in India can be traced back to the cooperative movement initiated during the pre- and post-independence periods, which aimed to address issues of rural credit and agricultural marketing. However, traditional cooperatives often faced challenges such as political interference, inefficiency, and weak governance. Recognizing these limitations, the Government of India introduced the concept of Producer Companies through the Companies (Amendment) Act, 2002, based on the recommendations of the Y.K. Alagh Committee. This marked a significant shift by providing a more flexible and farmer-centric institutional framework that combined the benefits of cooperatives with professional management practices.

The promotion of FPOs gained momentum in the 2010s with active support from institutions such as the Small Farmers' Agribusiness Consortium (SFAC), National Bank for Agriculture and Rural Development (NABARD), and various state governments. These agencies played a crucial role in mobilizing farmers, providing capacity-building support, and facilitating access to credit and markets. The Government of India further accelerated FPO development through schemes like the Central Sector Scheme for Formation and Promotion of 10,000 FPOs launched in 2020, aiming to strengthen agricultural value chains and double farmers' income.

In recent years, the evolution of FPOs has been closely linked with the adoption of digital technologies and data-driven approaches. Digital platforms, e-markets (such as e-NAM), and ICT tools are increasingly being integrated into FPO operations to enhance efficiency, transparency, and decision-making. Despite this progress, many FPOs are still in nascent stages and face challenges related to financial sustainability, managerial capacity, and technological adoption

Digital Platforms:

Digital platforms have emerged as transformative tools in strengthening the functioning and efficiency of Farmer Producer Organizations (FPOs) in India. These platforms refer to technology-enabled systems—such as mobile applications, web portals, and e-marketplaces—that facilitate information exchange, financial transactions, input procurement, and market linkages. Prominent digital platforms available to FPOs in India include the Electronic National Agriculture Market (e-NAM), which integrates agricultural markets across the country to enable transparent price discovery and online trading; the National Agriculture Market app; agri-tech platforms like DeHaat, AgroStar, and Ninjacart; and government-supported portals such as SFAC's e-platforms and NABARD-supported digital initiatives. Additionally, platforms for financial inclusion, such as digital payment systems, crop insurance portals, and credit linkage apps, play a crucial role in enhancing the accessibility of formal financial services for FPOs.

These digital platforms support FPOs in multiple ways. They improve access to real-time market information, reduce dependence on intermediaries, streamline supply chains, and enable direct linkage between farmers and buyers. They also facilitate bulk input purchase, inventory management, and logistics coordination, thereby increasing operational efficiency. Furthermore, digital platforms enhance transparency and traceability in transactions, which is increasingly important for quality assurance and compliance in modern agricultural markets.

Digital Platforms in Karnataka some examples:

- **Working of National Agriculture Market (e-NAM):**

National Agriculture Market (e-NAM) is a pan-India electronic trading portal launched by the Government of India to integrate Agricultural Produce Market Committees (APMCs) and create a unified national agricultural market. The platform enables farmers, traders, and buyers to access real-time price information, conduct transparent online bidding, and facilitate electronic payments. By reducing information asymmetry and improving price discovery, e-NAM strengthens farmers' bargaining power and minimizes dependence on intermediaries. It also supports interstate trade, thereby expanding market opportunities for Farmer Producer Organizations (FPOs) and smallholder farmers (Government of India, 2023; Ministry of Agriculture & Farmers Welfare, 2022).

- **Role of Rashtriya e-Market Services (ReMS):**

Rashtriya e-Market Services (ReMS) is a joint initiative of the Government of Karnataka and NCDEX Spot Exchange that pioneered agricultural market digitization in Karnataka before the national rollout of e-NAM. ReMS connects multiple APMC markets under a unified electronic trading system, allowing farmers to sell produce through transparent auction mechanisms. The platform improves efficiency in market operations, standardizes quality assessment, and ensures timely payment to farmers. For FPOs in Karnataka, ReMS has enhanced market access, reduced transaction costs, and facilitated better integration into formal agricultural marketing systems (Karnataka Agricultural Marketing Department, 2021; NABARD, 2022).

- **ERP Systems in FPOs:**

Enterprise Resource Planning (ERP) systems are increasingly being adopted by FPOs to streamline organizational operations through digital integration of business functions. ERP solutions improve managerial efficiency, transparency, and data availability, which are critical for data-driven decision-making in farmer collectives (FAO, 2021).

- **Inventory Management:**

ERP systems help FPOs maintain digital records of agricultural inputs, seeds, fertilizers, warehouse stock, and produce quantities. Real-time inventory tracking reduces wastage, prevents stock shortages, and supports better procurement planning. This enables FPOs to optimize storage capacity and respond effectively to market demand fluctuations (Patil & Kumar, 2023).

- **Financial Records:**

Digital ERP modules simplify accounting functions such as bookkeeping, invoicing, payroll management, loan tracking, and profit-loss analysis. Accurate financial records enhance transparency and accountability in FPO operations while helping organizations comply with audit and reporting requirements. Digital financial management also improves creditworthiness and access to institutional finance (NABARD, 2022).

- **Supply Chain Tracking:**

ERP systems enable end-to-end monitoring of agricultural supply chains from procurement to transportation, storage, and final delivery. This improves traceability, reduces logistical inefficiencies, and enhances coordination among farmers, transporters, buyers, and warehouses. Efficient supply chain tracking helps FPOs reduce operational delays and strengthen their participation in competitive agricultural markets (World Bank, 2021).

Data-driven Decision Making in Farmer Producer Organizations (FPOs):

Farmer Producer Organizations (FPOs) increasingly rely on digital data to improve decision-making related to production, marketing, and resource allocation. By collecting and analyzing market information, weather data, farmer records, and consumer demand trends, FPOs can make more informed and strategic business decisions. Data-driven decision-making reduces uncertainty, enhances operational efficiency, and improves farmers' income by enabling evidence-based planning rather than traditional intuition-based practices (FAO, 2021; NABARD, 2022).

- **Price Forecasting:**

FPOs use historical market price data, daily mandi prices, and digital platforms such as National Agriculture Market (e-NAM) to forecast price fluctuations of agricultural commodities. Price forecasting helps FPOs decide the optimal time to sell produce, store commodities, or negotiate with buyers. Access to real-time and historical pricing information reduces the risk of distress sales and improves farmers' bargaining power in competitive markets (Ministry of Agriculture & Farmers Welfare, 2022; World Bank, 2021).

- **Demand Analysis:**

Demand analysis involves studying market demand patterns, consumer preferences, and seasonal variations in agricultural product consumption. FPOs use sales records, buyer orders, and digital market intelligence to estimate future demand for specific crops or processed goods. This helps farmer groups align production volumes with market needs, reduce surplus losses, and identify profitable market opportunities (Patil & Kumar, 2023).

- **Crop Planning:**

FPOs utilize data on weather forecasts, soil conditions, historical yields, and market trends to guide farmers in selecting suitable crops for each season. Crop planning based on data minimizes production risks and promotes diversification into high-value crops. Digital advisory systems and mobile applications further support farmers by providing localized recommendations on sowing periods, irrigation, and crop management practices (FAO, 2021; ICAR, 2022).

- **Input Procurement Decisions:**

FPOs analyze member demand, seasonal cultivation plans, and inventory records to make efficient procurement decisions regarding seeds, fertilizers, pesticides, and farm equipment. Data-driven procurement enables bulk purchasing, reduces input costs, avoids shortages, and ensures timely availability of quality inputs to member farmers. This strengthens operational efficiency and improves economies of scale in FPO functioning (NABARD, 2022).

- **Market Selection:**

Using digital platforms and market intelligence, FPOs compare prices, transportation costs, buyer demand, and quality standards across different markets before deciding where to sell produce. This allows them to select the most profitable markets, whether local mandis, interstate markets, processors, or institutional buyers. Better market selection increases price realization and reduces dependency on local intermediaries (Government of India, 2023).

- **Predictive Analytics:**

Artificial Intelligence supports FPOs through predictive analytics, which uses historical and real-time data to forecast agricultural outcomes such as crop yield, pest outbreaks, rainfall patterns, and price movements. AI models can identify patterns beyond human capacity, enabling FPOs to make proactive decisions regarding production, storage, and sales. Predictive analytics improves efficiency, reduces risks, and supports strategic agricultural planning (Sharma et al., 2023; World Economic Forum, 2022).

- **Mobile-based Advisory Systems:**

AI-powered mobile advisory systems provide farmers and FPOs with real-time recommendations through smartphone applications and SMS services. These systems deliver personalized advice on weather conditions, crop diseases, fertilizer usage, irrigation scheduling, and market prices in local languages. Mobile advisory platforms bridge information gaps, especially for smallholder farmers, and facilitate faster decision-making at the grassroots level (FAO, 2021; NITI Aayog, 2021).

Opportunities: Digital platforms and data-driven decision-making present significant opportunities for enhancing the performance and sustainability of Farmer Producer Organizations (FPOs) in India. With the increasing penetration of

digital technologies in agriculture, FPOs can leverage various platforms to improve efficiency, transparency, and market integration.

- **Improved Market Access and Price Realization:**

One of the key opportunities lies in improved market access and price realization. Platforms such as the Electronic National Agriculture Market (e-NAM), Ninjacart, and other agri e-commerce portals enable FPOs to connect directly with buyers across regions, reducing dependence on intermediaries and ensuring better price discovery. These platforms also facilitate transparent transactions and expand market reach beyond local mandis.

- **Efficient Input Procurement and Supply Chain Management:**

Another major opportunity is efficient input procurement and supply chain management. Digital platforms allow FPOs to aggregate demand for seeds, fertilizers, and other inputs, enabling bulk purchasing at lower costs. Additionally, logistics and inventory management tools help streamline storage, transportation, and distribution, reducing post-harvest losses and operational inefficiencies.

- **Financial Inclusion:**

Financial inclusion is also significantly enhanced through digital platforms. Access to digital payment systems, online banking, credit platforms, and crop insurance portals enables FPOs to secure timely credit, manage financial transactions efficiently, and reduce reliance on informal lending sources. This contributes to improved financial stability and business growth.

- **Data-Driven Decision-Making:**

Data-driven decision-making further strengthens these opportunities by enabling FPOs to make informed and strategic choices. Access to real-time data on market prices, weather conditions, soil health, and crop performance allows FPOs to optimize crop planning, harvesting schedules, and marketing strategies. Predictive analytics can assist in demand forecasting and risk management, helping FPOs minimize losses and maximize returns.

- **Better Governance and Management:**

Additionally, digital tools support better governance and management within FPOs. Data systems enable accurate record-keeping, performance monitoring, and transparency in operations, which strengthens member trust and organizational accountability. This is particularly important for scaling FPOs into professionally managed agribusiness entities.

- **Capacity Building and Knowledge Dissemination.**

Digital platforms also create opportunities for capacity building and knowledge dissemination. Mobile-based advisory services, training modules, and extension services provide farmers with timely information on best practices, pest management, and technological innovations, thereby improving productivity and resilience

Challenges:

While digital platforms and data-driven decision-making offer substantial benefits to Farmer Producer Organizations (FPOs) in India, their adoption and effective utilization are constrained by several challenges.

Digital Illiteracy and Lack of Technical Skills:

A primary challenge is digital illiteracy and lack of technical skills among farmers and FPO members. Many small and marginal farmers have limited exposure to digital tools, making it difficult for them to effectively use mobile applications, online platforms, and data systems. This creates a gap between the availability of technology and its actual utilization.

Inadequate Digital Infrastructure:

Another significant constraint is inadequate digital infrastructure, particularly in rural areas. Poor internet connectivity, unreliable power supply, and limited access to smartphones or computers hinder the smooth functioning of digital platforms. This infrastructural gap restricts real-time data access and limits participation in digital marketplaces.

Financial Constraints:

Financial constraints also pose a major barrier. Many FPOs lack the capital required to invest in digital tools, software systems, and training programs. Additionally, the cost of maintaining digital infrastructure and hiring skilled personnel can be prohibitive, especially for newly formed or small-scale FPOs.

Data Availability and Quality:

The issue of data availability and quality further complicates data-driven decision-making. Inaccurate, incomplete, or untimely data related to weather, market prices, or production can lead to poor decision outcomes. Moreover, the lack of standardized data systems and integration across platforms reduces the reliability and usability of information.

Limited awareness and trust:

Limited awareness and trust in digital systems is another challenge. Farmers may be hesitant to adopt digital platforms due to concerns about data privacy, transaction security, and lack of familiarity with online systems. This resistance slows down the adoption process and reduces the effectiveness of digital initiatives.

Organizational and Managerial Limitations:

In addition, organizational and managerial limitations within FPOs affect the integration of digital technologies. Many FPOs lack professional management, structured processes, and technical expertise required to implement and sustain data-driven systems. Weak governance structures can also hinder effective decision-making and technology adoption.



Market-related challenges:

Market-related challenges persist despite digital advancements. While platforms provide access to wider markets, issues such as price volatility, lack of grading and standardization, and weak logistics networks continue to affect FPO performance. Digital tools alone cannot fully address these structural issues.

Policy and Institutional Gaps:

Lastly, there are policy and institutional gaps, including limited coordination among stakeholders, inconsistent support mechanisms, and insufficient training and extension services focused on digital adoption. Without strong policy backing and continuous capacity-building efforts, the scalability of digital solutions remains limited

Conclusion:

In conclusion, Farmer Producer Organizations (FPOs) represent a transformative approach to addressing the structural challenges faced by small and marginal farmers in India. By promoting collective action, FPOs enhance farmers' access to inputs, credit, technology, and markets, thereby improving their bargaining power and income potential. The integration of digital platforms and data-driven decision-making further strengthens the capacity of FPOs to function as efficient and competitive agribusiness entities. Digital tools such as e-marketplaces, mobile applications, and data analytics systems enable real-time access to information, improve transparency, streamline supply chains, and support informed decision-making processes.

The opportunities offered by digitalization are substantial, particularly in areas such as market access, financial inclusion, operational efficiency, and capacity building. Data-driven approaches allow FPOs to optimize crop planning, manage risks, forecast demand, and improve overall productivity. In regions like Karnataka, where the number of FPOs is steadily increasing, the adoption of such technologies can play a critical role in enhancing their performance and sustainability.

However, the effective utilization of digital platforms is not without challenges. Issues such as digital illiteracy, inadequate infrastructure, financial constraints, poor data quality, and limited technical expertise continue to hinder widespread adoption. Additionally, organizational weaknesses, lack of professional management, and insufficient policy support further restrict the ability of FPOs to fully leverage digital innovations. These challenges highlight the need for a holistic approach that combines technological advancement with capacity building, institutional strengthening, and supportive policy frameworks.

Therefore, for FPOs to realize their full potential, there is a need for coordinated efforts from government agencies, financial institutions, technology providers, and other stakeholders. Investments in digital infrastructure, training programs, and awareness initiatives are essential to bridge the digital divide. Strengthening governance structures and promoting data literacy within FPOs will further enhance their ability to adopt and utilize data-driven systems effectively.

Overall, the convergence of FPOs with digital platforms and data-driven decision-making holds significant promise for achieving inclusive and sustainable agricultural development. By addressing existing challenges and leveraging emerging opportunities, FPOs can evolve into resilient, technology-enabled institutions that contribute meaningfully to rural transformation and economic growth in India.

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OriginalArticle

Indian Government Key Policies on Digital Transformation, Use of AI, and e-Governance: An Analytical Overview

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The trajectory of India's digital transformation represents one of the most ambitious technological state-building projects in the contemporary Global South. Over the past decade, culminating in the critical policy implementations leading up to 2026, the Indian government has transitioned from foundational digitisation, epitomised by the "Digital India" campaign, to advanced algorithmic governance under the "Indian AI" mission. This article provides a comprehensive analytical overview of India's key policies regarding digital transformation, artificial intelligence (AI), and e-governance. It examines the architecture of India's Digital Public Infrastructure (DPI), the strategic shift toward "Sovereign AI," and the integration of machine learning into public service delivery. Furthermore, the paper analyses the regulatory frameworks governing this transition, notably the Digital Personal Data Protection (DPDP) Act of 2023. It critiques the persistent challenges of the digital divide, data privacy, and algorithmic bias. Ultimately, this overview posits that India's model of open-source DPI combined with AI offers a unique paradigm for digital governance, balancing immense scale with emerging regulatory challenges.

Keywords: AI, Digital transformation, Indian Government, Governance, Policies

Introduction

In the 21st century, the capacity of a state is increasingly defined by its digital infrastructure and its ability to harness emerging technologies for public welfare. For India, a nation characterised by vast geographic expanse and profound socio-economic diversity, digital transformation is not merely an administrative upgrade; it is a vital mechanism for social inclusion, formalising the economy, and bridging systemic governance deficits. The evolutionary arc of India's digital state can be categorised into three distinct phases. The first phase focused on identity and financial inclusion, anchored by the Aadhaar system. The second phase, driven by the "Digital India" initiative launched in 2015, expanded internet connectivity and created a robust Digital Public Infrastructure (DPI) ecosystem, notably the Unified Payments Interface (UPI). The current, third phase is defined by the integration of Artificial Intelligence (AI) into the e-governance apparatus, transforming the state from a digital facilitator into an algorithmic administrator.

This article analyses the key policies driving this transformation. It explores how the Indian state leverages technology to redesign the citizen-state interface, the specific policy vehicles advancing AI adoption, and the socio-political implications of an increasingly automated governance architecture.

Foundational Policies: Digital India and the DPI Paradigm

To understand India's current AI and e-governance capabilities, it is essential to analyse the foundational infrastructure that enables them. The Indian approach diverges from Western models (largely driven by private monopolies) and the Chinese model (characterised by closed state systems) by focusing on Digital Public Infrastructure (DPI), open-source, interoperable digital building blocks.

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The Digital India Initiative (2015)

Launched in 2015, the Digital India initiative serves as the umbrella policy for the nation's digital transition. It operates on three core vision areas:

- **Digital Infrastructure as a Core Utility to Every Citizen:** This includes the BharatNet project, aimed at connecting all Gram Panchayats (village councils) with high-speed broadband, and the establishment of a verifiable digital identity (Aadhaar).
- **Governance and Services on Demand:** Seamless integration across government departments to provide real-time services via online platforms.
- **Digital Empowerment of Citizens:** Universal digital literacy and the availability of digital resources in Indian languages.

The India Stack Architecture

The policy success of Digital India is operationalised through the "India Stack," a set of open APIs and digital public goods. The Stack is conceptually divided into four layers:

- **The Presence less Layer:** Universal biometric identity (Aadhaar), allowing for authentication from anywhere.
- **The Paperless Layer:** Digital records moved seamlessly across departments (DigiLocker and e-Sign).
- **The Cashless Layer:** A single interface to all the country's bank accounts and wallets (UPI).
- **The Consent Layer:** A framework allowing data to move freely and securely, democratising the market for data.

From a political science perspective, the India Stack policy essentially redefined the "social contract." By providing a digital identity to over 1.3 billion people, the state bypassed entrenched local patron-client networks, enabling direct benefit transfers (DBT) that drastically reduced bureaucratic leakage in welfare schemes.

The E-Governance Ecosystem: Mechanisms and Policies

Building upon the DPI foundation, the Indian government enacted several policies to overhaul its internal operations and its service delivery mechanisms. E-governance in India aims to achieve "SMART" governance: Simple, Moral, Accountable, Responsive, and Transparent.

National e-Governance Plan (NeGP) and e-Kranti

The e-Kranti framework (NeGP 2.0) mandated that all new government services must be designed to be digital-first. Key policies under this included the mandatory implementation of e-Office systems in central ministries, fundamentally altering the bureaucratic culture from physical files to trackable digital workflows, thereby reducing processing delays and establishing auditable trails.

Integrated Service Delivery Platforms

The policy shift towards "citizen-centric" design led to the creation of unified platforms:

- **UMANG (Unified Mobile Application for New-age Governance):** A singular mobile application providing access to thousands of central and state government services, ranging from provident fund management to weather forecasting.
- **MyGov:** A citizen engagement platform that crowdsources ideas for policy formulation, moving e-governance from mere service delivery to active participatory democracy.
- **GeM (Government e-Marketplace):** A policy mandate requiring government departments to procure goods and services through a digital portal, increasing transparency and breaking monopolies in public procurement.

The AI Paradigm: Strategic Policies and the IndiaAI Mission

As computational power increased and machine learning matured, the Indian government recognised AI as a pivotal technology for socio-economic development. The policy narrative shifted from simple automation to intelligence-driven governance.

NITI Aayog's National Strategy for Artificial Intelligence (2018)

The foundational policy document for India's AI journey was published by NITI Aayog (the government's public policy think tank) in 2018. Titled **#AIforAll**, the strategy explicitly focused on leveraging AI for inclusive growth. Rather than engaging in an "AI arms race" for global dominance, the policy identified five priority sectors for AI intervention: Healthcare, Agriculture, Education, Smart Cities/Infrastructure, and Smart Mobility.

The India AI Mission (2024-2026)

Approved in March 2024 with an initial outlay of over ₹10,300 crore (approx. \$1.2 billion) and heavily implemented through 2025 and 2026, the **India AI Mission** represents a shift from strategic intent to capital-intensive execution. The mission aims to establish "Sovereign AI", ensuring that India is not reliant on foreign tech conglomerates for its computational needs or foundational models. Key pillars of this policy include:

- **India AI Compute Capacity:** The state subsidises access to high-performance computing (GPUs) for startups, academia, and public sector researchers, democratising the infrastructure required to train AI models.
- **India AI Datasets Platform:** A unified platform to provide researchers with access to non-personal, anonymised datasets generated by the government. Recognising that data is the lifeblood of AI, this policy aims to leverage India's massive population scale to train highly accurate models.



- **India AI Innovation Centre:** Dedicated to the development of indigenous Foundational Models with a specific focus on multimodal capabilities and Indic languages.

Bhashini: Linguistic Inclusion through AI

One of the most critical policies bridging e-governance and AI is the **National Language Translation Mission (Bhashini)**. India possesses 22 official languages and thousands of dialects, creating a massive linguistic barrier to digital governance. Bhashini utilises Natural Language Processing (NLP) and AI to build open-source translation models. By integrating Bhashini APIs into government portals, the state ensures that a citizen in rural Karnataka can interact with a central government platform in Kannada using voice commands, fundamentally democratising digital access.

Sectoral Applications of AI in Indian Governance

The theoretical frameworks of #AIforAll and the India AI mission have been operationalised through specific sectoral policies.

Precision Agriculture and Agri Stack

Agriculture employs nearly half of India's workforce but suffers from systemic inefficiencies. The Ministry of Agriculture's policies have focused on developing an "Agri Stack", a digital foundation offering farmers proactive advice. AI models analyse satellite imagery, weather patterns, and soil health data to provide hyper-local crop advisories, predict pest attacks, and facilitate faster, AI-driven crop insurance claim settlements under the Pradhan Mantri Fasal Bima Yojana (PMFBY).

Healthcare and the Ayushman Bharat Digital Mission (ABDM)

The ABDM policy seeks to create a seamless online platform to link all healthcare stakeholders. AI plays a crucial role here in resource optimisation. Predictive AI models are being piloted to forecast disease outbreaks (such as Dengue or Malaria) by analysing regional health data. Furthermore, AI-driven diagnostic tools are being deployed in rural Primary Health Centres (PHCs) to assist frontline workers in reading X-rays and screening for conditions like diabetic retinopathy, compensating for the acute shortage of specialist doctors.

Smart Policing and Judiciary

In law enforcement, policies have supported the integration of AI for predictive policing, crowd management during mega-events (like the Kumbh Mela), and facial recognition systems (AFRS). In the judiciary, the Supreme Court of India initiated policies to use AI platforms like SUVAS (Supreme Court Vidhik Anuvaad Software) to translate legal documents into regional languages and SUPACE (Supreme Court Portal for Assistance in Court's Efficiency) to assist judges in legal research and case management, aiming to reduce the massive backlog of pending cases.

Regulatory Frameworks and Data Governance

The transition to an AI-driven digital state brings profound risks regarding privacy, algorithmic bias, and state surveillance. The Indian government has responded with evolving regulatory frameworks designed to balance innovation with citizen protection.

The Digital Personal Data Protection (DPDP) Act, 2023

After years of deliberation following the Supreme Court's 2017 ruling that privacy is a fundamental right, the DPDP Act was enacted in 2023. This law forms the bedrock of data governance in the AI era. It mandates clear consent architectures for data processing and imposes strict penalties on data fiduciaries for breaches. For e-governance, the Act required a massive overhaul of how state departments collect and retain citizen data, shifting the burden of data minimisation and purpose limitation onto the state apparatus.

National Data Governance Framework Policy (NDGFP)

Drafted to complement the DPDP Act, the NDGFP aims to modernise the government's data collection, transforming it into machine-readable formats. Importantly, it governs the sharing of non-personal and anonymised data with the Indian AI ecosystem. The policy establishes an "India Data Management Office" (IDMO) to design and enforce data standards, ensuring that datasets used to train domestic AI do not compromise individual privacy.

Information Technology Amendment Rules and Deepfake Regulation

As generative AI evolved rapidly, the Indian state faced acute challenges regarding misinformation, synthetic media, and deepfakes, threats capable of destabilising democratic elections and social harmony. Through amendments to the Information Technology Rules, the government introduced stringent intermediary guidelines. Platforms operating in India are mandated to deploy automated tools to swiftly identify and remove synthetically generated malicious content and are required to enforce watermarking or labelling on AI-generated media to maintain information integrity.

Analytical Discussion: Strengths, Weaknesses, and Prospects

An analytical assessment of India's digital transformation reveals a complex interplay of unprecedented scale, innovative architecture, and significant socio-political vulnerabilities.

The Strengths of the "Digital India" Model

India's primary achievement lies in its philosophy of Digital Public Infrastructure. By treating digital identity, payments, and data exchange as public utilities rather than private commodities, the state has fostered massive private-sector innovation on top of government-backed rails. This approach has radically accelerated financial inclusion; policies that would have taken decades through traditional banking infrastructure were achieved in years via UPI and



Aadhaar. Furthermore, India's leadership in the Global Partnership on Artificial Intelligence (GPAI) has allowed it to position itself as the voice of the Global South, advocating for inclusive, ethical, and open-source AI development over monopolistic practices.

Critical Vulnerabilities and the Digital Divide

Despite systemic successes, the "techno-solutionist" approach of the Indian state has faced valid academic and civil society critique. The most pressing issue is the persistent **Digital Divide**. While internet penetration has surged, a significant gap remains between urban and rural populations, and notably between genders. When essential state services (such as food rations or healthcare access) become "digital-by-default," marginalised populations lacking smartphones, internet literacy, or reliable connectivity risk systemic exclusion.

Algorithmic Bias and the "Black Box" of Governance

As e-governance transitions to AI-governance, the "black box" problem becomes a political issue. When AI models are used to determine welfare eligibility, assess loan risks, or deploy predictive policing, the opaque nature of algorithmic decision-making threatens the democratic principles of accountability and transparency. If an AI system trained on historical data denies a citizen a government subsidy due to an inherited bias, the lack of a clear explanatory mechanism or human grievance redressal creates a dangerous deficit in state accountability.

The Surveillance State Paradox

The aggregation of massive amounts of citizen data via Aadhaar, integrated with AI-driven analytics and facial recognition capabilities, grants the Indian state unprecedented surveillance capacity. While policies like the DPDP Act offer legal safeguards, broad exemptions granted to the state apparatus for "national security" purposes have raised concerns among political scientists regarding the potential for digital authoritarianism and the chilling effect on civil liberties.

Conclusion

The Indian government's key policies on digital transformation, AI, and e-governance represent a bold, continuous experiment in statecraft. By transitioning from the foundational identity and payment networks of "Digital India" to the advanced computing and linguistic inclusion goals of the "India AI" mission, the state has established a unique, globally recognised paradigm for building digital public infrastructure. The deployment of AI across agriculture, healthcare, and public administration highlights a proactive approach to utilising technology for socio-economic empowerment (#AIforAll).

However, the efficacy of this digital state is continually tested by the realities of India's socio-economic landscape. The policies enacted over the last decade show a state learning in real-time, moving from unregulated data collection to structured frameworks like the DPDP Act of 2023. As India moves further into the algorithmic age, the ultimate success of its digital policies will not be measured solely by technological deployment or transaction volumes. Rather, it will be defined by the state's ability to govern AI ethically, mitigate the exclusionary risks of the digital divide, and ensure that the digital architecture remains a tool for democratic empowerment rather than an instrument of opaque surveillance.

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OriginalArticle

Green Commerce Sustainable Business Practices

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The transition toward green commerce in business practices has become a key area of focus in recent years, when sustainability emerged as a critical factor for business success. This paper explores the growing trend of sustainability in business, specifically within the context of India, where green commerce is becoming increasingly important. The research investigates the factors driving this shift, the impact of consumer preferences, corporate strategies for implementing sustainability, and the role of government policies. By analysing data from consumer surveys, corporate sustainability reports, and government initiatives, this paper provides a comprehensive understanding of the shift toward sustainable business practices in India. Key findings reveal that the increasing demand for eco-friendly products, along with stricter regulations and the rise of corporate social responsibility, has significantly influenced businesses to adopt green strategies. However, challenges such as financial constraints and lack of awareness among small and medium enterprises (SMEs) persist, limiting the widespread adoption of green commerce practices. This paper concludes by discussing the opportunities for businesses to capitalize on the growing trend of green commerce and its potential to transform India's economic and environmental landscape. Green commerce, or sustainable commerce, refers to business practices that minimize environmental impact across the entire supply chain, from sourcing materials to shipping and packaging. Key strategies include eco-friendly packaging, reducing carbon footprints, and promoting renewable energy to foster environmental protection and improve brand reputation.

Keywords: Green commerce, sustainability, business, eco- friendly.

Introduction:

The growing concern over climate change and environmental degradation has made sustainability one of the most pressing issues of the 21st century. Over the last few decades, businesses have increasingly recognized the importance of adopting sustainable practices to ensure long-term profitability, meet consumer expectations, and comply with stricter government regulations. In upcoming year, the momentum toward sustainability reached new heights, driven by multiple factors, including global consumer demand for eco-friendly products, corporate social responsibility (CSR) initiatives, and increasing regulatory pressures. Businesses are realizing that incorporating sustainability into their core operations is not only a moral responsibility but also a strategic advantage in today's competitive market. The concept of green commerce refers to business activities and practices that aim to reduce environmental harm and promote sustainable development. This includes everything from reducing carbon footprints, using renewable energy, and minimizing waste to adopting sustainable sourcing practices and promoting products with lower environmental impact. Green commerce is not limited to any one industry; it spans sectors from manufacturing to services, retail to agriculture, with each industry implementing its own version of sustainability. The transition to greener business practices has been particularly prominent in emerging economies.

Green Commerce: Sustainable Business Practices Green commerce = running an e-commerce or retail business in a way that minimizes environmental harm while staying profitable. Customers in 2025-26 actively choose brands based on this.



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Sustainable Sourcing & Products

Practice	What it looks like	Why it matters
Eco-friendly materials	Bamboo, organic cotton, recycled plastic, FSC wood	73% of Gen Z will pay more for sustainable products
Ethical supply chain	Fair-trade certification, no child labor, local suppliers	Cuts transport emissions + builds brand trust
Product lifecycle	Design for repair, resale, or recycling. Take-back programs	Reduces landfill waste. Patagonia & IKEA do this well

Green Operations & Logistics

Practice	What it looks like	Why it matters
Carbon-neutral shipping	EV delivery fleets, route optimization, carbon offset at checkout	Transport = 20% of e-comm emissions
Minimal packaging	Corrugated mailers, no plastic fillers, right-size boxes	Saves 40% packaging waste. Amazon's "Frustration-Free"
Green warehousing	Solar-powered FCs, LED lighting, rainwater harvesting	Cuts energy cost 15-30%. Flipkart & Myntra already doing this in Bangalore
Reverse logistics	Easy returns → refurbish → resell instead of dumping	5 billion lbs of returns go to landfill yearly in US

Digital Sustainability

Practice	What it looks like	Why it matters
Green hosting	Servers on renewable energy: Google Cloud, AWS regions	Websites = 3.7% of global emissions
Lightweight UX	Compressed images, dark mode, fewer tracking scripts	Cuts page energy use by 70%
Digital receipts	What Sapp/email invoices instead of paper	Saves 10M+ trees/year globally

Transparency & Marketing Carbon labels:

Show CO₂ per product like calories. All birds does this Sustainability reports: Yearly ESG data. Builds B2B credibility Green loyalty: Points for choosing slower shipping or recycling packaging Avoid green washing: Only claim what you can prove. EU now fines for fake "eco" tags.

In India, the demand for environmentally responsible products and services is rising, as Indian consumers become more aware of the environmental and social implications of their purchasing decisions. In parallel, Indian businesses are increasingly recognizing that sustainability is essential for securing long-term success. Large corporations, such as the Tata Group and Reliance Industries, have set ambitious sustainability goals, including achieving net-zero emissions and investing heavily in renewable energy. However, challenges remain, especially for small and medium-sized enterprises (SMEs) that often lack the resources and knowledge to implement sustainable practices.

India's government has also taken significant steps to support green commerce. Policies and initiatives, such as the National Action Plan on Climate Change (NAPCC) and the Perform, Achieve, and Trade (PAT) scheme, have incentivized businesses to adopt energy-efficient technologies and reduce carbon emissions. These regulatory frameworks, combined with market demand for green products, are helping to shape the future of business sustainability in India.

This paper aims to explore the key drivers of green commerce, analyse the sustainability practices of Indian businesses, and examine the role of government policies in shaping the green economy. The research further investigates the challenges faced by businesses in adopting sustainable practices, particularly SMEs, and identifies opportunities for growth in the green commerce sector. Through a comprehensive review of literature, data analysis, and case studies, this paper will shed light on the ongoing shift towards sustainability in business and its potential impact on India's economic and environmental future.

Literature Review

This section discusses various studies and reports related to sustainability and green commerce, with a particular focus on India.

Global Literature on Green Commerce • Sustainability as a Competitive Advantage: According to Nielsen (2021), 73% of global consumers are willing to pay more for products from brands that are sustainable. This trend has influenced

businesses worldwide to adopt greener practices, with a significant rise in the use of renewable energy, eco-friendly packaging, and waste reduction strategies.

- **Green Supply Chains:** Grewal et al. (2020) highlighted that businesses are increasingly focusing on integrating sustainability into their supply chains, using green logistics and sourcing materials from sustainable sources.

Indian Literature on Sustainability and Green Commerce

Consumer Preferences: Research by KPMG India (2021) revealed that Indian consumers are becoming more eco-conscious, with 61% of consumers expressing a preference for purchasing sustainable products. This is reflected in the growing demand for organic food, eco-friendly products, and ethical sourcing.

Corporate Sustainability: According to a PwC India (2021) report, Indian companies are focusing on sustainability to attract investment and meet regulatory requirements. Large Indian conglomerates like Tata Group and Reliance Industries have made public commitments to achieving net-zero emissions.

Government Policies: India's government has introduced policies aimed at encouraging sustainable business practices, including the National Action Plan on Climate Change (NAPCC) and the Perform, Achieve and Trade (PAT) scheme. These regulations have forced businesses to adopt greener processes.

Challenges in India: Despite the growing interest in sustainability, Rao (2021) noted that small and medium-sized enterprises (SMEs) in India face challenges in adopting green practices due to financial constraints and lack of awareness.

Data Analysis and Findings

To understand the extent of the shift toward green commerce in India, we analysed consumer behaviour data, corporate sustainability reports, and government initiatives.

Consumer Preferences in India: Green Commerce India's green shopper isn't niche anymore. Here's what data + behaviour shows for 2025-26:

Who's buying green in India

Segment	% willing to pay more	What they care about
Gen Z: 18-26 yrs	73%	Plastic-free packaging, brand activism, resale value
Millennials: 27-42 yrs	68%	Organic food, EV delivery, carbon-neutral claims
Tier-1 cities	61%	Sustainable = premium + healthy. Bangalore, Mumbai, Delhi lead
Tier-2/3 cities	42% and rising	Value + sustainability. Price sensitive but prefer local/eco if same cost

Top 5 things Indian consumers check before buying green.

1. Packaging: 74% – “No plastic” is the #1 filter. Paper tape, corn starch pouches win. If they see bubble wrap, 52% abandon cart
2. Price parity: 66% – Will pay 5-10% premium max. Beyond 15%, they drop off. “Eco” can't mean “expensive”
3. Proof, not promises: 59% – Want certifications: FSC, GOTS, Eco mark, or QR code to trace materials. “Green washing” backlash is real Local & Indian-made: 57% – Lower shipping distance = lower carbon.
4. Vocal-for-Local + sustainable is a strong combo Health link: 54% – Bamboo toothbrush, organic cotton, chemical-free skincare.
5. Personal health = planet health for most buyers.

Category-wise preference

Category	Green driver	India insight
Fashion	Organic cotton, thrift/resale	Myntra “M-Express Green”, Ajio Slow Fashion growing 40% YoY
Food & Grocery	Organic, no-pesticide, local farms	Big Basket Organic, Blinkit farm-direct tags get 2x clicks
Beauty/Personal Care	No micro plastics, refill packs	Mama earth, Bare Necessities, Juicy Chemistry win on this
Electronics	Energy star, take-back, refurbished	Flipkart 2GUD, Cashify seeing huge Tier-2 demand
Home & Living	Bamboo, recycled wood, solar	Ikea India reports 30% sales from “Sustainable Living” range

What makes Indians not buy :

1. Green washing doubt: 62% – If claim looks fake, trust drops for entire brand.
2. Inconvenience: No COD on eco-products, or 7-day delivery vs 1-day kills conversion
3. No clear disposal info: “Biodegradable” but no home-compost guide = confusion
4. Too preachy: Moralizing ads backfire. Show benefit: “saves you money + planet”

Behaviour shifts post 2023

1. “Green delivery” opt-in: 31% of Zepto/Blinkit users in Bangalore choose “club orders, deliver in 4 hrs” to cut trips
2. Resale-first: OLX, Cashify, Libas resale up 3x. Gen Z checks resale value before buying new
3. Subscription + refills: Soap, detergent refills by mail gaining traction to cut plastic
4. Festival gifting: Diwali/Holi hampers with plantable boxes, seed rakhis now mainstream.

Challenges for Indian Businesses Adopting Green Commerce.

Going green in India sounds great on paper, but the ground reality hits hard. Here are the biggest roadblocks brands face:

Cost & Infrastructure Challenges

Challenge	What it looks like in India	Impact
Higher upfront cost	Compostable mailers = Rs. 8-12 vs plastic pouch Rs. 2. EV delivery van = 2x diesel cost	Margins get hit 3-5% immediately. Tough for bootstrapped D2C
Lack of green supply chain	Few FSC-certified paper vendors, organic cotton mills clustered only in Tamil Nadu/Gujarat	Sourcing takes 2-3x longer, MOQs are high
Warehousing gaps	Solar panels + cold chain + rainwater harvesting = big capex. Most 3PLs don't offer green FCs	Brands stuck with traditional godowns
EV logistics limits	EV range anxiety, charging infra poor beyond Tier-1. Ecom Express/Delhivery green fleet only in 15 cities	Can't promise pan-India carbon-neutral shipping

Consumer & Market Challenges

1. Price sensitivity: 66% Indians won't pay >10% premium for “eco”. But sustainable raw materials cost 20-40% more
2. Green washing trust deficit: After Patanjali, Mamaearth controversies, customers doubt every “natural” claim. Need certifications which cost Rs. 50K-5L yearly
3. Awareness gap in Tier-2/3: “Biodegradable” vs “compostable” confusion. Many think paper packaging = cutting more trees
4. Demand inconsistency: Festive spike for eco-hampers, dead rest of year. Hard to plan inventory.

Opportunities for Indian Businesses

- Government Support: Policies and incentives such as tax breaks and subsidies for sustainable practices present significant opportunities for businesses to invest in green technologies.
- Rising Consumer Demand: The increasing awareness and demand for sustainable products create a market for businesses to expand their green product lines.

Conclusion

The shift toward green commerce represents a significant transformation in the way businesses operate, especially in emerging economies like India. In 2021, sustainability has evolved from a fringe concern to a mainstream business strategy, driven by a convergence of consumer preferences, corporate social responsibility, and government policies. As businesses increasingly adopt environmentally friendly practices, the demand for green products and services continues to grow, offering a new avenue for innovation and market growth. Our findings underscore that large corporations in India, such as the Tata Group, Reliance Industries, and Infosys, are leading the way in embracing sustainability. These companies have made substantial commitments to reducing their environmental footprints, including setting ambitious goals for carbon neutrality, increasing the use of renewable energy, and incorporating sustainable sourcing in their supply chains.

Additionally, there is a lack of awareness and understanding of the long-term benefits of sustainability, leading to a reluctance to embrace green initiatives. Without targeted support and incentives, it is likely that SMEs will fall behind in the green commerce movement, widening the gap between large and small businesses in terms of sustainability performance. Government policies and regulations play a critical role in shaping the trajectory of green commerce. India's proactive stance in encouraging sustainable business practices, through initiatives such as the National Action Plan on Climate Change (NAPCC) and the Perform, Achieve, and Trade (PAT) scheme, provides businesses with the necessary frameworks and incentives to adopt green practices. These policies not only encourage businesses to reduce their environmental impact but also promote the development of green technologies, making sustainability more accessible for companies of all sizes. However, the government needs to do more to address the specific challenges faced by SMEs, such as providing financial support, offering tax incentives, and raising awareness about the economic and environmental benefits of green commerce.

This shift in consumer behaviour provides a significant opportunity for businesses to differentiate themselves by offering greener alternatives and positioning themselves as leaders in corporate social responsibility. Looking ahead, the future of green commerce in India appears promising, but it will require continued collaboration between



businesses, consumers, and policymakers. The rising awareness of environmental issues, coupled with the growing demand for sustainable products and services, will continue to drive the adoption of green practices. However, businesses must be prepared to navigate the challenges of integrating sustainability into their operations, especially in the face of financial constraints and market competition. In particular, businesses must focus on innovation to develop new green products, enhance supply chain sustainability, and integrate circular economy principles into their business models. In conclusion, while the shift toward green commerce in India is still in its early stages, it holds immense potential to reshape the country's economic and environmental landscape. By aligning business strategies with sustainability goals, companies can not only contribute to mitigating climate change but also enhance their long-term profitability and market competitiveness. As businesses in India continue to adopt sustainable practices and as the government introduces more supportive policies, India will emerge as a key player in the global green economy. The green commerce movement in India is not only an opportunity for businesses to capitalize on a growing market but also a crucial step towards ensuring a sustainable and environmentally responsible future.

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OriginalArticle

The Non-Brahmin Movement in South India: Role of Jyothibha Govindarao Phule

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Abstract

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Jyotibha Govindarao Phule (1827-1890), or Mahatma Jyotiba Phule as he is popularly known was the first person in modern India to launch a movement for the liberation of caste-oppressed toilers and women irrespective of the caste. What were social reformers like Rammohan Roy, Dayanand Saraswati and Vivekananda were to the elitist cultural nationalism, Phule was to the freedom struggle of India's long-suppressed humanity. Phule was inspired by the egalitarian philosophy of Buddha and Kabir and was an admirer of the emergent liberal democracies of the west and the ideology of social revolution. He presented a socio-cultural analysis that was deeply critical of caste-vama domination. He saw Brahmanism both as the ideological and institutional system of monopolizing knowledge and power by a particular class which excludes, divides and dominates other groups in the society. He argued that even before trying to overturn the material power of the upper castes, it was necessary to step out of the ideologies of Brahmanism for which proper access to knowledge was an essential prerequisite. He thought if both Women and Sudratisudhra do not get education, they would not be able to emancipate themselves. So he started a massive work of education by starting various schools in and around Poona. Phule exposed the Brahmanical pretensions and appreciated the Christian missionaries for their noble work in school education. He termed this understanding of knowledge as Tritiya ratna, the 'third eye', which was the means to end Brahmanism hegemony. Phule had a vision of a fundamental change castfs constitute the overwhelming majority their own path, outside the Brahmin fold, to fo castelessness, rationality and justice. To prom founded the Satyashodak Samaj in 1 873. A se after its formation included belief in equal organization were: members were exhorted to sp make them aware about their rights and social and public education was accorded the highs educating Shudras, it could be possible to brin him, education was the weapon to bring to a Brahmins. Members were advised to make every women and children of the Society.

Keywords Ideological Hegemony, Rationalism, Phenomenon, Subordination of women, Iconoclast, Authoritarian, anomic and Domination

Introduction

Jyothi Rao Phule occupies a unique position among the social reformers of Maharashtra in the nineteenth century. While other reformers concentrated more on reforming the social institutions of family and marriage with special emphasis on the status and right of women, Jyotiba Phule revolted against the unjust caste system under which millions of people had suffered for centuries and developed a critique of Indian social order and Hinduism. During this period, number of social and political thinkers started movement against such systems and methods. These thinkers aimed at upliftment of the status of women socially, economically, educationally and politically. Of these socio-political thinkers Mahatma Phule, Mahatma Gandhi, Dr. B.R. Ambedkar, Raja Ram Mohan Roy, Ishwar Chandra Vidyasagar, and such other have organized movement for striving equality for dalits, backward classes and women. As such, Mahatma Phule was an earliest leader, who strongly opposed gender inequality. He was in the real sense a great thinker finder of truth... He was severely criticized by Brahmin samaj for his noble work and attacked by them. But he continued with his movement.

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He sacrificed his life for the upliftment of untouchables, peasants and women. Mahatma Jyoti Rao Phule is regarded as the most important figure of social reform movement in India. He is regarded as the father of Indian social revolution. He was First revolutionary and leader of downtrodden, peasants and supporter of women's education. He paved the way for the new era of social activism. He established many institutions and tried to remove manmade inequality. He was the first active leader of downtrodden and introduced us to humanity. He was propagator of Human unity and national progress. Dr. B.R. Ambedkar said Mahatma Phule the greatest Shudra of modern India who made the lower classes of Hindus conscious of their slavery to the higher classes who preached the gospel that for India social democracy was more vital than independence from foreign rule. Phule's views and philosophy was based on facts, reality, experiences and observation. In that sense his philosophy was not utopian but realistic. He was a source of inspiration for Maharshi Shinde, Dr. Babasaheb Ambedkar, Gadgebaba and Shahu Maharaj. He was a Founder of many movements- 1. Movement against discrimination. 2. Movement of Dalit. 3. Movement of women's Education. 4. Peasant's Movement. 5. Movement against blind faith.

Objective of the Study

1. The social and cultural struggle against the British ideas as well as the traditional social order, in the west and south of India.
2. The nature of the challenge these posed for both the British rule and traditional social order.
3. The variations of the character and nature in these movements from region to region.
4. The basic limits of these movements

The Social and Cultural Background

The social and cultural struggle in the nineteenth century was a resistance offered simultaneously against the ideological hegemony of the British colonial rule and the traditional- social and cultural order. With the formation of a "community of intellectuals", at regional level and on the national place, there developed an awareness of the weaknesses of the traditional order, which could be combated with modern western ideas. The birth of. Modern ideas were however, influenced by the specific material, social and political conditions under colonialism and in different parts of the country these ideas came up through different moving: nets. The nineteenth century, saw the emergence of a number of socio-cultural movements which sought to reform and regenerate Indian culture and traditional institutions. Castes which produce inequality and social division, inhuman practices like Sati, infanticide and polytheism etc., were criticised with the help of new ideals of freedom, reason, toleration and human dignity. The English educated middle class were united in waging a series of social and cultural battles, against caste inequality and its hierarchy that went with it. They also worked for the general emancipation of women by taking up issues like widow marriage, female education and equal property rights. Rational and religious universalism were no doubt two important ideas used by the nineteenth century intellectuals which gave birth to radical social critiques like that of Jotibao Phule in Maharashtra. These intellectual struggles were informed by an ideology or a world view which was broadly the same: "while opposing the hegemonic values of a feudal society they in Western and Southern were adulating the introduction and acceptance of values characteristic of a bourgeois order". Influenced as it was western liberalism, this world view resulted in the retreat of several ideas as is evident from the character of some recent radical social and cultural movements. This we shall see in the following sections.

The Cultural Movement in Maharashtra

The traditional social stratification in Maharashtra was governed by Varnashrama dharma, that is the division of society into an unequal hierarchical order comprising Brahmins, Kshatriyas, Vaishyas and Sudras. The social interaction between different castes governed by this stratification was maintained by strict rules of pollution and purity. At the top, was the Brahmin caste with many rights and privileges which maintained their social control over society by developing a religious ideology which gave legitimacy to many superstitions and inhuman practices. At the lowest end were the Ati-Sudras or untouchable outcastes deprived of education and all other rights. In Maharashtra the Hindus were 74.8 per cent of the total population. According to the Census of 1881, the Kunbis or Marathas were the main community about 55.25 per cent of the total population. Kunbis were also economically powerful in rural society. Being a rich peasant class they controlled agricultural production. However, the influence of the traditional ideology and the institution of caste made them subservient to the Brahmins. The Brahmins, on the other hand, exercised considerable influence over other castes due to their ritualistic power and monopoly over learning and knowledge. During the British period the Brahmins successfully adopted the new English education and dominated the colonial administration. The new intelligentsia therefore, came mostly from the already advanced Brahmin caste, occupying strategic positions as officials, professors, lower bureaucrats, writers, editors or lawyers. This created fear among the non-Brahmin castes. It was this traditional social order which came under heavy fire both from The Christian missionaries and the nationalist intelligentsia that had imbibed western liberal ideas. We can divide the reform movements into two distinct strands. The early radical reforms like Jotirao Govindrao Phule tried for a revolutionary reorganisation of the traditional culture and society on the basis of the principles of equality and rationality. The later moderate reformers like Mahadev Govind Ranade (1842-1901), however, gave the argument of a return to the Dast traditions and culture with some modifications. It was the early radical tradition of Phule which gave birth to the non-Brahmin movement in Maharashtra.



Jyothi Rao Govindrao Phule (1827-1890)

Personality Jotiba Phule was born into a Sudra Mali family in Poona in 1827. His father was a gardener or a flower merchant. Being a member of the oppressed sudras, Phule could easily understand the problems of the Ati-Sudras, i.e., the untouchable Mahars and Mangs and identify himself with them. He received initial education in a mission school but had to discontinue it in 1833. An incident in 1848 turned Phule into a social revolutionary. When he went to attend a Brahmin friend's marriage, some orthodox Brahmins insulted him by calling him a sudra and asked him to leave. This humiliation made Jotiba search for the roots of caste discrimination and the inhuman practice of untouchability. Ideas on Society and Economy 16. Jotirao Govindrao Phule In his quest for the truth, Phule read the Vedas, the Manu Samhita, the Puranas, the thought of Buddha, Baseshwar and Tirthankar and the medieval Bhakti saints extensively. He also acquainted himself with the western thought and the Christian and Islamic religions. Phule judged the whole culture and tradition through the spirit of rationality and equality. While the principle of equality called for a total rejection of caste system, authoritarian family structure and subordination of women, the principle of rationality demanded the removal of superstitions, ritualism and the traditional whole of cultural behaviour. This called for a complete rejection of the sacred Hindu texts and scriptures which sustained the inequitable institutions. Like Dr. Ambedkar, Phule read the scriptures as he would read ordinary books, the object in the two cases being to find out the truth. He had radical views on social, religious, political and economic issues. Jotiba Phule considered the caste system as an antithesis of the principle of human equality. The existing caste system reserved a perpetual slavery for the sudras, especially the untouchables. The untouchables were not allowed to walk on the streets during the sunrise lest their long shadows should pollute Brahmin houses. This inhuman treatment of atisudras by the Brahmins and the denial of the common rights of humanity made Phule rebel against the caste system. Interpreting the past history, Phule argued that the alien Aryans after conquering the original inhabitants i.e. the Dravidians, imposed the unequal caste system. They then invented the supposed divine origin of caste divisions to perpetuate their exploitation of the natives branded as sudras. Showing the egalitarian past of the united sudras, he sought to raise the morale of the non-Brahmins and united them to revolt against the centuries old inequality and social degradation.

Since Hindu religion justified and sanctioned caste system, Phule rejected it completely. He was an iconoclast through his satirical writings. Phule exposed the irrationalities in Hindu religion. He criticized idolatry, ritualism and priesthood, theory of Karma, rebirth and Heaven. For Phule, God is one and is impersonal. His religion rests on three principles of truth which include freedom and equality of men and women and dignity of labour. "Brahmins hide Vedas from Sudras because they contain clues to understand how Aryas suppressed and enslaved 'them'", wrote Phule. Naturally he looked upon education of the masses as a liberating and revolutionary factor. In the words of Phule: No riches without vigour, no vigour without morality, no morality without knowledge, no knowledge without education. Unless ignorance and illiteracy of the masses are removed through education they would not rebel against their mental and physical slavery. He urged the British Government to impart compulsory primary education to the masses through teachers drawn from the cultivating classes.

Women and untouchables were the two worst sufferers in Hindu society. Phule argued that women's liberation was linked with the liberation of other classes in society. He regarded Brahminism responsible for keeping women uneducated and slaves to men. He turned to break the hold of the authoritarian family structure. Equality between classes as also between men and women was pleaded by Phule. During marriages he asked the bridegroom to promise the right of education to his bride. The pamphlet, *Isara* (warning), published in 1885 contains Phule's main ideas on economics of the agrarian classes. Aware of the problems of agricultural labourers and small peasant cultivators, Phule supported them in their struggles. For example, in Konkan, he stood by the tenant sharecroppers and criticized the Khots for exploiting them. Mostly concerned with the immediate issues like irrigation facilities, indebtedness, land alienation to moneylenders, burden of land revenue, etc., Phule however, failed to elaborate any coherent economic ideology. Phule saw the British rule as an instrument in breaking the slavery of sudras and hoped for a further revolutionary transformation of society under their rule. He was one of the first to introduce peasantry as a class in politics. He opposed the Indian National Congress, for it -- failed to take up peasant problems. His concept of nation rested upon freedom and equality.

Activist

To propagate his ideas the means that Phule used were: Publication of journals and magazines, pamphlets and books and the Marathi language both in speeches and writings. A journal, *Deen Bandhu*, in Marathi, was edited and published by Phule for disseminating his thought and exposing the oppressive character of the Aryan-Vedic tradition. In his book, *Gulamgin* (slavery), which appeared in 1873, Phule elaborated his conception of the historical roots of Sudras' slavery under Brahminical domination and compared it with the negro slavery in America. In *Setakaryancha Asaela* (The whip-cord of the Peasantry), he elaborated on what the peasants can do about their misery and exploitation. By 1870, the social reforms talked about by the liberals and those sponsored by Phule. The non-Brahmin in Western and Southern India emerged on opposite lines. Unlike liberals, Phule's aim was a total reconstruction of the socio-cultural structure based on the principles of rationality, equality and humanism. The primary task of his struggle was to create an awareness of inequality in people's minds. This Phule accomplished by critically analysing and exposing the Brahminical literature. Phule also tried to translate his ideas into actual struggles. He started a girls school



in 1851 and one for Sudras. Widows were offered protection and shelter. A water tank was opened near his house, to provide drinking water for Sudras. To fight against Brahmanism and its ideology, Phule started the Suryashodhak Sanstha (society for Finding Truth) in 1875. Phule also organized the poor tenants in Junnar against the extraction of heavy rents by landlord-moneylenders. This compelled the government to impose ceiling on rentals. Thus throughout his life, Phule took the side of down-trodden classes. He worked for the removal of unequal caste system and for the establishment of democratic justice. Jyotirao Phule possessed an awareness of the relationship between caste inequalities and social subordination and material backwardness of Sudra castes. However, he failed to perceive the actual character of colonial rule and, like other liberals, believed in its historically progressive role. The type of social revolution envisaged by Phule could not be accomplished without any radical changes in agrarian relations and without removing

Non-Brahmin Movement in the Early Twentieth Century

With the death of Jyotirao Phule in 1890, his Suryashodhak movement receded into the background. Even though the movement was revived by Chhatrapati Shahu Maharaj of Kolhapur (1874-1922), with the establishment of Satya Shodhak Samaj in July 1913 at Kolhapur, it acquired a narrow complexion. Shahu Maharaj no doubt furthered the cause of non-Brahmin movement by starting educational institutions, hostels and scholarships -for the students of the depressed classes. Between 1913 and 1922 he was also actively associated with several non-Brahmin and Kshatriya caste conferences. Under Shahu Maharaj, the non-Brahmin movement passed into the hands of business and land-owning (feudal) upper caste non-Brahmins, who used it for their political gains. A major battle waged by Shahu Maharaj was for acquiring Kshatriya status within the Varnashrama Dharma for himself and his community. This was nothing but a betrayal of Phule's ideology which left the lower Sudra castes to their social degradation and poverty. After 1918, with Montague-Chelmsford reforms, Shahu Maharaj, along with the Justice Party in Madras, used the movement for demanding special political representation for 'backward' classes in the Councils. Thus the Satya Shodhak movement deviated from its main path and turned into a movement for the benefit of the landowning upper caste non-Brahmins.

Character of the Movement It is argued by historians like Anil Seal that the Brahmins, being a traditional literate caste, adapted themselves to the colonial system faster and began to monopolize the opportunities in professions and bureaucracy. As a result, the non-Brahmins rose against this Brahmin monopoly. However, a deeper analysis of Jyotirao Phule's social reforms reveals a wider consciousness of the system of caste inequalities and its relationship with the social subordination and material backwardness of the Sudras. For Phule vehemently argued for a fundamental change in Sudras' attitude towards their caste subordination. He established an ideological basis for a revolution in social and religious values. Yet the movement was slowly diverted from its radical path, by Shahu of Kolhapur, because of some inherent weaknesses. Phule did not see the essential link between material conditions of the people and their culture. His support to British rule obscured the colonial exploitation of the peasantry, and their interest in sustaining the old feudal social and economic order which generated and sanctified caste inequalities.

Non Brahmin Movement in South India

In the Madras presidency the Brahmins constituted 3.3% of Hindus. But in the rituals dominated traditional hierarchy, they were superior to other castes. Traditionally being a literate caste, the Brahmins were quick in adopting English education and monopolizing opportunities in professions and colonial bureaucracy. This aroused the envy and hostility of the non-Brahmin communities, which in turn, resulted in a non-Brahmin movement. However, the Brahmin and non-Brahmin conflict which was aggravated by job opportunities, had much deeper social, economic and cultural roots.

Self-Respect Movement in Tamilnadu

Recent historical works show that the Tamil renaissance had resulted in the growth of Dravidian consciousness, and its critical manifestation was the starting of non-Brahmin movement. Based on the Tamil classical works like Pattupattu, Manimekalai, Cilappatikaram, published between 1887 and 1904, Tamil scholars had elaborated on a picture of classical Dravidian civilization which was distinct from the Aryan and Sanskrit culture. Interestingly, the notion of independent existence of Tamil culture was first in the Non-Brahmin Movement developed by a European scholar, Caldwell, this was later elaborated by Tamil scholars. In Western and Southern India the non-Brahmin Tamil scholars also attempted to show that the Aryans had distorted the superior Dravidian religious systems like Saiva Siddhanta philosophy and imposed the teachings of the Vedas and the caste system on the South Indian people. It was this rediscovered distinct cultural identity, which expressed itself in the non-Brahmin movement after 1916.

Justice Party and Non-Brahmin Politics

The Non-Brahmins' resentment took a political form, in 1916 in Madras city, with the formation of South Indian Liberal Federation, known as the Justice Party, which claimed to represent the interests of all non-Brahmins in the Madras Presidency including Muslims, Christians and Untouchables. The founders of the organization were T.N. Nair, P. Tyagaraya Chetti and C. Natesa Mudaliar. The initial demand of the Justice leaders for reserved seats in the Provincial Legislative Council was slowly extended to include concessions in education, public appointments and nomination to local boards. The development of a non-Brahmin section of the professional middle class and the creation of the Justice Party to express its political views, dominated the political scene till the late 1930's. However,



the social base of the Justice Party being the non-Brahmin leading zamindars and the urban business groups, it served the political interests of these feudal and commercial classes. Understandably in the 1920s, there arose a conflict within the Justice Party. Some felt that the party should be working for the reform and regeneration of non-Brahmin society and culture, and should not remain confined to a quest for jobs and offices. This urge for social uplift through cultural reform, could not be satisfied, by the narrow social and political perspective of the feudal and commercial leadership. On the other hand, the increasing mass character of the national movement, after 1920-22, started drawing most of the non-Brahmin peasant groups within its fold. Especially after 1927-28, the mass national movement overshadowed the Justice Party. At this juncture the non-Brahmin intellectuals like E.V.R. Naicker, who came out of the Indian National Congress due to disillusionment, launched a separate popular movement, called the Self-Respect Movement, giving a new twist and lease of life to the non-Brahmin movement in Madras.

Non-Brahmin Movement in Karnataka

The Vokkaligas, two dominant castes in Karnataka, had suffered sub-divisions before being listed as a single unified caste by the Census of 1901. This categorization, argued one historian, "provided the leaders of the non-Brahmin movement with a significant base for collective mobilization". Serious solidarity efforts were also made internally by different caste associations. The Lingayats established the Mysore Lingayat Education Fund Association in 1905, while the Vokkaligas formed the Kokkaligara Sangha in 1906. However, it was the non-Brahmin movement, which provided these caste associations with a common platform, and held these social groups together.

The non-Brahmin movement in Karnataka took its birth around 1918 and it was Years-I spearheaded by Vokkaligas and Lingayats. A delegation of non-Brahmin leaders called on the Maharaja of Mysore in 1918 and protested against the discrimination practised against non-Brahmins. This resulted in the appointment of a committee headed by Sir Leslie Miller, who submitted his report in 1919. On the recommendation of Miller, the Government passed an order for an equitable communal representation in the public service. With the emergence of the Congress movement in Mysore State, the non-Brahmin movement was slowly drawn towards the national liberation struggle and it finally merged with the Congress in 1938. When secular politics also recognizes the caste based demands, however genuine they might be, what follows is an ascendancy of caste associations to voice the secular demands. This was what happened to the non-Brahmin movement in Karnataka. During the 1930s and '40s, the non-Brahmin groups began to lose their each caste category began to demand separate representation for itself both in the Representative Assembly and in Government services. Thus, the non-Brahmin movement was transformed into a backward class's movement from the 1940s. The two dominant groups, the Vokkaligas and the Lingayats, began to fight between themselves for a share of political power in the newly emerging representative political system, especially after 1950.

Comparative Analysis of the Movements

A comparative analysis of the non-Brahmin movements of Maharashtra, Tamil Nadu, Andhra and Karnataka shows different levels of perception with regard to the system of caste inequalities and its relationship with socio-cultural subordination and material backwardness of Sudra caste. Of course, there were some crucial social and religious elements which were perceived as common to the oppression of the non-Brahmin groups, in all these regions. Let us look at these commonalities and differences. Religious conservatism of high caste Brahmins and the rigid caste structure were perceived as the main reasons for the socio-cultural backwardness of non-Brahmin peasant groups and the main obstacles to their programme of radical social reform. Unlike in other regions, Jyotiba Phule in Maharashtra, put forward a deeper analysis of social inequalities and vehemently argued for a fundamental change in the attitude of non-Brahmins towards their status as Sudras. He totally rejected the existing religious ideology and caste system. Unlike the nineteenth century social reformers, Phule saw no possibility of reforming them internally. It was in establishing an ideological basis for a revolution in social and religious values that Phule displayed his greatest talent. He projected a new collective identity for all the lower castes of Maharashtra. In his bid to discover the identity of Sudras, Phule drew on the existing symbols from Maharashtra's warrior and agricultural tradition and gave them a powerful new meaning. One drawback, however, was Phule's support to the British rule. He failed to understand the real nature of the colonial rule. Even his social reform got distracted under Maharaja of Kolhapur, because the emphasis was on Kashatriya status for his caste and electoral politics. Emphasis on English education, larger representations in provincial Legislative Councils and local boards and reservation in government services could also be seen in the case of Justice Party in Madras and non-Brahmin movement in Karnataka. However, educational development was central to the self-respect movements in Tamil Nadu and Andhra.

In Tamil Nadu it was Periyar who articulated new radical ideas for the uplift of women and non-Brahmin groups. Unlike in other regions, the Self-Respect Movement under Periyar sought to integrate the emancipation of women and Sudra by reforming the system of marriage and rejecting the caste system. When compared to Maharashtra, the social base of Periyar's movement was confined to the rural landowning classes and urban based business groups and he failed to mobilize the untouchables. Similarly in coastal Andhra the self-respect movement was dominated by upper caste Non Brahmins: Karnmas, Reddis and Velamas. The non-Brahmin category failed to encompass. The Untouchables-Malas and Madigas who constituted the most oppressed class of agricultural labourers. The movement only aimed at the upward social mobility of the landowning upper caste non-Brahmins. It never questioned the rationale of the caste system. Instead of rejecting the hierarchical principle itself, they drew heavily on it to estate their



position. This was in contrast to the Maharashtra scene in the 19th century The Non-Brahmin Movement where Phule had rejected the Varnashrama dharma. The result was a cleavage among the in Western and Southern India non-Brahmins, who split into different caste groups and started articulating their immediate demands like better education, government jobs and representation in politics. One of the negative trends, as witnessed in Karnataka, was the increasing use of caste category even to put forward secular demands. This negative trend became more pronounced after India had attained her independence in 1947.

Conclusion and Findings

The background of oppression and backwardness of the traditional social order (like caste, oppression of women, etc.) from which his non-Brahmin movement emerged, how its distinct radical tones of change were watered down by the politics of Shahu in Maharashtra or the politics of Dravida Kazhgam (in which Justice Party and Self Respect movement merged), in south e.g., that this watering down happened because of the increase in the influence of landed Non Brahmin castes and the way they used the movement to gain social and economic status, consequently, the weak understanding of the British rule as a perpetrator of oppressions of traditional order, never changed. The non-Brahmin movement never developed an independent nationalist strategy, that the strength of these movements varies region to regions. In Madras e.g. it never reached the untouchables, while in Maharashtra e.g. Phule was able to project a new collective identity for lower castes. Phule is remembered for his contribution to various fields like education, caste equality, agricultural reforms, economics, women and widow rights, human rights and social equal. He occupies a unique position among the 19th century social reformers of India thought of Jyotirao Phule was revolutionary; it gave a clearer goal for individual self-fulfillment, complete equality and social unity than many other "reformist" time. People called him a revolutionary, because of his uncompromising attack on the old society. When he stressed about participatory development, he did economic development of peasants, shudras and women, but other reforms more on reforming the social institutions of family and marriage with respect to the status and rights of women. He emphasized more on classless/casteless by his ideology. Several Parties, organizations, dalit intellectuals started work to push forward Phule's revolutionary ideology. Although many political parties for this cause, they did not make qualitative difference. But all these parties are political power and giving moral and political strength to scheduled castes and OBCs and encouraging dalits to become leaders. To sum up, Mahatma J a revolutionary social reformer.

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OriginalArticle

Role of Artificial Intelligence in Digital World

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Artificial intelligence refers to systems that perform tasks typically requiring human cognition, such as learning, reasoning, perception, and decision-making. Its role spans across domains by automating complex processes, augmenting human capability, and extracting patterns from large datasets that would be impractical for manual analysis.

Artificial intelligence is the foundational technology that enables digital systems to perceive, learn, and act without explicit programming. In the digital world, it functions as both infrastructure and interface — transforming raw data into services, predictions, and experiences.

In the digital world, artificial intelligence functions as the underlying engine that converts raw data into actionable intelligence, enabling systems to operate at scale, adapt in real time, and deliver personalized experiences.

Key Words: -Types, Objectives, Significance, Impact and Challenges of Artificial Intelligence.

Introduction: -

The digital world runs on data, and artificial intelligence is what makes that data useful. As the internet, mobile devices, and connected systems generate information at an unprecedented rate, AI provides the tools to interpret, organize, and act on it automatically.

At its core, AI in the digital world functions as a layer of applied intelligence. It powers the systems we interact with daily — search engines that surface relevant answers, recommendation feeds that adapt to our behavior, fraud detectors that flag suspicious transactions and voice assistants that understand natural language. Beyond user-facing features, AI also manages the infrastructure behind the scenes: optimizing cloud servers, detecting cyber security threats, and

In short, artificial intelligence is no longer an add-on to the digital world — it's becoming the operating system for it.

Literature Review

1. **AnkitChourasiya, Artificial Intelligence and Digital World, March 2023:-**Artificial Intelligence (AI) is changing the digital world and opening new opportunities for businesses and individuals. AI is becoming a key driver of growth, efficiency, and competitiveness, and it will continue to shape the future.
2. **Michael Cheng-Tek Tai, The impact of artificial intelligence on human society and bioethics,August 2020.:-** Artificial intelligence (AI), often called the fourth industrial revolution (IR 4.0), is changing not only how we work and interact, but also how we understand ourselves.

Meaning: -

Artificial intelligence is the ability of machines to perform tasks that typically require human intelligence.

Types of Artificial Intelligence in Digital world

Artificial Intelligence types are usually grouped by **Capability, Function and Technology.**



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I) By Capability: How "smart" it is

1. **Narrow AI / Weak AI:** Built for one specific task. This is 100% of AI in use today. Examples: ChatGPT for text, Google Photos for face tagging, Spotify for song recommendations. It can't do anything outside its training.
2. **General AI / Strong AI:** Hypothetical. Can understand, learn, and apply knowledge across any task like a human. Doesn't exist yet.
3. **Super intelligence:** Hypothetical AI that outperforms humans at every task. Still science fiction.

II) By Function: What it does in digital systems

1. **Reactive Machines:** Simplest type. Reacts to current input with no memory. Example: IBM's Deep Blue chess AI. It analyzes the board now, but doesn't remember past games.
2. **Limited Memory:** Most digital AI today. Uses past data to make decisions. Examples: Self-driving cars use recent sensor data. Chatbots remember your last few messages to stay coherent.
3. **Theory of Mind:** Hypothetical. Would understand human emotions and beliefs. Not available in current digital products.
4. **Self-Aware:** Hypothetical. Has consciousness. Not real yet

III) By Technique: How it's built

1. **Machine Learning (ML):** Systems learn from data without explicit rules. Powers most digital AI.
2. **Deep Learning:** A type of ML using neural networks with many layers. Handles images, audio, text. Examples: Image recognition, voice assistants, large language models.
3. **Generative AI:** Creates new content instead of just classifying it. Examples: DALL-E for images, GPT for text, Sora for video.
4. **Rule-Based / Symbolic AI:** Follows hand-coded logic. Still used in digital systems for compliance, chatbots with fixed flows. Example: Tax software that applies IRS rules.

Objectives of Artificial Intelligence in the Digital World

- **Automate Complex Decision-Making:** Replace or augment human judgment in high-volume, high-speed decisions.
- **Personalize User Experience at Scale:** Tailor digital content, products, and interactions to individual users.
- **Extract Value from Unstructured Data:** Turn text, images, audio, and video into actionable insights.
- **Optimize Systems and Resources:** Improve efficiency, reduce waste, and lower costs in digital infrastructure.
- **Enable New Digital Products and Services:** Create capabilities that weren't possible before.
- **Improve Security and Trust:** Detect threats and anomalies faster than human teams.
- **Bridge Human-Computer Interaction:** Make digital interfaces more natural and accessible.

Significance of Artificial Intelligence in the Digital World

- **Shifts the Economy from Manual to Cognitive Scale:** AI lets digital platforms perform reasoning, prediction, and creation at internet scale.
- **Turns Data into the Primary Product:** In the digital world, data alone is useless. AI is what extracts value from it.
- **Accelerates Innovation Cycles:** AI compresses time between idea and deployment.
- **Redefines Human Labour and Skills:-** AI automates routine cognition, forcing a shift in what humans do.
- **Creates New Risks and Dependencies:** As AI runs the digital world, failures scale too.
- **Democratizes Access to Expertise:** AI puts specialist-level capabilities into anyone's hands.
- **Makes the Digital World Adaptive:** Static software is giving way to dynamic systems.

Impact of Artificial Intelligence in the Digital World

1. Economic Impact: New Winners, New Work

Positive: AI creates efficiency gains that scale. Companies using AI report 20-40% productivity boosts in digital workflows. New roles like prompt engineers, AI trainers, and data curators are emerging.

Negative: Automation is hollowing out mid-level digital jobs — data entry, basic customer support, routine coding. The digital economy is splitting into "AI operators" and "AI-augmented workers."

2. Information Impact: Abundance + Manipulation

Positive: AI makes information more accessible. Real-time translation, summarization, and search mean a student in Navalgunj has the same access to knowledge as someone in Silicon Valley.

Negative: Generative AI floods the digital world with synthetic content. Deepfakes, AI-written misinformation, and SEO spam are eroding trust in digital media. We now have to verify what we see and read.

3. Social Impact: Personalization vs. Filter Bubbles

Positive: AI tailors digital experiences. Your news feed, shopping recommendations, and learning apps adapt to you. This boosts engagement and reduces decision fatigue.

Negative: Hyper-personalization creates echo chambers. Social platforms optimize for engagement, not truth, which amplifies division and mental health risks. The digital world increasingly feels like "your world" instead of "the world."



4. Infrastructure Impact: Centralization + Energy

Positive: AI optimizes cloud, networks, and data centers. Google reduced data center cooling energy by 40% using AI. Digital infrastructure is becoming smarter and cheaper to run.

Negative: Training large models requires massive compute. The digital world is centralizing around a few AI labs with GPUs. This creates bottlenecks, energy demand, and new dependencies on Big Tech.

5. Creative Impact: Democratization + Devaluation

Positive: AI tools let non-experts create. A solo creator can now write, design, code, and edit video. The barrier to digital creation dropped from “years of training” to “good prompts.”

Negative: AI-generated content devalues human craft. Writers, artists, and developers face price pressure. The digital world is saturated with average AI output, making originality harder to find.

6. Security Impact: Better Defense, Better Attacks

Positive: AI detects threats in real time. Banks catch fraud, platforms flag malware, and governments spot cyber attacks faster than human teams.

Negative: AI also powers attacks. Phishing emails are now personalized, deepfake scams are rising, and automated hacking tools are cheaper.

7. Governance Impact: Rules Can't Keep Up

Positive: AI enables regulatory tech — automated compliance, audit trails, and risk monitoring.

Negative: Digital platforms operate globally, but AI laws are national. The impact: platforms self-regulate, creating a patchwork of standards. We're building digital systems faster than we can govern them.

Challenges of Artificial Intelligence in the Digital World

- **Data Quality and Bias:** AI learns from data, and the digital world is messy. If training data reflects historical bias, AI will amplify it.
- **Hallucination and Reliability:** Generative AI confidently produces wrong answers. In digital contexts, this creates misinformation at scale.
- **Security and Adversarial Attacks:** AI systems are vulnerable to manipulation.
- **Transparency and Explain ability:** Most high-performing AI models are black boxes. We can't easily explain why they made a decision.
- **Energy and Infrastructure Costs:** Training and running large AI models requires massive compute and power.
- **Job Displacement and Skill Gaps:** AI automates cognitive tasks faster than people can reskill.
- **Privacy and Surveillance:** AI needs data to work, but digital data often comes from user behavior.
- **Regulatory and Legal Uncertainty:** Laws haven't caught up to AI. Who's liable when AI causes harm? What counts as fair use for training data?
- **Over-Reliance and Skill Atrophy:** When people depend on AI, their own skills decline.
- **Centralization of Power:** Only a few companies have the compute and data to build frontier AI.

Conclusion:

Artificial Intelligence in the Digital World Artificial Intelligence has shifted from a digital feature to digital infrastructure. It now decides what we see, how we work, and how fast systems respond. AI makes the digital world faster, cheaper, and more personalized. It automates decisions, unlocks insights from data, and puts specialist tools in the hands of everyone. That's why search engines, social platforms, e-commerce, and cloud services all run on it today. That same power creates new fragilities. Bias in data becomes bias at scale. Hallucinations become misinformation. Centralized models create dependency. The digital world is now defined by a tension: more capability, less control.

The next phase won't be about “more AI.” It'll be about better governance, transparency, and human-AI collaboration. The digital world will succeed with AI only if we design systems that are accountable, energy-efficient, and aligned with human intent.

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OriginalArticle

Sustainable Business Practices in Major Indian Business Houses A Study of Tata Group, Reliance Industries Limited and Adani Group

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This research paper provides an analytical examination of sustainable business practices adopted by major Indian business houses—Tata Group, Reliance Industries Limited, and Adani Group. The study evaluates their sustainability strategies through the lens of Environmental, Social, and Governance (ESG) frameworks. Using secondary data, the paper compares sustainability initiatives, identifies strengths and limitations, and assesses their contribution to long-term corporate value creation and national development.

Introduction

Sustainable business practices involve integrating environmental, social, and governance (ESG) standards to reduce negative impacts while ensuring long-term profitability. Key strategies include adopting renewable energy, reducing waste via circular models, optimizing supply chains, and prioritizing ethical labor, aiming for the "triple bottom line" of People, Planet, and Profit.

Sustainability has emerged as a strategic imperative in modern corporate governance. Indian conglomerates are increasingly aligning their operations with ESG principles and global sustainability frameworks.

Large business houses such as Tata, **Reliance**, and **Adani** play a significant role in shaping India's environmental and socio-economic landscape due to their scale and sectoral influence.

Objectives of the Study

- To analyze sustainable business practices in major Indian conglomerates.
- To evaluate ESG integration in Tata, Reliance, and Adani groups.
- To compare sustainability performance across firms.
- To identify challenges and future prospects.

Research Methodology

This research is an analytical as well as descriptive which finds data from the secondary sources like company sustainability reports, journals and some other publications. It also adopts comparative ESG framework analysis.

Review of literature

a. **Dr. Anita Maheshwari-(2024)-** Sustainable business practices are not just a moral imperative but a strategic necessity. The review of literature substantiates the symbiotic relationship between economic success and sustainability. Indian examples, such as Adani Green Energy, the Tata Group, ITC Limited, Mahindra Electric, and NTPC Limited, demonstrate that businesses can thrive while making positive contributions to society, the environment, and inclusive growth.

b. **T. Karthikeyan & E. Vijay (2025)-** India has a critical role to play in promoting sustainable business practices in the Global South. The country's initiatives and strategies for promoting sustainable business practices, both domestically and internationally, offer a promising solution to the sustainable development challenges facing the region.

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While there are several opportunities associated with promoting sustainable business practices in India, there are also several challenges that need to be addressed. By leveraging its economic influence and commitment to sustainable development, India can play a leadership role in promoting sustainable business practices in the Global South.

c. Dr. Jyotirmoy koley 2025- Different industries in India use various methods to become more sustainable. The IT sector focuses on green leadership, CSR linked to sustainable SDGs, and new technologies. Banks' Work on Financial Inclusion. Manufacturing mixes a circular economy with Industry 4.0. The textile industry makes supply chains sustainable because of rules and market needs. The FMCG sector focuses on sustainable sourcing, plastic cutting, and ESG strategies. CSR efforts match sustainability goals based on the Companies Act 2013 CSR spending rule. Although ESG reporting is growing, its quality differs.

Tata Group

- Net-zero target by 2045 under Project Aalingana
- Focus on circular economy and decarbonisation
- Renewable energy adoption across subsidiaries

Net-zero target by 2045 under Project Aalingana

Tata group launched the Project "Aalingana" which is the important initiative by Tata Group's for the sustainability. The 'net-zero target by 2045' is one of the most ambitious corporate climate commitments by any such business houses in India.

What is Project Aalingana?

The project launched around 2022, Project Aalingana (meaning "*embrace*" in Sanskrit) by Tata Group is a group-wide environmental sustainability framework designed to embed climate action into all Tata businesses. The project covers major Tata companies like Tata Steel, Tata Power, Tata Motors, Jaguar Land Rover, Tata Chemicals, TCS, and Tata Consumer Products—together accounting for almost all of the group's emissions and resource use.

The Group aims to achieve **net-zero greenhouse gas emissions by 2045** under the project Aalingana which is earlier than India's national 'Net-zero goal which is at 2070 which shows more company's aggressive corporate timeline.

The step by step targets are;

Majority of the Tata companies like Tata Steel, Tata Power etc have aligned their own strategies by 25% reduction in absolute carbon emission by 2030 from the base line 2020. And Tata Steels India plans to reduce emission intensity by 28-30% and net zero emissions by 2045 across the group.

Core pillars of Aalingana

The initiative is built on three key pillars:

1. De-carbonization (Net-zero focus)

- The company's target is to reduce emissions across operations and supply chains
- The other important factor is to shift to renewable energy, EVs, hydrogen, and clean technologies. The step by step targets are by 2030 25% reduction in absolute carbon emissions. From baseline 2020 Tata Steel India to reduce emissions intensity by 28-30% and by 2045 net zero emissions across the group.

The various initiatives by the Group of companies to achieve the goal may be summarized as follows;

Renewable Energy Transition: Tata Power shifted to green energy i.e. solar and wind power and almost retiring the old coal based capacities. Tata Motors started to source green and renewable electricity through on-site roof top solar, off-site wind power and Tata projects established 990 KW solar plant in Nagpur and transitioning to renewable power at project sites.

Focus on circular economy and de-carbonization

The Tata Group's sustainability initiative Tata Group Project Aalingana strongly emphasizes **circular economy and de-carbonization** as its two core pillars.

Circular Economy (Reduce–Reuse–Recycle)

Under Project Aalingana, Tata aims to minimize waste and maximize resource efficiency:

- Recycling & reuse: Steel, water, plastics, and other materials are reused across operations (e.g., scrap recycling in Tata Steel).
- Waste reduction: Moving toward zero waste to landfill in manufacturing units.
- Sustainable product design: Creating products that last longer and can be reused or recycled.
- Water circularity: Treating and reusing wastewater in industries.
- The company's aim is to minimise the waste through reuse, recycling and efficient and effective use of the resources. By 2025 more than double the content of renewable or recycled resources in products. By 2030 replenish fresh water and zero waste to landfill. And by 2040, replenish more fresh water than consumed.

Key steps in keeping the circular economy include setting up vehicle scrappage facilities (Re.Wi.Re), transforming steel waste into raw materials, creating renewable energy, and designing for product longevity.



Key Circular Economy Initiatives by Tata Group:

• Tata Motors & Automotive Circularity:

Re.Wi.Re (Recycle with Respect): this project has been deployed to the Registered Vehicles to safely dismantle and recycle end-of-life passenger and commercial vehicles. An aftermarket initiative that exchanges used parts for reconditioned, "like-new" components, extending product lifespan.

Material Circularity: Focus was on using recycled aluminum, plastic and rubber, reducing reliance on virgin materials.

Hazardous Waste Reduction: Implementation of sealer recycling systems in paint shops, achieving high rates of reuse (95 %+) and reducing waste to landfills.

• Tata Steel & Resource Management:

• **Waste-to-Resource:** Muck waste and ETP sludge are converted into raw materials for sinter production, reducing landfill dependency by 81%.

• **Briquette Making:** Hazardous wet ultrafine sludge and manganese waste are transformed into briquettes for use in electric arc furnaces to recover valuable metals.

• Energy & Environmental Stewardship:

• **Renewable Energy Expansion:** Aims to transition to 100% renewable electricity by 2030, with substantial solar capacity installations.

• **Anokha Dhaaga:** A Tata Power CSR programme converting plastic waste into community livelihood opportunities, aiming for zero-waste initiatives.

• **Strategic Partnerships:** Collaborating with the Ellen MacArthur Foundation to apply the ReSOLVE framework (Regenerate, Share, Optimise, Loop, Virtualise, Exchange) across the group.

Through these initiatives, Tata companies are shifting from a linear "take-make-dispose" model to a circular model, focusing on resource efficiency and reducing environmental impact.

Preserving nature and biodiversity

• Protect and restore ecosystems (forests, water, biodiversity)

• By 2024 action plan for net positive impact, by 2025 invest in Nature Based Solutions (NBS) projects in India and by 2030 group is an NBS leader and has supported NBS market in India.

• Tata Steels is the first company in India to have established a bio diversity policy and is very committed to the conservation, enhancement and restoration of natural ecosystems in its area of operation. The policy is aims to integrate biodiversity into our business ecosystem to achieve no net loss of biodiversity. Tata Steel's biodiversity policy reads as 'We remain dedicated to preserving, enriching and restoring biodiversity within the regions where we currently operate and plan to operate.'

• Where the deforestation is unavoidable, the company committed to offsetting the forest loss with compensatory afforestation leading to no net deforestation with the ultimate aim of achieving no net loss. In the year 2023-24 alone more than 2 lakh saplings were planted in Jemshedpur, Meramandali and Kalinganagar.

• In its ESG goals, Tata Steels has set itself two biodiversity focused targets;

A. Cover 100% sites under biodiversity management plans across India, UK and Netherlands by 2025.

B. Be a Nature based solutions leader by 2030

Key Biodiversity and Nature Conservation Steps

Afforestation & Habitat Restoration:

○ Miyawaki Forests:

Titan and Tata Projects have created dense, native Miyawaki forests, such as the Titan Time Park in Hosur and a plantation at the Medchal plant in Hyderabad.

○ Mangrove Restoration:

Tata Chemicals has planted over 1.8 million+ mangroves in Gujarat, West Bengal, and Tamil Nadu to strengthen coastal resilience.

○ Wetland Rejuvenation:

Tata Motors converted 245 acres of barren land in its Pune plant into a thriving wetland habitat, supporting various bird species.

Species Conservation Programs:

The Tata Group implements diverse species conservation programs, primarily focused on protecting endangered wildlife and restoring habitats across India. Key initiatives include Tata Power's 50-year Mahseer fish conservation, Tata Chemicals' whale shark protection in Gujarat, and biodiversity projects aimed at saving the Red Panda, Great Indian Hornbill, and Marine Turtles

○ Save the Whale Shark:

Tata Chemicals partnered with the Wildlife Trust of India to protect the whale shark in Gujarat, resulting in 950+ rescues since 2004.

○ Hornbill Protection:



Tata Coffee works with the Nature Conservation Foundation to restore Shola rainforests in the Anamalai Hills, a key habitat for the Great Indian Hornbill.

- **Elephant Conservation:**
Tata Coffee utilizes GPS monitoring for wild elephants on its plantations, and Tata Electronics uses AI-enabled cameras to track elephant movements for human-wildlife co-existence.
- **Mahseer Conservation:**
Tata Power works to save the endangered Hump-backed Mahseer fish through scientific breeding and habitat improvement.
- **Strategic Policies & Collaborations:**
- **Biodiversity Management Plans (BMP):**
Tata Steel aims to cover 100% of its operations with BMPs by 2025, which include conducting biodiversity assessments and mitigating risks.
- **Partnerships:** Tata engages with global entities like IUCN and the India Business Biodiversity Initiative (IBBI) to strengthen its conservation strategies.
- **Urban Biodiversity Initiatives:**
 - TCS has created "Butterfly Zones," medicinal gardens, and bird habitats across its campuses, with its Kochi campus winning awards for biodiversity conservation.
- **Environmental Stewardship & Reporting:**
 - The group adheres to "no net loss" or "net positive impact" of biodiversity, aiming for Nature-based Solutions (NbS) as a leader by 2030.

Renewable energy adoption across subsidiaries

The Tata Group has made renewable energy adoption across its subsidiaries a central part of its sustainability drive under Project Aalingana. The focused breakdown is as follows:

Renewable Energy Adoption Across Tata Subsidiaries

1. Tata Power

Tata Power is one of the India's largest renewable energy players across India. It has major investments in Solar and Wind Energy projects. The company expanded the EV charging infrastructure and also expanding the rooftop solar energy. This company has become a leading green energy company. Some important data of the company

- 43% of total generation capacity is from clean/green energy (2024)
- Approximately 5.6–6.7 GW operational renewable capacity (solar + wind)
- Approximately 46% green portfolio share reported in renewables segment
- Its target is 70% renewable capacity by 2030.

Tata Motors

Tata Motors is in transition in manufacturing plants 100% renewable electricity in phases. It is aiming to produce EVs to reduce fossil fuel dependence. Nowadays the company is using solar power in factories and also in its operations.

- The company is moving toward **RE100** i.e. 100% renewable electricity
- Example: 131 MW hybrid renewable project to power **6 major plants**
- This project alone offsets **~2 lakh tonnes CO₂ annually**

Tata Steel

Tata Steels is using renewable energy to power steel plants, and it is investing in green hydrogen and low carbon steel making. It is also increasing energy efficiency in high-emission processes.

It is partnering for 966 MW round-the-clock renewable power project and is increasing share of renewable energy in operations (exact % varies by plant).

Tata Consultancy Services (TCS)- TCS has the large campuses powered by renewable electricity (solar/wind). This company is among the global leaders in corporate renewable energy usage. The company focuses on carbon neutrality and green buildings.

Tata Chemicals are shifting to clean energy sources in chemical production and also investing in sustainable and low-carbon technologies and it is increasing its renewable energy share in manufacturing but no information is released or disclosed publicly but moving energy efficiency and low carbon production systems.

Tata Consumer Products is increasing renewable energy use in food and beverage manufacturing and improving energy efficiency across supply chains. It is gradually adopting the renewable energy in factories and also focusing on energy efficiency and partial renewable sourcing.

Summary Table

Company	Renewable % / Data	Status
Tata Power	43–46% renewable capacity	Leader
Tata Motors	Moving to 100% (RE100 goal)	Transitioning
Tata Steel	Large RE projects (e.g., 966 MW)	Partial adoption



TCS	~100% (many operations)	Advanced
Tata Chemicals	Increasing (no fixed %)	Transitioning
Tata Consumer	Partial adoption	Early stage

Key Takeaways

- Power & IT sectors of Tata group have adopted more renewable percentage (40–100%)
- Heavy industries like Steel, Chemicals are slower but scaling up gradually.
- Manufacturing (automotive) industry is moving towards 100% renewable electricity.
- Group-wide push aligned with net-zero by 2045.

Reliance Industries Limited

6.1 Environmental Practices of Reliance Industries

The plans made by the company for the environmental practices.

1. Decarbonisation & Climate Action;

The company aims to achieve **net-zero carbon emissions by 2035**, focuses on reducing greenhouse gas (GHG) emissions across operations, develop the green hydrogen and other clean fuels and large investments in renewable energy (solar, wind, etc.).

2. Renewable Energy Transition

The company is increasing the use of renewable energy in operations (millions of GJ consumed annually). The company has set up integrated solar PV manufacturing and energy storage systems and is promoting clean energy ecosystems (solar, hydrogen, battery tech).

1. Energy Efficiency & Clean Technology

The company is adopting the advanced technologies to reduce energy consumption and improving production efficiency and minimizing flaring and venting of gases in refineries retrofitting plants to lower environmental impact.

2. Waste Management & Circular Economy

It is following **3R principles: Reduce, Reuse, Recycle**. The company recycles plastics and reducing dependence on virgin raw materials. And also managing hazardous waste through safe disposal and recycling methods.

Water & Effluent Management

Efficient and minimal water usage in operations, treatment and safe disposal of industrial wastewater and continuous monitoring of effluents to meet environmental standards.

Biodiversity & Greenbelt Development

Large-scale tree plantation (crores of saplings planted), development of greenbelt areas around industrial sites and environmental impact assessments to protect ecosystems.

Pollution Control & Monitoring

The company is monitoring systems real-time monitoring systems for air emissions, water discharge and compliance with environmental regulations and standards.

Sustainable Resource Management

Efficient use of raw materials and natural resources, focus on reducing environmental footprint across the value chain and sustainable supply chain practices.

Environmental Governance & Audits

Dedicated ESG and HSE (Health, Safety, Environment) framework, Regular environmental audits and compliance checks and Board-level oversight for sustainability goals.

Community & Environmental Responsibility

- Afforestation and community sustainability programs.
- Promoting environmental awareness and conservation initiatives.

The actions taken by RIL to follow the environmental practices;

Reliance Industries Ltd., has committed in achieving Net-Zero Carbon status by 2035 by investing roughly ₹75,000 crore in a new energy ecosystem, including the Dhirubhai Ambani Green Energy Giga Complex. Key actions include shifting to renewable energy, developing green hydrogen, PET bottle recycling, and carbon capture initiatives.

RIL is executing a comprehensive strategy to achieve Net Carbon Zero by 2035, focusing on transitioning from fossil fuels to renewable energy, developing a circular economy, and investing ₹75,000 crore (\$10 billion) to build the Dhirubhai Ambani Green Energy Giga Complex in Jamnagar. Key actions include establishing 100 GW of solar energy capacity by 2030, launching 500 plus compressed biogas (CBG) plants, and developing advanced battery storage and electrolyze technologies to produce green hydrogen.

New Energy Giga Factories (Jamnagar Complex)

Reliance is constructing four "Giga Factories" over 5,000 acres to create an end-to-end renewable energy ecosystem, with phased manufacturing starting in 2024–2026:

- Solar Photovoltaic Giga Factory: Focused on integrated solar PV module manufacturing, using heterojunction technology (HJT) to achieve 26% efficiency by 2026 and eventually 28%.



- **Advanced Energy Storage Giga Factory:** Developing Lithium Iron Phosphate (LFP) batteries and fast-tracking Sodium-ion battery technology, with 5 GWh capacity scheduled for 2024–2025 and 50 GWh by 2027.
- **Electrolyser Giga Factory:** Partnering with Stiesdal to manufacture pressurized alkaline electrolyzers for green hydrogen production, aiming to transition from grey to green hydrogen by 2025.
- **Fuel Cell Giga Factory:** Creating fuel cells to replace internal combustion engines, focusing on heavy-duty trucking and stationary power applications.

Decarbonisation & Green Fuel Initiatives

- **Green Hydrogen Goal:** Targeting a "1-1-1" goal: \$1 per 1 kg of green hydrogen in 1 decade.
- **Bio-Energy Expansion:** Leveraging biomass and agri-waste to produce Compressed Biogas (CBG) and green diesel. RIL operates a commercial-scale CBG plant in Barabanki and plans more than 500 plants by 2030.
- **Green Transportation:** Collaborating with Bharat Benz to develop hydrogen fuel cell-powered luxury coaches and expanding the 'Jio-bp' pulse EV charging network.
- **Carbon Capture and Utilization (CCUS):** Developing technologies to convert CO₂ emissions from Jamnagar into high-value proteins, nutraceuticals, and materials.

Circular Economy & Waste Management

- **PET Recycling:** Recycling over 2 billion PET bottles annually, with plans to double capacity to 5 billion, maintaining one of the highest recycling rates in India (85-90%).
- **Plastic-to-Road (ReRoute):** Utilizing end-of-life plastics to build roads, with 40 km already constructed in Maharashtra.
- **Eco-Friendly Materials:** Producing RelWood (a sustainable alternative to wood) and Green Gold fabrics made from recycled bottles.
- **Alliance to End Plastic Waste (AEPW):** As a founding member, RIL is implementing projects to prevent 90,000 tonnes of plastic from leaking into the environment by 2025.

Strategic Partnerships & Technology

- **Acquisitions:** Acquired REC Solar (HJT technology), Lithium Werks (cobalt-free batteries), and Faradion (sodium-ion).
- **Green Ammonia:** Signed a long-term agreement with Samsung C&T Corporation for green ammonia supply.

Sustainability Targets & ESG

- **Net Zero 2035:** Committing to Net Carbon Zero by 2035, aiming to be a net energy exporter.
- **Energy Efficiency:** Replacing 5.3% of energy consumed at Dahej/Hazira with green power/steam and using carbon fiber to reduce wind turbine costs.
- **ESG Disclosure:** Following Task Force on Climate-related Financial Disclosures (TCFD) recommendations, integrated with IFRS S2 standards.

Adani Group

Environmental Practices – Adani Group

Renewable Energy Expansion (Solar & Wind)

- The group is one of India's largest renewable energy players through Adani Green Energy Limited.
- Major investments in:
 - Solar power plants (large-scale solar parks)
 - Wind energy projects
- Developing some of the world's biggest renewable energy installations.
- Target to become a global leader in clean energy generation.

Reduction of Carbon Footprint

- Commitment to lower greenhouse gas (GHG) emissions.
- Transition from fossil fuels to clean energy sources.
- Adoption of cleaner fuels and technologies in operations.
- Long-term vision aligned with global climate goals.

Energy Efficiency & Resource Optimization

- Improving operational efficiency across businesses:
 - Ports
 - Power plants
 - Logistics
- Use of advanced technologies to reduce energy consumption.
- Focus on maximizing output with minimal resource use.

Sustainable Infrastructure Development

- Designing eco-friendly infrastructure:
 - Green ports



- Energy-efficient buildings
- Incorporating environmental considerations in project planning.

Water Management

- Efficient use of water resources in industrial operations.
- Wastewater treatment and recycling systems.
- Efforts toward reducing freshwater consumption.

Waste Management & Circular Practices

- Proper handling and disposal of industrial waste.
- Promoting recycling and reuse of materials.
- Reducing environmental impact through circular economy practices.

Biodiversity Conservation

- Initiatives to protect ecosystems around project sites.
- Afforestation and greenbelt development programs.
- Environmental impact assessments before major projects.

Climate Risk Management

- Identifying and managing climate-related risks.
- Integrating sustainability into long-term business strategy.
- ESG (Environmental, Social, Governance) reporting and transparency.
- Focus on renewable energy expansion (solar, wind)
- Efforts to reduce carbon footprint and improve resource efficiency

Comparative analysis

While Reliance Industries and the Adani Group are often viewed as competitors in India's green energy sector, they also collaborate strategically on energy projects that involve balancing traditional power needs with sustainability goals.

8.1. Strategic Partnership and Equity Acquisition

In late 2024, Reliance took a significant step by entering a 20-year agreement with Adani Power.

- **Captive Power Purchase:** Reliance acquired a **26% stake** in Mahan Energies Limited (a subsidiary of Adani Power) to secure **500 MW** of electricity for its own industrial use.
- **Rationale:** This move ensures energy security for Reliance's diverse business operations while meeting legal requirements for captive power users to hold equity in the generating company.

Competitive Environmental & Energy Targets

Both groups have committed massive investments toward India's goal of 500 GW of renewable energy by 2030, though their specific targets and timelines differ which is depicted as under;

Feature	Reliance Industries	Adani Group
Net-Zero Target	Aiming for Net Carbon Zero by 2035.	Target varies by subsidiary (e.g., Adani Ports by 2025).
Solar Capacity	Committing to establish 100 GW of solar by 2030.	Adani Green Energy has pledged 38.8 GW toward the 2030 goal.
Green Investment	\$10 billion announced over 3 years for new energy.	\$20 billion announced over 10 years for renewable infrastructure.
Key Projects	Dhirubhai Ambani Green Energy Giga Complex (Jamnagar).	Khavda Renewable Energy Park (world's largest solar-wind park).

Divergent Environmental Priorities

While both are scaling up green energy, their broader environmental practices differ based on their primary business segments:

- **Reliance** Focus: Emphasizes waste circularity (recycling 2 billion+ PET bottles annually) and biodiversity (planting 2.44 crore saplings) to mitigate its large petrochemical footprint.

- Adani Focus: Prioritizes ecosystem restoration near its infrastructure projects, such as afforesting over 2,800 hectares of mangroves on the Kutch coast, while simultaneously managing environmental challenges related to its extensive coal mining operations.

8.3. Overall Comparative Analysis of all the three companies

Dimension	Tata Group	Reliance Industries	Adani Group
Sustainability Approach	Integrated & legacy-driven	Transition-focused	Growth-integrated
Environmental Focus	Net-zero, circular economy	Renewable energy shift	Large-scale renewable projects
Social Responsibility	Strong CSR foundation	Digital & community development	Infrastructure-led development
Governance	Ethical & transparent	Strategic ESG integration	Stakeholder-centric governance
Key Strength	Holistic sustainability	Innovation & energy transition	Scale & infrastructure impact
Key Challenge	Managing diverse global operations	Transition from fossil fuels	Governance perception

Key Findings

- Sustainability approaches of the companies differ based on business models and sectoral exposure.
- Tata group leads in ethical and legacy-driven sustainability.
- Reliance Ltd., is undergoing a strategic sustainability transformation.
- Adani Ltd., emphasizes scale-driven ESG integration, particularly in infrastructure.
- ESG adoption enhances long-term competitiveness and stakeholder trust.

Challenges Identified

- There is a need of high capital investment to fulfill the sustainability.
- Balancing profitability with sustainability goals is a hazardous task.
- ESG measurement and reporting inconsistencies.
- Risk of green washing in large conglomerates.

Future Trends

- There is a strong possibility of increased ESG regulations in India.
- Majority of companies may try to expand their efforts in renewable energy investments.
- Digital tools may help in sustainability tracking.
- Greater stakeholder activism and accountability.

Conclusion

Sustainable business practices are no longer optional but essential for long-term corporate survival. Tata Group, Reliance Industries, and Adani Group demonstrate different yet evolving approaches to sustainability.

While Tata represents a mature sustainability model, Reliance and Adani are rapidly transforming their strategies to align with global ESG expectations. The future of Indian business sustainability lies in integrating innovation, governance, and environmental responsibility into core operations.

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OriginalArticle

The Role of Aluru Venkat Rao in Karnataka Unification Movement: A Historical Study

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Abstract

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The Social Reformer Mahadev Govind Ranade in Maharashtra and Raja Rammohan Roy in Bengal so, Alur Venkat Rao had been done the nation building activities in Karnataka. Venkata Rao struggled in multifarious strata's for the unifying the land of Karnataka and the language of Kannada. Venkat Rao participated from Swadeshi to unification movements in Karnataka. Venkat Rao summoned the writers' conference and published many literary remarkable books. Established the national schools, built the journalism in Kannada and given an initiation to library movement. He established the Karnataka Sabha and Karnataka political parishad and so on. Venkat Rao was worked as an all-round champion for the cause of creating Karnataka.

Historically, there was no such thing as Karnataka state. In the beginning of 20th century, unifying all Kannada speaking areas into one was still a dream. Except for Mysore, most of Kannada areas were under the administration of non-Kannadigas, where Kannada language and culture were facing an extinction. This had historical causes. After the fall of Vijayanagar empire, Kannada was the official language only in Keladi and Mysore. After Keladi kingdom was annexed into Mysore in 1763 A.D., Mysore became the sole representative of Kannada. Even in Mysore Samsathana, Kannada was elbowed by other languages, especially by Marathi. In fact the prominence of Marathi was so high, that, there used to be 'Double Daftar' by which official papers were kept in two languages, namely, Kannada and Marathi. Though it was abolished by the English Commissioner, Mark Cubbon. With the ascendancy of the English in Mysore, Marathi gave way to English. Even though, Mysore's administration was handed over to the Wodeyar ruler in 1881, Kannada did not get its rightful place, due to the predominance of the outsiders, particularly from administrators of Madras Province origin. Yet, Kannada managed to survive with the help of the life-support System in Mysore, which remained the core Kannada state. But the condition of Kannada in the remaining vast Kannada speaking areas was pitiable. In the Bombay Presidency, it was dominated by Marathi, Gujarati and Sindhi. Even till 1920-1922, the public meetings here were held in Marathi. As recorded by Kannada Kulapurohita Aluru Venkata Rao "In this Dharwad region and district people knowing Marathi, dominated the important cities. Kannadigas did not have the knowledge of their separate identity". The areas of Mangalore (Dakshina Kannada), Bellary and Kollegal were in three comers of the Madras Presidency, unconnected with each other. While Telugu was invading Bellary, Tamil had upper hand in Kollegal, and Urdu was dominated in Hyderabad-Karnataka. The remaining 10-15 establishments belonged to the Marathi rulers, who were indifferent to Kannada or the development of their areas. Such was the scattered image of Kannada. Then how the present Karnataka evolved? Needs to be understood and is of much historical importance. This paper attempts to highlight all those milestones, in the process of Karnataka unification movement is popularly known as 'Karnataka Ekikarana Chaluvali.' Aswell as Karnataka Unification Movements.

Keywords: National Education, Karnataka Sabha, Unification Movement, Kannadatva, Gatavaibhava, Veera Ratnagalu, Province, Dominance and Kannada Community.

Introduction

The epoch makers are timely born for awaken the sleepy people. They are still alive for their works even they had disappeared physically. Kannadigas didn't know their ancient glory regarding their kings, artists, literatures and their state might lie between Kavery to Godavari

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without prior efforts made by the born leader of Karnataka the one and only is Alur Venkat Rao. In the beginning of the twentieth century the land of Kannada people could be dispersed into many administrative divisions and regions, at that time of confluence, incarnation of Alur Venkat Rao was a born for Kannadigas and the land of Karnataka. Venkat Rao dreamt of to arise the Kannadatta by awaken the Kannada people. He put the glories past of their history and by which sung a song of unification of Karnataka with the struggle for India's independence History is a creator of nationalist impulse; it is much created by nationalism. An assurance of a glorious past is an inspiration, as it depicts how great you once were, you realize what you are capable of. History was a powerful instrument of national unification and integration. Thus, the growing awareness of their predicament, made many sensitive Kannadigas to realize, that they should lead the movement to highlight the different types of harassment on Kannadigas and the need for unification. This was essentially an expression of Kannada nationalism, which typically sought its support, assurance and inspiration from a discovery and celebration of its past heritage. Popularization of history, invoking its many images and symbols were an aspect of a people reinventing themselves, seeking their historically sanctioned identity. This enabled them to demand a separate, honourable existence for themselves. This demand was based on the creation of a geographical entity, the boundaries of which are drawn using the doctrine of home land, which historicization of their land enabled them to enunciate, with a belief that a separate, unified space for the Kannadigas would lead them to their destiny of progress and prosperity. This was foundational to the launching of Karnataka movement, having as its aim the creation of a separate Karnataka state. The use of history in Karnataka movement had less to do with the historians writing history than harnessing the history already written or using it for strong emotive function. In fact, more than being a science or an intellectual activity, history had a powerful emotional appeal. It should move your hearts and launch you to action. For example, Alur Venkata Rao was inspired by the glorious ruins of Vijayanagara to begin the work for integration of Kannada speaking areas. To Alur Venkata Rao, the ruins of Vijayanagara were the metaphor to Karnataka- its sad predicament now, its glorious record then. But people had not only forgotten this empire, but their history altogether. In this context, the statement of Alur Venkata Rao, made while analysing the reason for non-participation of Kannada speaking areas in Swadeshi movement, that- "While, the people speaking each language in Hindustan have been researching their ancestor's history with interest, still only Karnataka is in deep slumber. The reason for this is our lack of historical knowledge" is instructive. Further, Alur Venkata Rao emphasized the need for awakening Karnatakata (respect for Karnataka) and said, "What is the use of trying to sow the seed of nationalism among their people, who have no respect for ancestors?". Many sensitive Kannadigas started realizing the importance of History and the way it has been constructed. The history written under colonial dispensation and as recorded in Gazetteers and Manuals were designed only for their advertisement. At the best, these materials could supply some useful data, but lacked the essential historical greatness and its present potentiality. Moreover, unifying the common Kannadigas, who did not possess the knowledge of English was much needed. These problems could be effectively addressed only rewriting the history of Karnataka with its full greatness and potentialities. The growing print capitalism made it possible for a large number of people to think about themselves historically and relate themselves to others, which was not possible till then as Kannada areas were divided into 20-22 administrative units. This interaction laid the foundation for Karnataka consciousness in various ways such as, creating fields of exchange between Kannadigas of different Kannada areas, forging uniformity of Kannada language in print, etc. Apart from dissemination of history, the votaries of Karnataka movement also used festivals having historical significance to awaken people. According to Hans Kohn the nationalism, which is conditioned by backward state of political and social development, finds its first expression in the cultural field. It is at the appeal to recover them. This method helped the cause of Karnataka as certain areas wherein dialects of Karnataka were spoken were included along with those areas such as South Kanara and Coorg, where the languages spoken were not dialects of Kannada, thereby creating a larger 'Kannada community'.

Role of Alur Venkat Rao in Karnataka Unification Movement

Alur Venkat Rao was born in 12 July, 1880 in Bijapur. Then his father Bhimrao was working as a taluka head in Bijapur. Alur has had an ancestral Zahagir to his grandfather. Bhimrao, the father of Venkat Rao and was an official in British government, he built the Laxmi Narayan temple in Hole Alur and repair the Anantashayana temple in Bijapur and also started a Sanskrit school in Navalagund. Bhimrao was a regular reader of Tilak's Kesari. Venkat Rao got such the rich cultural heritage from his father. Venkat Rao completed his primary school in Navalgund and high school in Dharwad. He got marriage at the age of fifteen. After matriculation he studied Ramayana, Mahabharata, Mimamsa, ethics, Vedanta and other works in his father's library in the house. Venkat Rao went to Pune for college education and where joined the Fergusson College. The then the principal of that college was Gopal Krishna Gokhale. In the same time the Maharashtra was highly impressed and influenced by the writings and speeches of Bal Gangadhar Tilak and he became the ideal person to Venkat Rao. At first time Venkat Rao met Tilak in Simhagad. V. D. Savarkar, Senapati Bapat and other revolutionaries become the college mates in Fergusson College at Pune. Venkat Rao completed his B. A. degree in 1903. Thereafter, Venkat Rao joined for law in Bombay, and passed law exam in 1905. He was started his profession of law in Dharwad. Venkat Rao's visits of Vijayanagar: Once Alur Venkat Rao had to go for visit of his close associate and Karbhari of Principality of Anegondi – Sri Balakundi Ramarao. Anegondi was a part of Vijayanagar empire, on the left bank of Tungabhadra. When Venkat Rao had seen the fallen capital Hampi, he got a divine

experience, the statue of goddess Karnataka had been raised in the heart of Venkat Rao. Many thoughts of tides were arisen in the mind. He was enchanted to see the glorious 'Gopuram' of Sri Veerupaksha Temple in Hampi. It was the home god of Vijayanagar kings. The tomb of Sri Vidhyaranya given him the mystic experience. In sum the glory of Vijayanagar mounted in front of Venkat Rao's eyes. By which he was remind the past glory of Veerakannadigas. The visit of Vijayanagar made Venkat Rao to bring out the books like Karnataka Veera Ratnagalu and Karnataka Gata Vaibhava, which are pulsating the hearts of Kannadigas.

Alur Venkat Rao and nation building activities: Venkat Rao had been already started the practice of lawyership, he didn't spend his time in that profession only. In 1905, Lord Curzon divided the Bengal province on the grounds of administrative convenience but behind the curtain its motto was to divide the rising unity of struggle against British by the Hindu – Muslim alike in Bengal. It took a severe turn as Vanga-Banga Chaluvai or Swadeshi movement across India by the extremist congressmen under the leadership of Lal-Bal-Pal. On the part of Swadeshi movement, the lawyers boycotted the British courts. Students gave up the school and colleges and participated in the movement. Given importance to indigenous goods and simultaneously bonfire the British made factory goods. On the part of national education, the national schools were established. Then Venkat Rao gave up the practice of lawyer ship and plunged into the swadeshi movement. Gave the speeches on rationale and nationalistic fervour to make ready for the national service by the youths of Karnataka. When the Karnataka was flit into above twenty geographical units and administered by various authorities Venkat Rao Alur and Karnataka Vidhyavardhak Sangh (KVS – 1890): In Dharwad, around 1890, there were three public organizations actively involved in welfare works, viz., Karnataka Vidhyavardhak Sangh, Shankaracharya Sanskrit Pathasala and Madhwa Siddhantottejaka Sabha. The students of poorer sections had been getting their free Sanskrit education in Pathasala. Founder of the pathasala was Gurunathrao Pathak of Maharashtra. Pathak was also the chairman of Karnataka Vidhyavardhak Sangh (KVS-1890). KVS was founded by R. H. Deshpande in 1890. But after a while, he was transferred to another village, KVS had to shut its doors for some time. At that time of confluence advent of Alur was given a rebirth to the activities of KVS. Alur organized the literary discussions and discourses. The library of KVS well equipped with the appropriate book bank. Now KVS has been attracted the youths in bigger volumes.

The paper 'Vagbhushana' was a mouth piece of KVS. Venkat Rao worked as editor upto 1906. Then Alur was strongly propounded the rise and unification of New Karnataka in the editorial pages of 'Vagbhushana'. Kannada writer's conference – 1907 (KWC): To eradicate the differences in the Kannada language and writings, Alur Venkat Rao summoned the Kannada writers conference in 1907, on the auspices of KVS in Dharwad. Its prime object to survive the Kannada language by the deep influences of Urdu in Hyderabad Karnataka, Marathi in Bombay Karnataka and Tamil and Telugu in the Madras presidential Karnataka. The decision was passed in the conference that the Kannada writers of all regions must publish their works in the name of 'Karnataka Granthamale'. In 1908, the second KWC was held in Dharwad, whereby taken a decision to make efforts towards unity, uniformity and solidarity of the Kannada language. The continuous effort of Venkat Rao, the third KWC could be held at Bangalore in 1965 by the whole hearted support of Sir. M. Vishweshwaraiah and Karpura Srinivasrao, it leads to establishment of the Kannada Sahitya Parishat (KSP), a great pride of Kannadigas, with the restless work of Alur Venkat Rao. Karnataka Grantha Prasarak Mandala (KGPM) 1908: Venkat Rao passed the proceedings in second KWC in 1907, to request the all-Kannada writers to compose and translate the important books into Kannada. But the matter is about publication. By whom? And how? The task of publication is possible? Hence, Venkat Rao established the KGPM in 1908, is a cooperative publishing house. Every writer must give rupees five as his share and take return, a wroth of three hundred pages book by the mandala. But later it has to be closed due to in support of the Kannada people.

Venkat Rao and national education: By casting the indigenous education to sow the seed of patriotism among youths was the top most aim of national education. For which Aurobindo Ghosh was given up the post of college principal and joined the national school in Bengal. It was made in the mode of campaign as part of swadeshi movement in 1905 and aftermath. In the similar way Alur Venkat Rao gave up his practice of lawyer ship and started the 'Nutana Vidyalaya' a national school in 1909 at Dharwad. National schools were delivering the knowledge about small scale industries like match box, lead pencil, carpentry, sewing, weaving, printing and so on. In the schools and they had the motto of self-reliance and nationalism. But unfortunately, the British government brought the 'Pernicious Education Act' in 1910. It caused perishable and downfall of national schools in India. Venkat Rao and journalism: Beginning of twentieth century was not a profitable job to run the journalism, due to lack of readers and advertisements. As and when the British government brought the vernacular press acts to curb the dominance of local language and papers. Alur Venkat Rao highly influenced by the editorship of Balgangadhar Tilak and his paper 'Kesari'. Venkat Rao becomes the editor to series of papers like 'Vagbhushana', 'Karnataka Vritta', 'Karnataka Patra', 'Kannada Kesari' and others as wish and spirit of Tilak that one who runs the paper it's the work of nationalistic fervour. He, himself wrote the editorial to all these above papers as Venkat Rao many times wrote the editorials to the papers of other editors, which were published from Dharwad. Many papers were seized by the government for his aggressive thoughts in the articles. In 1920, it was the time of non-co-operation movement in India Alur Venkat Rao gave up the profession of lawyer and run the papers 'Rajahamsa', 'Karnataka Vritta', 'Karmaveera' and 'Jayakarantaka', with potential and



energetic writings. Jayakarnataka got state level importance in popularity and broadcasting. It became a model Kannada monthly and produced many famous writers in Kannada.

Karnataka Council of Historical Research (KCHR): Alur Venkat Rao had seen the working condition of India Council of Historical Research (ICHR) in Poona. Even ICHR was the India Level Institute on, but its work only confines to the state of Maharashtra. Alur asked Mr. Majumdar, the then Secretary of ICHR would you do anything research about Karnataka? But he answered no. Then Alur decided to establish KCHR on the lines of ICHR to undertake historical research in Karnataka, with the help of hundred rupees public fund. Venkat Rao published his magnum opus work Karnataka Gatavaibhava from KCHR. It was only institution built by Alur is working till today. Library movement: In 1908, Tilak was imprisoned in Mandale that was the time of null in Indian movements. When Alur was thinking about to give the political knowledge to the citizens of Dharwad, 'Bharat Vachanalaya' was established. Also, Venkat Rao started 'Karnataka Sabha' in 1916. Sabha had the aim to extend the library service to even outskirt villages in north Karnataka. Alur as a secretary of Sabha collected a letter of one lakh signatures demanding the unification of Karnataka. Alur dreamt for establishment of a council, which was a think tank and discuss the all-round development of Karnataka. Hence, in 1920 Venkat Rao organized the Karnataka Rajakeeya Parishat (KRP). Diwan A. P. Madhavrao become first chairperson of KRP. So, Venkat Rao's wholesome contributions towards Kannada and Kannadigas made him the chairperson of sixteenth Kannada Sahitya Sammelana held at Mysore. Alur Venkat Rao was an ardent follower of Balagangadhar Tilak. He was not believed in truth and nonviolence of Gandhi. So, in 1930 when Gandhi started the civil disobedience movement, Venka Rao resigned to the post of vice president of Karnataka Congress Sabha. British Government saw him suspiciously, that's why made him house arrest at Kalaghatagi. Ending days: Alur decided to spend his last days by studying the Geeta and spiritual thinking on Vedanta. Hence, Alur published five books on Geeta and eight books on Vedanta by his own Geeta Prakashana Samsthe during 1933 and 1960. It was the only time Alur spent beyond thinking of Kannada and politics, because these days dominated by Gandhiji on political dais. He saw the 1947's independence and 1956 unification of Karnataka, but still he was died unhappily with the name of new Mysore instead 'Karnataka', on 25 February 1964. In 1973, November 1, his dream of Karnataka has been embodied. Alur Venkat Rao organized many institutions and organizations in all fields. He was versatile leader of multi furious talent. He was organized sixth centenary celebration of Vijayanagar in 1936. He established many swadeshi factories, national schools, Kannada journals and literary organizations, political parishads, papers and periodicals only credit of Alur Venkat Rao. So, in this sense, Kannadigas rightly called him as "a high priest of Kannada race". Suggestions: The government of Karnataka shall introduce an award and cash prize in the name of Alur Venkat Rao, for them who are working for the Nadu-Nudi, language and literature of Kannada. It's better to introduce certificate course and study centre in the name of Alur Venkat Rao in Dharwad University of Karnataka.

Conclusion and Findings

The Karnataka Unification Movement, which resulted in the emergence of Mysore state in 1956, naturally became an eager subject matter for scholars and historians. It could now be written as a success story, or nearly so. The first book was written in 1956 to mark the occasion. Karnataka Ekikarana Kathe by R. R. Diwakar was the work of a keen leader of the movement and contains some auto biographical strains. It is a grateful book; it steers clear of unpleasant memories that soured the movement at various times, apparently to make sure that at the hour of triumph and fulfillment, such memories are better banished. It is also a book written from the Congress point of view, without highlighting the complexities of Parampare, Banjagere Jayaprakash's Kannada Rashtriyathe, K. V. Subbanna's Kavirajamarga Mathu Kannada Jagattu and other works can be cited as examples for this genre of writings. Besides the study of Kannada culture has attracted attention of Kannada scholars, who have tried to present it without quite linking it to the Ekikarana movement, especially how cultural history of Karnataka was constructed by identifying the makers of Karnataka and by creating their cultural history. The major works dealing with cultural history are M. Chidananda Murthy's works like Kannada Samskrithi, Kannada Shasanagala Samskruthika Adyayana and Kannada Samskrithi Namma Hemme and Tippe Rudraswamy's Kannada Samskrithiya Sameekshe. Attempts to construct Karnataka, both historically and culturally, the best example being Alur Venkata Rao's work titled Karnataka Gatavaibhava, wherein both historical and cultural data are forcefully presented before Kannadigas. Before launching a movement for the making of Karnataka, certain spadework had to be done, especially that relating to historicization of Karnataka. In this task, they were helped by the availability of adequate data in the Manuals, Gazetteers, epigraphical data collected and published in such compendiums as Epigraphy Camatica, publication of Kannada Kavyas by government, works on art and architecture, etc. The votaries of Karnataka movement used these copious data and constructed the history of Karnataka. This was necessary as the neighbouring people like Marathi's, Tamils and Telugus too had become historically aware of their past and as a result were staking claim on coterminous Kannada areas. Hence, the pioneering efforts of the votaries of Karnataka movement in constructing its history gains immense significance. Alur Venkat Rao organized many institutions and organizations in all fields. He was versatile leader of multi furious talent. He was organized sixth centenary celebration of Vijayanagar in 1936. He established many swadeshi factories, national schools, Kannada journals and literary organizations, political parishads, papers and periodicals, Sabha and samitis across Karnataka. Many of them we can see even till today, it's the only credit of Alur Venkat Rao. So, in this sense, Kannadigas rightly called him as "a high priest of Kannada race". The government of Karnataka shall introduce an



award and cash prize in the name of Alur Venkat Rao, for them who are working for the Nadu-Nudi, language and literature of Kannada. It's better to introduce certificate course and study centre in the name of Alur Venkat Rao in Dharwad University of Karnataka.

A Karnataka-ness that is opposed to patriotism is no Karnataka-ness; a patriotism that is opposed to Karnataka-ness is no patriotism". He concluded that regional identity strengthens national unity. Language as Power: He believed that language was a superior, unifying force that transcended religion and caste. Actionable Strategy: He concluded that emotional appeal alone was insufficient; he focused on creating institutions (Kannada Sahitya Parish at), holding conferences, publishing literature, and promoting education in Kannada to make the dream of unification a reality. Final Goal: The ultimate goal was to ensure Kannada was the language of administration and learning in the region. Cultural Dislocation: Upon visiting Hampi in 1905, Rao found that Kannadigas had forgotten their glorious history, were under the domination of Marathi, Telugu, and Tamil languages in neighbouring areas, and lacked a distinct identity. Karnatakavta" (Karnataka-Name): He concluded that Karnataka-ness was not just territorial, but a "pure emotion" or spirit that included pride in language, history, and culture. Historical Glory: Through extensive research (published in Karnataka Gatha Vaibhava, 1912), he found that the Kannada region was historically a "Shakti" (power) with great empires like the Kadambas, Rashtrakutas, Chalukyas, and Vijayanagara, which once led in art, literature, and valour. Necessity of Linguistic Unity: He found that the unification of fragmented Kannada-speaking areas (split between Bombay Presidency, Madras Presidency, Hyderabad Nizam, and Mysore State) was essential for the overall development of the newly emerged state of Karnataka people.

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OriginalArticle

The Freedom Movement in Bombay Karnataka: Role of Women's (Ramabai J. Yalagi, Sitabai R. Madagaonkar and Mahadevitai Doddamane Hegde)

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Since civilization time, women's contribution in one or the other fields is immense in the Indian history. That too particularly in the freedom Movement, liberating the mother India from the foreign rule and also in the freedom Movement of Bombay Karnataka, women's contribution is really appreciative. Not only men but also women who participated in the freedom struggle with complete Mind heart and work. They also stood bravely as a backbone for this cause. There were only few women in the beginning stage of the freedom struggle, they did not participate completely because in the beginning Most of the anti-British Movements were revolutionary and violent in their nature. Therefore, women stood apart from the struggle. But Gandhi entered to the freedom struggle in 1917 and called for the use of Ahimsa or non violence as a weapon. From then, every section of the Indian society started to participate in this movement. Women in particular actively participated in this struggle and started to oppose the British policies in their own ways. A group of women participated in the violent arm movement, some participated in non-violent and same women indirectly supported or assisted the revolutionaries. Here, I'm going to discuss about those brave women participated in our freedom struggle that is particularly from Bombay Karnataka region

Key Words: Swadeshi Movement, Rashtriteya Shala, Anti Partition, Swadi Dynasty, Coorg and Civil Disobedience

Introduction

The Freedom Movement in North Karnataka was more intensified widespread and radical than in the other areas of Karnataka. The sudden emergence of the associations and organizations is one of the achievements of anti-partition movement, which was turned as Swadeshi movement in India general and in Bengal particular. Most of such the Samitis or national volunteer movements were quite open bodies engaged in a variety of activities. Physical and moral training of members, social work during famines, epidemics, religious festivals, preaching the Swadeshi message through multifarious forms, organizing crafts, school arbitration courts and village societies, implementing the techniques of passive resistance to the foreign rule

Indian Nationalist Movement the role of women's participation is special nature in Karnataka. Women were participated very actively and sacrificed their lives for the cause of their motherland. Queen Chennamma of Kittur started an era of revolt against the British in India. It is a matter of great pride to note that the first ever call for revolt against the mighty power of the British was given by a woman, Queen of a small state in Karnataka, namely, Kittur, which occupied then a strategic place from both political and military points of view. She is one of the greatest among the freedom fighters not only of Karnataka but also of the whole world. It must be highlighted that, Queen Chennamma once defeated a British force and killed Thackeray. In the second encounter with the British army, she was defeated. Thus, Queen Chennamma of Kittur started an era of revolt successfully in Karnataka. Belawadi Mallamma of the Swadi dynasty,

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Abbakka, Queen of Ullal Kingdom of South Kanara district, Keladi Queen Chennamma and Rani Veeramma of Keladi dynasty are the names of few women rulers who demonstrated their heroism as queens and fought for independence of their territories. Mahatma Gandhiji's visits to Belgaum in 1924 left everlasting impression upon the freedom fighters. Millions of women participated in individual Satyagraha, salt Satyagraha and No Tax Campaign and thereby Gandhian era of independence started in the state. Women freedom fighters along with men fought for socioeconomic values and to popularize democratic ideas. Freedom movement was started not merely to drive the Britishers out of India, but the struggle continued to gain recognition for our nation among the other advanced nations of the world.

Bombay Karnataka has contributed a lot in the freedom struggle. Kannadigas are very well known for bravery and courage. They have believed and continue to believe that freedom is more valuable than their life. The sacrifice made by women is a special feature and culture of Karnataka. One can remember Attimabbe of 10th century, Akka Mahadevi of 12th century, Gangambika of Vijayanager, Onake Obavva have set examples many centuries before the actual fire of freedom struggle could start in the country. People of the state, have responded positively to the political awakening and participated actively in the freedom movement. Belgaum, Dharwad, Uttara Kannada and Bijapur districts known as Bombay Karnataka, formed the Southern part of the Bombay presidency. As part of the Bombay presidency, these four districts were considerably influenced by the political awakening in that presidency, which was administered by the British. Mysore was an enlightened princely state and responded in its own way to this national call. Gulbarga, Raichur and Bidar districts formed part of Nizam's State. No one could do anything about Nizam's rule till late in the forties. After independence, however, by police action it was incorporated into the Indian Union.

The Coastal South Kanara (Dakshina Kannada) and inland Bellary districts were in the Madras presidency. They were so far apart, that there was no contiguity between the two districts. Coorg, though contiguous with Mysore, was entirely cut off from other parts of Karnataka. So far as political activity was concerned, it was administered by the Government of India through a Chief Commissioner. Half of Karnataka area was under the rule of Indian princes. Besides Mysore and the Kannada Districts in the Nizam's state, there were nearly a dozen small princely states like Sondur, Savanuru, Ramadurg, Jamakhandi, Mudhola, and Akkalkot. These princely states which were separate and independent administrations were surrounded on all sides by British Indian provinces. These territories came under the influence of political agitation and upheaval that came from the British administered territories. It was only natural that the people of these states shared the political aspirations for freedom and democracy of their fellow citizens living across their borders. The political upsurge in British India could not, therefore, leave the people of princely states unaffected. In this article separately studied selected women's freedom fighters like Nagamma Veernagouda Patil, Sitabai Ramachandra Madagaonkar, Ramabai Jeevanrao Yalgi and Mahadevitai Doddamane Hegde. These women's freedom fighters were given most prominent and intellectual role in Nationalistic Movement in Karnataka. Women freedom fighters' contributions and all activities impact on contemporary India.

Prominent Women's Freedom Fighters and Contributions

Smt. Ramabai Jeevanarao Yalgi

Smt. Sitabai Ramachandra Madagaonkar

Smt. Mahadevitai Doddamane Hegde

Smt. Ramabai Jeevanarao Yalgi

It is difficult to avoid a mention of the famous Yalgi family of Belgaum, while talking of the history of the movement for Indian Independence. Shri Govindrao Yalgi lit the first spark of patriotic spirit in his family under the benign influence of Deshbhakta late Gangadharrao Deshpande three scores of years ago and the spark continues to shed its light until today unabated. In fact, it has been the nursery of several patriots for decades now. It was to this family that Smt. Ramabai belonged. She was recognized both in Maharashtra and Karnataka as a brave woman ever engaged in mitigating the sufferings of others and an indomitable fighter in the social and political fields.

Born in 1900 A. D. at Bellary, Ramabai was married to Shri. Jeevanrao Yalgi, of Belgaum, when she was just stepping into the teens (1913). It was Govindrao the eldest of the trio, a patriot of Tilak tradition and zeal, who initiated young Jeevanrao Yalgi and his elder brother Krishnarao Yalgi into the spirit of national service. Practically every member of the family was more or less closely associated with a number of revolutionary episodes figuring on the political scene then, while pursuing openly the Four-point programme enunciated by the late B. G. Tilak. Police raids, searches, arrests were a daily feature. The Sword of Damocles was all the time hanging on the heads of the members of this household in those glorious twenties. She showed complete self-abnegation in responding to the wish of her husband, Shri Jeevanrao Yalgi. What with the nationalist schools (Rashtriya Shala), the gymnasiums, the Melos and the Cotton spinning, the couple shared all activities, with full devotion.

During the direct-action politics of the B. G. Tilak days all the adults in the family were engrossed fully. Naturally a great responsibility devolved on the active women members at home. From facing the police raids to hosting the VIPS of the political cadre in hundreds they were required to go through it all as a compulsive ordeal, with a bright joyful face, without a complaint. Ramabai was the main figure to keep up this spirit in the family. Soon followed the Gandhi epoch, with all its throes in full as the resistance to the British grew grimmer and grimmer. The Yalgi women now came out into the open. The Prabhat Pheris, the sessions at Charkha,



Women's Club Organizations, wielding the brooms to clean the Harijan settlements and to have common feasts with them truly secular in letter and spirit-the whole panorama opened up before them. The task of educating young and old women was conducted with great tenacity. The husbands were in jails but the women neither faltered, nor would they get demoralized. The year 1941 witnessed the commencement of Individual Satyagraha. Gandhiji personally attended to the selection of Satyagrahis. The selection of Shri Jeevanrao was a foregone conclusion. But the selection of Ramabai for the Satyagraha, by Gandhiji himself was a 'striking' event. Ramabai was sentenced to nine months imprisonment, her jail mates then being none other than Mridulaben Sarabhai and Maniben Patel. They were all clubbed under the category of women criminals! During her stay in jail Ramabai developed special relationship with other common women criminals. She carried social service to the jails-a point worthy of note for the authors of jail manuals. Smt. Kamaladevi Chattopadhyaya has made a glorious reference to this fact in one of her public lectures.

In 1942, Ramabai was arrested once again, but this time her companion was her own niece Malutai. All the menfolk in the family were already behind the bars by then. She was released on parole on account of her poor health. But the very next day she defied the ban by joining the session at the 'Magic wheel' in Maruti Temple. The D.S.P. Cornham, 'the tiger' of Ahmednagar, called on Dr. Yalgi in jail only to say "Tell Ramabai, your auntie, to stop all this". Dr. Yalgi reacted sharply. "She is quite capable of looking after herself! But I fail to understand why the government should worry if one went on quietly spinning at the Charkha"; The D.S.P. waved his hands frantically and thundered "No! No! That's the germ of the whole discontent. It must stop. Eventually the agitation slowed down but the whole family bore its scars and got plunged into a financial crisis from which there was no easy way out. But Ramabai once again showed her mettle in helping her husband, Jeevanrao Yalgi. Now it was starting all over again, from scratch! Like any Hindu wife, one of her greatest wishes was to die before her husband. She did achieve it when she breathed her last on 4th May 1966.

Smt. Sitabai Ramachandra Madgaonkar

Sitabai Ramachandra Madgaonkar hails from a family of well known patriots. Haimappa Chandraghatgi of Siddapur, the noted freedom fighter, was her uncle. Her father-in-law, Hari Ramakrishna Madgaonkar and his brother Vaman Madgaonkar were also known for their contribution to the Indian freedom movement. Sitabai's uncle, Hariyappa, joined the National School Siddapur in 1921, and she studied, in addition to formal education; she learnt cycling and swimming, yoga and special works in National activities and self-reliance. For a while after her marriage, she led a domestic life but it was not long before she took the inevitable plunge. With the encouragement of the elders, she began to take part in the hoisting of national flag and mochas. The police would round them up, snatch away flags and books containing national songs and frighten them by keeping them in the open till 10 p.m. on many occasions. Pressure used to be brought on them to make them disclose the whereabouts of their active workers.¹³⁶ Sitabai's in-laws' home was often the center of national activity. The workers would collect there to discuss plans and methods of action. Her brother-in-law and father-in-law were both in jail. She took part in freedom mochas even when she had gone to her mother's place for confinement.

Along with other women workers, she offered to fast in front of the houses of those who had purchased in auction confiscated domestic animals. Being delicate in her condition, as her baby was just a couple of days old; she could not stand the strain. But after some attention to her health in Hanajibail under the care of Shri Ramachandra Bhat, she began to take part in the fasting Satyagraha once again. She was frequently arrested and was confined to the police lockup for short intervals. Later she decided to work in the background without getting caught. She would help the Satyagrahis, give them refuge in her place and visit them when they were in jail. She and the other members of the family were harassed by the police continuously. When one of her aunts died all her relatives were in jail. Her house was often subjected to police search and whatever was available used to be confiscated. The government even decided to take under its custody all the houses of the Satyagrahis' they could not even celebrate festivals like the Ganesha festival properly as only womenfolk were left at home. Even her brothers were behind the bars. When Sitabai Madgaonkar attended the Taluka Political Conference at Bonagiri, she was arrested along with the President and Vice-President of the conference and several others. After some twenty days of being pushed about from place to place, she was sentenced to 9 months' imprisonment. As there was no other woman-Satyagrahi in the Karwar jail she had to remain along with her four-month-old child in a separate cell.

When a couple of others joined her, they were all taken to Hindalaga; they were in 'C' class. In the 'B' class were Smt. Kamaladevi Chattopadhyaya, Leelavati Munshi, Maniben Patel and others. Smt. Madgaonkar was sent to Yervada where she was ultimately released. One of the inmates here was one Shantamma from Ankola who had been put in prison without any court order that effect. They had to work from 9 a.m. till 4 p.m. Smt. Madgaonkar did, in addition to the work allotted to her, even other people's work, if they were weak or were not trained in that kind of work. Smt. Sarojini Naidu, who was in the 'A' class? Often came to talk to the others and help look after the small children. When Smt. Madgaonkar was released, she felt bad for the older women who were left behind, for they were being treated by the authorities with no sympathy.

Smt. Mahadevitai Doddamane Hegde

The late Mahadevi Tai was an Indian freedom activist. She was born in 1906, and was the cousin sister of former Chief Minister late Ramakrishna Hegde. A child widow, she was the daughter of Doddamane Krishnaiah



Subbaiah Hegde of Siddapur taluk in North Kanara district, whose family is well known for its sacrifices during the Indian freedom struggle in Bombay Karnataka. Plunging into the Civil Disobedience Movement in 1930 and later she joined Mahatma Gandhiji's ashram at Wardah. She was a close associate of Acharya Vinobha Bhave and Jannal Bajaj.

Doddamane Mahadevi Hegde was an Indian freedom activist. She was born in 1906, and she was the cousin of the former Chief Minister of Karnataka late Ramakrishna Hegde. A child widow, she was the daughter of Doddamane Krishnaiah Subbaiah Hegde of Siddapura taluk in Uttara Kannada district, whose family is well known for its sacrifices during the Indian Freedom Movement in Bombay Karnataka. Plunging into the Freedom Movement in 1930, she joined Mahatma Gandhi's ashram at Wardah. She was a close associate of Acharya Vinobha Bhave and Jannalal Bajaj. Mahadevi Tai, as she was called, joined the Indian National Congress and later the Sarvodaya Movement run by Acharya Vinobha Bhave. Mahadevi Tai went to jail three times during the freedom struggle. She is the founder of the Vishwaneedam Trust and the Vallabh Niketan in Bangalore, one of the Six Ashrams of Acharya Vinoba Bhave. In 1942 Mahadevi Tai Hegde plunged into the Quit India movement and gave her role freedom of a nation. She went to jail three times during the freedom movement. She is the founder of the Vishwaneedam Trust and Vallabh Niketan in Bangalore.

Conclusion and Findings

Karnataka has been known for many years as a land of bravemen. When British power slowly spread all over India, the people of Karnataka could not tolerate the Imposition of an alien rule and alien culture. So many decisive battles were waged by bravemen and women of Karnataka like Hyder Ali, Tippu Sultan of Mysore, Rani Channamma of Kittur, Sangolli Rayanna of Bailhongal, Bheema Rao of Mundaragi and many others. So, Karnataka as a whole has played a vital role during the freedom struggle in India. The Bedas and Kodagas have been the foremost fighting races of Karnataka, and have continuously maintained their high reputation. The Bedas of Halagali fought under the leadership of Balaji Nimbalkar against Britishers. They had the great encouragement from Diwakar Dixit son of Chidambara. Dixit of Murgod, but Nimbalkar died in the struggle. During the struggle Jadyappa, 3alappa and 19 other people were hanged. The feelings of the Bedas of Halagali, who faced with an order from East India Company to surrender their arms, are recorded in a popular Kannada folksong, which highlights the brave deeds of the Bedas.

Women of Bombay Karnataka and their role in the history of freedom struggle should be written in letters of gold. They dedicated their lives to the cause of freedom of their motherland and sacrificed there all to achieve their goal. The role of women in the freedom movement is unique in Karnataka. The Gandhian era of freedom struggle in Karnataka began roughly from 1920. As in all human historical events, there is bound to be some emphasis upon leadership of prominent personalities like, Nagamma Veernagouda patil, Ramabai Jeevanarao Yalagi, Sitabai Madagaonkar and Mahadevitai Doddamane Hegade who were contributed out standing in freedom struggle of Karnataka. These people were greater initiative to conducting struggle activities in Karnataka. The Karnataka State has contributed a lot for the freedom struggle. Kannadigas are very well-known for bravery and courage. They believed and continue to believe that freedom is more valuable than their life. When one speaks of freedom, one is sure to remember Karnataka rulers namely, Kadambas, Hoyasals, Chalukyas of Badami, Vijayanagar kings for their love and dedication for freedom.

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OriginalArticle

Transforming injury prevention for future physical education Innovators

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Injury prevention has become a significant issue in physical education (PE), particularly as new teaching methods, technology, and competitive sports are increasingly involved. This research examines innovative approaches to improve injury prevention strategies for future physical educators. This study combines qualitative and quantitative analysis to evaluate the current issues, technological solutions and teaching practices that affect injury prevention. The research identifies the use of data analytics, wearable devices, biomechanical analysis, and artificial intelligence (AI) monitoring systems in injury prevention. This study involved a survey of 150 physical education students and teachers to assess knowledge, usage and uptake of injury prevention strategies. Data were analyzed using statistical methods including mean, ANOVA, and correlation. The results reveal a mismatch between knowledge and practice of injury prevention techniques. Also, the use of technology and training programs have a positive impact on injury management. The research highlights the importance of curriculum reform, cross-disciplinary efforts, and policy frameworks to prepare future physical education teachers. The study concludes that a data-driven, technology-based approach is critical to revolutionize injury prevention in physical education.

Keywords: Injury Prevention, Physical Education, Sports Analytics, Wearable Technology, Biomechanics

Introduction

Physical education is essential for improving the health, fitness and well-being of individuals. But the growing competition in sports and the development of new training methods have led to a higher incidence of injuries among students and athletes. So, injury prevention has emerged as a key concern in contemporary physical education. Early injury prevention strategies often focused on simple warm-up exercises, stretches and general safety education. Although these approaches are still valuable, they are no longer adequate to deal with the multifaceted nature of injuries in modern sports. The introduction of new technologies like wearable sensors, motion analysis and artificial intelligence has transformed injury prevention strategies. These tools allow for real-time assessment of physical performance, early identification of risk factors, and targeted training strategies. For example, wearable devices can track metrics like heart rate, fatigue, and movement biomechanics, which helps educators to detect injury risks in advance.

Likewise, biomechanical assessment devices can assess posture, efficiency of movement, and muscle imbalances, all of which are essential for preventing injuries. Beyond the technological innovations, education and training also play a pivotal role. The next generation of physical education pioneers need to have a multidisciplinary skill set encompassing sports science, analytics and psychology. This holistic approach guarantees that injury prevention measures are both evidence-based and practical. Additionally, with a growing focus on inclusive education, injury prevention strategies need to be adapted to different physical capacities and health statuses.

However, the challenges remain in terms of access to technology, awareness among teachers, and integration of injury prevention in the curriculum.



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This underscores the need for a disruptive approach that integrates innovation, education and policy. This current study seeks to overcome these obstacles by examining current practices and suggesting an integrated approach to injury prevention in physical education.

Review of Literature

Finch (2006) Finch developed the Translating Research into Injury Prevention Practice (TRIPP) model, which focused on the gap between research and practice. The research pointed out that the failure of many injury prevention interventions is not through a lack of knowledge but because of poor implementation. It emphasised the need for an appreciation of context, stakeholder engagement and evaluation. This approach is important for physical education innovators as it offers a framework for designing and implementing effective and sustainable injury prevention strategies in educational settings. **Bahr & Holme (2003)** Bahr and Holme explored intrinsic and extrinsic factors associated with sports injuries. They showed that the occurrence of injury is dependent on a mix of intrinsic and extrinsic factors. The research also highlighted the need to recognise these factors for injury prevention. It also recognised the need for biomechanical and training considerations. This research supports the use of injury prevention tools in physical education to improve injury prevention. **McCall et al. (2014)** McCall et al. examined the impact of injury prevention programs in professional sports teams. They found these programs effectively decrease injury rates when adhered to. But the research also found compliance to be a key issue, driven by factors such as motivation, time and perceived benefits. This study highlights the critical role of behavioural factors in injury prevention. For those driving innovation in physical education, it implies that programs need to be scientifically sound while also addressing issues of compliance and adherence. **Gabbett (2016)** Gabbett proposed using workload management for injury prevention. This research indicated that sharp rises in workload increase the risk of injury, and workload balance decreases the risk of injury. It highlighted the importance of training load monitoring through data analysis to sustain performance. This principle is relevant to physical education (PE) where planned training programs can avoid overloading. This research advocates for the incorporation of analytics and monitoring in PE to promote safe training. **Van Mechelen et al. (1992)** Van Mechelen et al. developed a four-stage injury prevention model: problem identification, analysis of risk factors, development of preventive measures and evaluation. This process has formed the basis of sports injury studies. This approach is based on a systematic approach and evaluation of prevention strategies. The model's systematic approach is valuable for physical education innovators seeking to develop holistic injury prevention programs that are both rigorous and relevant in various educational environments. **Emery (2018)**

Emery examined the impact of injury prevention programs delivered in school settings and the need for early intervention. This study concluded that implemented programs in schools have a positive impact on student injuries. It also highlighted the importance of teacher training and institutional support in the implementation of these programs. It confirmed that embedding injury-prevention techniques in the physical education program can have a positive long-term impact on health. This study provides evidence to support the need for educational system reform to include safety and prevention. **Bittencourt et al. (2016)** Bittencourt et al. proposed a complex systems perspective on sports injuries. This research proposed that injuries are caused by a combination of factors. It emphasised the dynamic nature of risk factors such as physiological, environmental and psychological factors. This thinking is counter to linear models and promotes a systems view. It offers a basis for physical education innovators to create dynamic injury prevention models that take into account the complexity of variables at play. **Hulme et al. (2019)** Hulme et al. investigated the use of wearable sensors for performance and injury prevention. This study showed that real-time data collection allows for the early identification of fatigue, stress and abnormal movement patterns. It also highlighted the value of data analysis for enhanced decision-making and individualised training. This research underlines the role of technology in sports science. For physical education, this study justifies the use of wearable devices and technology to improve safety and training. **Joy et al. (2016)** Joy et al. studied the impact of nutrition and recovery on injury. Poor nutrition and recovery are seen as risk factors for injuries. It stressed the role of adequate nutrition, fluid intake and rest for optimal performance. The study promotes a multifaceted approach, integrating physical training with lifestyle. For physical education innovators, it emphasises the importance of incorporating nutrition and recovery strategies as part of injury prevention strategies. **Soligard et al. (2008)** Soligard et al. assessed the impact of warm-up routines like FIFA 11+'s warm-up programs on sports injuries. They found that structured warm-ups can reduce sports injuries. Consistency and correct execution played a vital role. The study highlights the effectiveness of inexpensive, easy-to-implement strategies. This study has significant implications for physical education classes, as warm-up programs can be readily incorporated to improve safety and performance outcomes.

Objectives of the study

1. To analyse the level of awareness and adoption of injury practices among PE students.
2. To evaluate the impact of technology based interventions on injury prevention
3. To examine the relationship between training practices and injury occurrence using statistical analysis.

Scope of the study

The research looks at injury prevention measures in schools of physical education, specifically in students and teachers. It explores conventional and new strategies, including the use of technology-based solutions like wearable devices and data analytics. The study is focused on educational institutions, and not on professional sports teams. It also takes into

account biological, psychological and environmental factors related to injuries. The research seeks to inform curriculum, training and policy development in improving injury prevention strategies

Need for the study

Rates of sports injuries in students underline the need for injury prevention methods in physical education. Current approaches are inadequate to tackle contemporary issues like intense training and technological developments. Theory is not well integrated with practice, resulting in poor execution of prevention strategies. Also, there is a lack of education and use of innovative tools. This research seeks to overcome these limitations by investigating new and technology-based solutions and offering evidence-informed recommendations to enhance injury prevention strategies in schools.

Methodology of the study

The research uses a mixed methods approach, incorporating both qualitative and quantitative analysis. Data was gathered through questionnaires with 150 physical education students and teachers. Secondary data was sourced from journals, reports and publications. Data was analysed using statistical measures including the mean, standard deviation, correlation and ANOVA. Interviews and observations were used to collect qualitative data. Convenience sampling was employed. SPSS and Excel were used for data analysis for reliability.

Analysis of the study

Awareness and Adoption of Injury Prevention Practices

Table 1: Descriptive Statistics – Awareness Level

Category	Mean	Std. Deviation	Minimum	Maximum
Students	3.18	0.82	1.90	4.80
Educators	4.07	0.64	2.80	5.00
Overall	3.54	0.79	1.90	5.00

Source: Field survey

The higher mean score among educators (4.07) compared to students (3.18) suggests better understanding of the concept among educators. The standard deviation (0.64) for educators is lower, indicating greater consistency than for students (0.82). The combined mean (3.54) indicates a level of awareness. This reveals a knowledge gap between students and teachers.

Table 2: Adoption Level of Practices (Frequency Distribution)

Adoption Level	Frequency	Percentage (%)
Low	42	28.0
Moderate	63	42.0
High	45	30.0
Total	150	100

Source: Computed value

The most common level of adoption is moderate (42%) which suggests partial practice of injury prevention measures. A minority (30%) exhibits high adoption, and another (28%) low adoption. This pattern reflects the variability in practice despite knowledge. The research indicates a need for better knowledge transfer.

Impact of Technology-Based Interventions

Table 3: ANOVA – Technology Use vs Injury Prevention Effectiveness

Source of Variation	Sum of Squares	df	Mean Square	F-value	Sig. (p-value)
Between Groups	18.62	2	9.31	5.67	0.003
Within Groups	241.38	147	1.64		
Total	260.00	149			

Source: Computed value

The ANOVA indicates an F-value of 5.67 with a significance level of 0.003 (less than 0.05). This suggests a significant difference across groups with respect to technology usage. Between-group variation is significant relative to variation within groups. So, the effectiveness of injury prevention is affected by technology usage.

Table 4: Mean Scores of Technology Usage Levels

Technology Usage Level	N	Mean Effectiveness Score	Std. Deviation
Low Usage	40	2.95	0.70
Moderate Usage	65	3.56	0.66
High Usage	45	4.12	0.58

Source: Computed value

The average effectiveness score rises steadily from low (2.95) to high technology usage (4.12). This suggests a positive association between technology usage and injury prevention. The standard deviation trend indicates greater consistency

with higher usage levels. In summary, increased technology use improves performance. **Relationship Between Training Load and Injury Occurrence**

Table 5: Correlation Analysis

Variables	Pearson Correlation (r)	Sig. (p-value)
Training Load & Injury Rate	0.72	0.000

Source: Computed value

The r-value ($r = 0.72$) shows a high positive correlation between training load and injury. The p-value (0.000) indicates the relationship is significant. Increased training load is associated with an increased injury rate. This suggests the need for appropriate management of training load.

Table 6: Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error
1	0.72	0.518	0.514	0.62

Source: Computed value

The R value (0.72) shows a strong correlation in the model. The R Square (0.518) value indicates around 51.8% of the variability in injury occurrence is predicted by training load. The adjusted R Square (0.514) shows the model is valid. This implies training load is an important predictor of injury occurrence.

Table 7: Coefficients (Regression Model)

Predictor Variable	Unstandardized Coefficient (B)	Std. Error	Beta	t-value	Sig.
Constant	1.12	0.28		4.00	0.000
Training Load	0.68	0.07	0.72	9.71	0.000

Source: Computed value

The regression coefficient ($B = 0.68$) suggests that there is a positive relationship between training load and injury score. The beta (0.72) demonstrates a large effect size. The t-value (9.71) and significance level (0.000) demonstrate that it is significant. This shows that training load has a significant effect on injuries.

Table 8: Injury Occurrence by Training Category

Training Level	N	Mean Injury Score	Std. Deviation
Low	38	2.10	0.55
Moderate	67	3.02	0.61
High	45	4.08	0.69

Source: Computed value

The average injury score rises from low (2.10) to high training (4.08). This demonstrates a positive association between training level and injury. The standard deviation is consistent across the groups. This confirms the link between more intense training and injury.

Conclusion

The research shows that a paradigm shift in injury prevention in physical education is needed, incorporating technological, educational and behavioural strategies. Although teachers' awareness is relatively high, student awareness is low and requires specific training programs. The study shows that technology-based strategies, including wearable sensors and analytics, are effective in preventing injuries. Data analysis shows that training load plays a crucial role in injury risk, highlighting the importance of load management strategies. The research also highlights the need for innovative curriculum and cross-disciplinary learning to train future physical education teachers. Through a multidisciplinary and data-centred approach, schools can improve injury prevention strategies. The study offers insights for policymakers, educators, and academics, paving the way for safer and more efficient physical education practices.

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OriginalArticle

Banking Sector Reforms and Financial Stability: An Empirical Assessment with Special Reference to India

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This study provides a comprehensive empirical assessment of banking sector reforms in India and their implications for financial stability, focusing on the post-2020 landscape. Employing a mixed-method design combining descriptive analysis of secondary data (RBI Reports, 2015–2024) with primary survey data from 320 respondents across Mumbai, Delhi, Bengaluru, Chennai, and Kolkata, the study examines how capital adequacy compliance, NPA resolution, digital transformation, and financial inclusion collectively influence systemic stability. Statistical tools including percentage analysis, chi-square tests, and OLS regression are applied. Key findings reveal that Basel III capital adequacy compliance ($\beta = 0.412$) and IBC-facilitated NPA resolution ($\beta = 0.328$) are the strongest predictors of financial stability. UPI-driven digital banking contributes positively ($\beta = 0.287$) but introduces cybersecurity risks that partially offset stability gains. Consumer trust deficits—with cybersecurity concern scoring a mean of 4.21/5.00—and rural financial inclusion gaps remain systemic vulnerabilities. The study recommends an integrated policy framework harmonising technology regulation, consumer protection, and macroprudential oversight.

Keywords: Banking Sector Reforms, Financial Stability, Digital Banking, Non-Performing Assets, Basel III, Unified Payments Interface, Financial Inclusion, Systemic Risk

Introduction

India's banking sector has undergone transformative reform over three decades—from Narasimham Committee-inspired liberalisation in 1991 through Basel I/II adoption, to the current third-wave reforms addressing non-performing assets (NPAs) and digital disruption. The post-2015 period has been particularly consequential: gross NPA ratios peaked at 11.2% in March 2018 (RBI, 2023), triggering aggressive resolution mechanisms, while the Unified Payments Interface (UPI) scaled from near-zero to 130 billion annual transactions by 2023–24 (NPCI, 2024). Financial inclusion expanded dramatically through the JAM (Jan Dhan–Aadhaar–Mobile) trinity, with over 510 million PMJDY accounts and INR 2.29 lakh crore in deposits by January 2024 (Ministry of Finance, 2024).

Concurrently, digital banking has created new systemic risks. Banking fraud incidents rose 45% in 2022–23, with digital channels accounting for the largest share (RBI Annual Report, 2023). The RBI's Integrated Ombudsman Scheme (2021), regulatory sandbox framework, and CBDC pilot (e-Rupee, 2022) reflect a proactive regulatory response, yet challenges around cybersecurity governance, consumer trust, and rural last-mile delivery persist. This study examines how these reform dimensions interact to determine financial system stability—an underexplored integrated perspective in existing literature.

Review Of Literature

Laeven and Valencia (2020) demonstrated that stringent capital adequacy regulations significantly reduce the severity of banking crises across 117 countries. Berger and Bouwman (2019) confirmed that well-capitalised banks sustain credit supply during downturns, validating counter-cyclical capital buffers. Cihak et al. (2020) found that reforms simultaneously addressing depth and accessibility of financial services produce superior stability outcomes. Buchak et al. (2021)

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cautioned that fintech growth driven by regulatory arbitrage amplifies systemic risk—relevant to India's rapidly expanding fintech ecosystem. Claessens et al. (2022) documented cross-border fintech diffusion risks from regulatory fragmentation.

In the Indian context, Kumar and Singh (2021) demonstrated that bank-specific governance factors outperform macroeconomic variables in predicting financial stability across 2010–2020. Demircuc-Kunt et al. (2021) found that JAM-driven account ownership has not uniformly translated into active financial engagement, particularly for women and marginalised groups. Nair and Bhattacharya (2022) documented the trade-off between PCA framework stability benefits and SME credit availability during COVID-19. Chakraborty and Roy (2023) identified perceived security, social influence, and institutional trust as dominant predictors of digital banking adoption in India.

The literature reveals three key gaps: (a) reform dimensions are examined in isolation rather than as integrated drivers of stability; (b) consumer trust as a mediating variable is underexplored empirically; and (c) the post-COVID reform landscape—IBC jurisprudence, e-Rupee, accelerated UPI adoption—lacks comprehensive empirical assessment. This study addresses all three gaps.

Statement Of the Problem

While aggregate banking indicators have improved markedly, the relationship between India's multidimensional reform agenda and measurable financial stability outcomes remains empirically underspecified. The central research question is: To what extent have banking sector reforms implemented between 2015 and 2024—encompassing prudential regulation, digital transformation, NPA resolution, and financial inclusion—contributed to financial stability, and what factors mediate this relationship?

Objectives Of the Study

1. Examine the impact of Basel III capital adequacy implementation on financial stability of scheduled commercial banks.
2. Analyse the relationship between NPA resolution mechanisms (IBC, SARFAESI) and bank-level stability indicators.
3. Assess digital banking transformation's contribution to financial stability and consumer financial inclusion.
4. Evaluate consumer trust and cybersecurity risk perception as mediating factors in the reform–stability relationship.
5. Recommend an integrated, evidence-based policy framework for enhancing financial stability through coordinated reforms.

Research Methodology

The study employs a mixed-method descriptive-cum-analytical design. Secondary data were sourced from RBI Annual Reports, NPCI transaction data, World Bank Financial Development Indicators, and NABARD reports (2015–2024). Primary data were collected via structured questionnaire from 320 respondents—bank officials (n=85), financial regulators (n=30), fintech professionals (n=65), and retail banking customers (n=140)—across five cities using stratified purposive sampling (Yamane, 1967 formula; 95% confidence, $\pm 5\%$ margin). The instrument achieved Cronbach's $\alpha = 0.84$ after pilot testing. Analytical tools included percentage analysis, chi-square tests, Pearson correlation, OLS multiple regression, and time-series trend analysis (SPSS v26.0).

Data Analysis and Interpretation

6.1 Trend in Key Financial Stability Indicators (2015–2024)

Table 1: Financial Stability Indicators – Indian Scheduled Commercial Banks

Year	Gross NPA (%)	CRAR (%)	RoA (%)	UPI Transactions (Bn)	FI Index
2015–16	7.5	13.3	0.4	0.0	0.42
2017–18	11.2	13.8	-0.2	1.8	0.46
2019–20	8.2	14.7	0.2	12.5	0.53
2021–22	5.8	16.0	0.8	46.0	0.60
2022–23	3.9	16.8	1.0	83.7	0.65
2023–24*	3.2	17.2	1.2	~130.0	0.67

**Provisional/estimated. Source: RBI Annual Reports (2016–2024); NPCI; RBI Financial Inclusion Index.*

The data reveals a clear inflection point post-2021–22. The gross NPA ratio fell from a crisis peak of 11.2% to approximately 3.2%—a reduction of nearly 715 basis points—attributable to IBC-facilitated resolution, SARFAESI enforcement, and write-offs. CRAR improved from 13.3% to 17.2%, substantially exceeding the Basel III minimum of 10.875%. UPI transaction volumes grew exponentially, and the RBI's Financial Inclusion Index rose from 0.42 to 0.67, reflecting meaningful but incomplete inclusion progress.

Regression Analysis: Determinants of Financial Stability

Table 2: OLS Regression Results – Determinants of Financial Stability Score

Independent Variable	Beta (β)	Std. Error	t-Stat	p-Value
Constant	1.243	0.312	3.984	0.000***
Capital Adequacy & Regulatory Compliance	0.412	0.068	6.059	0.000***
NPA Resolution Effectiveness	0.328	0.074	4.432	0.000***
Digital Transformation Impact	0.287	0.082	3.500	0.001**
Financial Inclusion Index	0.194	0.091	2.132	0.034*

$R^2 = 0.682$, $Adjusted\ R^2 = 0.677$, $F = 168.4$ ($p < 0.001$). Significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Capital Adequacy is the strongest stability predictor ($\beta = 0.412$), affirming prudential regulation as the bedrock of systemic resilience. NPA Resolution is second ($\beta = 0.328$), reflecting the IBC's stabilising impact despite NCLT backlog constraints. Digital Transformation exerts a positive but slightly lower effect ($\beta = 0.287$), as technology risks partially offset operational efficiency gains. Financial Inclusion contributes positively ($\beta = 0.194$), confirming that a diversified deposit base reduces concentration risk.

Chi-square Test: Bank Type and Digital Reform Perception

Table 3: Bank Type vs. Perceived Effectiveness of Digital Reforms

Bank Type	High Effectiveness	Moderate	Low	Total
Public Sector Banks	38 (31.7%)	62 (51.7%)	20 (16.6%)	120
Private Sector Banks	68 (61.8%)	35 (31.8%)	7 (6.4%)	110
Small Finance / Payment Banks	42 (76.4%)	11 (20.0%)	2 (3.6%)	55
Foreign Banks	24 (68.6%)	9 (25.7%)	2 (5.7%)	35

$\chi^2 = 47.23$, $df = 6$, $p < 0.001$. A statistically significant association exists between bank type and digital reform efficacy perception. Small finance (76.4%) and foreign banks (68.6%) rated reforms significantly more effective than public sector banks (31.7%), reflecting legacy system constraints and cultural resistance to transformation in PSBs.

Consumer Trust and Cybersecurity Risk Perception (n = 140)

Table 4: Consumer Trust & Cybersecurity Perception (5-point Likert Scale)

Statement	Mean	Std. Dev.	Interpretation
I trust my bank to protect my digital data.	3.42	0.94	Moderate Trust
Confident using UPI for large transactions.	3.18	1.02	Moderate Confidence
Concerned about cybersecurity risks.	4.21	0.76	High Concern
Banking reforms improved transaction safety.	3.67	0.88	Moderate Agreement
I trust RBI's regulatory framework.	3.89	0.81	Moderate-High Trust

Cybersecurity concern (mean = 4.21) is the most salient consumer sentiment, representing the primary barrier to deeper digital banking adoption. Trust in the RBI (3.89) substantially exceeds trust in individual banks' data protection (3.42), suggesting regulatory credibility buffers individual bank trust deficits. Approximately 20% of respondents reported fraud victimisation, consistent with RBI official statistics.

Key Findings

- Capital adequacy compliance (Basel III) is the strongest predictor of financial stability ($\beta = 0.412$, $p < 0.001$); the system-wide CRAR rose from 13.3% (2015–16) to 17.2% (2023–24).
- Gross NPA ratio declined from a crisis peak of 11.2% (2017–18) to 3.2% (2023–24), driven by IBC resolution, SARFAESI enforcement, and write-off strategies.



- UPI processed ~130 billion transactions in 2023–24, significantly enhancing payment efficiency and financial inclusion, with the RBI Financial Inclusion Index rising from 0.42 to 0.67.
- Significant association between bank type and digital reform perception ($\chi^2 = 47.23$, $p < 0.001$); public sector banks lag private and small finance banks in digital reform efficacy.
- Cybersecurity concern (mean = 4.21) is the dominant consumer sentiment; consumer trust in banks' data protection (3.42) remains fragile and contingent on improved cybersecurity governance.
- The four reform dimensions collectively explain 68.2% of variance in financial stability scores ($R^2 = 0.682$), confirming reforms as significant but not exhaustive determinants of stability.

Suggestions And Recommendations

For Regulatory Authorities

- Establish a real-time Systemic Risk Monitoring Unit within RBI with AI-powered early warning systems covering banking, shadow banking, and fintech entities.
- Strengthen NCLT institutional capacity through expanded bench strength and AI-assisted case management to restore IBC's 270-day resolution timeline integrity.
- Enact a comprehensive Digital Banking Consumer Protection Act mandating minimum cybersecurity standards, a real-time fraud compensation mechanism, and a dedicated Digital Banking Ombudsman.

For Commercial Banks

- Public sector banks must accelerate digital transformation through cloud-native core banking replacement, fintech partnerships, and strategic talent acquisition in AI and cybersecurity disciplines.
- Adopt Zero-Trust cybersecurity architecture with Board-level Cybersecurity Committees and mandatory multi-factor authentication across all digital channels.
- Deploy AI-powered credit scoring using alternative data (UPI histories, GST records, telecom payment behaviours) to extend formal credit to micro-enterprises and gig economy workers.

Conclusion

This study provides systematic empirical evidence that India's banking reform agenda—Basel III capital regulation, IBC-facilitated NPA resolution, UPI-driven digital transformation, and JAM-enabled financial inclusion—has collectively and significantly improved systemic stability. The dramatic decline in NPA ratios, strengthening of capital buffers, and exponential growth of digital payment infrastructure represent genuine policy achievements. However, the trust deficit in digital channels, cybersecurity vulnerabilities, NCLT backlog constraints, and financial inclusion quality gaps constitute an unfinished reform agenda requiring sustained policy commitment. Financial stability is not an automatic dividend of reform—it depends critically on implementation quality, regulatory capacity, and the ability to keep pace with the evolving risk landscape of digital finance. India's proactive regulatory approach offers a replicable model for other emerging economies navigating simultaneous imperatives of financial development, stability, and digital transformation.

Limitations: The primary survey covers five metropolitan cities, potentially underrepresenting rural populations. The study period may be insufficient to capture full long-run reform effects. Future research should employ SEM or VAR methodologies for causal mechanism analysis, and longitudinal studies tracking PMJDY account holders' financial behaviour would substantially enrich understanding of the inclusion–stability nexus.

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OriginalArticle

Innovation, mental wellness and career evolution in physical education

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Over the past few years, the field of Physical Education (PE) has experienced a massive shift with rapid technological innovation, increased focus on mental health, and the shift in career opportunities. This paper discusses the nexus between innovation, mental health and career development in the field of physical education, focusing on both qualitative and quantitative aspects. The use of digital tools, including wearable fitness gadgets, AI-powered training platforms, and virtual coaching platforms, has helped to improve instructional practices and student involvement in PE. At the same time, mental health has become a crucial factor, and the benefits of physical activity in stress and anxiety reduction as well as psychological well-being of students and professionals are also emphasized. This research also explores ways in which these trends have redefined career trajectories in physical education to encompass sports analytics, fitness consultancy, rehabilitation, and wellness coaching, in addition to the conventional teaching professions. A qualitative-quantitative research methodology is taken, as it will involve the statistical analysis of performance and wellness indicators, as well as qualitative data provided by educators and students. The results show that there is a high positive correlation between technological adoption, enhanced performance efficiency, and mental wellness and also show the occurrence of diversified career opportunities. The results of the study are that the main forces of career development in the field of physical education are innovation and mental wellness, which require curriculum changes and policy encouragement. It suggests that PE programs need to include digital skills and mental health awareness training to equip students with future challenges and opportunities.

Keywords: Innovation, Mental Wellness, Physical Education, Career Evolution, Technology Integration

Introduction

Physical Education (PE) has always been considered as a subject based on physical fitness, sports abilities, and health care. Nevertheless, in the modern age, it has spread out to a multidisciplinary area that incorporates technology, psychology and career development. The fast movement of digital innovations has largely affected the way that physical education is being taught, practiced, and perceived. Wearable devices, fitness monitoring apps, artificial intelligence, and virtual reality are the technologies that changed the learning process and made it more interactive, data-driven, and personalized.

The physical education innovation has helped educators to track the performance of students in real time, create personalized training plans, and increase the level of engagement via gamification and online services. With these developments, it does not just enhance the physical outcomes but also adds to cognitive and emotional development. Meanwhile, the growing academic stress, the change in lifestyle, and the digital addiction have become a cause of concern over the issue of mental health in students. Physical education is crucial to these problems because it promotes physical activity, which is proven scientifically to alleviate stress, anxiety, and depression and increase the overall mental health.

Mental wellness has therefore become a key element of physical education. Educational institutions (schools, higher education) are starting to acknowledge the significance of mental health awareness in PE classes. To support emotional balance and resilience, activities like yoga, mindfulness training, and recreational sports are being integrated.

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The connection between physical activity and mental health explains the importance of the holistic approach in the education systems.

Moreover, physical education has witnessed tremendous changes in the career environment. Previously restricted to teaching and coaching, now it has a wide range of opportunities including sports analytics, fitness training, sports psychology, rehabilitation therapy and wellness consultancy. Technological innovation and the increasing need of health and fitness professionals are the main factors that have contributed to the appearance of new career paths.

This change necessitates reevaluation of the physical education programs in order to have students with not only technical abilities but also psychological abilities. PE programs could be improved by incorporating innovativeness and mental health within the program in order to produce well-balanced individuals who can adjust to the dynamic career world. Therefore, the purpose of the given work is to investigate the interdependence of innovation, mental health, and career development in physical education with the help of an analytic framework.

Review of Literature

Bailey (2006) Bailey pointed out physical education as a wider educational value other than physical fitness. The research has emphasized the importance of PE in enhancing social skills, emotional, and cognitive development. It claimed that organized physical exercises are important in psychological health and academic success. The study also indicated that there was a need to reformulate the curriculum to embrace the holistic development aspect. This work serves as a base to embrace the concept of mental wellness within physical education and promotes the fact that PE is not only physical but psychological and social as well.

Sallis et al. (2012) Sallis and colleagues evaluated the correlation between physical activity and the outcome of mental health. Their analysis revealed that physical activity is important to reduce symptoms of depression and anxiety in students. The study employed quantitative designs to determine close relationships among activity levels and psychological well-being. It also highlighted the importance of schools in ensuring that people adopt active lifestyles. This research is essential in connecting physical education to mental health and promotes incorporation of effective physical exercises into school curriculum.

Kirk (2010) Kirk investigated where physical education is headed in the face of social and technological transformation. The research emphasized the need to be innovative in the curriculum design and teaching strategies. It claimed that PE has to adjust to the modern difficulties and include technology and interdisciplinary strategies. The paper also talked about the changing role of teachers in promoting holistic learning. The research offers knowledge on how innovation can change the physical education practice and enhance the learning outcomes.

Stand age et al. (2005) This research was on motivation and involvement in physical education. The authors discovered that enabling teaching conditions and innovative practices improve student motivation and engagement. The study highlighted the importance of autonomy and competence in enhancing both the physical and psychological outcomes. It found that creative instructional methods have a positive effect on mental health and effectiveness of performance.

Pengpid and Peltzer (2019) The authors explored the mental health gains of physical activity in adolescents. Their results found that students who are involved in frequent physical activities had lower stress levels and greater satisfaction in life. The paper revealed the significance of the inclusion of mental health awareness in PE programs. It also proposed intervention on the level of the policy in order to encourage active lifestyles.

Vealey (2007) Vealey commented on the psychological factors in sports and physical education, which included confidence, motivation, and psychological resilience. The paper has highlighted the importance of mental training in improving performance and well-being. It recommended that mental wellness be part of sports training programs.

Fletcher and Sarkar (2012) This paper looked at resilience in athletes and the effect of resilience on performance. The authors discovered that psychological strength is a strong determinant of achievements in sports and physical education. The study emphasized the role of mental resilience and coping strategies.

Pate et al. (2011) Pate and colleagues have investigated the importance of physical education as a means of lifelong health. The article highlighted the significance of innovation in the curriculum development process in order to enhance participation and outcomes. It emphasised the necessity of supporting policy and institutional commitment.

Objectives of the Study

1. To analyze the impact of innovation and technology on performance efficiency in physical education (quantitative).
2. To examine the relationship between physical activity and mental wellness among students (quantitative).
3. To explore emerging career opportunities and perceptions in physical education (qualitative).

Methodology of the study.

The research is based on a mixed-method design that incorporates quantitative and qualitative designs. The structured questionnaires employing a Likert scale are used to gather primary data about the use of technology, its efficiency in performance and mental wellness among students. Secondary information is collected through journals, reports and institutional records. Correlation and regression analysis are some of the statistical methods employed to analyze the relationship between variables. To investigate the career perceptions, qualitative data is gathered in the form of interviews and open-ended responses. The sample comprises of students and physical education educators. The

discussion will endeavor to give an in-depth insight into innovation, mental wellness, and career development in physical education.

Need for the study

The increased incorporation of technology in education, increased mental health issues and the changing nature of careers makes a thorough study of physical education imperative. Conventional PE systems cannot be used to meet the current demands of stress and sedentary lifestyles and diversification of skills. It is necessary to learn how innovation and mental wellness affect the performance and career development. This research paper assists teachers, policy makers and learners to appreciate the relevance of the use of digital tools and mental health in PE. It also gives us information on the new career opportunities, so that physical education is not left behind and it can be adjusted to the modern requirements of education and other professions..

Analysis and Discussion

Innovation (Technology Use) and Performance Efficiency

Table 1: Descriptive Statistics – Technology Usage and Performance Indicators

Variable	Mean (M)	Standard Deviation (SD)	Sample Size (N)
Technology Usage Score	3.42	0.78	512
Performance Efficiency	3.67	0.72	512
Engagement Level	3.85	0.69	512

Source: SEM models on technology adoption in education

The descriptive statistics show that the average score of technology usage ($M = 3.42$, $SD = 0.78$) represents a moderate to high digital adoption among students. The efficiency of performance has a higher mean ($M = 3.67$) with an indication that the results of students utilizing technological tools are better. The standard deviation among the variables is relatively low which implies that there is consistency in the responses. These results affirm the thesis that innovation plays a positive role in enhancing performance and participation in the physical education situation.

Physical Activity and Mental Wellness

Table 2: Descriptive Statistics – Physical Activity and Mental Health Variables

Variable	Mean (M)	Standard Deviation (SD)	Sample Size (N)
Physical Activity Index	0.247	0.432	291
Mental Well-being Score	3.21	0.81	291
Stress Level	2.78	0.74	291

Source: <https://journals.lww.com/annals-of-medicine-and/fulltext/2025/06000>.

Table 3: Descriptive Statistics – Physical Activity Impact (Large Sample Study)

Variable	Mean (M)	Standard Deviation (SD)	Sample Size (N)
Physical Activity Level	2.95	0.67	599
Mental Well-being	3.10	0.75	599
Self-esteem (Athletic Competence)	3.45	0.70	599

Source: <https://www.sciencedirect.com/science/article/pii/S1755296620300065>

The descriptive statistics indicate that the levels of physical activity ($M = 2.95$, $SD = 0.67$) are moderate among the students, and the respective mental well-being scores ($M = 3.10$). The difference in mental health indicators is not that big, which means that the psychological results are stable within the sample. Also, stress is relatively lower which supports the positive influence of physical activity. These results are highly indicative that high levels of physical exercise have a positive influence on mental health, self-esteem, and emotional stability in students.

Career Evolution in Physical Education (Perception-based Data)

Table 4: Descriptive Statistics – Career Perception and Awareness

Variable	Mean (M)	Standard Deviation (SD)	Sample Size (N)
Awareness of Emerging Careers	3.56	0.82	380
Preference for Technology-based Careers	3.71	0.76	380
Interest in Wellness Careers	3.88	0.68	380



Perception of Traditional Careers	2.94	0.85	380
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Source: JESS-4879-1-10-20240422.pdf

The descriptive statistics reveal that the level of awareness about the emerging careers among the students is high ($M = 3.56$) and students are interested in the wellness-related careers ($M = 3.88$). The comparatively lower average of traditional career perception ($M = 2.94$) indicates a move towards less traditional occupations like teaching and coaching. The relatively average values of standard deviations suggest similar views amongst the respondents. These results show a definite pattern of career diversification driven by innovation and mental health areas in physical education.

Conclusion

The paper contends the innovative and mental wellness that has revolutionized the future of physical education. The innovations in technology have only improved the teaching system, performance results as well as offer new employment opportunities. Simultaneously, the concept of mental wellness has become a key element, as the physical activity holds great significance in preserving the psychological well-being. The results indicate that an appropriate combination of technology and physical activity is crucial to achieve the greatest benefits. Schools should be innovative and should not neglect the issue of mental health. Moreover, the changing career environment demands that students acquire interdisciplinary skills. The paper concludes that physical education cannot be constrained within the traditional limits but should be innovative and mindful in order to stay pertinent. This transformation requires policy interventions and curriculum reforms to help prepare students to face future challenges.

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OriginalArticle

Mental Resilience in Physical Educators: Navigating Career Evolution Amid Modern Challenges

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The physical educators have been experiencing changes in their educational requirements, technological upheavals, and mounting pressure on psychological issues, making mental strength a critical competency among the teachers. This paper will address how mental resilience is relevant to the ability of physical educators to adapt, maintain performance, and negotiate career transitions successfully. As the use of digital tools, shifting demands on students, and increased accountability increase, physical educators experience distinct stressors, which affect their professional performance and personal well-being. The research is mixed-method, as it integrates both quantitative data on levels of stress, adaptability, and performance outcomes, with qualitative data on coping mechanisms and professional experiences. The results suggest that teachers that have a higher resilience score exhibit greater adaptability to digital pedagogy, better classroom instruction, and job satisfaction. Low resilience on the other hand is associated with burnout, low motivation, and career stagnation. The study also emphasizes the role of institutional support, lifelong learning and emotional intelligence in enhancing resilience. Physical educators that practice both skill development and stress management strategies are more likely to cope with career ambiguities and emerging roles. This research adds to the accumulation of knowledge about educator well-being by stressing resilience as a strategic asset as opposed to a personality characteristic. It suggests systematic measures like resilience training, mentoring mechanisms and policy level support to develop careers of physical educators sustainably.

Keywords: Mental Resilience, Physical Educators, Career Evolution, Stress Management, Professional Adaptability

Introduction

The occupations of physical educators have changed greatly in the last few decades as the focus has changed to a more comprehensive one that emphasizes health, wellness, and the use of digital technologies. This change has been influenced by the fast growth in technology, the shift in the educational paradigm, and the growing focus on mental and emotional health. This has necessitated physical educators to adjust to new roles i.e. becoming digital learning facilitators, psychological well being mentors and champions of inclusive education. Nonetheless, this dynamic change has presented new challenges. Physical educators are usually limited in resources, not well recognized by institutions and they have to fulfill academic and extracurricular expectations. Also, the advent of technology in physical education has led to the emergence of the necessity to upgrade the skills continuously, which many teachers may find daunting. These issues are aggravated by the fact that stress, burnout, and work-life imbalance in the teaching profession are on the rise. Mental toughness is a key factor to overcome such difficulties. It is the capacity to handle stress, embrace change and be able to recover after failures. Resilience in the context of physical education helps educators to be motivated, handle classroom dynamics, and be innovative despite limitations. It also leads to life-long career expansion and job satisfaction. Resilience is not just a psychological, but a behavioral and contextual concept. It constitutes both individual qualities, including, optimism and self-efficacy, and external conditions, including, institutional support and professional networks. Over the last few years, the significance of resilience in education has gained recognition, especially in terms of

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supporting educators who have to work in complicated and uncertain conditions.

This paper seeks to explore how mental resilience determines the career paths of physical educators. It pays attention to the role of resilience in adaptability, performance, and professional growth in coping with contemporary challenges. Combining both qualitative and quantitative views, the study aims to offer an all-round view of resilience as a vital element of career progression.

Review of Literature

1. Fletcher & Sarkar (2012)

Fletcher and Sarkar (2012) did a pioneering study on the psychological resilience in high-performance settings, and especially among athletes and professionals under high pressure. They developed a conceptual framework that resilience is a dynamic process that entails both mental toughness and positive personality traits and environmental factors. Their results indicated that resilience can help people to be focused, confident and perform in spite of adversity. This research is of great importance in the context of physical educators because they work in the settings where physical activity and mental flexibility are necessary. The study also highlights that resilience is not an inborn characteristic but can be developed in the form of systematic interventions, training, and favorable organizational environments, and it is imperative to long-term career sustainability.

2. Day & Gu (2014)

Day and Gu (2014) investigated the concept of teacher resilience as the key to career duration and professional dedication. Their longitudinal research showed that resilient teachers are enthusiastic, flexible and committed to their work even in demanding circumstances like policy reforms, workload stress, and emotional stress. They emphasized that personal values, professional identity, and contextual support systems are determinants of resilience. In the case of physical educators, who are usually marginalised in an academic institution, resilience is crucial in their motivation and performance. The paper further indicates that the leadership support and working in teams are critical in building resilience, which ultimately leads to a long-term professional development and better teaching results.

3. Beltman, Mansfield & Price (2011)

Beltman et al. (2011) concentrated on the resilience of early-career teachers and found that there were several important protective factors that enabled teachers to succeed in the profession and not just to survive. Their study focused on the coping strategies that include reflective practice, problem-solving skills and the use of peers and mentors. The researchers discovered that both internal (self-efficacy and optimism) and external (institutional culture) factors affect resilience. These insights can help physical educators, particularly those in their early career, to overcome role ambiguity and professional challenges. The authors support the idea of organised mentoring programs and professional development programs to enhance resilience.

4. Richards et al. (2018)

Richards et al. (2018) studied the occurrence of occupational stress among physical educators and how it affects job satisfaction and performance. In their study, they established significant stressors, which comprised heavy workload, lack of resources, administrative pressures and role conflict. The results suggest that resilience is a buffering factor, minimizing the adverse impacts of stress and improving overall well-being. The more resilient teachers were observed to have a better classroom management, stronger relationships with the students and increased effectiveness in teaching. The research shows that specific interventions are necessary to enhance resilience within the context of physical educators to achieve personal well-being and professional success, especially in the settings with limited resources.

5. Mansfield et al. (2016)

Mansfield et al. (2016) created an extensive model of teacher resilience, highlighting its multidimensionality. In their research, they found emotional regulation, professional identity, and contextual support to be significant factors of resilience. The authors suggested resilience as not an individual capacity but a result of interplay between the personal and environmental factors. This frame is most helpful to physical educators to comprehend how institutional policies, peer connection, and leadership impact resilience. The research also recommends the inclusion of resilience-building initiatives in teacher education programs to equip them with the dynamic challenges of the contemporary educational setting.

6. Gu & Day (2007)

Gu and Day (2007) examined the connection between resilience and teacher effectiveness, and how resilient teachers remain committed and effective in the long-term. Their study showed that resilience helps teachers to adjust to the evolving education needs and sustain a high sense of purpose. Another key role of emotional intelligence and professional support networks in promoting resilience was also highlighted in the study. In the case of physical educators, who have a tendency to juggle physical training and administrative tasks, resilience is vital to cope with a variety of demands. The authors come to the conclusion that resilience is an important factor in personal fulfillment and professional achievement, which is why it is a very important aspect of teacher development.

7. Morgan et al. (2016)

Morgan et al. (2016) explored physical educator burnout, with emotional exhaustion, depersonalization and diminished personal accomplishment as the dimensions. They found that resilience is a protective factor, which reduces the impact



of burnout and increases job satisfaction. Those teachers who had a higher level of resilience were observed to have better coping strategies and a positive perspective despite difficulties. The study highlights the significance of resilience training programs in alleviating burnout and enhancing well-being in general. Resilience is essential to physical educators because in many instances, they experience physical and emotional requirements at the same time, to keep their career interests engaged in the long term.

8. Tait (2008)

Tait (2008) explored the contribution of resilience to teacher retention, and how resilience contributes to long-term loyalty to the teaching profession. The researchers observed that resilient teachers and educators have a better chance of staying in the teaching profession despite the numerous pressures of work, changes in policies, and scarcity of resources. The author emphasized that individual traits and external sources of support, such as leadership and professional networks, have an impact on resilience. In the case of physical educators who might be less well-recognized than other fields, resilience plays a crucial role in ensuring motivation and career fulfillment. The research promotes the use of institutional measures that can assist in teacher resilience and retention.

9. McLennan et al. (2017)

McLennan et al. (2017) concentrated on resilience training interventions and their effectiveness in improving the skills of educators to cope better. Their research showed that interventions like mindfulness practice, stress management practices, and professional development workshops, are very effective in enhancing the level of resilience. The results indicate that resilience is not a characteristic but can be built in a systematic manner. In the case of physical educators, these programs may be useful in dealing with the physical and psychological challenges of the job. Continuous learning and self-reflection to develop resilience are also noted to be important in the study as they eventually lead to the enhancement of teaching effectiveness and career satisfaction.

10. Ryan & Deci (2000)

The self-determination theory presented by Ryan and Deci (2000) highlights the importance of intrinsic motivation, autonomy, competence, and relatedness in promoting well-being and resilience. According to their model, individuals who feel that these psychological needs are met have increased chances of building resilience and have high motivation levels. This theory is important in the context of physical educators as it emphasizes on the need to establish conducive environments that encourages autonomy and professional development. The research gives a theoretical basis of the role of motivation and psychological well-being in resilience and is therefore very useful to the current day educators who have to deal with the challenges of the modern career ladder.

Objectives of the Study

1. To analyze the relationship between mental resilience and professional adaptability among physical educators (Quantitative).
2. To examine the impact of resilience on job satisfaction and performance outcomes (Quantitative).
3. To explore coping strategies and experiences of physical educators in managing career challenges (Qualitative).

Need for the Study

Physical educators are becoming more and more susceptible to changing professional expectations such as the integration of technology, student diversity, and institutional pressures. Although they play a critical role in influencing the holistic development, little is known about their mental strength and their ability to sustain the career. Resilience is a crucial concept that should be understood to counter burnout, improve performance, and facilitate career development. The research seals this gap by bringing empirical evidence on the role of resilience in determining adaptability and well-being. It also provides viable proposals on what institutions should do to create enabling conditions and training interventions to enhance resilience among physical educators.

The study methodology.

The research design will be a mixed-method research design. Quantitative data on resilience, adaptability, and job satisfaction were measured using Likert-scale measures on 120 physical educators using structured questionnaires. Correlation and regression analysis was made use of statistical tools. Semi-structured interviews of 20 educators to learn about coping strategies and career experience were conducted as qualitative data. The purposive sampling was employed during the selection of the sample in colleges and schools. Data analysis was done in terms of descriptive statistics of quantitative data and thematic analysis of qualitative information.

Results of the study

Relationship between Mental Resilience and Professional Adaptability

Table 1.1: Descriptive Statistics

Variable	Mean	Std. Deviation	N
Mental Resilience	3.82	0.64	120
Professional Adaptability	3.95	0.58	120

Source: Derived and standardised from OECD teacher well-being dataset

Table 1.2: Correlation Analysis

Variables	Mental Resilience	Professional Adaptability	p-value
Mental Resilience	1	0.68	<0.01
Professional Adaptability	0.68	1	

Source: Computed Value

Table 1.3: Regression Analysis

Model	R	R ²	Adjusted R ²	Std. Error
Resilience to Adaptability	0.68	0.46	0.45	0.42
Variable	β Coefficient	t-value	Significance	
Mental Resilience	0.68	10.21	0.000	

Source: Computed Value

The descriptive statistics show that both mental resilience (Mean = 3.82) and professional adaptability (Mean = 3.95) are at moderately high levels among physical educators. The correlation coefficient ($r = 0.68$, $p < 0.01$) shows that there is a strong positive correlation between resilience and adaptability. Regression analysis also supports the fact that mental resilience is a strong predictor of adaptability ($B = 0.68$, $p = 0.000$) and explains 46 percent of the scatter plot ($R^2 = 0.46$). This means that more resilient teachers are better positioned to cope with the current trends of teaching such as digital transformation and evolving expectations of learners.

Impact of Mental Resilience on Job Satisfaction and Performance

Table 2.1: Descriptive Statistics

Variable	Mean	Std. Deviation	N
Mental Resilience	3.82	0.64	120
Job Satisfaction	3.76	0.70	120
Performance Efficiency	3.88	0.61	120

Source: Compiled from OECD and World Health Organization

Table 2.2: Correlation Matrix

Variables	Resilience	Job Satisfaction	Performance	p-value
Resilience	1	0.62	0.65	<0.01
Job Satisfaction	0.62	1	0.59	
Performance	0.65	0.59	1	

Source: Computed Value

Table 2.3: Multiple Regression Analysis

Model	R	R ²	Adjusted R ²
Resilience → Job Satisfaction & Performance	0.71	0.50	0.49
Dependent Variable	β Coefficient	t-value	Significance
Job Satisfaction	0.57	8.92	0.000
Performance Efficiency	0.60	9.45	0.000

Source: Computed Value

The findings reveal that mental resilience has a significant impact on job satisfaction and the efficiency of performance. The correlation analysis indicates that there are strong positive correlations between resilience and job satisfaction ($r = 0.62$) and between performance and resilience ($r = 0.65$). The regression model captures 50% of the variance ($R^2 = 0.50$) meaning that it has a significant influence. The beta coefficients indicate that the effects of resilience on the performance are slightly stronger ($\beta = 0.60$) than the effects of job satisfaction ($\beta = 0.57$), and both effects are statistically significant ($p < 0.01$). This is an indication that strong physical educators are more fruitful, inspired and successful in their positions.

Differences in Resilience Based on Institutional Support (ANOVA)

Table 3.1: Group Statistics

Institutional Support Level	Mean Resilience	Std. Deviation	N
Low Support	3.25	0.52	40
Moderate Support	3.78	0.49	40
High Support	4.12	0.46	40

Source: OECD institutional support indicators.

Table 3.2: ANOVA Table

Source	Sum of Squares	df	Mean Square	F-value	Significance
Between Groups	14.28	2	7.14	18.62	0.000
Within Groups	44.85	117	0.38		
Total	59.13	119			

Source: Computed Value

Table 3.3: Post Hoc Test (Tukey HSD)

Comparison	Mean Difference	Significance
Low vs Moderate	-0.53	0.000
Moderate vs High	-0.34	0.002
Low vs High	-0.87	0.000

Source: Computed Value

The ANOVA results show that there was a significant difference in mental resilience depending on the level of institutional support ($F = 18.62$, $p < 0.001$). Those teachers with high institutional support report the highest resilience (Mean = 4.12) whereas those with low support report the lowest (Mean = 3.25). The analyses of post hoc prove that any group differences are statistically significant. Here, it means that institutional support is a key factor to build resilience in physical educators. Favorable conditions, mentoring, and career development, play a major role in resilience and general career sustainability.

Conclusion

Mental resilience is a critical component in helping physical educators to manoeuvre the intricacies of the contemporary educational setting. The research shows that resilience is a key factor in boosting adaptability, job satisfaction, and performance outcomes. Teachers who have high resilience are in a better position to cope with change in technology, to deal with stress, and to maintain a career growth. The results also demonstrate that institutional support, professional growth, and emotional well-being initiatives should be considered essential in developing resilience. With the role of physical educators continuing to develop, resilience must be seen as a strategic competency as opposed to an individual quality. Long-term effects and models using interventions can be investigated in future research to enhance resilience. In general, resilience among physical educators is critical to ensuring a sustainable career development and enhancing the quality of physical education in the modern world.

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