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Contents

Volume IV, Issue 1 • January–June 2026 • 28 articles • Article pages 1–239

No.	Author(s)	Article title	Pages
1	Dr. Deepak Kumar Sahu	Workforce Quality, Human Development and Economic Productivity: Foundations for Viksit Bharat 2047	1–4
2	Dr. Arvind Anand	Training and Performance Appraisal in Human Resource Management: An Integrated Framework for Employee Development	5–8
3	Dr. Roshni Lohia	The Role of the Banking Sector in Rural Development: Financial Inclusion and the Vision of Viksit Bharat 2047	9–12
4	Jayendra Kumar	Self-Regulating Hydrogels for Healing	13–20
5	Dr. Mrinal Gaurav Karuna Kumari	Integrating Spirituality, Circular Economy and Gandhian Resource Management for an Indigenous Sustainable Model of Viksit Bharat @2047	21–35
6	Afreen Ejaz	Digital India at the Margins: Uneven Participation, Structural Barriers, and the Future of Tribal Retail in Gumla District, Jharkhand	36–44
7	Dr. Anirban Gupta Ashish Sharma	Cashless Convenience or Costly Habit Among Youth. A Case Study of Lalpur Area, Ranchi.	45–52
8	Saroj Kumari Jayanti Kumari Partha Sarathi Chattaraj Priyanka Kumari	A Study of the Impact in Education of the 7- Pillars India Artificial Intelligence Mission: For Viksit Bharat 2047	53–67
9	Dr. Amit Kumar Gupta	Online Price Advantage and Its Impact on Traditional Retail Stores: Evidence from Ranchi District	68–80
10	Dr. Bakshi Om Prakash Sinha	Viksit Bharat 2047: Role of Innovation, Youth, Startups, Environment, and Rural Development in Achieving Sustainable Growth	81–86
11	Dr. Sanjay Kumar	Good Governance and State Capacity: Institutional Foundations for Building Viksit Bharat 2047	87–95
12	Dr. Aarti Kumari	Viksit Bharat @ 2047: Weaving Indian Ethics and Values into the Framework of National Development	96–103

Contents

Volume IV, Issue 1 • January–June 2026 • 28 articles • Article pages 1–239

No.	Author(s)	Article title	Pages
13	Awesh Kumar Rawani	A Study on challenges of Urban Development project with reference to Ranchi Smart city	104–113
14	Dr. Ajay Kumar	Viksit Bharat @ 2047: Strengthening India's Economic Future through MSMEs, Startups and Financial Inclusion	114–121
15	Dr. Ravindra Kumar Ms. Simran Kaur	From Access to Innovation: A Critical Review of India's Education Policy Evolution, Employability and the Viksit Bharat @2047 Vision	122–135
16	Dr. Rajni Singh	OCCUPATIONAL STRESS AND MENTAL WELL-BEING AMONG WORKING PROFESSIONALS: IMPLICATIONS FOR HUMAN DEVELOPMENT TOWARDS VIKSIT BHARAT @ 2047	136–141
17	Mr. Nihal Toppo Dr. Tarun Chakraborty	Comparative study on marketing strategy of Tata motors India limited and Hyundai motors India limited	142–151
18	Prity Kumari	Gender Responsive Emotional intelligence to emotionally resilient society for Viksit Bharat: Sociological Implications for Mental Health in India	152–159
19	Dr. Diwakar Kumar	Assessing the Scope of Artificial Intelligence in Rural Governance	160–165
20	Dr. Priyanka Kashyap	The Impact of Commercial Banks on the Economic Development of India	166–171
21	Swati Rani	FROM BURNOUT TO BUILDUP: MENTAL CAPITAL AS INDIA'S $1 TRILLION OPPORTUNITY FOR VIKSIT BHARAT @ 2047	172–176
22	Sourav Nag	Reimagining College Libraries as Knowledge and Innovation Hubs for Realizing the Vision of Viksit Bharat 2047	177–186
23	Col Himanshu Shekhar (Retd)	VIKSIT BHARAT @ 2047: A SOLDIER'S PERSPECTIVE ON NATIONAL CHARACTER, NATION BUILDING AND YOUTH EMPOWERMENT	187–193
24	Anupam Mishra	Higher Education, Employability, and the Crisis of Academic Culture in India: Rethinking Universities for Viksit Bharat @ 2047	194–204
25	Abhishek Kumar Vishwakarma Khushbu Kumari Priyanka Kumari	From Fragmented IoT to Connected India: Solving Interoperability Issues	205–213
26	Dr. Loveneesh Goutam	Startup Ecosystems as Catalysts of Reverse Migration and Labour Market Redistribution in Tier-II India: Pathways towards Inclusive Regional Development under Viksit Bharat 2047	214–222
27	Sumit Kumar Pathak Apurw Kumar Anushka Priti Kumari	Studies on compost production and its evaluation of soil blend from the Jhiri landfill, Ranchi, Jharkhand, India	223–229
28	Siddhi Pandey Priyanshu Kumar	Mining Proximity and Infrastructural Disparities among Tribal Households in Jharkhand's Bauxite Belt: Evidence from Logistic Regression Analysis	230–239

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Workforce Quality, Human Development and Economic Productivity: Foundations for Viksit Bharat 2047

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Abstract

India's aspiration to become a developed nation by 2047 depends not only on capital formation and technological progress but also on the capabilities of its workforce. This paper examines how education, health, skills and equitable access to employment shape labour productivity and the prospects for inclusive economic growth. Using a descriptive and analytical review of secondary sources, including reports of the United Nations Development Programme, the International Labour Organization, the Institute for Human Development and the World Bank, the paper develops a human-capital-centred interpretation of India's development challenge. The review suggests that educational attainment alone cannot ensure productivity gains unless learning quality, employability, population health and the availability of productive jobs improve together. It also identifies persistent obstacles arising from skills mismatch, uneven public services, gender and regional disparities, and changing technological demands. The paper argues for coordinated action by educational institutions, businesses and public agencies, with particular attention to vocational pathways, health systems, lifelong learning and the quality of employment. These conclusions represent a synthesis of published evidence rather than the results of a new statistical or field survey.

Keywords: Human development; human capital; workforce quality; labour productivity; skill development; Viksit Bharat 2047

Introduction

The vision of Viksit Bharat 2047 places sustained economic progress alongside broader improvements in living standards and social opportunity. Although investment in physical infrastructure, manufacturing and technological capability remains important, the ability of individuals to participate productively in economic life is equally consequential. Workers who possess relevant knowledge, maintain good health and can adapt to changing technologies are better positioned to contribute to output, organizational efficiency and innovation. The development challenge is therefore not merely to increase the number of people entering the labour force, but to improve the quality of their participation.

Human development and economic productivity are related but distinct concepts. Human development concerns the expansion of people's capabilities and freedoms, whereas productivity concerns the value of output generated from labour and other inputs. Their relationship is not automatic. Access to schooling may increase formal qualifications without producing adequate learning; similarly, improvements in health may not translate into higher earnings when productive work is unavailable. The World Bank (2018) emphasizes that schooling and learning should not be treated as equivalent, while the United Nations Development Programme (UNDP, 2025) places human choices and capabilities at the centre of development.

For India, this distinction is especially relevant because the transition from educational participation to decent and productive employment remains uneven. The International Labour Organization (ILO) and Institute for Human Development (IHD, 2024) document challenges associated with youth employment, skills and the relationship between education and work. Against this background, the present paper considers workforce quality as an integrating concept linking social investment, organizational performance and the aspiration for a more inclusive economy by 2047.

Conceptual and Literature Background

Human capital refers to the stock of knowledge, competencies and health-related capacities embodied in individuals that can support productive activity. It differs from physical capital because its quality is influenced by family circumstances, public services, workplace learning and individual opportunities across the life course. Investments in these capacities may generate private benefits, such as higher employability, and wider social benefits, such as more

effective institutions and increased innovation. Yet the returns depend on the quality and accessibility of education, health services and labour markets.

A human development perspective prevents workforce quality from being reduced to employers' short-term requirements. UNDP (2025) stresses the importance of retaining meaningful human choice as technologies evolve. From this perspective, workers should be able not only to perform tasks efficiently but also to obtain safe employment, continue learning and share in the benefits of economic change. A productive economy cannot be assessed fully through output indicators if large groups remain excluded from skills, health protection or suitable employment.

The educational dimension requires particular attention. The World Bank (2018) notes that the expansion of schooling does not necessarily resolve shortfalls in foundational learning, making educational quality a critical part of any human-capital strategy. In the Indian context, the ILO and IHD (2024) link the youth employment challenge to the changing composition of employment and the transition from education to work. These sources jointly support a broad proposition: the effectiveness of human-capital investment depends on how learning, skills formation and employment opportunities reinforce one another.

Objectives and Research Methodology

The paper has four objectives: to explain the relationship between human development and labour productivity; to examine the roles of education, health and skills in workforce quality; to identify structural constraints affecting productive employment in India; and to derive policy and organizational implications for Viksit Bharat 2047. These objectives are addressed through a descriptive, qualitative synthesis rather than an attempt to estimate a new causal relationship.

The analysis draws on publicly available secondary materials, with emphasis on the World Development Report 2018, the India Employment Report 2024, the Human Development Report 2025 and the National Education Policy 2020. Relevant themes were organized into education, health, workforce adaptability, employment opportunities and inclusion. Because the sources differ in scope and method, the discussion does not aggregate their data or claim that all relationships have been independently tested in this paper. The review also does not include an original household survey, enterprise dataset or econometric model.

Human Development as a Foundation of Productive Work

Educational development raises productivity when learning outcomes allow individuals to solve problems, adopt improved practices and communicate effectively. Foundational literacy and numeracy underpin later technical learning, while higher education and professional training can develop specialized knowledge. The National Education Policy 2020 identifies flexibility, multidisciplinary education and vocational exposure as important aspects of educational reform (Ministry of Education, 2020). In practice, the policy challenge is to connect qualifications with demonstrable competencies and the changing needs of workplaces, rather than treating certification as a sufficient outcome.

Health is a second foundation of workforce quality. Illness, preventable disability, poor nutrition and inadequate access to care can affect attendance, concentration and the capacity to sustain employment. Better health may strengthen productivity directly, but it also shapes an individual's ability to acquire education and training. This implies that public health systems, preventive services, occupational safety and workplace welfare should be understood as productive investments as well as components of social well-being. Their economic effects will vary with local labour conditions and service quality.

Skills development connects general education to specific occupational tasks. Technical skills, digital competencies, communication, teamwork and problem-solving are particularly relevant when firms adopt new processes. However, training does not produce lasting gains merely because participants complete a course. Employers need opportunities to deploy new skills, and training providers require feedback about actual work requirements. An effective skills ecosystem therefore combines credible certification, workplace exposure, apprenticeships and mechanisms through which learners can update their knowledge throughout their careers.

Technological change makes adaptability increasingly important. Digital tools and artificial intelligence can complement some tasks while transforming or reducing the demand for others. UNDP (2025) frames the development implications of artificial intelligence around people's ability to exercise choices, rather than technology alone. Accordingly, India's workforce strategy must address digital access and competencies without presuming that

technology will benefit every worker equally. The possibility of technological displacement strengthens the case for reskilling, job-transition support and inclusive access to learning.

Structural Constraints in the Indian Context

A central constraint is the mismatch between available qualifications and the competencies requested by employers. This mismatch may reflect weak foundational learning, insufficient practical experience, limited information about labour-market demand or the absence of suitable jobs in a particular location. It should not be interpreted solely as a deficiency among job seekers. The ILO and IHD (2024) show why youth employment needs to be assessed in relation to education and the broader structure of labour demand. A successful intervention must therefore address both skill supply and the capacity of the economy to generate remunerative work.

Regional inequalities complicate human-capital formation. Remote and disadvantaged communities may face less reliable access to educational institutions, healthcare, transport, digital connectivity and formal employment networks. These barriers accumulate: limited schooling constrains future training opportunities, while poor health or weak infrastructure restricts the range of jobs individuals can accept. Policies designed for well-connected urban labour markets may consequently be less effective in rural areas unless adapted to local constraints.

Participation is also shaped by gender, social inequality and conditions within the workplace. Unpaid care responsibilities, safety concerns, discrimination and inflexible work arrangements can prevent capable individuals from entering or remaining in productive employment. Workforce development is therefore not only a matter of raising average skill levels; it also requires institutions that allow people to use their capabilities. Removing participation barriers may improve household welfare and expand the effective talent pool available to organizations.

Implications for Enterprises and Public Policy

From a management perspective, workforce quality is a strategic organizational resource. Firms benefit when recruitment, job design, skills upgrading and employee welfare are treated as interconnected decisions. Training investments are more likely to be useful when linked with genuine tasks, supportive supervision and opportunities for internal mobility. Productivity improvement should therefore be assessed using a combination of output, quality, employee development and retention indicators, rather than training expenditure alone.

Public policy should coordinate education, health, industrial development and employment services. Stronger foundational education is needed before advanced training can deliver its intended benefits. Vocational institutions can work with employers to update curricula and provide practical exposure, while public employment information and career guidance may reduce informational barriers between job seekers and firms. In addition, accessible health services and social protection can help workers maintain productive participation when they face illness or employment transitions.

A territorially sensitive approach is essential. District-level planning can identify local sectors with employment potential and the competencies they require, including opportunities in agriculture-related industries, services and microenterprises. At the same time, evaluation should distinguish between participation in a programme and substantive outcomes such as improved learning, sustained employment, earnings or workplace performance. Monitoring these outcomes provides a firmer basis for allocating resources than the number of certificates or enrolments issued.

Discussion and Conclusion

The reviewed evidence suggests that India’s development ambitions will be better served by a coherent human-capital strategy than by isolated interventions in education, health or skills. Education without learning produces limited capabilities; training without appropriate work produces limited returns; and employment without basic protections may fail to generate durable improvements in well-being. These relationships make workforce development a cross-sectoral concern that extends beyond the responsibilities of any single ministry or employer.

This paper has not established a quantitative estimate of how particular investments will affect gross domestic product or labour productivity by 2047. Its contribution is conceptual: it clarifies the complementary conditions under which human development can support higher-quality employment and economic performance. Future research could use state- and district-level data to examine differences in skill acquisition, health access, formal employment and enterprise productivity.

Viksit Bharat 2047 will ultimately require the development of people alongside the development of markets and technology. Improving learning quality, health security, skills relevance and equal access to productive opportunities offers a defensible path toward a more resilient workforce. The quality of employment created, and the breadth of participation in that employment, should remain central measures of progress.

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Training and Performance Appraisal in Human Resource Management: An Integrated Framework for Employee Development

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Abstract

Training and performance appraisal are closely connected human resource management practices, yet they are frequently treated as separate administrative activities. This paper examines how their integration can support employee capability, organizational performance and career development. The study uses a conceptual and descriptive review of established scholarship on training design, feedback and performance management. The analysis distinguishes training needs assessment, programme implementation and transfer of learning from the measurement, feedback and developmental functions of appraisal. It argues that appraisal becomes more useful when performance evidence informs targeted learning, while training becomes more accountable when its outcomes are reviewed through fair and continuous performance discussions. Research also indicates that feedback and training are not uniformly effective; their value depends on the quality of programme design, employee participation, organizational support and the context in which skills are applied. The paper proposes a cyclical approach linking performance expectations, evidence, feedback, development planning and follow-up evaluation. As a conceptual review, it does not report original survey findings or statistical tests.

Keywords: Human resource management; training and development; performance appraisal; feedback; employee performance; performance management

Introduction

Human resource management has progressively shifted from a narrow administrative focus toward the development and effective deployment of employee capabilities. Within this approach, training and performance appraisal influence how organizations establish expectations, identify skill gaps and support employees as their roles change. Training aims to build competence; appraisal examines how employees perform against relevant requirements. Their contribution is greatest when the two processes inform one another rather than operating as isolated annual or occasional events.

In many organizations, training is assessed by attendance or course completion, while performance appraisal is treated as a formal rating exercise. These approaches provide limited information about whether employees can use newly acquired skills or understand how their performance can improve. A more integrated system begins with the work itself: organizational goals inform individual expectations, actual performance provides evidence of developmental needs, training addresses selected needs and subsequent appraisal assesses improvement.

Prior research demonstrates that neither practice should be assumed to work automatically. Aguinis and Kraiger (2009) document the benefits of training while emphasizing conditions affecting training effectiveness. DeNisi and Murphy (2017) review a century of appraisal research and underline the complexity of performance measurement and management. Building on these insights, the paper analyzes the interdependence of training and appraisal and outlines principles for their responsible use in contemporary organizations.

Review of Relevant Literature

The training literature treats learning as a process that extends beyond delivery of instructional content. Aguinis and Kraiger (2009) explain that training can benefit individuals, teams and organizations, while outcomes depend on needs assessment, programme design, employee characteristics and the transfer of learning to the workplace. Salas et al. (2012) similarly emphasize evidence-informed training practices and the importance of the circumstances surrounding learning before, during and after an intervention. These contributions suggest that the organization, not only the individual learner, influences whether training becomes productive capability.

Performance appraisal research identifies distinct issues of measurement, feedback and employee reactions. DeNisi and Murphy (2017) describe the long-standing challenges involved in rating performance and using appraisal information for different purposes. In a related synthesis, Kluger and DeNisi (1996) demonstrate that feedback interventions do not universally improve performance and can sometimes be counterproductive. The manner in which feedback is delivered and the attention it directs toward the task therefore matter as much as the existence of feedback itself.

Taken together, these studies support a reciprocal relationship. Appraisal offers diagnostic information that can guide training priorities, while training can help employees respond constructively to weaknesses identified through appraisal. The relationship should nevertheless be treated as contingent rather than mechanical: low performance can result from poor tools, unclear work objectives or organizational constraints, none of which will necessarily be solved through a training course.

Objectives and Methodology

The objectives of this paper are to examine the respective functions of employee training and performance appraisal; analyze the mechanisms connecting them; consider their role in employee development and organizational effectiveness; and develop practical recommendations for an integrated performance management process. The analysis is conceptual and descriptive, based on a focused review of scholarly articles and scholarly literature concerning organizational training, evaluation and feedback.

The review organizes existing knowledge under training needs identification, design and delivery, appraisal criteria, developmental feedback and organizational outcomes. No interviews, employee questionnaires or experimental interventions were undertaken. Consequently, the conclusions should be read as evidence-informed managerial propositions rather than statistically verified findings for a particular institution or industry.

Training as a Strategic Human Resource Practice

Employee training refers to planned learning activities intended to improve knowledge, skills or behaviour relevant to work. It may address immediate task requirements, prepare employees for technological or procedural change, or enable broader career development. A sound programme begins with a needs assessment that distinguishes what employees do not know from obstacles created by the work environment. For example, a service-quality problem may arise from insufficient communication skills, but it may also reflect inadequate staffing or inconsistent procedures. Training should be recommended only after the source of the performance gap is understood.

Training design should connect clearly defined learning objectives to methods suitable for the workforce and its tasks. Classroom instruction can convey concepts and encourage discussion, whereas structured on-the-job learning permits practice in authentic situations. Digital learning can improve flexibility and reach, but only when employees have adequate access, time and motivation. Simulations and role-playing may be valuable when tasks involve judgment or interpersonal interaction. Salas et al. (2012) show why training effectiveness needs to be approached as a system involving preparation, learning conditions and post-training reinforcement.

Evaluation should examine more than participants' satisfaction. It should consider whether relevant competencies were acquired, whether participants subsequently used them and whether changes in performance were sustained. These distinctions protect organizations from mistaking popular courses for productive investments. Training benefits are most defensible when supervisors create opportunities to apply learning, recognize improvement and address barriers that prevent new practices from being adopted.

Performance Appraisal and Its Developmental Functions

Performance appraisal involves collecting and interpreting evidence about an employee's work in relation to agreed expectations. Its purposes may include identifying strengths, clarifying improvement needs, informing career discussions and contributing to decisions about recognition or advancement. Because these purposes are not identical, managers must decide how evaluation information will be used and communicate the basis of the assessment. Vague criteria can weaken legitimacy and leave employees uncertain about what improvement requires.

Fair appraisal depends on job-relevant standards, consistent evidence and opportunities for dialogue. Quantitative measures can provide useful information about output or timeliness, but important dimensions such as cooperation, quality and judgment may require carefully documented qualitative assessment. Self-assessment and multisource

feedback can broaden the discussion, although neither automatically eliminates subjectivity. Managers should explain their reasoning, remain alert to contextual limitations and avoid converting isolated incidents into sweeping judgments about an employee's potential.

Developmental feedback is most valuable when it is timely, specific and oriented toward an achievable action. Kluger and DeNisi (1996) caution against assuming that all feedback is beneficial; poorly framed evaluations can divert attention away from effective task behaviour. Employees therefore need information that identifies the work requirement, describes the observed gap and suggests a feasible path toward improvement. This process is more consistent with ongoing performance management than a once-a-year rating meeting.

Integrating Training and Appraisal into One Cycle

The integration of these practices begins with performance planning. At the start of a review period, managers and employees can agree on outcomes, behavioural expectations and the competencies needed to achieve them. During the period, supervisors collect proportionate evidence and discuss progress rather than waiting until the formal review. Appraisal conversations then distinguish knowledge or skill deficiencies from issues of motivation, work design, resources or conflicting expectations.

Where a learning need is identified, an individual development plan should specify the competency, suitable learning method, support available and time for reassessment. A customer-service employee might benefit from coaching and supervised practice, whereas a worker learning new software may require guided digital exercises and access to a testing environment. The appraisal record supplies the rationale for the intervention; the development plan turns that rationale into a practical commitment. Training and assessment then become consecutive stages within a coherent process.

Follow-up is essential. Managers should look for evidence that new competencies are being applied, discuss remaining obstacles and adjust the development plan as appropriate. They should also avoid treating a single rating change as proof that training caused an improvement: changes in workload, colleagues, tools or market conditions may influence the observed outcome. A thoughtful appraisal system therefore supports learning while retaining appropriate caution about causal claims.

Organizational Benefits, Risks and Managerial Implications

An integrated approach can improve the relevance of training expenditure because learning priorities are tied to observed work needs. It can also make appraisal more acceptable to employees when feedback leads to concrete support rather than only criticism or reward allocation. Over time, repeated performance discussions may contribute to clearer goals, more credible career planning and better succession decisions. These outcomes depend on the quality of implementation and should not be presumed in every organization.

Several risks require attention. Managers may use appraisal information inconsistently, employees may interpret ratings as punitive, and organizations may rely excessively on easily counted outputs. Linking appraisals to promotion and remuneration can create pressure that complicates open developmental discussion. Separate conversations or transparent procedures may be appropriate where evaluation decisions and coaching objectives are likely to conflict. Confidential treatment of employee information is also important to organizational trust.

Managers can strengthen the process by training assessors, reviewing rating criteria, documenting task-specific feedback and giving employees a meaningful opportunity to respond. HR departments should periodically evaluate whether training opportunities and appraisal decisions are distributed fairly across employee groups. Where possible, organizations can examine changes in job performance, retention, internal mobility and employee perceptions before concluding that a redesigned system has been successful.

Conclusion

Training and performance appraisal are most useful when understood as interdependent elements of human resource management. Appraisal can reveal developmental priorities, training can address the competencies required for improved performance, and subsequent reviews can assess progress. The cycle works only when job requirements are clear, feedback is credible, learning is supported and employees have opportunities to apply new capabilities.

This conceptual review does not establish a universal performance effect or compare organizations empirically. It instead advances a practical argument grounded in established research: integrated, fair and continuous people-management practices are more defensible than disconnected training events and annual ratings. Further empirical work could evaluate how such integration affects performance and employee experiences across sectors and organizational sizes.

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The Role of the Banking Sector in Rural Development: Financial Inclusion and the Vision of Viksit Bharat 2047

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Abstract

Rural development is essential to an inclusive Viksit Bharat 2047, and the banking sector influences this process through savings, credit, payments and financial-risk management. This paper examines the contribution of commercial banks, regional rural banks, cooperative institutions and development-finance initiatives to rural economic opportunity in India. Adopting a descriptive, secondary-source approach, it synthesizes academic evidence and publications of the Reserve Bank of India, the National Bank for Agriculture and Rural Development and the Department of Financial Services. The analysis considers agricultural and enterprise finance, women's self-help groups, government-linked financial inclusion schemes and digital payments. Official data indicate continued growth in financial access, although access to accounts should not be equated automatically with adequate credit, sustained usage or improved livelihood outcomes. Persistent constraints include variable service quality, financial literacy gaps, digital exclusion, agricultural risk and the cost of reaching remote communities. The paper argues that rural banking can support structural transformation when inclusion is measured by useful, affordable and secure financial services rather than by the numerical expansion of accounts alone. The conclusions synthesize published evidence and do not rely on original fieldwork.

Keywords: Rural development; banking sector; financial inclusion; agricultural credit; self-help groups; Viksit Bharat 2047

Introduction

India's long-term aspiration for Viksit Bharat 2047 depends on reducing differences in economic opportunity between rural and urban communities. Rural livelihoods extend beyond cultivation to wage employment, animal husbandry, local services, small-scale manufacturing and trading activities. Access to appropriate financial services can help households manage income fluctuations and enable enterprises to invest, but finance alone does not remove constraints relating to markets, infrastructure or human capabilities. The banking sector should therefore be examined as one institution within the wider process of rural transformation.

Banks perform several interconnected functions in the rural economy. Deposit facilities provide a means to hold savings more securely; payments systems enable transfers; and credit may finance working capital, equipment and enterprise expansion. Bank accounts can also support the delivery of benefits under public programmes. These services matter especially where income is seasonal, informal borrowing is costly or physical distance limits access to formal institutions. The central question is not simply whether a bank has established a presence in a village, but whether residents can use reliable services that meet their economic needs.

The literature offers a basis for taking rural branch networks seriously. Burgess and Pande (2005), studying India's historical social banking programme, provide evidence that rural branch expansion reduced rural poverty and increased non-agricultural output in the period they investigated. Their findings, however, do not imply that every contemporary banking intervention will have identical effects. This paper therefore reviews multiple channels through which the banking sector may contribute to rural development, alongside the limitations that condition those outcomes.

Literature Review and Analytical Perspective

Rural development encompasses changes in income security, productive employment, agricultural capacity, access to basic services and the ability of households to manage shocks. Financial inclusion is an enabling component, conventionally understood in terms of access to and effective use of appropriate financial services. A banking system may expand account ownership without meeting the needs of farmers seeking flexible credit or small enterprises facing uncertain cash flows. Consequently, an assessment of rural banking should distinguish availability of services, meaningful usage and their quality.

Burgess and Pande (2005) make an important empirical contribution by connecting the historical expansion of rural bank branches with poverty and economic outcomes. Their analysis indicates that the location and reach of financial infrastructure can influence development. More recent policy documents emphasize a wider set of delivery mechanisms. The Reserve Bank of India (RBI, 2025) describes ongoing work in credit delivery, financial literacy and the expansion of digital payment infrastructure, while the National Bank for Agriculture and Rural Development (NABARD, 2025) reports on its institutional role in supporting agricultural and rural finance.

An integrated perspective must also consider market and institutional conditions. Credit may be productive when borrowers have access to inputs, transport, technology and markets; it may be less beneficial when weather-related losses or volatile prices undermine repayment. Digital transactions can lower some costs, but unreliable connectivity and the risk of fraud can deter vulnerable users. These qualifications imply that successful financial inclusion combines physical or assisted access, suitable products, consumer protection and financial capability.

Objectives and Research Methodology

The paper seeks to examine how banking services contribute to rural economic development; assess the relevance of agricultural finance, microenterprise credit, self-help groups and digital banking; review major policy measures promoting rural inclusion; and identify barriers that must be addressed to support Viksit Bharat 2047. The approach is descriptive and analytical, using a thematic review of secondary materials rather than primary interviews or an original statistical sample.

Sources include an academic study of rural bank expansion, RBI publications on inclusion and credit delivery, the NABARD annual report, and official information on Pradhan Mantri Jan Dhan Yojana (PMJDY) and Pradhan Mantri MUDRA Yojana (PMMY). Selected official statistics are presented with dates to avoid suggesting that they describe an unchanged current position. This review does not attribute observed national trends solely to the banking sector, because wider policy, technological and economic changes also affect rural outcomes.

Banking Channels and Rural Economic Development

Agricultural credit helps eligible cultivators finance seasonal expenses such as seeds, fertilizers, labour and equipment. When timely and appropriately structured, formal credit can reduce dependence on costly informal borrowing and help farms adopt improved techniques. Agricultural finance nonetheless carries distinctive risks. Rainfall variation, crop damage and fluctuations in prices can weaken repayment capacity, particularly for small and marginal farmers. Credit policies are therefore more likely to support sustainable development when combined with risk-management arrangements, advisory services and viable market access.

Rural diversification requires finance beyond crop production. Small retail businesses, agro-processing units, transport operators, artisans and service providers may require modest working-capital loans and payment facilities. The formal banking system can support these activities, but eligibility, documentation and repayment conditions need to reflect the circumstances of microenterprises. The Department of Financial Services (2025) identifies PMMY as a mechanism for collateral-free credit to eligible microenterprises, including certain activities allied to agriculture, through participating financial institutions.

Regional Rural Banks and cooperative banking institutions are relevant because their operations can be adapted to local agricultural and community needs. They complement commercial banks and development-finance institutions rather than replacing them. NABARD’s role includes supporting agricultural and rural finance and institutional development (NABARD, 2025). The quality of governance, lending practices and customer service remains important: proximity to borrowers does not, by itself, guarantee affordable or appropriate credit.

Women’s self-help groups provide an additional bridge between rural households and formal institutions. Collective saving and bank linkage can offer an entry point for women who have limited experience with individual financial products. Potential benefits include greater financial participation, access to small loans and opportunities for enterprise activity. Such outcomes, however, should not be presumed for every group: their effectiveness depends on management capacity, repayment conditions, markets for members’ products and the extent to which women exercise genuine control over financial decisions.

Government Initiatives and the Expansion of Financial Access

PMJDY was launched in 2014 to broaden access to formal banking services. According to the official PMJDY progress dashboard, reporting figures as of 14 October 2026, participating institutions listed approximately 59.59 crore beneficiaries overall, including 46.27 crore beneficiaries at rural and semi-urban bank-branch centres (Department of Financial Services, 2026). These administrative figures demonstrate the scale of inclusion efforts, but they do not by themselves establish whether every account is regularly used or whether beneficiaries have obtained suitable credit.

PMMY, launched in 2015, supports access to institutional credit for qualifying microenterprises. Its loan categories include Shishu, Kishore and Tarun. The revised Tarun Plus category permits eligible entrepreneurs who have successfully repaid earlier Tarun loans to seek amounts above ₹10 lakh and up to ₹20 lakh; this provision took effect on 24 October 2024 (Department of Financial Services, 2025). As a policy instrument, the programme can support rural entrepreneurship, but its developmental contribution must also be assessed through viable business activity, repayment sustainability and employment outcomes.

Digital payments complement traditional banking channels. Unified Payments Interface applications, Aadhaar-enabled services and assisted banking points can reduce the need for travel and make small transactions more convenient. National indicators provide evidence of progress: the RBI's composite Financial Inclusion Index increased from 64.2 in March 2024 to 67.0 in March 2025, with reported improvements in its access, usage and quality dimensions (Press Information Bureau, 2025). This index is national, not exclusively rural, and should not be interpreted as a direct measure of improvements in any particular village.

Challenges to Effective Rural Financial Inclusion

Financial literacy remains a substantive barrier. Households may understand how to open an account but have limited knowledge of interest costs, insurance conditions, digital fraud or grievance-redress mechanisms. When individuals cannot compare financial products or identify risks, the existence of banking facilities may lead to limited usage or unsuitable borrowing. Financial education must therefore address practical decisions in familiar languages and should be accompanied by clear documentation and accessible customer support.

Infrastructure and geography continue to influence the cost and reliability of service delivery. Weak connectivity, unstable electricity and long journeys to branches or cash points create obstacles to routine banking. Assisted digital channels and business correspondents can improve reach, although service reliability and security remain essential. Digital inclusion requires attention to device access, connectivity, disability, language and confidence, rather than assuming that availability of an application is equivalent to effective participation.

The financial position of rural borrowers also matters. Seasonal income, climatic uncertainty and market volatility can create repayment pressure, especially where loans are not aligned with cash-flow patterns. Financial institutions must manage credit risk without excluding borrowers who lack conventional collateral or documentation. Transparent pricing, proportionate due diligence and suitable products are particularly important for maintaining trust among first-time and low-income customers.

The growing use of digital channels also exposes customers to phishing, impersonation and unauthorized payments. Consumer protection requires clear reporting mechanisms, rapid responses to suspected fraud and continued awareness campaigns. Expansion of inclusion should therefore be judged partly by safety and confidence, not merely by transaction volume or the number of accounts opened.

Policy Implications for Viksit Bharat 2047

A rural banking strategy consistent with inclusive development should prioritize sustained and useful participation. Banks and policymakers can evaluate whether households save regularly, whether credit reaches viable economic activities and whether customers can resolve service problems. Delivery models may need to combine digital infrastructure with local assisted banking and in-person support. Such a mixed approach is particularly relevant to customers who are new to formal financial services.

Product design should reflect rural economic realities. Credit schedules aligned with agricultural income, appropriate financing for non-farm enterprises and accessible products for women-led groups may improve the relevance of institutional finance. Collaboration between financial institutions, producer organizations, educational initiatives and

market-support agencies can address complementary constraints. Financial inclusion is likely to support stronger livelihoods when borrowers also have access to information, skills and commercial opportunities.

Future evaluation should use disaggregated evidence. National inclusion measures are useful for monitoring the overall system, but rural outcomes differ by region, income group, gender and type of economic activity. District-level research could examine the relation between service usage, productive borrowing, debt stress, enterprise survival and livelihood security. Such evidence would help distinguish expansions in banking reach from improvements in development outcomes.

Conclusion

The banking sector can contribute to rural development by enabling saving, financing productive activities, facilitating payments and linking households with formal financial institutions. Historical empirical evidence and contemporary policy reporting indicate that banking access is relevant to inclusive growth, while the expansion of account ownership and digital channels has significantly altered the landscape of financial services. Yet the benefits remain conditional on the affordability, reliability and appropriateness of services.

Viksit Bharat 2047 requires a rural financial system that extends beyond numerical inclusion to meaningful economic participation. Better financial literacy, suitable credit, stronger consumer protection and responsive local delivery can help transform access into more secure livelihoods. The discussion is based on secondary evidence and should be complemented by location-specific empirical studies before drawing causal conclusions about particular schemes or banking institutions.

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Self-Regulating Hydrogels for Healing

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Abstract

Smart hydrogels are advanced materials that sense body changes and respond intelligently. Unlike traditional hydrogels that simply hold substances, these new versions can release drugs, repair tissue, or change shape when triggered by pH shifts, temperature changes, light, enzymes, or mechanical pressure. Scientists build them using special bonds that break and reform on demand, allowing controlled and reversible behavior. Key design methods include mixed networks for strength, molecular stamps for precise drug loading, and living connectors that respond to biological signals. These gels help heal wounds, grow blood vessels, and rebuild damaged organs while preventing scars. Emerging technologies like AI-driven design, 4D printing, and body sensors are making them even smarter. However, challenges remain in mass production, long-term stability, and predicting how they behave inside living bodies. Overall, smart hydrogels mark a major shift from passive carriers to active, self-regulating healing partners in modern medicine.

Keywords: Smart hydrogels, Stimuli-responsive; Drug delivery, Regenerative medicine; Biomaterials

Introduction

Regenerative medicine has transformed modern healthcare by providing innovative strategies for repairing or replacing damaged tissues and organs. (Liu, et al., 2026) Traditional treatment methods often fail to achieve complete tissue restoration, particularly in chronic wounds, traumatic injuries, diabetic ulcers, myocardial infarction, and neurodegenerative disorders Consequently, biomaterial-based regenerative platforms have gained substantial importance in recent years. Among various biomaterials, polymeric hydrogels have attracted exceptional scientific attention because of their three-dimensional network structure, high-water content, and extracellular matrix-like properties. (Webber, 2016)

Hydrogels are crosslinked polymeric networks capable of retaining large quantities of water without losing their structural integrity. Their hydrophilic nature provides a moist environment favorable for cellular proliferation, migration, angiogenesis, and nutrient transport. Smart polymeric hydrogels represent an advanced generation of hydrogels that can respond intelligently to environmental stimuli such as pH, temperature, enzymes, reactive oxygen species, electrical fields, magnetic fields, and light. Such responsiveness enables these systems to provide controlled drug release, adaptive mechanical properties, and improved therapeutic outcomes. (Genchi, Marino, Tapeinos, & Ciofani, 2017, p. 4)

The growing integration of polymer chemistry, nanotechnology, stem cell engineering, and biofabrication has accelerated the development of multifunctional hydrogel systems with enhanced biological performance. Recent advances have enabled the fabrication of injectable, self-healing, conductive, adhesive, and immunomodulatory hydrogels that are highly effective in promoting tissue repair and organ regeneration. (Guan, et al., 2017, p. 18)

The present review aims to provide a comprehensive overview of smart polymeric hydrogels with special emphasis on their applications in wound healing and organ regeneration. The review also highlights recent technological advances, clinical challenges, and future perspectives in this rapidly evolving field. (Choi, Choi, & Jeong, 2024)

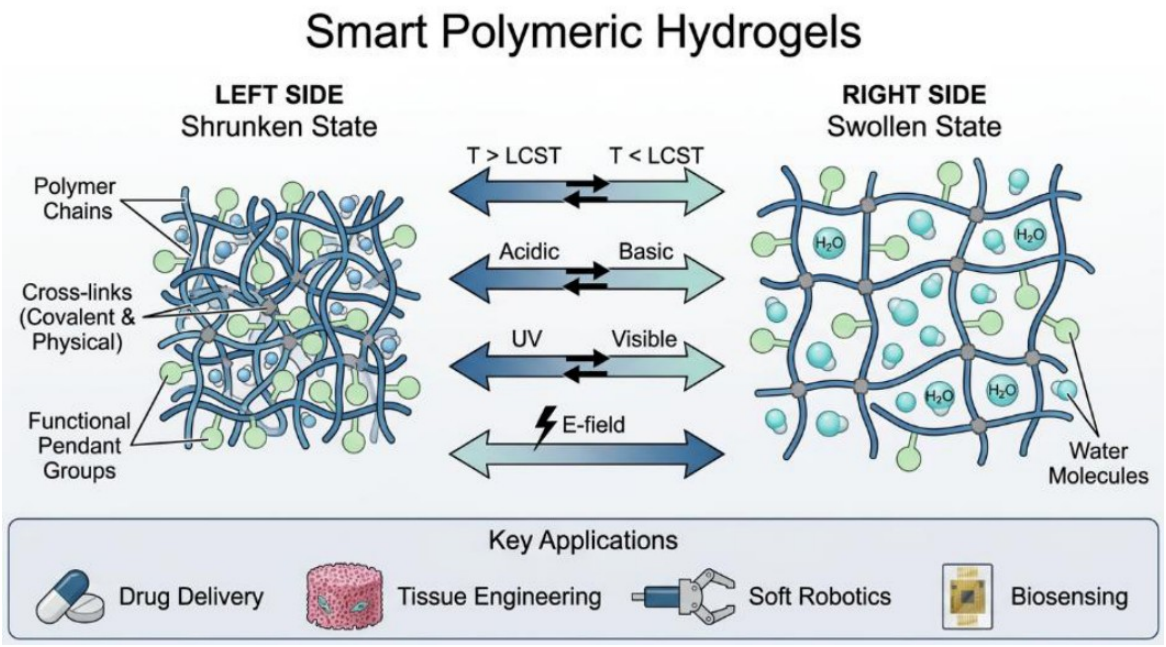


Figure 1. Schematic Representation of Smart Polymeric Hydrogels in Regenerative Medicine

Classification of Smart Polymeric Hydrogels

Smart polymeric hydrogels can be classified according to their origin, crosslinking mechanism, and responsiveness toward environmental stimuli. This classification is essential for understanding their physicochemical behavior and biomedical applications. (Chelu & Musuc, 2024, p. 8)

Natural Polymer-Based Hydrogels

Natural polymer-based hydrogels are synthesized from biopolymers such as collagen, gelatin, alginate, hyaluronic acid, dextran, chitosan, and fibrin. These polymers exhibit excellent biocompatibility, biodegradability, and low toxicity due to their biological origin. Natural hydrogels are highly suitable for tissue engineering because they mimic the extracellular matrix and support cellular adhesion and proliferation. Chitosan-based hydrogels possess intrinsic antimicrobial activity, whereas hyaluronic acid hydrogels facilitate tissue hydration and cell migration. However, natural hydrogels often suffer from poor mechanical strength and rapid degradation, limiting their application in load-bearing tissues. (Piantanida, 2020, p. 39)

Synthetic Polymer-Based Hydrogels

Synthetic polymeric hydrogels are prepared using polymers such as polyethylene glycol, polyvinyl alcohol, polyacrylamide, and poly(N-isopropylacrylamide). These hydrogels offer superior mechanical stability, tunable physicochemical properties, and reproducible synthesis. Thermoresponsive polymers such as PNIPAM exhibit temperature-dependent sol-gel transitions, making them suitable for injectable systems. Synthetic hydrogels can also be engineered to possess controlled degradation rates and tailored drug release profiles. (Patenaude & Hoare, 2012)

Hybrid Hydrogels

Hybrid hydrogels combine the biological advantages of natural polymers with the mechanical robustness of synthetic polymers. Such systems have emerged as highly promising biomaterials because they integrate biocompatibility with structural stability. Hybrid hydrogels can be functionalized with nanoparticles, bioactive molecules, and conductive materials to further enhance their regenerative performance. (Chandra, Yoo, & Lee, 2014, p. 447)

Table 1. Classification of Smart Polymeric Hydrogels

Type of Hydrogel	Common Polymers	Major Advantages	Limitations
Natural Hydrogels	Collagen, Chitosan, Alginate	Excellent biocompatibility	Poor mechanical strength
Synthetic Hydrogels	PEG, PVA, PNIPAM	Tunable properties	Limited bioactivity
Hybrid Hydrogels	Natural and Synthetic combinations	Balanced bioactivity & strength	Complex fabrication

Type of Hydrogel	Common Polymers	Major Advantages	Limitations
Conductive Hydrogels	Polyaniline, Graphene composites	Electrical conductivity	Costly synthesis
Injectable Hydrogels	Thermosensitive polymers	Minimally invasive delivery	Stability concerns

Stimuli-Responsive Mechanisms of Smart Hydrogels

The unique ability of smart hydrogels to respond to external and internal stimuli has significantly enhanced their biomedical applications. Stimuli-responsive hydrogels undergo reversible physical or chemical changes when exposed to specific physiological conditions. (Kim, Lee, & Kang, 2026)

pH-Responsive Hydrogels

pH-responsive hydrogels contain ionizable functional groups that undergo swelling or shrinking in response to changes in pH. In infected wounds and tumor microenvironments, the pH differs considerably from normal tissues. Such hydrogels can therefore release drugs selectively at pathological sites. Chitosan and polyacrylic acid-based hydrogels are commonly employed in pH-responsive systems. (Wang, et al., 2017)

Thermoresponsive Hydrogels

Thermoresponsive hydrogels exhibit sol-gel transitions in response to temperature changes. These hydrogels remain in liquid form at room temperature and transform into gels at physiological temperature after injection. This property allows minimally invasive administration and localized therapeutic action. (Xiao, et al., 2021)

Enzyme-Responsive Hydrogels

Enzyme-responsive hydrogels are designed to degrade selectively in the presence of disease-associated enzymes such as matrix metalloproteinases. Such systems provide targeted drug release and controlled biodegradation during tissue remodeling. (Zhang & Huang, 2021, p. 7)

ROS-Responsive Hydrogels

Reactive oxygen species-responsive hydrogels are particularly useful in chronic inflammatory wounds where oxidative stress is elevated. These systems scavenge excessive ROS and reduce tissue damage while promoting regeneration. (Laurano, Torchio, Ciardelli, & Boffito, 2023)

Conductive Hydrogels

Conductive hydrogels have emerged as important biomaterials for cardiac and neural tissue engineering because they facilitate electrical signal transmission. The incorporation of conductive materials such as graphene, polyaniline, and carbon nanotubes enhances cellular communication and tissue functionality. (Cai, et al., 2023, p. 6)

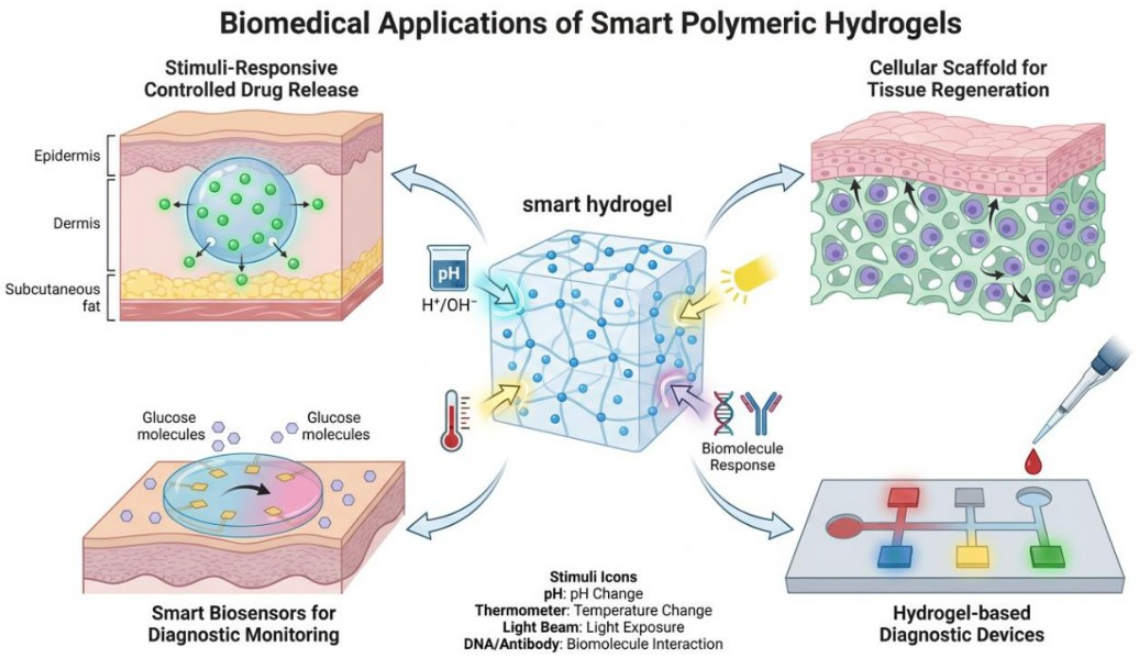


Figure 2. Biomedical Applications of Smart Polymeric Hydrogels

Smart Hydrogels in Wound Healing

Wound healing is a complex and highly coordinated physiological process involving hemostasis, inflammation, proliferation, and tissue remodeling. Chronic wounds such as diabetic ulcers, burns, and pressure sores often fail to progress through these stages due to persistent inflammation, microbial infection, impaired angiogenesis, and oxidative stress.

Smart polymeric hydrogels provide an ideal moist environment that promotes cellular proliferation and tissue regeneration. Their porous architecture enables oxygen diffusion, nutrient transport, and exudate absorption while protecting the wound from microbial contamination. (Jia, et al., 2023)

Antimicrobial Hydrogels

Infected wounds are major clinical challenges because bacterial biofilms significantly delay tissue repair. Smart antimicrobial hydrogels loaded with silver nanoparticles, antibiotics, antimicrobial peptides, or nanozymes exhibit potent antibacterial activity against multidrug-resistant pathogens. These systems also minimize systemic toxicity by providing localized drug delivery. (Zhuang, et al., 2025)

Injectable Self-Healing Hydrogels

Injectable self-healing hydrogels can conform to irregular wound geometries and recover their structural integrity after mechanical disruption. Such properties improve adaptability and durability in dynamic wound environments. Dynamic covalent bonds and supramolecular interactions are commonly used to achieve self-healing behavior. (Zhang, Qi, Ulrich, Bărboiu, & Ramström, 2019, p. 493)

Angiogenic Hydrogels

Angiogenesis plays a crucial role in wound healing by supplying oxygen and nutrients to regenerating tissues. Hydrogels loaded with vascular endothelial growth factor, fibroblast growth factor, or exosomes stimulate neovascularization and accelerate tissue repair. (Fan, Saha, & Hanjaya-Putra, 2021, p. 9)

Immunomodulatory Hydrogels

Recent studies have highlighted the importance of immune regulation in tissue regeneration. Immunomodulatory hydrogels promote macrophage polarization from pro-inflammatory M1 phenotype to regenerative M2 phenotype, thereby reducing inflammation and enhancing tissue remodeling. (Vieira, Silva-Correia, Reis, & Oliveira, 2022, p. 16)

Table 2. Smart Hydrogel Systems Used in Wound Healing

Hydrogel Type	Bioactive Component	Therapeutic Effect
Chitosan hydrogel	Silver nanoparticles	Antibacterial activity
Injectable hydrogel	Stem cells	Enhanced tissue regeneration
Conductive hydrogel	Graphene oxide	Accelerated diabetic wound healing
ROS-responsive hydrogel	Antioxidants	Oxidative stress reduction
Angiogenic hydrogel	VEGF/FGF	Enhanced neovascularization

Smart Hydrogels in Organ Regeneration

The field of organ regeneration has experienced significant advancement due to the development of multifunctional hydrogel scaffolds capable of supporting cell growth and tissue remodeling. (Chelu & Musuc, 2024, p. 21)

Bone Tissue Engineering

Bone regeneration requires coordinated osteogenesis and angiogenesis. Smart hydrogels loaded with bone morphogenetic proteins, calcium phosphate nanoparticles, and mesenchymal stem cells have demonstrated significant potential in repairing critical-size bone defects. Injectable bone hydrogels provide minimally invasive therapeutic strategies while facilitating localized mineralization. (Ashammakhi, et al., 2018, p. 18)

Cartilage Regeneration

Cartilage possesses limited intrinsic healing ability due to its avascular nature. Hydrogels provide a supportive microenvironment for chondrocyte survival and extracellular matrix deposition. Gelatin methacryloyl hydrogels and 3D-bioprinted scaffolds have shown promising outcomes in cartilage reconstruction. (Mouser, et al., 2016, p. 35004)

Neural Tissue Engineering

Neural tissue engineering remains one of the most challenging areas of regenerative medicine. Conductive hydrogels facilitate electrical signal transmission and axonal growth while supporting neuronal survival. Injectable neural hydrogels also provide sustained release of neurotrophic factors. (Yang, et al., 2024)

Cardiac Regeneration

Myocardial infarction results in irreversible cardiomyocyte loss and scar formation. Conductive and injectable hydrogels loaded with stem cells or growth factors have demonstrated improved angiogenesis, reduced fibrosis, and enhanced cardiac function. (Tian, et al., 2025, p. 14)

Liver and Kidney Regeneration

Hydrogels are increasingly being explored for the development of liver organoids and renal tissue constructs. Their ECM-like properties support hepatocyte proliferation and renal cell survival while promoting functional tissue regeneration. (Spang & Christman, 2017, p. 11)

Table 3. Applications of Smart Hydrogels in Organ Regeneration

Organ/Tissue	Hydrogel Strategy	Major Therapeutic Outcome
Bone	BMP-loaded injectable hydrogels	Enhanced osteogenesis
Cartilage	GelMA-based scaffolds	Cartilage matrix formation
Neural tissue	Conductive hydrogels	Axonal regeneration
Cardiac tissue	Stem cell-loaded hydrogels	Improved cardiac function
Liver tissue	ECM-inspired hydrogels	Hepatocyte proliferation
Kidney tissue	Injectable biomimetic hydrogels	Renal tissue support

Biofabrication and 3D Bioprinting

Biofabrication technologies have revolutionized regenerative medicine by enabling precise spatial organization of cells and biomaterials. Three-dimensional bioprinting allows fabrication of patient-specific tissue constructs with complex geometries and enhanced biological functionality.

Cell-laden hydrogels have shown considerable promise in tissue engineering because they support stem cell proliferation, differentiation, and extracellular matrix deposition. Microfluidic hydrogel systems further enhance nutrient transport and cellular interactions.

The integration of nanotechnology with biofabrication has accelerated the development of multifunctional hydrogel systems with improved mechanical and biological properties. (Geçkil, Xu, Zhang, Moon, & Demirci, 2010, p. 473)

Challenges and Future Perspectives

Despite remarkable scientific progress, several challenges limit the clinical translation of smart hydrogel systems. Mechanical weakness, uncontrolled degradation, sterilization difficulties, high production costs, and regulatory barriers remain important concerns. Long-term biosafety studies are also required to evaluate immunogenicity and toxicity.

Future research should focus on AI-assisted hydrogel design, personalized biomaterials, 4D bioprinting, gene-activated hydrogels, and hydrogel-integrated biosensors. The convergence of nanotechnology, stem cell biology, and precision medicine is expected to revolutionize regenerative therapeutics.

Conclusion

Smart polymeric hydrogels represent a transformative class of biomaterials in regenerative medicine because of their dynamic responsiveness, extracellular matrix-mimicking properties, and multifunctional therapeutic capabilities. Significant advancements have been achieved in the development of injectable, self-healing, conductive, and immunomodulatory hydrogels for wound healing and organ regeneration applications.

These hydrogel systems have demonstrated remarkable potential in promoting angiogenesis, osteogenesis, neural repair, cartilage reconstruction, and cardiac tissue regeneration. Although several challenges remain concerning scalability, mechanical strength, and clinical translation, continued interdisciplinary research is expected to accelerate the development of next-generation hydrogel-based regenerative therapies.

Smart hydrogels are therefore poised to become key therapeutic platforms in precision medicine, tissue engineering, and advanced regenerative healthcare.

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Integrating Spirituality, Circular Economy and Gandhian Resource Management for an Indigenous Sustainable Model of Viksit Bharat @2047

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Abstract

The contemporary global development model, driven by industrial expansion, consumerism and material accumulation, has contributed to economic growth but has also created serious ecological, social and ethical challenges. Rising waste generation, climate change, environmental degradation and unsustainable consumption patterns have raised concerns regarding the long-term viability of development based solely on continuous production and consumption. The dominant linear economy based on the "take, make and dispose" approach has intensified ecological imbalance and waste generation. In response, the Circular Economy has emerged as an alternative framework emphasizing recycling, reuse, repair culture, resource efficiency and regenerative systems. However, the study argues that sustainability cannot be achieved only through technological and economic reforms without ethical and behavioural transformation.

The paper examines the relevance of spirituality, circular economy principles and Gandhian resource management in developing an indigenous sustainable model for Viksit Bharat @2047. It argues that India should avoid blindly imitating materialistic Western development models and instead build upon its own civilizational values rooted in spirituality, moderation, coexistence with nature and ethical living.

The study is exploratory and analytical in nature and is based on both primary and secondary data. Primary data were collected from 150 respondents through a structured questionnaire examining perceptions regarding consumerism, sustainability, spirituality, Gandhian principles and circular economy practices. The findings reveal strong concern regarding excessive consumerism and ecological degradation, along with considerable support for conscious consumption, sustainable lifestyles, circular economy practices and Gandhian principles such as simplicity, trusteeship, decentralization and need-based consumption.

Based on the findings, the study proposes the Sahaj Sustainable Development Model (SSDM) as an indigenous framework integrating spirituality, circular economy principles and Gandhian resource management. The model emphasizes conscious consumption, decentralized and regenerative economic systems, ethical responsibility, ecological balance and human-centric development. The study concludes that the vision of Viksit Bharat should extend beyond industrial growth and consumption to include sustainability, social harmony and holistic human well-being.

Keywords: Spirituality; Circular Economy; Gandhian Resource Management; Sustainable Development; Consumerism; Conscious Consumption; Indigenous Development Model; Sahaj Sustainable Development Model (SSDM); Environmental Sustainability; Viksit Bharat @2047

Introduction

The modern idea of development has largely been shaped by industrial expansion, technological advancement, urbanization and increasing consumption. For decades, economic growth measured through indicators such as GDP, industrial output and market expansion has been treated as the primary indicator of progress. Although this model has contributed significantly to material prosperity and technological innovation, it has also generated serious ecological, social and psychological challenges including climate change, environmental degradation, resource depletion, excessive waste generation and unsustainable lifestyles.

The contemporary global economy continues to function predominantly through a linear economic system based on the pattern of "take, make and dispose." Natural resources are extracted, transformed into products, consumed rapidly

and eventually discarded as waste. According to the United Nations Environment Programme, global waste generation is expected to rise significantly in the coming decades. India itself generates nearly 62 million tonnes of waste annually, including large quantities of plastic and electronic waste. Such trends indicate that unlimited production and consumption cannot continue indefinitely on a planet with finite ecological resources.

At the same time, the crisis of development is not merely environmental but also ethical and human in nature. Despite unprecedented material growth, societies continue to face rising stress, inequality, social alienation and ecological imbalance. This raises an important question: can a society truly be considered developed if economic progress comes at the cost of environmental destruction and uncontrolled consumerism? Development must therefore extend beyond material accumulation and include sustainability, ethical living and social well-being.

In response to these challenges, the Circular Economy has emerged as an alternative to the wasteful linear economy. It promotes recycling, reuse, repair culture, resource efficiency and regenerative production systems aimed at reducing environmental damage and extending product life cycles. However, sustainability cannot be achieved solely through technological innovation and policy reforms. The ecological crisis is also rooted in excessive materialism and patterns of overconsumption. Therefore, sustainable development requires transformation in human attitudes, values and lifestyles.

In this context, spirituality becomes highly relevant. In the present study, spirituality refers not to religious ritualism but to conscious living, self-restraint, ethical behaviour, harmony with nature and responsible consumption. Indian civilization has historically emphasized coexistence with nature, moderation, simplicity and non-violence. Among modern Indian thinkers, Mahatma Gandhi strongly criticized uncontrolled industrialism and materialistic civilization. His ideas of simplicity, trusteeship, decentralization, self-reliance and need-based consumption remain highly relevant in contemporary sustainability discourse.

The vision of Viksit Bharat @2047 provides India with an opportunity to rethink the meaning of development itself. While economic growth and technological advancement are essential, blindly imitating Western consumerist models may not offer a sustainable path for India. India possesses a rich civilizational heritage rooted in spirituality, ethical economics and ecological consciousness. Therefore, Viksit Bharat should represent not merely higher consumption and industrial growth, but also sustainability, social harmony, environmental responsibility and balanced living.

Against this background, the present study attempts to integrate spirituality, circular economy principles and Gandhian resource management into a broader framework for an indigenous sustainable model of development. The paper critically examines the limitations of materialistic development while exploring the relevance of Indian philosophical and Gandhian perspectives in addressing contemporary sustainability challenges.

Review of Literature

The discourse on development and sustainability has evolved significantly in recent decades. Traditional economic theories largely emphasized industrial growth, increased production and rising consumption as indicators of progress. However, growing ecological concerns and the visible consequences of climate change have encouraged scholars and policymakers to critically examine the limitations of conventional development models. As a result, concepts such as sustainable development, ethical consumption, ecological economics and the Circular Economy have gained increasing importance.

One of the earliest critiques of unlimited economic growth emerged through *Limits to Growth* published by the Club of Rome in 1972, which warned that unchecked industrialization and resource exploitation could lead to ecological crises. Later, the United Nations through the Brundtland Report *Our Common Future* (1987) popularized the concept of sustainable development, emphasizing the need to balance economic growth with environmental protection and social equity.

Contemporary literature increasingly highlights the unsustainable nature of consumerist lifestyles. Scholars such as Tim Jackson (2009) argued that endless consumption-driven growth creates ecological stress without necessarily

improving human well-being. Rising waste generation, fast fashion, electronic waste and disposable consumer culture have further strengthened criticism of linear economic systems.

Within this context, the circular economy has emerged as an important alternative framework promoting waste reduction, recycling, reuse, repair culture and regenerative production systems. According to the Ellen MacArthur Foundation, circular economy practices aim to keep materials in continuous use instead of turning them into waste. Countries such as Japan, China and the Netherlands have increasingly incorporated circular economy principles into sustainability policies.

In India, NITI Aayog has emphasized the importance of circular economic practices in areas such as waste management, recycling, renewable energy and sustainable manufacturing. However, much of the existing literature remains focused on technological and policy aspects while comparatively neglecting the ethical and cultural dimensions of sustainability.

The relationship between spirituality and sustainability has also attracted increasing academic attention. Scholars argue that environmental crises cannot be solved solely through technological interventions because they are deeply connected with human attitudes and consumption patterns. Spirituality, in this context, is associated with conscious living, self-restraint, moderation and harmony with nature. Researchers have suggested that spiritually aware individuals are more likely to adopt environmentally responsible lifestyles.

Indian philosophical traditions have historically emphasized coexistence with nature, simplicity, moderation and non-violence. Scholars have argued that Gandhian principles closely align with contemporary sustainability concepts such as ethical consumption, local production systems and ecological balance.

Despite growing literature on sustainability, circular economy and Gandhian economics, limited attention has been given to integrating spirituality, circular economy principles and indigenous Indian development philosophies within mainstream sustainability discourse. Therefore, the present study attempts to bridge this gap by examining how spirituality, circular economy and Gandhian resource management can collectively contribute toward an indigenous sustainable model for Viksit Bharat @2047.

Theoretical and Conceptual Framework

The present study is based on the idea that sustainable development cannot be achieved solely through technological advancement and economic expansion. Contemporary ecological and social crises are deeply linked with excessive materialism, uncontrolled consumerism and exploitative production systems. Therefore, sustainable development must integrate not only economic and environmental concerns but also ethical, cultural and spiritual dimensions. The framework of this study is built around three interconnected pillars: spirituality, the Circular Economy and Gandhian resource management.

Linear Development Model and its Limitations

Since the Industrial Revolution, global development has largely followed a linear economic model based on extraction, production, consumption and disposal. Although this model contributed significantly to industrial growth and technological progress, it also created severe ecological challenges including pollution, deforestation, carbon emissions, plastic waste and resource depletion. The modern “use and discard” culture has accelerated waste generation and encouraged excessive consumerism, inequality and psychological stress.

These limitations have led scholars and policymakers to question whether development based solely on material accumulation can remain sustainable in the long run. The present study argues that the crisis of development is not only ecological but also ethical and philosophical in nature.

Circular Economy as a Sustainable Alternative

The circular economy emerged as an alternative to the wasteful linear economic model. Unlike the “take-make-dispose” approach, it promotes regenerative and resource-efficient systems where products and materials remain in use for longer periods.

The circular economy emphasizes:

- waste reduction,
- reuse,
- recycling,
- repair culture,
- resource efficiency,
- regenerative production systems.

It encourages businesses and consumers to shift away from disposable culture toward sustainable production and consumption practices. However, the study argues that circular economy alone may not be sufficient if society continues to operate within highly consumerist value systems. Therefore, sustainability also requires ethical and behavioural transformation.

Spirituality and Conscious Living

Spirituality forms the ethical foundation of the present framework. In this study, spirituality refers not to religious ritualism but to conscious living, moderation, self-restraint, ethical behaviour and harmony with nature.

Modern consumer culture often associates happiness with material accumulation, leading to overconsumption and ecological stress. Spirituality offers an alternative perspective emphasizing simplicity, mindfulness and need-based living. A spiritually informed society is more likely to:

- consume responsibly,
- avoid unnecessary waste,
- respect ecological limits,
- prioritize collective well-being.

Indian philosophical traditions have historically emphasized coexistence, non-violence, moderation and respect for nature. Such ideas remain highly relevant in the contemporary sustainability discourse.

Gandhian Resource Management

The third pillar of the framework is Gandhian resource management. Mahatma Gandhi strongly criticized excessive industrialism and materialistic civilization. His philosophy emphasized:

- simplicity,
- trusteeship,
- need-based consumption,
- decentralization,
- self-reliance,
- harmony with nature.

Gandhi believed that economic systems should serve human welfare rather than encourage greed and exploitation. Many Gandhian ideas closely align with modern sustainability and circular economy principles such as ethical consumption, local production, repair culture and resource conservation.

Integrating Spirituality, Circular Economy and Gandhian Resource Management

The study proposes that sustainable development for Viksit Bharat @2047 requires integration of spirituality, circular economy principles and Gandhian resource management rather than treating them separately.

The conceptual framework may be summarized as follows:

Component	Core Contribution
Spirituality	Ethical consciousness and responsible living
Circular Economy	Resource efficiency and waste reduction
Gandhian Resource Management	Simplicity, trusteeship and decentralized development

Together, these dimensions contribute toward:

- sustainable production,
- conscious consumption,
- environmental balance,
- social harmony,
- culturally rooted development.

The framework argues that India has the opportunity to develop a distinct model of development that combines technological progress with ethical and spiritual consciousness. Thus, true development should not only increase economic prosperity but also strengthen ecological sustainability, social harmony, ethical responsibility and human well-being.

Research Methodology

The present study is exploratory and analytical in nature and examines the relevance of spirituality, Circular Economy and Gandhian resource management in developing an indigenous sustainable model for Viksit Bharat @2047. The study critically analyzes the limitations of materialistic development models while exploring sustainability approaches rooted in Indian civilizational values and ethical economics.

Research Design

The study adopts a mixed conceptual and perception-based research design. The conceptual component focuses on sustainability, spirituality, circular economy and Gandhian philosophy through literature and policy discourse, while the perception-based component examines public attitudes regarding consumerism, sustainability and indigenous development models through primary data collection.

Sources of Data

The study is based on both primary and secondary data.

Primary Data

Primary data were collected through a structured questionnaire designed to examine perceptions regarding:

- consumerism,
- materialistic development,
- sustainable lifestyles,
- spirituality,
- Gandhian principles,
- circular economy practices,
- indigenous models of development.

The questionnaire included demographic questions, Likert-scale statements, behavioural indicators and a few open-ended questions. Responses were collected from 150 respondents belonging to different educational, occupational and residential backgrounds.

Secondary Data

Secondary data were collected from:

- government reports,
- policy documents,
- sustainability reports,
- academic journals,
- books,
- research articles,
- publications of organizations such as the United Nations, United Nations Environment Programme and NITI Aayog.

Contemporary data related to waste generation, environmental degradation, circular economy practices and sustainable development were incorporated into the analysis.

Sampling Design

The study used convenience and purposive sampling techniques. Respondents were selected based on accessibility and their ability to provide meaningful insights regarding sustainability and development-related issues. A sample size of 150 respondents was considered appropriate for perception-based analysis.

Tools of Data Collection and Analysis

The primary tool of data collection was a structured questionnaire using a five-point Likert scale ranging from:

- Strongly Agree,
- Agree,
- Neutral,
- Disagree,
- Strongly Disagree.

Open-ended questions were also included to obtain qualitative insights.

The collected data were analyzed using:

- percentage analysis,
- mean score analysis,
- ranking analysis,
- thematic interpretation of qualitative responses.

Descriptive and comparative analysis was used to examine perceptions regarding consumerism, sustainability, spirituality, Gandhian thought and circular economy practices.

Scope and Limitations of the Study

The study focuses primarily on the ethical, behavioural and philosophical dimensions of sustainable development rather than technical industrial frameworks. Since the primary data are perception-based and collected through convenience sampling, the findings may have limited generalizability. The study also emphasizes conceptual integration and perception analysis rather than extensive econometric modelling.

Despite these limitations, the study provides important insights into the relevance of spirituality, Gandhian resource management and circular economy principles in shaping an indigenous sustainable development framework for contemporary India.

Data Analysis and Discussion

The primary data collected from 150 respondents were analyzed using percentage analysis and mean score analysis in order to understand public perceptions regarding consumerism, spirituality, Circular Economy, Gandhian resource

management and the idea of an indigenous sustainable model for Viksit Bharat @2047. Responses were recorded using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

The findings reveal significant concern regarding excessive materialism and environmental degradation, along with strong support for ethical and sustainability-oriented approaches to development.

Respondent Profile Analysis

Out of the total 150 respondents:

- nearly 45% belonged to the 20–30 years age group,
- respondents included students, academicians, professionals, entrepreneurs and employees,
- participants represented rural, semi-urban and urban backgrounds.

The diversity of respondents helped capture broad perspectives regarding development, sustainability and Indian value systems.

Perception Regarding Development and Consumerism

The respondents were first asked questions relating to modern development and materialistic lifestyles.

Statement	Mean Score	Agree + Strongly Agree (%)
Development should not be measured only through economic growth	3.85	72.7
Viksit Bharat should include ethical and environmental dimensions	3.89	70.7
India should develop its own model instead of blindly following the West	3.82	72.0
Excessive consumerism is becoming a serious challenge	3.98	74.0

The findings clearly indicate that a substantial majority of respondents believe that development should move beyond purely material indicators such as GDP and industrial expansion. Nearly three-fourths of respondents agreed that excessive consumerism has emerged as a major challenge in modern society.

The responses also suggest strong support for an indigenous developmental approach rooted in Indian realities rather than complete imitation of Western consumerist models. This finding strongly supports the central argument of the study that the idea of a developed India must include ethical, ecological and cultural dimensions.

Perception Regarding Linear Economy and Waste Generation

Questions related to waste generation and unsustainable consumption patterns also revealed strong environmental concern among respondents.

Statement	Mean Score	Agree + Strongly Agree (%)
Linear economic systems lead to wastage of resources	3.87	66.7
Modern lifestyles encourage unnecessary consumption	3.95	72.0
Frequent replacement of products increases waste	3.87	70.0
Waste generation is a major environmental challenge	3.81	66.0

The results indicate increasing awareness regarding the environmental consequences of “use and discard” lifestyles. Respondents particularly recognized the role of excessive purchasing behaviour and product replacement culture in generating waste.

These findings align with contemporary global concerns regarding rising e-waste, plastic waste, fast fashion and overconsumption. The data suggest that respondents increasingly associate modern development patterns with ecological imbalance and unsustainable resource utilization.

Awareness Regarding Circular Economy

The study also examined public awareness regarding circular economy principles.

Statement	Mean Score	Agree + Strongly Agree (%)
Awareness regarding circular economy concepts	3.79	65.3
Reuse, repair and recycling should become part of daily life	3.73	64.7
Businesses should produce recyclable and repairable products	3.67	62.7
Government should promote circular economy practices	3.77	66.0
Circular economy can improve sustainability in India	3.63	63.3

The findings suggest moderate to high awareness regarding circular economy practices among respondents. Most respondents supported greater adoption of recycling, reuse and repair culture. There was also considerable agreement that government policies and industrial systems should encourage environmentally responsible production.

However, the slightly lower mean scores compared to spirituality and Gandhian values indicate that circular economy as a concept is still emerging in public understanding and may require greater awareness initiatives.

Spirituality and Sustainable Living

One of the strongest findings of the study relates to the perceived relationship between spirituality and sustainability.

Statement	Mean Score	Agree + Strongly Agree (%)
Spirituality encourages responsible living	3.92	74.0
Spiritual values reduce greed and unnecessary consumption	3.88	73.3
Spiritually conscious societies are more likely to respect nature	4.02	78.7
Sustainable development requires change in human attitudes	3.88	70.7

The responses reveal that respondents strongly associate spirituality with environmental responsibility and conscious living. The highest agreement level in this section was recorded for the statement that spiritually conscious societies are more likely to respect nature and natural resources.

The findings indicate that respondents view sustainability not merely as a technological issue but also as a matter of values, ethics and human behaviour. This strongly supports the theoretical position of the study that ecological crises are deeply connected with human attitudes and excessive materialism.

Relevance of Gandhian Resource Management

Respondents also expressed significant support for Gandhian principles in addressing sustainability challenges.

Statement	Mean Score	Agree + Strongly Agree (%)
Gandhian principles remain relevant today	3.81	70.0
Simple living can reduce excessive consumerism	3.85	67.3
Trusteeship promotes responsible use of resources	4.01	75.3
Decentralized local production supports sustainability	4.05	76.7
Need-based consumption is more sustainable	3.89	69.3

The findings demonstrate strong acceptance of Gandhian ideas such as simplicity, trusteeship, decentralization and restrained consumption. The highest support was observed for decentralized and local production systems, indicating growing awareness regarding the environmental and social benefits of localized economies.

The principle of trusteeship also received strong support, suggesting that respondents value ethical responsibility in the use of wealth and resources.

These findings indicate that Gandhian thought continues to hold contemporary relevance in discussions surrounding sustainability and responsible development.

Indigenous Sustainable Model for Viksit Bharat @2047

The final set of questions examined respondents' views regarding India's developmental direction.

Statement	Mean Score	Agree + Strongly Agree (%)
India's development should be rooted in Indian values	3.81	68.7
Western development models cannot be copied blindly	3.88	70.7
Indigenous development can balance growth and sustainability	4.01	76.7
India can offer an alternative sustainable model to the world	3.94	76.0

The findings clearly reveal strong support for the idea that India should evolve its own culturally rooted and sustainable developmental framework. A substantial majority of respondents believed that Western consumerist models may not be fully suitable for India's long-term ecological and social realities.

Respondents also expressed optimism that India can contribute an alternative developmental philosophy to the world by integrating sustainability, ethics, spirituality and social harmony.

Behavioural Sustainability Practices

The study also examined whether respondents personally practice sustainable behaviour.

Behavioural Indicator	Mean Score	Agree + Strongly Agree (%)
Avoid unnecessary purchases	3.72	68.7
Prefer repairing products over replacement	3.61	64.7
Reuse and recycle household items	3.57	57.3
Avoid wastage of food, water and electricity	3.75	68.0
Consider environmental impact before purchases	3.76	69.3

The findings indicate that although respondents generally support sustainability principles conceptually, behavioural adoption remains moderate. This reflects the practical challenge of transforming sustainability awareness into everyday lifestyle practices within modern consumer economies.

The data analysis strongly supports the central argument of the study that development models based solely on material accumulation and excessive consumption are increasingly being questioned. Respondents demonstrated significant awareness regarding environmental degradation, waste generation, unsustainable lifestyles and the social consequences of consumerism. At the same time, the findings reveal strong support for spirituality-based conscious living, Gandhian ethical principles, circular economy practices and culturally rooted development approaches.

The analysis suggests that sustainability is increasingly perceived not merely as an environmental issue but also as a moral, behavioural and civilizational concern. Therefore, the integration of spirituality, Circular Economy and Gandhian resource management emerges as a meaningful framework for building an indigenous and sustainable vision of Viksit Bharat @2047.

Case Studies and Contemporary Examples

The growing ecological crisis has exposed the limitations of development models based on excessive industrialization, consumerism and continuous resource extraction. The modern linear economy follows a "take, make, use and dispose" approach that has resulted in rising waste generation, pollution, resource depletion and climate change. According to the United Nations Environment Programme, the world generates more than 2 billion tonnes of municipal solid waste annually, while India alone generates nearly 62 million tonnes of waste each year, including large amounts of plastic and electronic waste. These trends highlight the urgent need for sustainable and responsible development models. A select few cases reflecting sustainable models are presented below:

Case Study 1: Indore – India's Waste Management Model

Indore has emerged as one of India's leading examples of circular economy practices through efficient waste segregation, recycling, composting and community participation. Door-to-door waste collection, conversion of organic

waste into compost and bio-CNG and citizen involvement have helped reduce landfill burden and environmental pollution. The model reflects Gandhian principles of decentralization, local participation and collective responsibility.

Case Study 2: Patagonia and Repair Culture

Patagonia promotes repair and reuse culture through its "Worn Wear" initiative, encouraging customers to repair old garments instead of purchasing new ones unnecessarily. The model challenges excessive consumerism and reflects Gandhian ideas of simplicity, restrained consumption and environmental responsibility.

Case Study 3: Kamikatsu, Japan – Zero Waste Community

Kamikatsu adopted a zero-waste strategy focused on segregation, recycling, composting and public participation. Residents separate waste into multiple categories and actively participate in sustainability efforts. The example demonstrates that sustainability requires not only policy intervention but also behavioural and cultural transformation.

Case Study 4: Traditional Indian Water Conservation

Traditional Indian systems such as Rajasthan's johads, stepwells and South Indian tank irrigation systems reflect indigenous sustainable resource management practices. These systems emphasized conservation, community participation, moderation and harmony with nature, demonstrating that sustainability has deep roots in Indian civilization.

Case Study 5: Gandhian Philosophy and Modern Minimalism

The growing popularity of minimalism, mindful consumption, sustainable fashion and low-waste lifestyles across the world reflects ideas similar to those advocated by Mahatma Gandhi. Gandhi's emphasis on simplicity, self-restraint and need-based consumption remains highly relevant in the contemporary sustainability crisis.

Lessons for Viksit Bharat @2047

The case studies suggest that sustainable development requires:

- waste reduction,
- repair and reuse culture,
- community participation,
- ethical consumption,
- decentralized systems,
- behavioural transformation.

Many contemporary sustainability practices closely align with Indian spiritual traditions and Gandhian philosophy emphasizing moderation, coexistence and harmony with nature. The examples indicate that India possesses the cultural and intellectual foundations necessary to develop an indigenous sustainable model balancing economic progress, ecological sustainability and social harmony.

Policy Implications and Recommendations

The findings of the present study suggest that the vision of Viksit Bharat @2047 should not be limited merely to rapid industrialization, rising consumption and economic expansion. While economic growth remains essential for national progress, the study highlights the need for a more balanced and sustainable developmental framework that integrates environmental responsibility, ethical consciousness, spirituality and social harmony. The increasing ecological crisis, rising waste generation and growing dissatisfaction associated with excessive consumerism indicate that development models based solely on material accumulation may not remain sustainable in the long run.

The study therefore proposes several policy implications and recommendations aimed at promoting an indigenous sustainable model of development integrating spirituality, Circular Economy principles and Gandhian resource management.

Reorienting the Meaning of Development

One of the most important policy implications emerging from the study is the need to redefine the meaning of development itself. Public policy and economic planning often prioritize GDP growth, industrial output and consumption indicators while giving comparatively less attention to ecological sustainability, mental well-being, ethical living and social harmony.

A sustainable model of Viksit Bharat should therefore adopt a broader understanding of development that includes:

- environmental quality,
- responsible consumption,
- community well-being,
- mental health,
- social equity,
- long-term ecological balance.

Development indicators should increasingly incorporate sustainability and quality-of-life dimensions rather than focusing exclusively on economic expansion.

Promoting Circular Economy Practices

The findings of the study reveal considerable public support for circular economy practices such as recycling, repair culture, waste reduction and resource efficiency. Therefore, stronger policy support for circular economic systems is essential.

The government may encourage circular economy adoption through:

- incentives for recycling industries,
- support for repair and refurbishment businesses,
- promotion of biodegradable and sustainable products,
- stricter regulations on excessive packaging and single-use plastics.

Extended Producer Responsibility (EPR) frameworks may also be strengthened to ensure that industries take responsibility for post-consumer waste management.

Special attention should be given to sectors generating large amounts of waste such as:

- plastics,
- electronics,
- fast fashion,
- packaging,
- construction materials.

Encouraging circular business models can simultaneously reduce environmental pressure and generate employment opportunities in recycling, green manufacturing and sustainable entrepreneurship.

Integrating Sustainability and Ethical Consciousness in Education

The study strongly indicates that sustainability challenges are not merely technological or economic issues but also behavioural and ethical concerns. Therefore, educational systems must move beyond purely technical skill development and incorporate environmental ethics, responsible consumption and sustainability awareness within mainstream curricula.

Educational institutions at school, college and university levels may integrate:

- sustainability education,

- environmental responsibility,
- ethical economics,
- Gandhian philosophy,
- conscious consumption practices into academic and co-curricular activities.

India's traditional knowledge systems and ecological wisdom may also be integrated within sustainability education to create culturally relevant environmental awareness.

Encouraging Conscious Consumption

One of the major findings of the study is growing concern regarding excessive consumerism and wasteful lifestyles. Therefore, policy efforts should also focus on encouraging conscious and need-based consumption.

Public awareness campaigns may promote:

- reduction of unnecessary consumption,
- repair and reuse culture,
- sustainable lifestyles,
- avoidance of wasteful practices.

The promotion of "mindful consumption" can help reduce environmental stress while improving long-term well-being and social balance.

Governments, media institutions and civil society organizations may collaborate to encourage behavioural transformation through awareness initiatives emphasizing sustainability and ecological responsibility.

Strengthening Localized and Decentralized Economies

The study highlights strong public support for decentralized and localized production systems, which closely align with Gandhian principles of self-reliance and sustainability.

Excessive concentration of production and long global supply chains often increase:

- resource consumption,
- transportation emissions,
- economic vulnerability.

Therefore, policies promoting local production, rural entrepreneurship, community-based industries and sustainable local markets can contribute toward ecological and economic resilience.

Support for:

- micro and small enterprises,
- village industries,
- cooperatives,
- sustainable local businesses may strengthen both employment generation and environmental sustainability.

Localized economic systems may also reduce dependency on highly centralized and resource-intensive industrial structures.

Promoting Green Entrepreneurship and Innovation

India's sustainability transition can also create major opportunities for green entrepreneurship and innovation. Startups and enterprises working in areas such as:

- recycling,
- renewable energy,

- sustainable packaging,
- organic products,
- waste management,
- repair services should receive stronger institutional and financial support.

Incubation centers, educational institutions and government agencies may encourage sustainability-oriented entrepreneurship capable of combining profitability with environmental responsibility.

India's youth population can play an important role in developing innovative indigenous solutions for sustainability challenges.

Reviving Gandhian Resource Management Principles

The study indicates that Gandhian principles such as simplicity, trusteeship, need-based consumption and harmony with nature remain highly relevant in the contemporary sustainability discourse.

Although modern economies cannot completely replicate early twentieth-century economic structures, several Gandhian ideas can still inform sustainable policy frameworks.

The principle of trusteeship may encourage businesses and wealthy sections of society to view wealth and resources as social responsibilities rather than instruments of unlimited accumulation. Similarly, the Gandhian emphasis on moderation and restrained consumption can help counter excessive consumerism.

Policies encouraging ethical business practices, sustainable production and socially responsible investment may help align economic systems with broader ecological and social goals.

Integrating Spirituality with Sustainability

An important contribution of the present study is the recognition that spirituality can act as an ethical foundation for sustainable living. Spirituality, understood as conscious living and harmony with nature, may help promote responsible behaviour and moderation in consumption.

Public discourse on sustainability may therefore move beyond purely technical discussions and include ethical and philosophical dimensions of development. Indian spiritual traditions emphasizing coexistence, simplicity and balance may contribute significantly toward creating environmentally responsible lifestyles.

Such integration does not imply religious policy intervention but rather promotion of universal ethical values such as:

- self-restraint,
- compassion,
- moderation,
- collective welfare,
- ecological responsibility.

Towards an Indigenous Sustainable Model of Viksit Bharat @2047

The overall findings of the study suggest that India has the opportunity to evolve a distinct developmental paradigm rooted in its own civilizational values while embracing modern innovation and sustainability practices.

Rather than blindly imitating highly consumerist models of development, India may pursue a more balanced pathway combining:

- technological advancement,
- economic growth,
- environmental sustainability,
- ethical consciousness,
- social harmony.

The integration of spirituality, circular economy principles and Gandhian resource management offers a framework capable of promoting not only economic prosperity but also ecological balance and human well-being.

A truly developed India by 2047 may therefore be defined not merely by higher levels of consumption and industrial output, but by its ability to achieve sustainable prosperity while preserving harmony between human beings, society and nature.

Conclusion

The present study examined the relevance of spirituality, Circular Economy and Gandhian resource management in developing an indigenous sustainable model for Viksit Bharat @2047. The study highlights that development driven solely by industrial expansion, material accumulation and excessive consumerism has created serious ecological, social and ethical crises. Rising waste generation, environmental degradation, climate change and growing psychological dissatisfaction clearly indicate that economic growth alone cannot ensure sustainable human progress.

The findings reveal strong public concern regarding unsustainable lifestyles and the limitations of the prevailing linear economic model. Respondents supported a developmental framework that combines sustainability, ethical consciousness, social well-being and responsible consumption. The study also found considerable acceptance of circular economy practices such as recycling, reuse, repair culture and resource efficiency. However, the analysis suggests that sustainability cannot be achieved only through technological reforms; it also requires transformation in human attitudes, lifestyles and consumption behaviour.

An important finding of the study is the continuing relevance of Mahatma Gandhi's ideas such as simplicity, trusteeship, decentralization, self-reliance and need-based consumption. Many principles promoted today under sustainability and circular economy frameworks closely resemble Gandhian thought articulated decades ago.

The study argues that India should not blindly imitate highly materialistic and consumerist development models while pursuing the vision of Viksit Bharat @2047. Instead, India can draw strength from its own civilizational heritage rooted in spirituality, coexistence with nature, moderation and ethical living.

The proposed Sahaj Sustainable Development Model (SSDM) offers an indigenous framework integrating spirituality, circular economy principles and Gandhian resource management. The model seeks to balance economic progress with ecological sustainability, ethical responsibility and human well-being.

Ultimately, the success of Viksit Bharat should not be measured merely by industrial output or rising consumption, but by India's ability to create a society that harmonizes prosperity with sustainability, technology with ethics and development with nature.

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Digital India at the Margins: Uneven Participation, Structural Barriers, and the Future of Tribal Retail in Gumla District, Jharkhand

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Abstract

As India advances towards the vision of "Viksit Bharat @ 2047," digital transformation has emerged as a key driver of economic growth, expanding access to digital infrastructure, mobile connectivity, and online payment systems. However, the inclusiveness of this transformation in marginalized tribal regions remains questionable. This study examines the nature and extent of digital participation in the tribal-dominated Gumla district of Jharkhand, with a specific focus on its impact on local retail systems.

The research adopts a mixed-method exploratory design based on primary data collected from 38 consumers and 20 small retailers, supported by secondary sources. The study employs the "Triple Divide" framework Access, Capability, and Outcome to analyze the multi-dimensional nature of digital inequality.

Findings reveal a significant gap between digital access and meaningful participation. While 85% of respondents own smartphones, only 40% have access to stable internet connectivity, indicating conditions of "network poverty." At the capability level, nearly 65% of respondents face difficulty in independently using digital applications, reflecting low digital literacy and a strong trust deficit. At the outcome level, the benefits of digitalization remain uneven, as 60% of local retailers report declining sales due to growing competition from e-commerce platforms, while only 15% of respondents actively engage in online purchasing.

Despite increasing digital penetration, traditional haat bazaars continue to function as vital economic and socio-cultural institutions, sustained by trust-based transactions, informal credit systems, and community interactions. In contrast, digital platforms often operate in an extractive manner, facilitating consumption without adequately integrating local producers into digital value chains.

The study concludes that digital transformation in tribal regions remains incomplete and uneven. It emphasizes the need for a hybrid "phygital" model that integrates digital innovation with traditional market systems to ensure inclusive, context-sensitive, and sustainable development.

Keywords: Digital Divide, Tribal Economy, E-commerce Impact, Haat Bazaar, Phygital Model

INTRODUCTION

The narrative of a transforming "New India" is increasingly defined by the rise of digital technologies, where the silicon chip symbolizes progress, efficiency, and connectivity. Over the past decade, India has witnessed an unprecedented expansion in digital infrastructure, positioning itself as a global leader in real-time digital transactions and Digital Public Infrastructure (DPI). With a rapidly growing base of internet users, affordable smartphones, and scalable digital platforms, the country presents a compelling model of technology-driven development. However, while these macro-level achievements reflect success at the national scale, they often conceal deep-rooted disparities at the local level, particularly in geographically and socially marginalized regions.

One such region is the Chota Nagpur plateau, where the Gumla district of Jharkhand offers a critical lens to examine the uneven trajectory of digital inclusion. Gumla is predominantly inhabited by Scheduled Tribe (ST) communities, accounting for more than 70 percent of its population. The socio-economic structure of this district is shaped not only by limited infrastructure and economic constraints but also by deeply embedded cultural practices and community-based systems of exchange. Unlike urban economies driven by formal markets and digital interfaces, Gumla's local

economy is sustained through traditional haat bazaars—weekly markets that function as both economic hubs and social institutions.

Haat bazaars are not merely sites of buying and selling; they are spaces where relationships are built, trust is negotiated, and cultural identity is preserved. Transactions here often go beyond monetary exchange, incorporating informal credit systems, barter practices, and community-based pricing mechanisms. These markets represent a localized form of economic resilience that has evolved over generations. However, the entry of digital technologies—particularly the expansion of 4G and 5G networks, along with the growing reach of e-commerce platforms such as Amazon and Flipkart—has begun to disrupt this delicate balance.

The introduction of digital platforms into such a context creates a complex tension between traditional modes of livelihood and emerging aspirations shaped by digital exposure. On one hand, digitalization promises access to wider markets, financial inclusion, and improved efficiency. On the other hand, it risks marginalizing those who lack the necessary infrastructure, skills, or cultural alignment to participate effectively in the digital economy. This duality raises an important question: does digital expansion in regions like Gumla lead to genuine inclusion, or does it simply overlay existing inequalities with a digital veneer?

The concept of the "digital divide" is often used to describe disparities in access to technology. However, in the context of tribal regions like Gumla, this divide is multi-dimensional. It is not limited to physical access to devices or internet connectivity but extends to issues of digital literacy, language barriers, and the ability to translate access into meaningful economic outcomes. Many individuals may own smartphones or use digital payment systems, yet their engagement remains superficial, restricted to basic consumption rather than active participation in digital marketplaces. This highlights a deeper structural issue where digital inclusion is measured in terms of access rather than empowerment.

Furthermore, the integration of global e-commerce platforms into local economies introduces an asymmetry in power and control. While consumers in Gumla may benefit from increased access to goods through online platforms, local producers and small retailers often struggle to compete with the pricing, logistics, and scale advantages of these corporations. As a result, the flow of economic value tends to move outward, reinforcing patterns of dependency rather than fostering local growth. In this sense, digital expansion can take on an "extractive" character, where benefits are unevenly distributed and local economies are gradually weakened.

At the same time, it is important to recognize that resistance to digital transformation is not merely a consequence of backwardness or lack of awareness. In many cases, it reflects a conscious preference for systems that are culturally familiar, socially embedded, and economically reliable. Haat bazaars, for instance, offer a level of trust and flexibility that digital platforms have yet to replicate. They accommodate linguistic diversity, support informal negotiations, and provide a sense of community belonging that is absent in impersonal online transactions.

This paper situates itself at the intersection of these contrasting dynamics. By focusing on Gumla district, it seeks to move beyond generalized narratives of digital success and examine the lived realities of digital integration in a tribal context. The central objective is to critically assess whether initiatives aimed at promoting digital inclusion are effectively bridging the gap between policy intent and ground-level outcomes, or whether they are inadvertently reproducing existing forms of marginalization in a new digital form.

In doing so, the study contributes to a broader understanding of development in the digital age, emphasizing the need for context-sensitive approaches that recognize cultural diversity, social structures, and local economic practices. It argues that the success of digital transformation should not be measured solely by technological adoption or transaction volumes, but by its ability to enhance livelihoods, empower communities, and sustain indigenous systems of knowledge and exchange. Only then can the vision of an inclusive and equitable "New India" become a reality across all regions, including those at its margins.

LITERATURE REVIEW

The academic discourse on the digital divide has evolved from a narrow focus on physical access to a more nuanced understanding encompassing disparities in usage, skills, and outcomes. Early frameworks emphasized connectivity gaps; however, recent studies conceptualize the divide as multi-layered, particularly in developing economies where socio-economic inequalities intersect with technological diffusion. Van Dijk (2020) argues that digital inequality persists even after access is achieved, as differences in skills, motivation, and usage patterns shape the benefits individuals derive from technology.

At the macro level, India's digital growth story is often highlighted as a success. The *Economic Survey of India (2022–23)* reports a substantial rise in rural internet penetration, reflecting the expansion of digital infrastructure (Government of India, 2023). Similarly, the *Telecom Regulatory Authority of India (TRAI, 2022)* notes a steady increase in broadband subscriptions across rural regions. However, such progress masks regional imbalances. Prasad and Kumar (2021) highlight that tribal regions continue to experience lower bandwidth density and unstable connectivity, creating what they term a "quality divide." Complementing this, the *Internet and Mobile Association of India (IAMAI, 2023)* reports that while rural internet users are increasing numerically, their average usage intensity remains significantly lower than urban users, indicating limited engagement.

In the realm of financial inclusion, digital payment systems have been widely promoted as instruments of democratization. The *Reserve Bank of India Annual Report (2022–23)* emphasizes the rapid adoption of real-time payment systems and their role in expanding financial access. Studies by Suri and Jack (2016) demonstrate how mobile money can enhance financial resilience in developing contexts. However, localized evidence suggests uneven outcomes. Gaur and Singh (2022) find that in tribal Jharkhand, digital payments are primarily used for receiving remittances rather than facilitating local commerce. Similarly, Khera et al. (2021) argue that while digital financial services expand access, their effective use depends heavily on digital literacy and institutional trust.

The implications of digitalization for small retailers have also been widely debated. The *World Bank (2021)* highlights the risk of "market cannibalization," where small businesses lose customers to large e-commerce platforms. This is further supported by UNCTAD (2021), which notes that global digital platforms tend to concentrate market power, disadvantaging local enterprises in developing economies. Reardon et al. (2021) observe that traditional retail structures often struggle to compete with the efficiency, pricing strategies, and logistics networks of digital marketplaces, particularly in price-sensitive regions.

Beyond infrastructure and markets, socio-cultural dimensions play a crucial role in shaping digital adoption. Bhowmik (2012) emphasizes that informal and tribal markets function as "social vents," where economic transactions are deeply embedded in social relations. Donner (2015) also notes that mobile technology adoption in low-income settings is influenced by cultural practices and trust networks. In tribal economies, systems such as informal credit (udhaar) and face-to-face negotiation remain central to survival. Digital platforms, which prioritize speed, standardization, and anonymity, often fail to replicate these relational dynamics. As a result, their integration into such contexts remains partial and contested.

Recent studies further highlight the need for context-sensitive digital policies. Heeks (2022) argues that digital development must move from a technology-centric approach to a people-centric model that prioritizes local needs and capabilities. Toyama (2015) similarly contends that technology amplifies existing inequalities unless supported by strong social institutions. In the Indian context, this implies that digital initiatives must align with local cultural and economic structures rather than attempting to replace them.

Overall, the literature indicates that while India has made significant strides in digital expansion, the benefits remain unevenly distributed. In tribal regions like Gumla, the interplay of infrastructural gaps, limited capabilities, market disruptions, and socio-cultural resilience creates a complex landscape where digital inclusion is far from complete. This underscores the need for hybrid and inclusive models that integrate technology with local systems rather than displacing them.

RESEARCH GAP

Although national reports highlight significant progress in digital penetration, there is a clear lack of district-level, ground-based research in tribal-dominated Scheduled Areas like Gumla. Existing studies largely focus on the "Urban–Rural" divide, often ignoring the distinct "Tribal–Non-Tribal" economic and cultural differences. Moreover, limited attention has been given to how traditional institutions such as haat bazaars are responding to the rise of e-commerce and digital platforms. There is also insufficient empirical evidence on whether digital expansion is enabling local tribal retailers to participate in the digital economy or marginalizing them further. This study addresses these gaps by providing primary, field-based insights from Gumla district.

RESEARCH OBJECTIVES

- To evaluate the "Triple Divide"—Access, Capability, and Outcome—in the context of Gumla's tribal population.

- To analyze the impact of e-commerce expansion on the revenue, customer base, pricing strategies, and long-term sustainability of local tribal retailers, especially those operating within haat bazaars.
- To examine changes in consumer behavior in tribal regions with the increasing availability of digital platforms and online marketplaces.
- To identify the structural and socio-cultural barriers—including infrastructural limitations, digital literacy gaps, language constraints, and trust-based practices—that restrict effective digital participation.
- To assess the role of traditional haat bazaars in sustaining local livelihoods and their adaptability in the face of digital disruption.
- To propose a policy-oriented framework for an inclusive and sustainable hybrid "Phygital" retail model that integrates digital innovation with traditional market systems.

RESEARCH METHODOLOGY

This study adopts a Mixed-Method Exploratory Research Design to examine the interaction between digital expansion and tribal economic systems in Gumla district. Such an approach is particularly suitable for studying complex socio-economic phenomena like digital inclusion, where both quantitative trends and qualitative experiences are essential for comprehensive understanding (Creswell, 2014).

The exploratory nature of the study is justified by the limited availability of district-level empirical research in tribal regions. Mixed-method designs enable triangulation, thereby enhancing the validity and reliability of findings through the integration of multiple data sources (Tashakkori & Teddlie, 2010).

Sampling and Study Area:

The research was conducted across three purposively selected blocks—Gumla (urban), Sisai (semi-urban), and Raidih (rural)—to capture spatial diversity in digital access and economic activity.

Consumers (n = 38): Selected using stratified sampling based on age (youth and elders) and income levels to capture socio-economic variation.

Retailers (n = 20): Included kirana store owners, cloth merchants, and electronics shopkeepers, representing key segments of local retail.

Purposive and stratified sampling methods are widely used in exploratory socio-economic research to ensure representation across relevant categories (Etikan et al., 2016).

Data Collection Methods:

Primary data was collected using structured questionnaires and semi-structured interviews. While questionnaires provided quantifiable data on device ownership, internet usage, and digital payments, interviews captured perceptions, trust levels, and socio-cultural barriers (Kothari, 2004).

Additionally, field observations were conducted during haat bazaars to understand real-time transaction patterns and the coexistence of cash and digital modes.

SecondaryDataandTriangulation:
To strengthen the analysis, secondary data from national reports and academic literature was incorporated. Triangulation ensures robustness by validating findings across multiple sources (Denzin, 1978).

AnalyticalFramework:
The study employs the Triple Divide Framework, which categorizes digital inequality into three dimensions:

Access Divide (Infrastructure)

Capability Divide (Skills and Literacy)

Outcome Divide (Economic Benefits)

This framework aligns with contemporary digital inequality research that emphasizes outcomes beyond mere access (OECD, 2020; Van Dijk, 2020).

FINDINGS AND ANALYSIS

The Access Divide: Network Poverty

The study reveals a condition of "network poverty," where device ownership does not translate into effective connectivity. While 85% of respondents own smartphones, only 40% reported stable internet access.

This finding reflects broader national patterns where rural connectivity suffers from infrastructural limitations such as low bandwidth and unreliable networks (TRAI, 2022). In hilly regions like Raidih, respondents reported "network shadows," where signal availability is highly inconsistent.

Furthermore, electricity instability exacerbates the problem, limiting the usability of digital devices. Approximately 70% of retailers reported frequent transaction failures, particularly during peak market hours. This leads to resistance toward digital payments, as failed transactions reduce trust and efficiency.

Thus, the Access Divide is not merely about availability but about the quality and reliability of infrastructure, confirming earlier studies on digital inequality (Prasad & Kumar, 2021).

Table 6.1: Access Divide – Network Poverty

Indicator	Percentage (%)	Interpretation
Smartphone Ownership	85%	High device availability
Stable Internet Access	40%	Poor connectivity quality
Retailers Facing Transaction Failures	70%	Unreliable digital payment system

Source: Data compiled by the researcher from primary field survey in Gumla 2026

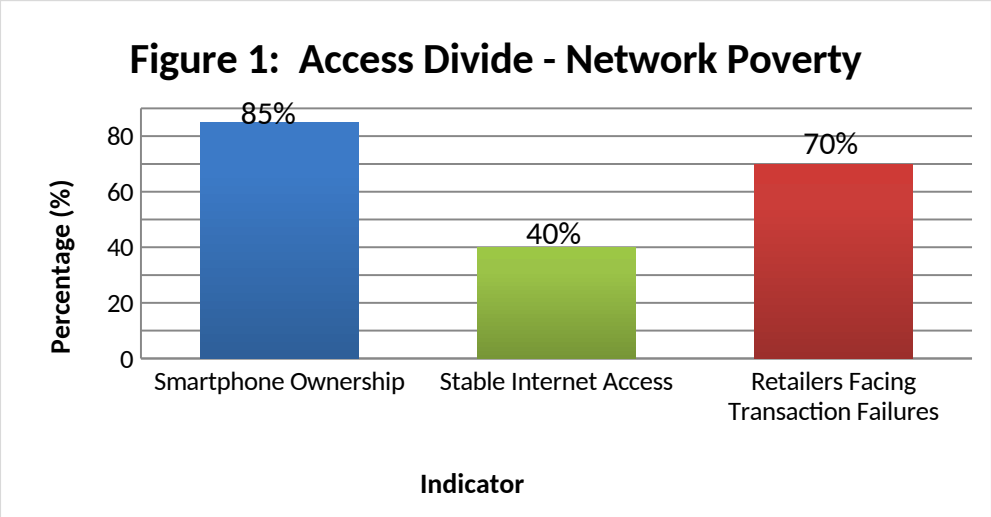


Figure 1: Access Divide – Network Poverty

The Capability Divide: Language, Literacy, and Trust Deficit

The Capability Divide emerges as a critical constraint in digital participation. Around 65% of respondents reported hesitation in using digital applications independently, highlighting low levels of digital literacy.

According to Van Dijk (2020), digital inclusion depends not only on access but also on skills and usage capabilities. In Gumla, this gap is further intensified by language barriers, as most digital platforms are not available in local dialects such as Nagpuri or Kurukh.

This results in "proxy usage," where individuals depend on intermediaries to perform transactions. While this facilitates basic participation, it increases vulnerability to fraud and reduces autonomy (Donner, 2015).

Additionally, a strong trust deficit exists. Fear of cyber fraud and lack of awareness regarding digital grievance mechanisms discourage users from adopting digital platforms. Similar concerns have been highlighted in studies on digital financial inclusion (Khera et al., 2021).

Table 6.2: Capability Divide – Digital Literacy and Trust

Indicator	Percentage (%)	Interpretation
Hesitation in Using Digital Applications	65%	Low digital literacy
Proxy Usage (Dependence on Others)	50%	Limited user autonomy
Fear of Cyber Fraud	High (Qualitative)	Strong trust deficit

Source: Data compiled by the researcher (2026) , Supported by Van Dijk (2020), Khera et al. (2021)

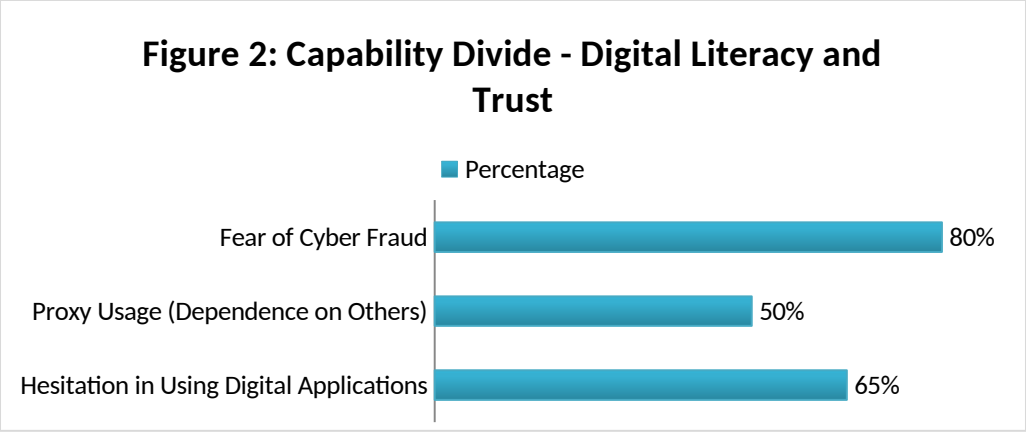


Figure 2: Capability Divide – Digital Literacy and Trust

The Outcome Divide: Retail Displacement and Extractive Digitalization

The most significant findings relate to the Outcome Divide, where digital access fails to translate into economic benefits.

- 60% of retailers reported declining sales, especially in high-margin goods like clothing and electronics.
- While 90% of respondents are aware of e-commerce, only 15% use it regularly, indicating a gap between awareness and adoption.

This reflects the phenomenon of "market cannibalization," where small retailers lose customers to large digital platforms (World Bank, 2021).

A crucial structural limitation is the absence of informal credit systems (udhaar) in digital platforms. Nearly 80% of consumers rely on credit purchases, particularly during low-income periods. Local retailers provide this service based on trust and long-term relationships an aspect that digital platforms cannot replicate (Bhowmik, 2012).

Moreover, digital platforms often redirect economic value outward, limiting local income generation. UNCTAD (2021) highlights that digital economies tend to concentrate value in centralized platforms, disadvantaging local markets.

Interestingly, social media usage remains high (around 80%), indicating that digital engagement is largely consumption-oriented rather than production-oriented. This supports the argument that technology often amplifies existing patterns rather than transforming them (Toyama, 2015).

Table 6.3: Outcome Divide – Retail Displacement

Indicator	Percentage (%)	Interpretation
Retailers Reporting Decline in Sales	60%	Market displacement effect
Awareness of E-commerce	90%	High awareness level
Regular Use of E-commerce	15%	Low adoption rate
Consumers Using Informal Credit (Udhaar)	80%	Dependence on traditional systems
Social Media Usage	80%	Consumption-oriented engagement

Source: Data compiled by the researcher (2026) , Supported by World Bank (2021), UNCTAD (2021)

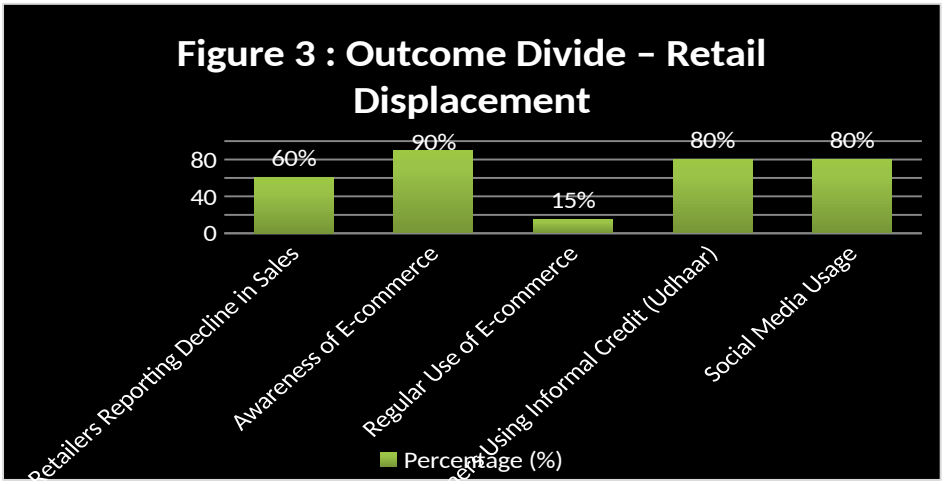


Figure 3: Outcome Divide – Retail Displacement

CONCLUSION

The findings of this study indicate that digital transformation in tribal regions like Gumla is progressing, but in an uneven and incomplete manner. While improvements in digital infrastructure and the spread of digital payment systems have enhanced basic access, these developments have not fully translated into meaningful socio-economic inclusion. The persistence of the Triple Divide Access, Capability, and Outcome clearly shows that access to technology alone is not sufficient for effective participation in the digital economy.

At the access level, smartphone ownership and internet availability have increased, but connectivity issues and network instability continue to limit consistent usage, especially in rural and hilly areas. At the capability level, challenges such as low digital literacy, language barriers, and lack of familiarity with digital platforms restrict independent usage. At the outcome level, the benefits of digitalization remain limited, with many users not experiencing significant improvements in income or business growth.

The study further observes that digital expansion has led to a situation where tribal communities are more active as digital consumers than economic participants. Engagement is higher in areas such as social media and entertainment, while participation in e-commerce and digital entrepreneurship remains low. This indicates that digital tools are not yet fully integrated into local livelihood systems.

This situation reflects the emergence of an imbalanced digital economy, where benefits tend to flow outward while local retail structures, including small shops and haat bazaars, face increasing pressure. These traditional systems continue to play an important role in providing trust-based exchange and informal credit, which digital platforms are currently unable to replace.

To address these challenges, the study suggests the need for a more people-centered approach to digital development. A hybrid “Phygital Model,” which combines digital tools with traditional market practices, appears to be a practical and context-sensitive solution. This approach can help maintain local economic structures while gradually improving digital participation.

In conclusion, digital transformation in tribal regions like Gumla should not be viewed only as a technological process, but as a social and economic transition. Its success depends on how effectively it aligns with local realities, improves capabilities, and ensures that the benefits of digital growth are shared more equitably across communities.

RECOMMENDATIONS

The study highlights that digital expansion in tribal regions like Gumla requires context-specific and inclusive strategies, as a uniform approach is not effective in such socio-economic settings. The following key recommendations are proposed to bridge the Triple Divide and ensure inclusive digital development.

i. Localized Digital Literacy (Sahiya Model)

Train local tribal youth, especially women, as “Digital Sahiyas” to provide basic digital training and support to consumers and small retailers. This will improve trust, awareness, and adoption of digital tools at the community level.

ii. Phygital Market Hubs (CSCs)

Strengthen Common Service Centres (CSCs) as hybrid "Phygital hubs" that connect traditional markets with digital platforms. They can support e-commerce deliveries, assisted transactions, and help local retailers integrate into digital supply chains.

iii. Vernacular Digital Platforms

Promote local language integration (Sadri, Nagpuri) in banking and e-commerce apps. Voice-based and icon-driven interfaces should be developed to reduce language and literacy barriers.

iv. Digital Udhaar System

Develop micro-credit digital solutions that replicate traditional udhaar systems. This can include digital credit wallets and community-based credit assessment mechanisms to support rural consumption patterns.

v. Infrastructure Strengthening

Improve network connectivity and electricity supply in remote and tribal areas to ensure stable digital access, especially in "network shadow" regions.

vi. Trust and Awareness Building

Conduct cyber safety awareness programs and establish local digital help centers through schools, SHGs, and panchayats to reduce fear of fraud and increase confidence.

vii. Support for Small Retailers

Provide financial incentives and training for digitization of small shops, and encourage local e-commerce cooperatives to help tribal entrepreneurs participate in digital markets.

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Cashless Convenience or Costly Habit Among Youth. A Case Study of Lalpur Area, Ranchi.

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Abstract

Digital payment in the recent time has become a significant part of human life. It has brought many changes in people's day to day life, especially to the young generation. Digital payment systems such as Mobile Wallets, UPI's, Net Banking are widely used and made cashless payments easy and smooth, and became an integral part of our daily life. Although the digital payment systems make the process of payment more convenient, fast and easy, they may also affect the spending behaviour of the consumers. Thus, this paper will study whether online payment works as a convenience for the people or it promotes cashless habits among youth in Lalpur area, Ranchi. In order to conduct this study, primary data of 100 respondent were collected through a structured questionnaire to see the impact on the consumer. Descriptive statistics, Correlation and basic regression methods were used to analyze whether digital payment systems affect spending behaviour among youth or not. After the analysis the findings shows that although digital payments improved transaction efficiency and increased spending but it somewhat or the other reduce financial awareness among youth. The paper concludes that digital payments are both beneficial and potentially risky for the youth depending among the usage pattern and indicates financial literacy among youth.

Keywords- Digital Payment, Youth Behavior, Financial Awareness, UPI.

INTRODUCTION

The term Digital payment means to pay for the goods and services, to friends and families, or to pay for any bills etc. digitally without making any physical contact in terms of cash. This payment system has revolutionized the financial ecosystem system in the world in the past few years.

Figure 1- Growth of Banks live on UPI



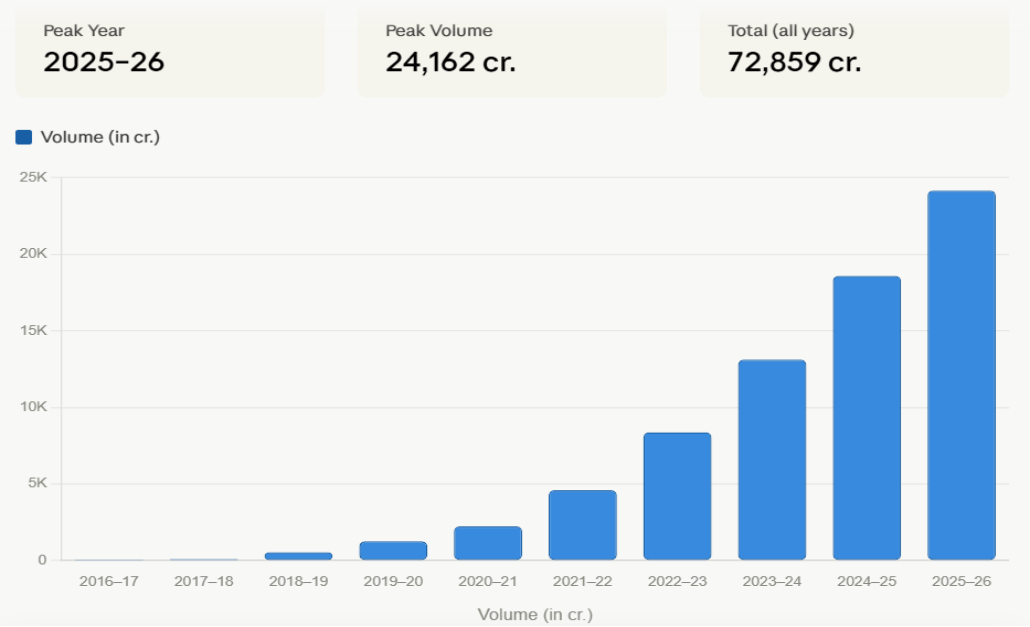
Source- National Payment Corporation of India

Countries depending upon cashless transaction has improved their financial condition to a greater extent. Many countries including India has step onto the path to become a cashless economy in the future. India with a GDP of $4.15

trillion as April 2026 stands at sixth position in the world after the United States, China, Germany, Japan and United Kingdom[1]. India has started to take baby step in the field of online payment in the early 2014 but the major change that took place was in the year 2016 when NPCI (National Payment Corporation of India) launched UPI (Unified Payments Interface) on 11 April 2016. It was in the same year when demonetisation occurred in India where 500 and 1000 rupees notes which were acting as the legal tender were removed, and people were facing numerous problems as the government limited the exchange of currency through banks. At that time UPI came out as a game changer for India in the field of online transactions. Another event that pushed people from offline to online payment was in the year 2020 during COVID-19 where physical contact was minimum and handling of cash was reduced due to the increase in the cases of Coronavirus.

Figure 1 shows the significant growth of banks live on UPI for the following ten years. Started in 2016 with just 21 banks onboard and the figure just got doubled in each of the first two years, growth was modest in FY2020 due to initial COVID disruption but sees a steep growth from 2021 to 2024 as NPCI added smaller cooperative banks and rural banks and now it moves towards full coverage of eligible banks. In the last 10 years UPI has seen 33.6 times growth in the involvement of banks.

Figure 2- Annual Transaction Volume Growth (2016-2025)



Source- National Payment Corporation of India

Figure 2 shows the growth of annual transaction volume of UPI in India. In India UPI transactions has seen a rapid growth, from having an annual transaction volume of just 2 crores in FY 2016-2017 to 24,162 crore transaction in FY 2025-26 showing almost 12,000-fold surge in transaction volume[2].

UPI is been happily adopted by Indians in respect to payments to various places due to which for the first time UPI monthly transaction volume crossed 2,000 crore transaction mark in August 2025 to 2001 crore transactions[2]. Apart from UPI various other modes of payment are also been used by the people for day-to-day activities like paying through QR scanner, online bank transfer, mobile wallets and etc. making payment easier, fast and convenient. Government initiatives like Jan Dhan Yojana scheme, Digital India scheme and increasing smartphone penetration among the people have accelerated digital payment. Among this youth are the most dynamic consumer segment using digital services due to their tech savvy nature, adaptability and lifestyle considerations. The convenience of using digital payment is unparalleled since users do not need to make cash transactions. This change can be evidently seen in the urban and semi urban areas in India among which one of the places is Lalpur area Ranchi (which is been considered in the study) which has a thriving business environment and large population of youth. Despite being convenient, digital payment is also shifting the behaviour of consumer; it has reduced the realness of transactions compared to cash and due to which consumers end up making more frequent purchase as they lose track of their financial limits.

STATEMEMT OF PROBLEM

Digital payment has become quite popular among the younger generation in the recent years. It has transformed the spending habits and also the methods through which money was managed earlier. Digital payment applications such as Unified Payment Interface, mobile wallets and online banking ensure that the process is convenient, fast and easy. However, this facility sometimes leads to overspending, buying unnecessary items and reduces financial awareness. Area like Lalpur, in Ranchi city having larger composition of youth in the population leads to rapid adoption of digital payment methods for shopping, travelling, entertainment, ordering foods and etc. this increases the dependence on cashless system to a greater extent. Despite of this growth very limited research exist related to spending habits and financial awareness among the youth of this region.

OBJECTIVES OF THE STUDY

- To study the behaviour of individual when paying digitally.
- To analyse the impact of digital payment on monthly expenditure.
- To compare spending habit between cash and online payers.

REVIEW OF LITERATURE

Digital payment has revolutionised the market to a greater extent by making transactions more convenient and faster. It has opened new gates in the field of business as well, not only the consumers but the businessman has also benefited from it in many ways. And the growth of which has been significantly observed by many researchers earlier. Those observations have been studied and presented here so as to get a clear picture of what has been explored earlier and what are the areas in which research can be done further.

The reason for huge dependence on digital payments lies on two major events as stated by KPMG in their report in (2020) first the demonetisation that occur during the year 2016 and second was the outbreak of coronavirus disease in the year 2020. The report also finds out that young generation relies on digital payment for their speed, security and reward system and in addition to that the cashback schemes which makes it more attractive.

Singh and Verma (2020) has explored the linkage between the usage of digital payments and customer satisfaction among the youth. In their study it was found that the ease and speed are the key factors behind digital payments but heavy usage of digital payments leads to lack of financial discipline.

Research done by Das and Roy (2021) throws light on the urban youth of eastern part of India, stating that digital payment encourages lifestyle driven consumption. The study finds out that regular use of online payments leads to increase in the expenditure on entertainment, food delivery services like Zomato and Swiggy and fashion related products due to its convenience of payment and online advertisement.

According to research done by Sharma and Gupta (2021), it was stated that mobile wallets affect college students because student who use digital payments method are more likely to adapt impulsive buying rather than those who opt for cash payments. In the study it was established that convenience of paying immediately through mobile wallets affects consumer decision making.

In a report published by World Bank (2021), digital financial services were found to have a positive impact towards financial inclusion and economic development. In this report it was also mentioned that financial illiteracy among youth results in overspending and mismanagement of their finances.

According to a report by NASSCOM (2022), digital payment systems have greatly affected the lifestyles of consumers living in the urban areas of India. In the report it was observed that youngers generations of consumer use online payment more frequently for purchasing goods and services, getting food delivered at their places, subscribing to entertainment services, and even commuting via public transport.

In a report published by Reserve bank of India (2022), states that Unified Payment Interface (UPI) has seen an exponential growth in the recent years due to smartphone penetration and internet connectivity in India. It was also found that the majority of people using UPI belongs to the young age group like student and working professionals which leads to a great dependency of youth on digital financial system.

RESEARCH METHODOLOGY

The study 'Cashless Convenience or Costly Habits Among Youth: A case study of Lalpur Area Ranchi' adopts an empirical, descriptive and analytical research design to analyse the data. For the study both Primary data and secondary data has been used to have a better understanding of the topic. For data collection a structured questionnaire was used through which 100 samples were taken having an age group between 18 to 30 which majorly involves youth. Lalpur a largely populated area of Ranchi was considered in this study due to the presence of larger number of students going to college or coaching institutes and also for the working professional which gives us more accurate data and reason for the shift from cash to cashless payments. Researcher used snowball sampling techniques to gather larger amount of information and also to reach a variety of sample which seemed to be impossible through other methods within the given time frame. The study includes Independent Variable (Digital Payment) and Dependent Variable (Spending Behaviour, Financial Awareness). To simplify the data collection, questionnaire was categories under 4 heads like 'Demographic Profile', 'Digital Payment Usage', 'Spending Behaviour', 'Financial Awareness'. Informal interviews were also conducted with some respondent to get a better in-depth knowledge about the behaviour and those questions and answer has also been included in the study. To analyse the data tools like Percentage Analysis, Correlation Analysis, Simple Regression were used in the study.

DATA ANALYSIS AND INTERPRETATION

TABLE 1- Demographic Profile of Respondent (Sample=100)

Age Group	No. of respondent	Percentage (%)
18-20	24	24%
21-23	32	32%
24-26	26	26%
27-30	18	18%

Source- Field Review

Table 1 describes the demographic profile of the study, in this total 100 samples were considered in which the majority of population which is 32% lies between the age group of 21 to 23 years and least between 27-30 showing the dominance of youth in this area due to the large establishment of coaching institute, shopping malls and hostels.

TABLE 2- Occupational Status

Status	Respondents	Percentage (%)
College Student	60	60 %
Working Professional	28	28%
Others	12	12 %

Source- Field Review

Table 2 shows the current status of respondents of what work they are doing in their lives. The data shows that majority of people around 60 % are students studying in college which shows the dominance of students and 28 % people are working professional.

TABLE- 3 Frequency of Online Payment Usage

Frequency of Use	Respondents	Percentage (%)
Daily	50	50 %
Weekly	28	28%
Occasionally	15	15 %
Rarely	7	7 %

Source -Field Review

Table 3 This table describe the usage of online payment by the respondents in every day's life. It indicates that 50 % of the respondents use online payment in their daily life which shows the strong use of online payment and few people around 7 % consider paying online rarely.

TABLE-4 Online Payment Method

Payment Modes	Respondents	Frequency
UPI	66	66 %
Debit Cards	16	16 %
Credit Cards	10	10 %
Mobile Wallet	8	8 %

Source – Field Review

Table 4 It indicate the modes through which majority of people pays for their expenses. It shows that maximum people use Unified Payment Interface for payments due to its convenience and real time payment confirmation followed by Debit card around 16 % and Credit card Around 10 % and at last mobile wallets.

TABLE- 5 Monthly Expenditure of Respondents

Monthly Expenditure	Respondents	Frequency
Below 5,000	22	22 %
5,001-10,000	38	38 %
10,001-15,000	25	25 %
Above 15000	15	15 %

Source- Field Review

Table 5 indicates the monthly expenditure chart which is the most important aspect of the study. It shows that how much money does the respondent get as an allowance to spend during the month. The amount shown in the table includes both online and offline amount which the respondent has with them. Majority of people spend between 5001 to 10,000 in a month and very few people spend above 15,000 because the area holds majority of college students who do not have much to spend.

TABLE- 6 Comparison between Cashless and Cash Payment

Spending Level	Respondents	Frequency
Higher	46	46 %
Same	33	33 %
Lower	21	21 %

Source- Field Review

Table 6 This table is the most important one on which the study primarily revolves. It shows the transformation of people from cash to cashless payment and how it had affected their spending level. Around 46 % of the respondent has seen a surge in their spending level after the adaption of online payments. And very few people respondents that it has lower their spending.

TABLE- 7 Behavioural Impact of Online Payment

Statement	Mean Score
Online payment makes payment easier	4.25
Cashbacks encourage spending	4.10
Impulsive buying increased due to Online payment	3.92
Monthly expenses increased due to digital payments	3.80
Online apps help to manage expenses	3.50

Source- Field Review

Table 7 This table is the representation of behavioural impact of online payment on the respondent. The table in based on Likert scale where (Scale 1 indicates Strongly Disagree and Scale 5 indicates Strongly Agree). And here the mean score 4.25 shows that online payment has made payment easier and at the same time it has increased the spending behaviour.

INTERVIEW ANALYSIS

Some questions related to spending behaviour have been asked from the respondent which are included in this section so as to know what they think while spending and buying things through digital payment modes.

Q1. Which online payment app do you use frequently?

Answer- I mostly use Google pay and Phone Pay for my day-to-day transaction as they have user friendly interface and mostly popular and easier to spilt bills among friends.

Q2. Which mode do you frequently use to pay for your expenses?

Answer- I generally prefer paying online for my expenses as it reduces the change problem and fear of misplacing cash is also minimised.

Q3. Do you able to track your monthly expenses easily?

Answer- Yes, through online payment it gets easy to track my expenses because I am able to monitor it on transaction history page.

Q4. Give me one reason why online payment is not been able to take full control over cash?

Answer- To pay digitally you require internet connectivity which is yet not properly available in every part of the country, so it is impossible to replace cash fully in the next 3 to 5 years.

Q5. According to you, are digital payment harmful or beneficial?

Answer- According to me they are beneficial in case of speed and convenience but are harmful if it is not controlled or monitored.

So, these were some of the questions which were asked by the researcher to the people of the Lalpur area, Ranchi. People have a mix response about cash and cashless payments but it can be seen that the weight is on the cashless payment due to the majority of youth.

RESULTS AND FINDINGS

The above data analysis shows that maximum people have shifted towards a more digital economy surpassing hard cash. Being a youth friendly zone people are more adapted towards technology making it a larger dependence area on digital services. After the analysis researcher finds out that 50 % of the respondents have moved towards a more cashless economy for their everyday payments ranging from 1 rupee to 10,000. Due to the absence of convenience fee people use it at all the places. Due to this people have seen a surge in their monthly expenditure by making impulsive buying.

LIMITATIONS OF THE STUDY

- Researcher used only 100 samples for the study as it was fitted good within the time frame but if conducted on a larger scale around 400 to 500 samples results might differ.
- Area was restricted to Lalpur only due to the presence of large number of youth but responses may differ if other areas like Dangratoli, Karbala Chowk, Church Road, Plaza chowk of Ranchi are also considered.
- Researcher used snowball sampling techniques to gather more information in less time which do not represents the accurate description of the people, results might differ if a probability sampling techniques was used.
- Only young generation was considered while studying the paper other age group of people might also be considered to see the impact on the other buying behaviour.

SCOPE OF THE STUDY

- Different areas where student footstep is large can also be considered and a relation can be formed for better understanding.
- Factors like internet connectivity, smartphone penetration, financial literacy can also be considered in future.
- Comparative studies can also be conducted between various categories of people.
- A long-term study can be conducted to analyse the change in the behaviour in spending.

CONCLUSION

The present study entitled ‘Cashless convenience or costly habit among the youth: A case study of Lalpur area, Ranchi’ focuses on the impact on the spending behaviour of the people ranging between 18-30 due to online payments. The study revealed that online payment system such as Mobile wallet, UPI have become an essential part of the students, working professional’s daily life. It has been observed that people buying behaviour changes due to the absence of hard cash. The psychology acts as if they are not paying to what they are consuming and this affect them while maintaining their financials.

Due to the factors like speed, convenience and ease people are more likely to adopt this payment system which leads them to impulsive buying and overspending. Companies like Phone pay, Google pay provides multiple cashbacks offers from time to time to engage people in spending more. However, respondents spoke more in favour of online payment as it reduces their time and increases their productivity but many youths who lack financial literacy gets into the trap of overspending again and again. But overall, it can be said that digital payment has both positive and negative impact on the consumer.

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A Study of the Impact in Education of the 7- Pillars India Artificial Intelligence Mission: For Viksit Bharat 2047

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Abstract

In Indian Education system, especially in HEI (Higher Education Institution) AI play very important role. The AI mission aims to help Viksit Bharat through 7-pillars, which focusing on both public & private sectors. These are the key area which include education, Deep Learning, Generative AI, Robotics, Cyber Security, Involving Partnerships with startups and global AI Leaders.

The “Viksit Bharat Mission” represent India’s great idea’s to developed the country by its centennial of Independence in 2047. This vision is the transformation of education over the technological progressions, promising to solve long-standing educational issues and make learning more individualized and inclusive. Artificial Intelligence (AI) is set to significantly impact this change, offering solutions to persistent educational issues and felicitating a more tailored and inclusive learning experience.

Incorporating Artificial Intelligence driven education supports the creation of scientifically proficient personnel vital for advancement of India as a developed nation, bring into line with the overarching goal of Viksit Bharat 2047. Towards offering a future generation with Artificial Intelligence skills aligned with India's development objectives under Viksit Bharat 2047, cooperation among educational institutions is crucial.

This paper scrutinizes at how the "Viksit Bharat Mission" goals can be met by incorporating Artificial Intelligence into India's educational system. India's journey toward becoming a developed nation by 2047 requires a pattern shift in its educational practices. Education is essential to national development.

Keywords: Artificial Intelligence, Viksit Bharat Mission, Higher Education, Technologies, NEP, Deep Learning

Introduction

India is on the brink of significant transformation as it aims for the national goal of Vikshit Bharat 2047, seeking to become a developed, inclusive, and innovation-led country by the hundredth year. Essential to this vision is the reconceptualization of tutoring as a domain where Artificial Intelligence (AI) has become a strategic influence [1] capable of driving remarkable progress in teaching, learning, access, and equity. As editors of this collection, we have the honour and duty to establish the context for practitioners, policy makers, and researchers aiming to comprehend, influence, and create.

India's ambitious goal of becoming a developed nation by its centennial of independence in 2047 is represented by the "Viksit Bharat Mission." The revolution of education concluded technological developments is at the heart of this vision. With the promise of addressing long-standing educational issues and enabling a more personalized and inclusive learning practice, artificial intelligence (AI) is composed to play a crucial role in this transformation. This paper looks at how the "Viksit Bharat Mission's goals can be met by incorporating AI into India's educational system. India's journey toward becoming a developed state by 2047 requires a paradigm shift in the educational practices because education is essential to national development.

Artificial Intelligence (AI) is restructuring the universal education ecosystem by empowering personalized learning, intelligent training systems, automated valuation, predictive analytics, and smart campus management. India, with one of the world’s major youth populations, has recognized AI [2] as a strategic technology for economic growth and educational modernization.

The concept of *Viksit Bharat 2047* emphasizes:

- Knowledge-driven development
- Technological self-reliance

- Innovation and entrepreneurship
- Inclusive and equitable education
- Global competitiveness

The National Education Policy (NEP) 2020 powerfully advocates digital transformation, multidisciplinary teaching, skill-based education, and evolving technologies [4] such as AI, machine learning, robotics, and data science. Therefore, integration of AI in higher education becomes essential aimed at building future-ready human capital [3].

Role of AI in Higher Education

AI can transform higher education in the following areas:

1. Personalized Learning

Personalized learning is the most significant contributions of Artificial Intelligence (AI) in higher education. Traditional classroom teaching often surveys a “one-size-fits-all” method, where all the students collect the similar content, pace, and assessment methods regardless of their education abilities and preferences. AI transforms this model by creating adaptive, learner-cantered educational experiences [5].



Figure - 1

AI-driven educational platforms bring together and analyse large amounts of student data such as:

- Learning speed
- Academic performance
- Attendance records
- Assessment scores
- Interaction patterns
- Preferred learning styles

Using machine learning algorithms and learning analytics, AI systems recognize strengths, weaknesses, and behavioural trends of individual learners. Based on this analysis, the system recommends customized study materials, videos, quizzes, and exercises tailored to each student’s needs.

2. Smart Assessment System

AI enables automated grading, plagiarism detection, and continuous performance evaluation.

Example

Universities use tools such as:

a. Turnitin
b. Grammarly AI
c. ChatGPT-assisted academic support systems

3. Research & innovation

Traditionally, research processes required significant time for data collection, analysis, interpretation, and experimentation. AI simplifies these processes by [5] [6] using machine learning, deep learning, natural language processing (NLP), and predictive analytics to generate faster and more accurate outcomes.

a. AI in data analysis

b. Predictive modelling & forecasting

c. Interdisciplinary Research

d. Automation of research process

e. AI in Innovation & Entrepreneurship

f. AI – assisted research collaboration

Importance for Viksit Bharat (AI- Assistance)

AI-driven research and innovation are essential for transforming India into a global knowledge economy by 2047. The incorporation of AI in the higher education may:

- Strengthen scientific research capacity
- Promote technological self-reliance
- Enhance global competitiveness
- Encourage innovation-led economic growth
- Generate employment opportunities in emerging technologies
- Startup incubation
- Product development
- Prototype design
- Technology transfer
- Patent analytics
- Literature reviews
- Citation management
- Data cleaning
- Survey analysis
- Language translation
- Precision agriculture
- Smart healthcare systems
- Renewable energy optimization
- Disaster management systems
- Computer Science
- Medicine
- Engineering
- Social Sciences
- Environmental Studies
- Economics
- Big data analytics
- Statistical modelling
- Automated data visualization
- Pattern recognition

The National Education Policy (NEP) 2020 also highlights research, innovation, as well as multidisciplinary learning as foundational pillars for national development.

The India AI Mission is a landmark creativity launched by the Government of India to position the country as a global leader in the field of Artificial Intelligence (AI) while supporting national growth across sectors such as education, healthcare, agriculture, governance, and industry [6][7]. In the ground of education, the mission seeks to transmute India's education system by integrating AI technologies in alignment with the vision and objectives of the National Education Policy (NEP) 2020.

One of the primaries aims of the India AI Mission is to introduce an adaptive learning system. AI-powered educational platforms can analyse students' learning patterns, strengths, and weaknesses to deliver customized learning practices. This supports students learn at their own pace and advances academic performance. Such intelligent systems also support continuous assessment and provide instant feedback, making learning more interactive and efficient.

The initiative emphasizes enhancing digital infrastructure and improving AI literacy within educational organizations. With programs like DIKSHA, SWAYAM, PM eVIDYA, and AI-driven curricula launched by CBSE and NCERT, both students and educators are gaining exposure to digital tools, coding, machine learning, and computational thinking. These programs align with NEP 2020's goal of fostering skill-oriented and technology-focused education

Another important aspect of the India AI Mission is empowering teachers. AI tools can provide assistance to teachers in lesson planning, grading, classroom management, and student performance analysis. This cuts administrative workload and allows educators to focus more on mentoring and creative teaching methods. Teacher training programs are also being developed to improve AI awareness and digital competency among educators [7][8].

In higher education, the mission encourages research, innovation, and interdisciplinary learning in AI and emerging technologies. Universities and institutions are being encouraged to establish AI labs, innovation hubs, and industry collaborations to foster research and entrepreneurship. This aligns with NEP 2020's prominence on multidisciplinary education and future-ready skills.

Although AI has capability to transform the education, its execution faces challenges such as the digital divide, insufficient infrastructure, data secrecy issues, and the necessity for tutor training. Consequently, the effectiveness of the India AI Mission relies [9] on efficient policy execution, funding for digital infrastructure, responsible AI governance, and partnerships among the government, educational bodies, and the private sector.

In summary, the India AI Mission signifies a significant advancement in updating India's educational framework. The mission seeks to merge AI with the objectives of NEP 2020 to establish a technologically sophisticated, inclusive, and globally competitive educational environment that prepares students with the knowledge and skills needed for the future.

Integrating foundational AI knowledge, ethical responsibility, and sectoral application are the primary focuses of a strategic AI Literacy Framework for Higher Education (HE) geared toward Viksit Bharat 2047.

Seven Pillars of the India AI Mission

The India AI Mission is a inclusive initiative introduced by the Government of India for accelerating the development and adoption of Artificial Intelligence (AI) across the country. The mission is structured around seven key pillars that aim to build a strong AI ecosystem while ensuring innovation, ethical governance, inclusivity, and sustainable growth. These pillars support India's vision of becoming a global leader in AI and align with national significances like Digital India and the National Education Policy (NEP) 2020[9][10].

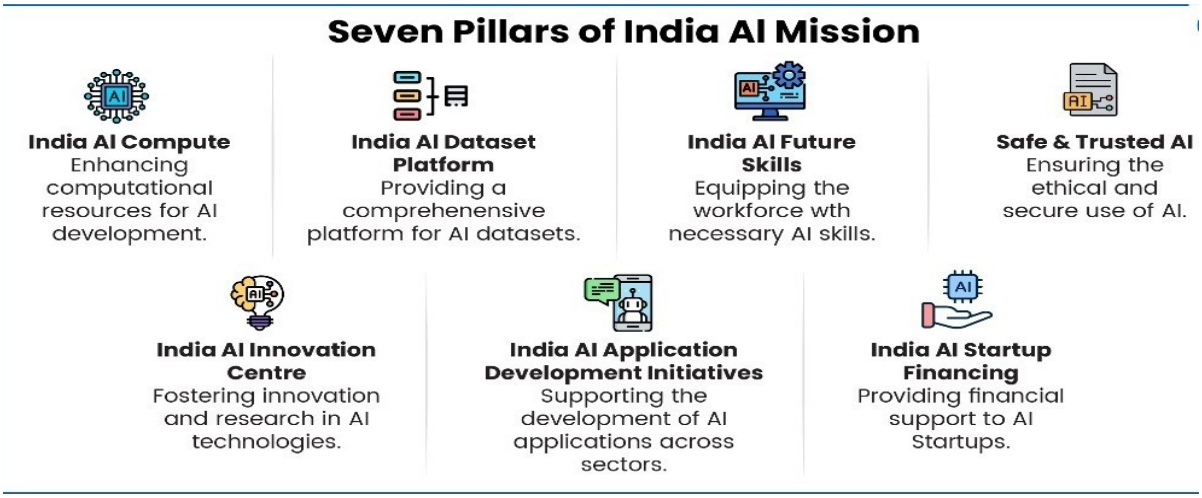


Figure-2

AI Infrastructure

The initial pillar emphasizes creating a strong AI infrastructure to facilitate research, innovation, and extensive AI implementation. This encompasses high-performance computing systems, cloud services, data hubs, and cutting-edge semiconductor technologies. The government intends to offer cost-effective access to computing resources for startups, educational organizations, researchers, and businesses. Robust digital infrastructure is crucial for developing [11] AI models, handling extensive datasets, and facilitating AI-powered applications in education, healthcare, agriculture, and government.

In education, AI infrastructure supports smart classrooms, virtual labs, adaptive learning platforms, and digital learning ecosystems that improve accessibility and learning outcomes.

Data Governance and Data Quality

AI systems depend heavily on quality data for accurate and reliable outcomes. This pillar emphasizes the creation of secure, transparent, and well-regulated data governance frameworks. The mission encourages the development of high-quality datasets while ensuring data privacy, cybersecurity, and ethical data usage.

India AI promotes responsible data-sharing mechanisms and the establishment of standardized datasets for sectors such as education, healthcare, and agriculture. In education, proper data governance helps institutions use student performance[12] data responsibly for personalized learning and academic analytics while protecting learners' privacy.

Research and Innovation

The research pillar aims to strengthen India's AI research ecosystem by supporting innovation, scientific development, and technological advancement. The mission encourages collaboration between universities, research institutions, startups, and industries to develop indigenous AI solutions.

Research grants, AI laboratories, innovation hubs, and Centers of Excellence are being promoted to encourage advanced studies in machine learning, robotics, natural language processing, and generative AI. This pillar also supports interdisciplinary research [13] that combines AI with social sciences, healthcare, education, and environmental studies.

In alignment with NEP 2020, the focus on research helps educational institutions become centers of innovation and creativity.

AI Skilling and Education

This pillar focuses on developing AI-related skills among students, teachers, professionals, and the general workforce. The India AI Mission promotes AI literacy, coding, computational thinking, and digital skills at school and higher education levels[14].

Programs such as AI curricula in schools, online certification courses, faculty training, and vocational education aim to prepare learners for future job markets shaped by automation and intelligent technologies. The mission also supports reskilling and upskilling initiatives for workers adapting to AI-driven industries.

This pillar directly supports NEP 2020's vision of skill-based, multidisciplinary, and technology-oriented education.

Public-Private Partnerships and Collaboration

The India AI Mission recognizes that collaboration between government, academia, industries, startups, and international organizations is essential for AI development. This pillar promotes partnerships that facilitate research funding, technology transfer, innovation, and industry integration.

Private companies contribute expertise, infrastructure, and investment, while academic institutions provide research and talent development. Collaborative initiatives help accelerate AI adoption in public services and education systems [15].

Such partnerships also create opportunities for internships, industry-oriented training, and entrepreneurial development for students.

Responsible and Ethical AI

Ethical AI development is a critical pillar of the India AI Mission. The government aims to certify that AI technologies are transparent, fair, liable, and free from favouritism. Ethical guidelines are being developed to address problems such as privacy, discrimination, algorithmic bias, cybersecurity, and misuse of AI systems.

Responsible AI is especially important in education, where AI systems process student data and influence learning decisions. Ethical frameworks help ensure that AI supports human values, inclusivity, as well as equal opportunities for all learners.

The mission promotes "AI for All," ensuring that technological advancement benefits society without causing social inequality or ethical harm.

Inclusion and Social Empowerment

The final pillar focuses on ensuring that AI benefits every section of society, including rural communities, economically weaker groups, women, and persons with disabilities. The mission seeks to bridge the digital divide by improving internet connectivity, digital access, and multilingual AI tools.

Inclusive AI applications in education can support students from diverse linguistic and socio-economic backgrounds through translation tools, speech recognition systems, and accessible learning platforms. The mission also promotes AI [15][16] solutions that improve livelihoods, public services, and social welfare.

This pillar aligns strongly with NEP 2020's goal of equitable and inclusive education for all citizens.

Impact of Education in a Study on the Seven Pillars of the India Artificial Intelligence Mission

The Seven Pillars of the India's AI Mission have a substantial effect on the Indian education system by promoting technological advancement, improving learning quality, strengthening research capabilities, and preparing students for future digital economies. These pillars collectively support the goals of the National Education Policy (NEP) 2020, which underlines innovation, digital learning, skill development, and inclusive education.[17] The impact of these pillars on education can be understood through various dimensions.

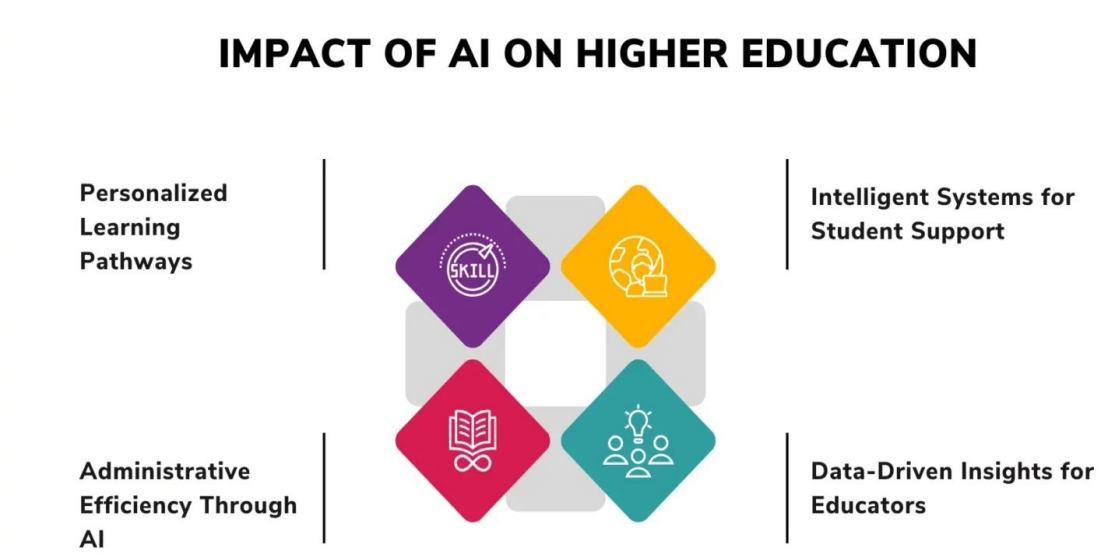


Figure-3

Impact of AI Infrastructure on Education

The AI infrastructure pillar improves the digital foundation of educational institutions by providing access to high-performance computing systems, cloud platforms, digital classrooms, and AI-enabled learning tools[14][18].

Educational Impact

- Supports smart classrooms and virtual laboratories
- Enables online and hybrid learning models
- Enhances access to digital educational resources
- Promotes technology-based teaching methods
- Improves connectivity between rural and urban educational institutions

Strong infrastructure allows schools and universities to adopt AI-powered platforms for teaching, assessment, and administration.

Impact of Data Governance on Education

Data governance ensures the safe, ethical, and effective use of educational data collected through AI systems.

Educational Impact

- Protects student privacy and academic records
- Enables data-driven learning analytics
- Helps identify student learning gaps
- Improves institutional decision-making
- Supports personalized learning systems

Responsible data management builds trust in AI technologies and ensures ethical educational practices.

Impact of Research and Innovation on Education

The research pillar encourages universities and educational institutions to engage in AI-based innovation and interdisciplinary research.

Educational Impact

- Strengthens research ecosystems in higher education
- Encourages scientific and technological innovation

- Promotes collaboration between academia and industry
- Supports development of indigenous AI solutions
- Enhances problem-solving and critical intellectual skills in students

AI research centers and innovation hubs create opportunities for advanced learning and entrepreneurship.

Impact of AI Skilling and Education

This pillar directly influences curriculum development and skill-based education [19].

Educational Impact

- Introduces AI literacy and digital skills in schools
- Encourages coding, machine learning, and computational thinking
- Improves employability and career readiness
- Supports vocational and multidisciplinary education
- Prepares students for AI-driven industries

Teachers and students gain exposure to emerging technologies, making education more future-oriented.

Impact of Public-Private Partnerships on Education

Collaboration amongst government, industries, and academic institutions enhances educational opportunities and technological growth.

Educational Impact

- Provides access to advanced technologies and funding
- Creates internship and training opportunities
- Encourages industry-oriented curriculum design
- Promotes startup culture and innovation
- Improves quality of technical education

Partnerships help to fulfil the gap among academic learning and industry necessities.

Impact of Responsible and Ethical AI on Education

Ethical AI ensures that educational technologies are fair, transparent, and inclusive.

Educational Impact

- Promotes safe and unbiased AI systems
- Protects learners from misuse of data
- Encourages responsible digital citizenship
- Ensures equal educational opportunities
- Builds awareness about AI ethics among students

Impact of Inclusion and Social Empowerment on Education

The inclusion pillar focuses on ensuring equal access to education through AI technologies.

Educational Impact

- Reduces the digital divide between rural and urban areas
- Supports multilingual learning platforms
- Assists students with disabilities through assistive technologies
- Expands access to quality education for marginalized communities
- Promotes equitable and inclusive learning environments

AI-powered educational tools make learning more accessible [20] to diverse groups of learners.

Overall Impact on Education

The Seven Pillars of the India AI Mission collectively transform education by:

- Enhancing personalized and adaptive learning
- Improving digital literacy and technological skills
- Strengthening research and innovation ecosystems
- Increasing accessibility and inclusion
- Supporting teacher effectiveness and institutional efficiency
- Preparing students for future employment opportunities
- Promoting ethical and responsible technology use

These reforms contribute to the creation of a modern, technology-driven, and globally competitive education system aligned with NEP 2020.

Challenges of the Study on the Seven Pillars of the India Artificial Intelligence Mission

The implementation of the Seven Pillars of the India AI Mission in the education sector presents several opportunities, but it also faces important challenges. These challenges affect the successful incorporation of Artificial Intelligence (AI) into schools, colleges, and universities across India. Major concerns include the digital divide, shortage of trained educators [19][21], ethical issues, infrastructure limitations, and data privacy risks. Addressing these challenges is important to achieve the objectives of the India's AI Mission and the National Education Policy (NEP) 2020.



Figure-4

Digital Divide

One of the major challenges in instigating AI in education is the digital gap between urban and rural areas.

Issues Related to the Digital Divide

- Lack of internet connectivity in rural regions
- Limited access to computers, smartphones, and digital devices
- Poor electricity supply in remote areas
- Economic inequality affecting access to technology

Numerous students and educational institutions in rural and economically weaker regions do not have the infrastructure needed to use AI-powered learning tools. This creates unequal educational opportunities and limits the reach of digital education initiatives [22].

Impact on Education

- Unequal access to AI-based learning platforms
- Reduced participation in online education
- Increased educational inequality
- Difficulty implementing smart classrooms and virtual learning systems

Bridging the digital divide requires investment in broadband connectivity, affordable devices, and digital infrastructure.

Lack of Trained Educators

AI integration in education requires teachers and educators to possess digital skills and AI literacy. However, many teachers are not adequately trained to use AI [23] technologies effectively.

Challenges Faced by Educators

- Limited knowledge of AI tools and applications
- Lack of technical training programs
- Resistance to adopting new technologies
- Insufficient professional development opportunities

Many educators still rely on traditional training approaches [24] and may find it tough to integrate AI-driven systems into classrooms.

Impact on Education

- Ineffective use of AI technologies
- Reduced quality of AI-assisted teaching
- Difficulty in guiding students in AI-related subjects
- Slow adoption of digital learning models

Teacher training and capacity-building programs are essential for successful AI implementation.

Ethical and Privacy Concerns

AI systems assemble and process large amounts of student and institutional data. This increases important ethical and privacy-related issues.

Ethical Challenges

- Data privacy and security risks
- Unauthorized use of student information
- Algorithmic bias and discrimination
- Lack of transparency in AI decision-making
- Overdependence on technology

AI algorithms may unintentionally favor certain groups of students or create biased learning outcomes if data is not managed properly.

Impact on Education

- Threats to student confidentiality
- Reduced trust in AI systems
- Risk of unfair assessment and evaluation
- Ethical misuse of educational data

Strong ethical frameworks, cybersecurity measures, and responsible AI policies are needed to address these concerns.

Infrastructure and Financial Constraints

AI technologies require advanced infrastructure and significant financial investment.

Infrastructure Challenges

- High cost of AI software and hardware
- Lack of smart classrooms and laboratories
- Inadequate computing facilities
- Limited access to cloud-based services

Educational institutions, especially government schools and rural colleges, may struggle to afford AI infrastructure.

Impact on Education

- Uneven AI adoption across institutions
- Limited research and innovation opportunities
- Slow digital transformation in education

Public-private partnerships and government funding can help overcome these barriers.

Language and Inclusivity Barriers

India is a multilingual country with diverse educational needs. Many AI tools are primarily designed in English and may not support regional languages effectively.

Challenges

- Limited multilingual AI educational content
- Difficulty for students learning in regional languages
- Accessibility issues for differently-abled learners

Impact on Education

- Reduced inclusiveness in AI-driven education
- Barriers to learning for marginalized groups
- Limited participation from non-English-speaking students

Developing multilingual and inclusive AI systems is necessary to ensure equitable education.

Resistance to Technological Change

Some educational institutions and educators may resist AI adoption due to fear of job displacement or uncertainty about technology.

Concerns

- Fear of replacement of teachers by AI
- Lack of confidence in digital learning systems
- Preference for traditional classroom methods

Impact on Education

- Slow implementation of AI initiatives
- Reduced innovation in teaching practices
- Hesitation in adopting new educational technologies

Awareness programs and balanced AI integration can help address these concerns[28][30]

Research and Policy Limitations

AI in education is still developing, and many institutions lack clear policies and research frameworks for implementation.

Challenges

- Limited AI research in educational contexts
- Absence of standardized AI policies
- Insufficient coordination among institutions and industries

Impact on Education

- Inconsistent implementation strategies
- Limited innovation and experimentation
- Lack of long-term sustainability

Policy support and interdisciplinary research are necessary for effective AI integration.

Comparative Impact of AI in Indian Higher Education (2025-2026) [22]]25]

Feature	Pre-AI / Traditional Approach	AI-Enabled Approach (Impact)
Learning Path	One-size-fits-all curriculum	Personalized learning paths adapting to student pace & preferences
Faculty Role	Traditional teaching & manual grading	AI-assisted teaching, 40%+ productivity boost in marking/analysis
Student Support	Scheduled office hours/limited support	24/7 AI-powered chatbots/tutors for immediate help
Admissions	Manual, time-consuming processes	Predictive analytics to speed up screening and identify "at-risk" students
Language Barrier	English/Hindi predominantly	Multilingual AI tools breaking gaps, fostering regional language education
Institutional Gap	Limited to elite institutions	Emerging democratization, but a persistent divide remains

Table-1

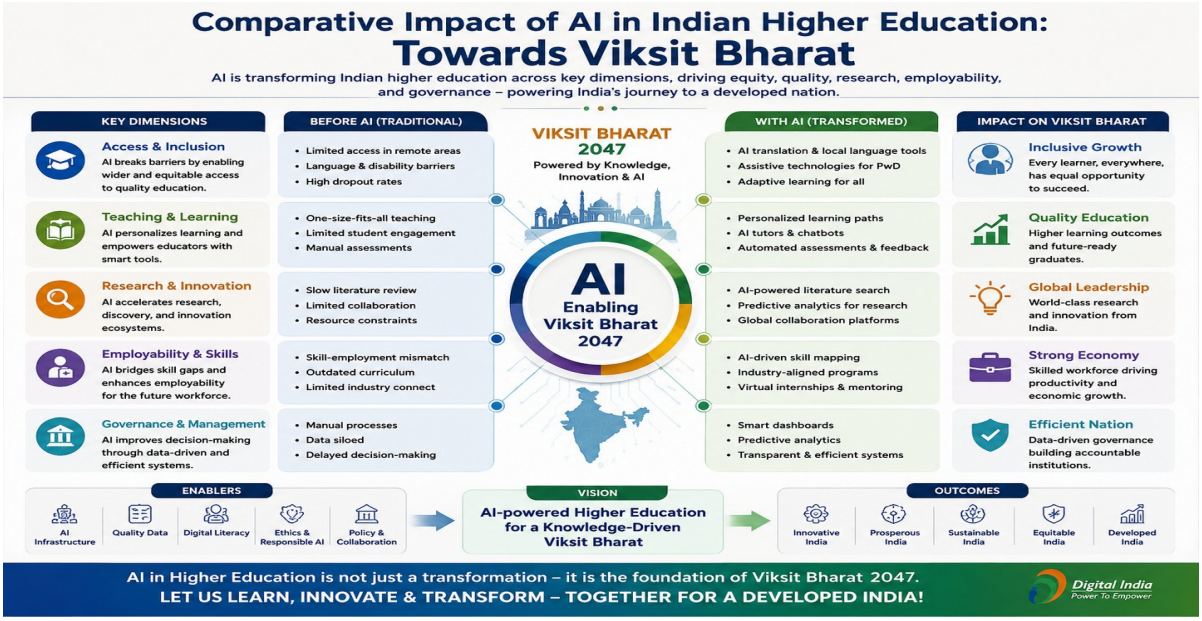


Figure-5

Future Scope

AI-Driven Personalized Learning

AI-driven personalized learning is expected to become one of the strongest pillars of future Indian education reforms. Future studies may explore how AI technologies can customize education according to learners' cognitive abilities, interests, socio-economic backgrounds, and career [26][27] aspirations.

Future Research Areas

- Development of adaptive learning platforms using AI and machine learning.
- Integration of Generative AI tutors for multilingual Indian classrooms.
- AI-based assessment systems for:
- real-time feedback,
- predictive analytics,
- student performance tracking.
- Personalized curriculum pathways for:
- rural learners,
- differently-abled students,
- vocational learners,
- gifted students.
- Use of AI for emotional and behavioural learning analytics.
- AI-enabled smart classrooms under Digital India and PM eVIDYA initiatives.
- Research on reducing dropout rates through predictive intervention systems.
- AI-supported competency-based learning aligned with NEP 2020.

Expected Educational Impact

- Increased learner engagement.
- Reduction in learning inequality.
- Enhanced academic outcomes.
- Greater inclusion in rural and tribal education systems.
- Promotion of multilingual and culturally contextual education.

Long-Term Vision for Viksit Bharat

India can emerge as a global leader in AI-powered education systems by:

- creating scalable EdTech ecosystems,
- democratizing quality education,
- enabling personalized lifelong learning opportunities.

Future Scope in National AI Curriculum Standards

Another major future direction is the creation of standardized national AI curriculum frameworks across school, higher education, teacher education, and vocational sectors[28][29].

Potential Areas of Future Study

- Designing AI literacy frameworks from primary to higher education.
- Development of:
- coding literacy,
- computational thinking,
- ethical AI understanding,
- responsible AI practices.

Integration of AI modules into:

CBSE,

- State Boards,

NCERT,

- UGC,
- AICTE curricula.

Conclusion

A study of the Influence on Education of the 7- Pillars India Artificial Intelligence Initiative: Towards a Viksit Bharat.

The future scope of this study is vast and multidimensional. The 7-Pillars India AI Mission has the potential to develop Indian education system through:

- AI-driven personalized learning,
- standardized AI curriculum frameworks,
- and lifelong learning ecosystems.

These transformations can significantly contribute toward achieving the goals of Viksit Bharat 2047 by developing:

- globally competent citizens,
- digitally skilled human resources,
- inclusive educational systems,
- and innovation-led economic growth.

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Online Price Advantage and Its Impact on Traditional Retail Stores: Evidence from Ranchi District

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Abstract

The rapid growth of e-commerce has heightened price-based competition between online and traditional retail channels, particularly in the electronics sector. This study investigates the influence of online price advantage on conventional retail stores in Ranchi District, Jharkhand. The analysis is based on primary data collected from 228 consumers and 104 retailers using structured questionnaires.

The results indicate that pricing is a critical factor influencing consumer buying behaviour. A substantial proportion of consumers actively compare prices not only between online and offline channels but also across different e-commerce platforms prior to making a purchase. Online platforms are often preferred due to competitive pricing, discounts, and promotional offers, which increase the perceived value for consumers. This trend has led to a significant shift towards online purchasing, especially for electronic goods.

From the retailers' viewpoint, many respondents reported a decline in both sales and profitability, largely attributed to aggressive online pricing strategies. The increasing tendency of consumers to compare prices and the transparency of online pricing have further intensified competition, placing traditional retailers at a disadvantage.

The study concludes that online price advantage is a major factor driving changes in consumer preferences and has a significant impact on the performance of traditional retail stores. It emphasises the importance for retailers to adopt competitive pricing, improve customer experience, and integrate digital strategies to sustain their position in a highly competitive retail environment.

Keywords: E-Tailing, Competitive Pricing, Online Price Advantage, Consumer Preferences, Consumer Buying Behaviour

Introduction

India's retail sector has undergone a significant transformation driven by the rapid growth of e-commerce and digital technologies. Increased internet penetration, smartphone usage, digital payments and online marketplaces have all reshaped consumer purchasing habits. Online retailers like Amazon and Flipkart offer lower prices, discounts, cash-back and convenience, making it easier for consumers to find products.

The electronics sector is particularly vulnerable to price competition. Consumers often compare prices before buying, so online price transparency has intensified competition between online and offline stores. This means consumers can now compare prices not just between online and traditional shops but also across various e-commerce platforms.

Traditional retail stores are struggling. Sales are declining, profits are dropping and footfall is dwindling. The rise of online retail, especially after the COVID-19 pandemic, has accelerated the shift towards online shopping.

While many studies have looked at e-commerce growth nationally, few have examined it at the district level, combining both consumer and retailer perspectives. This study aims to analyse how online price advantages affect traditional retail stores in Ranchi District.

Problem Statement

Traditional retail stores are under intense pressure from online platforms offering lower prices discounts and promotional deals. Consumers, particularly for electronics, now compare prices online before buying. This increased price transparency and online competition are impacting offline retailers' sales and profits.

This study aims to analyse how online pricing strategies influence consumer behaviour and affect traditional retail stores in Ranchi District.

Review of Literature

Existing studies indicate that price competitiveness is a major factor influencing online shopping behaviour. The Reserve Bank of India (RBI, 2022) highlighted the expansion of digital payment infrastructure in India, which has supported the growth of e-commerce and digital transactions.

To understand the challenges faced by traditional retail stores in India, it is important to consider the broader digital transformation occurring in the retail sector. Nayak (2018) noted that the rapid expansion of e-commerce platforms has significantly altered consumer purchasing behaviour, resulting in reduced customer footfall and declining profit margins for many brick-and-mortar retailers. One of the major reasons for this shift is the price advantage enjoyed by online platforms, which are able to offer products at lower prices due to reduced operational costs and frequent promotional discounts. Existing studies, supported by models such as the Technology Acceptance Model (TAM), suggest that consumers are strongly influenced by the perceived economic benefits of online shopping. While previous research has largely focused on national-level trends and the growing preference for digital marketplaces, limited attention has been given to understanding how these developments affect local retail markets. Therefore, the present study seeks to bridge this gap by examining the specific impact of online price advantage on traditional retail stores in Ranchi District, a representative Tier-II market, using empirical evidence collected from local retailers and consumers.

In their study published in the *Journal of Retailing*, Hult et al. (2019) demonstrate that the drivers of customer satisfaction and loyalty differ significantly between online and offline channels. By analysing the American Customer Satisfaction Index (ACSI) framework, the authors find that perceived value (the price-to-quality ratio) is a significantly stronger driver of satisfaction in online purchases, directly reinforcing the concept of an "online price advantage." Conversely, offline brick-and-mortar satisfaction relies much more heavily on the overall quality of the physical purchase experience and pre-purchase expectations.
In Perlman (2022), a game-theoretic two-dimensional utility model is established to examine the pricing competition between an online retailer (offering digital convenience) and a traditional brick-and-mortar store (offering physical shopping helpfulness/experience).

The India Brand Equity Foundation (IBEF, 2023) reported significant growth in India's retail and digital economy due to increasing internet penetration, smartphone usage, and urbanisation. The report also emphasised that online retail platforms are transforming traditional market structures.

In a foundational study on digital retail migration, Pathak (2025) examines the shifting paradigms of consumer behaviour within a hybrid retail environment. The author highlights that the proliferation of e-commerce platforms (e.g., Amazon, Flipkart) has fundamentally disrupted traditional brick-and-mortar setups by offering a distinct online price advantage, extensive product assortments, and unparalleled logistical convenience. However, the study notes that traditional retail maintains resilience through non-price value propositions that digital channels cannot easily replicate. These include:

- Sensory gratification (the ability to touch and feel products),
- Immediate risk mitigation through instant fulfilment, and
- Localised trust established via face-to-face customer service.

Debopriyo Nandy (2025) observed that the pandemic period was a turning point for digital transactions in India. UPI usage surged as people and businesses embraced contactless payments. The data clearly shows a sharp rise in transaction volumes both during and after the pandemic. Increase in digital payments is closely linked to increase in online shopping.

Previous studies also identify trust, convenience, and price transparency as major determinants of online purchasing behaviour. However, limited district-level studies combine both consumer and retailer perspectives. The present study addresses this gap by providing micro-level evidence from Ranchi District.

Importance of the Study

The study is important for the underlying reasons :

- Provides micro-level evidence from Ranchi District
- Analyses both consumer and retailer perspectives
- Examines price comparison behaviour
- Helps understand the impact of online price competition
- Offers policy and business implications for traditional retailers

Objectives of the Study

- To analyse the effect of online pricing on consumers
- To study price comparison behaviour among consumers
- To examine the impact on traditional retailers
- To assess decline in footfall, sales, and profitability
- To analyse whether the impact is temporary or long-term

Hypothesis

The Combined Hypothesis is taken as follows :

H_0 (Null Hypothesis):

The proportion of respondents perceiving significant impact of online price advantage on traditional retail stores is not greater than 50%.

H_1 (Alternative Hypothesis):

The proportion of respondents perceiving significant impact of online price advantage on traditional retail stores is greater than 50%.

Research Methodology

The study is descriptive and analytical in nature. The study uses a subset of primary data collected during the author's doctoral research titled "The Impact of Online Retailing (E-Tailing) on Traditional Retail Stores – A Case Study of Electronic Goods in Ranchi District (Jharkhand)". The data have been re-analysed to examine the impact of online price advantage, representing a distinct research objective.

Primary data collection	Personal interviews and direct field survey (offline) of retailers across all 18 blocks of Ranchi District; Google Forms (online) responses from retailers and consumers.
Sample size	332 respondents: 228 consumers and 104 traditional-store retailers (including 69 electronics retailers).
Survey period	27 June 2023 – 2 September 2023.
Data-collection tools	Structured questionnaires; responses analysed using descriptive statistics, tables and graphs.
Statistical techniques	Stratified purposive sampling was used to ensure representation from urban and semi-urban areas of Ranchi District; Z one-tailed test for hypothesis testing (Z-test for proportions: one proportion to a known value); percentage analysis; comparative analysis.

Electronic Goods were chosen because they are price sensitive high value items. This makes them a suitable category for analysing online price advantage.

The author used AI-based tools like ChatGPT for refining language and structuring the manuscript. However, the analysis interpretation and conclusions are entirely based on the author's original research data and remain the sole responsibility of the author.

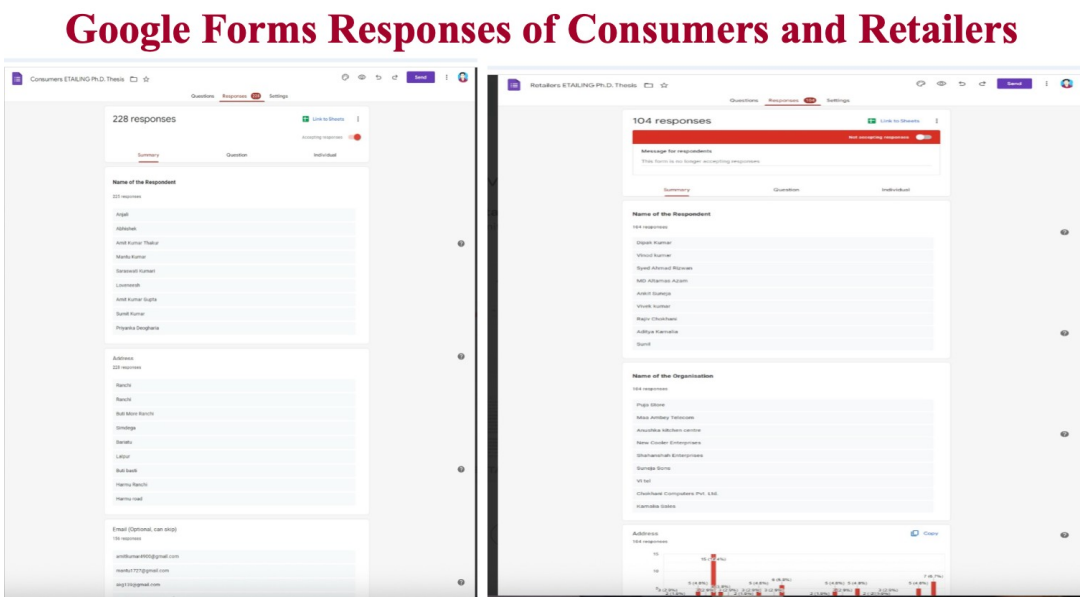


Figure 1. Picture showing the collected Responses of Consumers and Retailers

Primary data was gathered through field surveys and personal interviews with retailers across all 18 blocks of the Ranchi District in Jharkhand State.

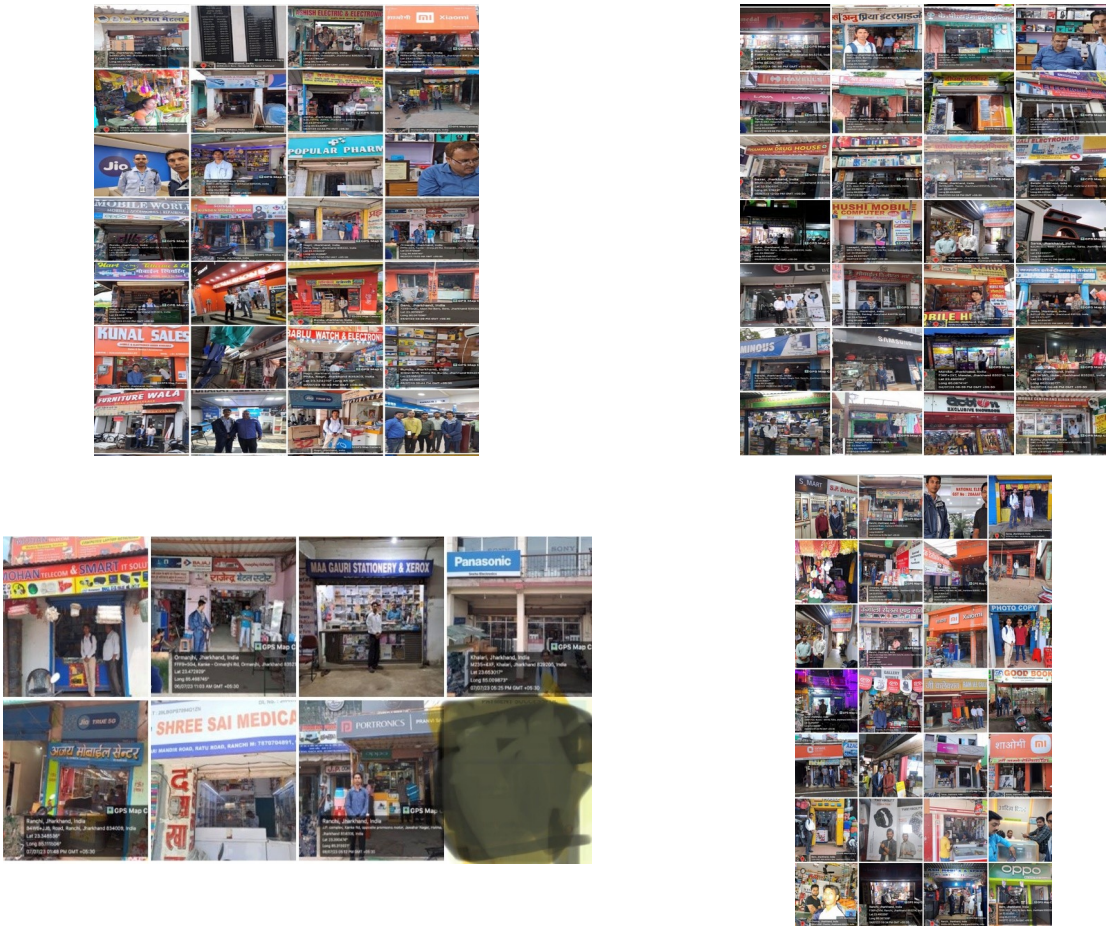


Figure 2. Pictures illustrating Researcher conducting Field Survey and Data Collection Activities in all the 18 Blocks of the Ranchi District of Jharkhand State

Data Analysis and Findings

Consumer Findings

The findings indicate a significant increase in online purchasing behaviour post COVID-19. Approximately 68.4% of consumers reported increased online shopping activities. Consumers showed high to very high satisfaction and trust in online shopping services.

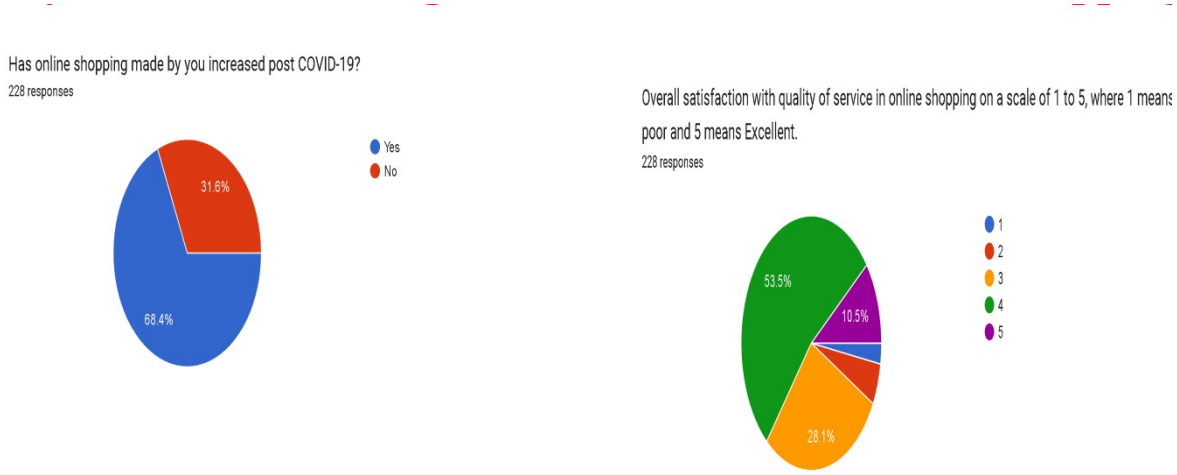


Figure 3. Rapid Increase in Online Shopping Post COVID-19 and High to Very High Level of Overall Satisfaction with Quality of Service in Online Shopping

Wide range of product/services and easy availability of the same, Reviews given by existing customers and Popularity, Lower prices, Convenience in buying, Comprehensive Information, and Quality significantly influenced online purchasing decisions.

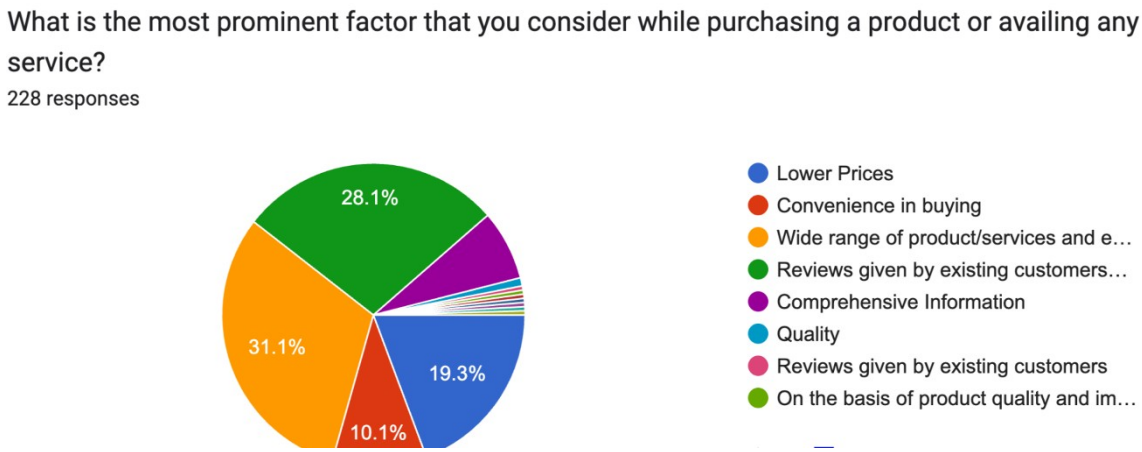


Figure 4. Lower Prices is one of the most Prominent Factor that influences consumer purchasing behaviour

Price is the most important factor influencing online purchasing of Electronic Goods.

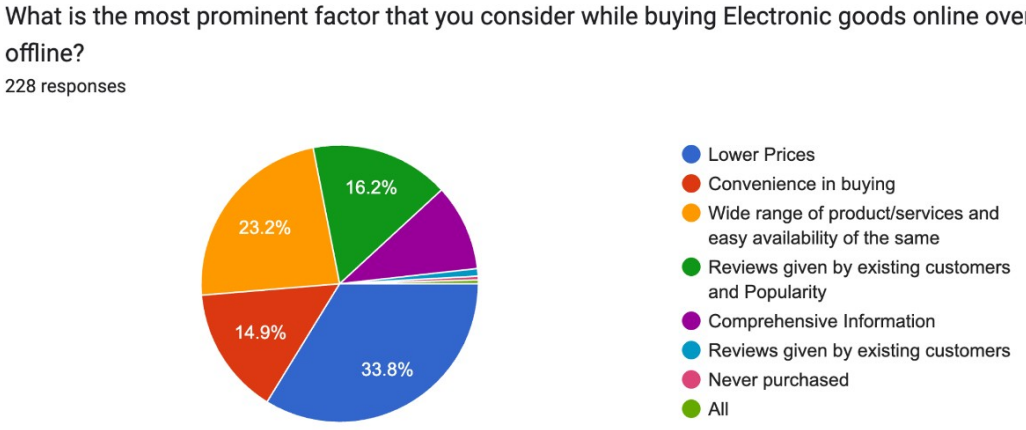


Figure 5. Price is the most prominent factor in the purchase of Electronic Goods

Response category	Share	Relative share
Online retail affects traditional stores — yes	85.5%	
Online retail affects traditional stores — no	14.5%	
Online retail affects electronics stores — yes	80.7%	
Online retail affects electronics stores — no	19.3%	

Figure 6. Consumers' High Belief on the Impact of Online Retailing on Offline Retail Stores and the same is true for Offline Electronic Goods Stores

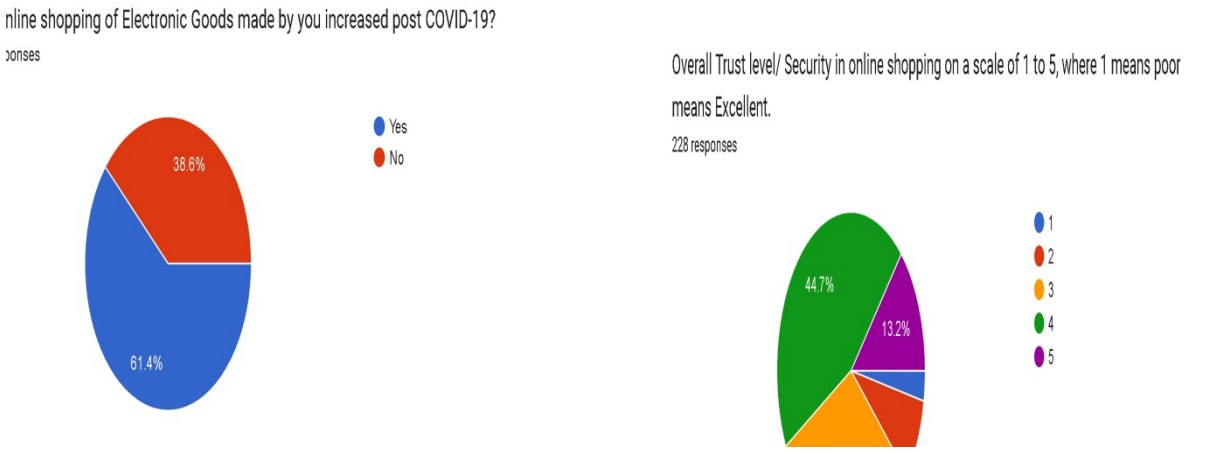


Figure 7. Significant increase in Online Shopping of Electronic Goods Post Covid-19 and High Overall Trust Level/Security in Online Shopping

Consumers frequently compare prices :

- between online and offline channels,
- and across different websites.

Response category	Share	Relative share
Always	44.7%	
Sometimes	53.1%	
Never	2.2%	

Figure 8. Frequent Comparison of Prices between online and offline channels

Response category	Share	Relative share
Always	50.9%	
Sometimes	41.2%	
Never	7.9%	

Figure 9. Frequent Comparison of Prices across different websites

So, the Conceptual Framework can be shown as :

Online price advantage

↓

Consumer price comparison

↓

Shift towards online purchasing

↓

Impact on traditional retail stores

Figure 10. Conceptual Flow

Retailer Findings

A significant proportion of retailers reported decline in sales, footfall and profitability due to online competition. Retailers strongly believed that customers increasingly prefer online platforms for electronic goods because of lower prices and discounts.

Most retailers also reported:

- decline in customer footfall,
- pressure to reduce prices,
- and inability to compete with online pricing strategies (Some Retailers said that few Retailers have closed their shops and some are also looking for other alternatives for livelihood).

Response category	Share	Relative share
Yes	99%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	1%	

Figure 11. 99% Retailers believe that Online Retailing impacts Offline Retail Stores

Response category	Share	Relative share
Very high	37.5%	▮▮▮▮▮▮▮▮▮
High	16.3%	▮▮▮▮
Moderate	30.8%	▮▮▮▮▮▮▮
Low	12.5%	▮▮▮
Nil	2.9%	▮

Figure 12. Retailers believe that Online Retailing has a High to Very High impact on Offline Retail Stores

Response category	Share	Relative share
Very high	37.5%	▮▮▮▮▮▮▮▮▮
High	12.5%	▮▮▮
Moderate	20.2%	▮▮▮▮▮
Low	17.3%	▮▮▮▮
Nil	12.5%	▮▮▮

Figure 13. Retailers believe that Online Retailing has a High to Very High impact on their own Offline Retail Stores

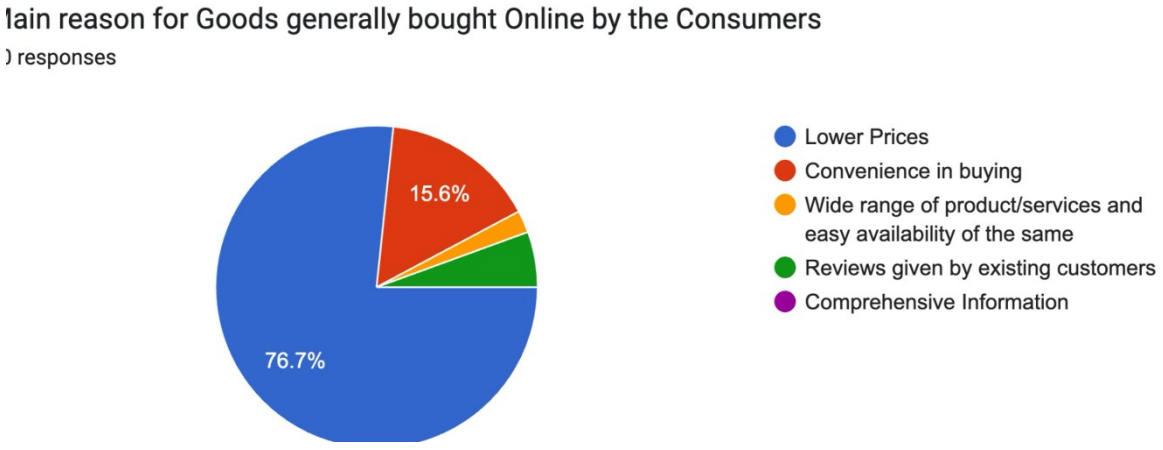


Figure 14. Retailers believe that Lower Prices is the most important factor of Online Purchases by the Consumers

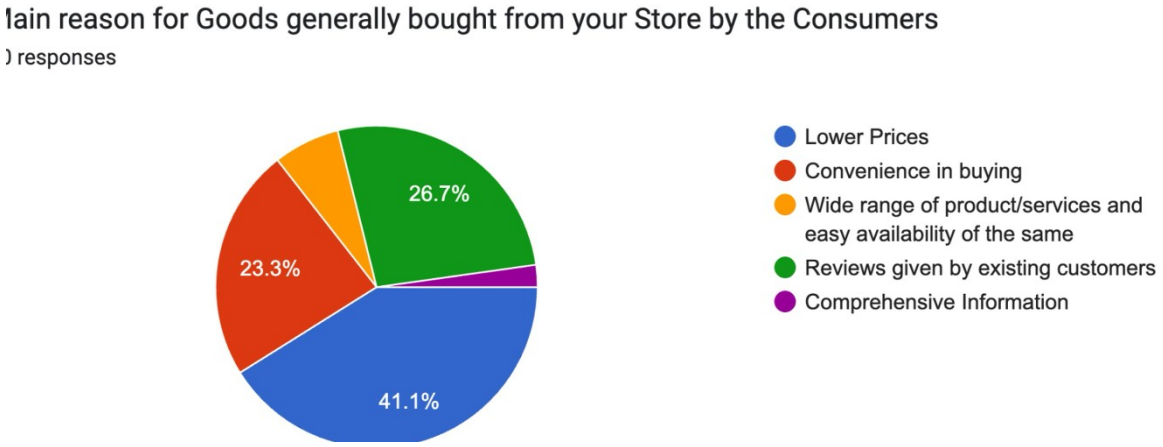


Figure 15. Retailers believe that Lower Prices is the most important factor of Purchases by the Consumers from their own stores



Figure 16. Retailers accepting the significant impact of COVID-19 on the Online Shopping

Response category	Share	Relative share
Yes	100%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	0%	—
Not sure	0%	—

Figure 17. 100% Retailers believe that Online Retailing of Electronic Goods (EGs) impacts the Offline Electronic Retail Stores

Response category	Share	Relative share
Very high	46.4%	▮▮▮▮▮▮▮▮▮▮▮
High	17.4%	▮▮▮▮
Moderate	24.6%	▮▮▮▮▮▮
Low	10.1%	▮▮
Nil	1.5%	

Figure 18. Retailers believe High to Very High Impact of Online Retailing of Electronic Goods on the Offline Electronic Retail Stores

Response category	Share	Relative share
Yes	82.6%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	11.6%	▮▮▮
Not sure	5.8%	▮

Figure 19. 82.6 % Retailers believe that Customers prefer Online for Electronic Goods

Response category	Share	Relative share

Yes	88.4%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	8.7%	▮▮
Not sure	2.9%	▮

Figure 20. 88.4 % Retailers believe that Major ECOs dominate in Electronic Goods

Response category	Share	Relative share
Very high	52.2%	▮▮▮▮▮▮▮▮▮▮▮▮
High	13%	▮▮▮
Moderate	20.3%	▮▮▮▮▮
Low	10.1%	▮▮
Nil	4.3%	▮

Figure 21. 52.2 % Retailers reported Very High Domination of Major ECOs in EGs

Response category	Share	Relative share
Yes	88.4%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	11.6%	▮▮▮

Figure 22. 88.4 % Retailers reported Decline in their Sales since the evolution of Online

Response category	Share	Relative share
1%–5%	10.3%	▮▮
5%–10%	16.2%	▮▮▮▮
10%–15%	8.8%	▮▮
Above 15%	52.9%	▮▮▮▮▮▮▮▮▮▮▮▮
Nil	11.8%	▮▮▮
Not applicable	0%	—

Figure 23. 52.9 % Retailers reported Above 15% Decline in their Sales due to the evolution of Online

Response category	Share	Relative share
Yes	91.2%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	8.8%	▮▮

Figure 24. 91.2 % EGs Retailers reported Decline in Footfall to Sales Ratio since the evolution of Online

Response category	Share	Relative share
1%–5%	8.8%	▮▮
5%–10%	11.8%	▮▮▮
10%–15%	10.3%	▮▮
Above 15%	60.3%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮
Nil	8.8%	▮▮

Figure 25. 60.3 % Retailers reported Above 15% Decline in their Footfall to Sales Ratio after evolution of Online

Response category	Share	Relative share
Yes	86.8%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	13.2%	▮▮▮

Figure 26. 86.8 % EGs Retailers believe Decline in Profitability since the evolution of Online

Response category	Share	Relative share
1%–5%	11.8%	▮▮▮
5%–10%	16.2%	▮▮▮▮
10%–15%	7.4%	▮▮
Above 15%	51.5%	▮▮▮▮▮▮▮▮▮▮▮▮

Nil	13.2%	▮▮▮
Not applicable	0%	—

Figure 27. 51.5 % EGs Retailers reported Above 15% Decline in Profitability after the evolution of Online

Response category	Share	Relative share
Yes	97.1%	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
No	2.9%	▮

Figure 28. 97.1 % EGs Retailers believe that Lower Prices is essential for remaining competitive with Online

Response category	Share	Relative share
1%–5%	26.5%	▮▮▮▮▮▮
5%–10%	27.9%	▮▮▮▮▮▮▮
10%–15%	22.1%	▮▮▮▮▮
Above 15%	20.6%	▮▮▮▮▮
Nil	2.9%	▮

Figure 29. 27.9 % EGs Retailers reported 5% - 10% Decline in Prices is essential for remaining competitive with Online

Response category	Share	Relative share
Lower prices	51.7%	▮▮▮▮▮▮▮▮▮▮▮
Convenience in buying	8.3%	▮▮
Wide range / easy availability	8.3%	▮▮
Reviews from existing customers	30%	▮▮▮▮▮▮▮
Comprehensive information	1.7%	

Figure 30. 51.7 % EGs Retailers believe that Lower Prices is the Most Prominent Factor for purchases from their own stores

Thus, the Key Findings can be summarised as :

Consumers' Behaviour

- Significant preference for online shopping post COVID-19
- High to very high level satisfaction & trust in online shopping services.
- Significant online shopping of Electronic Goods post COVID-19
- Frequent price comparison behaviour
- Lower price = key purchase factor (High price sensitivity)
- Shift towards online purchasing

Retailers' Behaviour

- Believe that Electronic Goods are supplied more online post COVID-19.
- Unanimous agreement on online impact in Electronic Goods retail.
- Decline in footfall, sales and profitability
- Strong impact of online pricing
- Difficulty competing with discounts
- Increased online consumer preference

Hypothesis Testing and Analysis

The following are Consumer and Retailer Specific Hypotheses :

a. Consumer-Specific Hypothesis

H_{01}: The proportion of consumers engaging in price comparison behaviour is not greater than 50%.

H_{11}: The proportion of consumers engaging in price comparison behaviour is greater than 50%.

b. Retailer-Specific Hypothesis

H_{02}: The proportion of retailers reporting sales decline due to online price advantage is not greater than 50%.

H_{12}: The proportion of retailers reporting sales decline due to online price advantage is greater than 50%.

The study employs a one-tailed Z-test for proportions to examine whether the proportion of respondents perceiving significant impact of online price advantage on traditional retail stores is greater than 50%. As the objective is to test for an increase, a right-tailed test is appropriate. In this method, a single sample proportion ($\hat{p}$) is compared against a known or hypothesised population proportion ($p_0 = 0.5$). The test statistic is computed using the standard error of proportion, and the calculated Z-value is compared with the critical value to determine statistical significance.

Hypothesis Testing Procedure :

Where:

- p= population proportion
- p_0= hypothesised proportion (benchmark = 0.5)

Test Statistic

Where:

- $\hat{p}$= sample proportion
- n= sample size
- $\sqrt{\frac{p_0(1-p_0)}{n}}$ = Standard Error (S.E.)

Decision Rule

- At 5% level of significance (α = 0.05)
  Critical value = 1.645 (right-tailed)
- At 1% level of significance (α = 0.01)
  Critical value = 2.33

Reject H_0 if:

Table 1. Hypothesis Testing Results at 5% and 1% Level of Significance for both Consumers (Price Comparison Behaviour) and Retailers (Sales Decline due to Online Pricing)

Measure	Consumers (price comparison)	Retailers (sales decline)
Sample size (n)	228	69
Positive responses (x)	223	61
Sample proportion ($\hat{p}$)	0.978	0.884
Hypothesised proportion (p_0)	0.50	0.50
Standard error (SE)	0.0331	0.0601
Calculated Z-value	14.44	6.39
Critical value at 5% (right-tailed)	1.645	1.645
Critical value at 1% (right-tailed)	2.33	2.33
Decision at 5%	Reject H_0	Reject H_0
Decision at 1%	Reject H_0	Reject H_0
Result	Significant	Significant

Interpretation :

The calculated Z-values for both consumers and retailers exceed the critical values at the 5% and 1% levels of significance. Therefore, the null hypothesis is rejected in both cases.

For Consumers, the findings indicate that the proportion of respondents engaging in online and offline price comparison is significantly greater than 50%, highlighting the strong influence of online price advantage on consumer purchasing behaviour.

Similarly, for Retailers, the results confirm that the proportion of retailers experiencing decline in sales due to online price competition is significantly greater than 50%. This demonstrates that online price advantage has a statistically significant impact on traditional retail stores.

Discussion

Online price advantages significantly influence consumer behaviour and intensify competition in the retail sector. Increased price transparency has made consumers more price-sensitive, prompting them to compare prices before buying. Online retailers benefit from economies of scale, lower operational costs and aggressive promotions, allowing them to offer lower prices than traditional retailers. This puts pressure on traditional retailers to struggle with sales, profitability and footfall. Furthermore the study suggests this impact is not temporary but a structural (permanent) shift in consumer purchasing habits.

Recommendations

- Traditional retailers should adopt competitive pricing strategies
- Improve customer service and shopping experience
- Integrate digital tools and online presence
- Focus on value-added services and after-sales support
- Government support and digital training for small retailers

Limitations of the Study

This study has the following limitations:

- Geographical Limitation
  - Study restricted to Ranchi District, mainly urban and semi-urban areas
  - Cannot represent the whole India
- Sample Size

Small sample of customers and retailers

- Limited Rural Representation

Findings largely based on urban and semi-urban respondents of Ranchi

- Confidentiality Issues

Respondents may have withheld actual financial data

Conclusion

The study concludes that the online price advantage significantly influences consumer purchasing behaviour and has a substantial impact on traditional retail. Consumers increasingly compare prices and favour online platforms for lower prices, discounts convenience and digital accessibility. This aggressive online competition is causing traditional retailers to experience declining sales, profitability and customer footfall. Electronics retail is particularly affected due to its price sensitivity and high value items.

The findings suggest this shift towards online retailing is a long-term structural change rather than a temporary trend. To remain sustainable in this evolving retail ecosystem traditional retailers must adopt digital integration competitive pricing and value-based strategies.

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Viksit Bharat 2047: Role of Innovation, Youth, Startups, Environment, and Rural Development in Achieving Sustainable Growth

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Abstract

India's aspiration to become a developed nation by 2047 requires more than high economic growth. It requires the simultaneous expansion of productive capabilities, social opportunities, environmental resilience, and regional inclusion. This paper analyses how innovation, youth participation, startups, environmental sustainability, and rural development can operate as mutually reinforcing pillars of Viksit Bharat 2047. The study uses qualitative descriptive analysis of secondary material, including policy documents, official statistical publications, institutional reports, and selected academic literature. The analysis suggests that innovation can raise productivity and improve public-service delivery; youth can supply human capital, entrepreneurship, and civic leadership; startups can diversify the economy and generate employment; environmental action can reduce the ecological costs of growth; and rural development can broaden the domestic market and reduce spatial inequality. At the same time, these contributions are conditional on the quality of implementation. Unequal digital access, skill mismatch, limited early-stage finance, regional concentration of entrepreneurship, climate risk, and weak local capacity may prevent broad-based gains. The paper proposes an integrated policy approach based on mission-oriented research, employability-linked education, responsible startup finance, green transition, and rural infrastructure. It concludes that Viksit Bharat 2047 should be evaluated not only by aggregate output but also by the distribution, resilience, and sustainability of development.

Keywords: Viksit Bharat 2047; innovation; youth empowerment; startups; environmental sustainability; rural development; inclusive growth.

Introduction

The vision of Viksit Bharat 2047 is linked to the centenary of India's independence. It represents an aspiration for a prosperous, capable, inclusive, technologically advanced, and environmentally responsible nation. NITI Aayog's discussions of the vision place economic competitiveness, social equity, sustainability, and institutional capacity within a broad national-development framework (NITI Aayog, 2025a). This makes the vision wider than a target for income or infrastructure alone.

India's development challenge is also a coordination challenge. Innovation without inclusion can widen inequality; startup growth without productive employment can remain concentrated in a few cities; industrial expansion without environmental safeguards can create long-term costs; and rural welfare without local enterprise may not generate durable livelihoods. The five themes examined in this paper are therefore treated as connected components of one development system.

The central argument is that sustainable growth will emerge when knowledge, talent, enterprise, environmental responsibility, and rural capabilities reinforce one another. The paper is conceptual and policy-oriented. It does not claim to estimate causal impacts from primary survey data.

Review of Literature

The innovation literature generally treats technological change, knowledge accumulation, and organisational learning as important sources of productivity and long-term growth. The capability perspective further suggests that countries benefit when they develop institutions that can absorb, adapt, and create technology rather than merely import it. In India, public digital infrastructure illustrates how interoperable platforms can reduce transaction costs and widen access to services when supported by effective governance (NITI Aayog, 2025b).

Research on human capital and the demographic dividend emphasises that a young population becomes an economic advantage only when people are healthy, educated, skilled, and productively employed. The International Labour Organization (2024) notes that employment quality, gender participation, and transitions from education to work are as

important as the size of the working-age population. Youth policy must therefore move beyond enrolment and focus on capabilities, work experience, innovation, and agency.

Entrepreneurship studies associate startups with experimentation, new products, competition, and employment. However, the startup ecosystem is not automatically inclusive. Access to finance, mentorship, markets, research facilities, and digital infrastructure is uneven across sectors and regions. Startup India has created an important institutional platform, but the quality and geographical distribution of enterprises remain central policy questions (Department for Promotion of Industry and Internal Trade, 2025).

The sustainable-development literature argues that economic activity must remain within ecological limits and protect the interests of future generations (United Nations, 2015). India's energy transition, resource efficiency, climate adaptation, and pollution control are therefore not separate environmental concerns; they affect productivity, public health, agriculture, and the cost of development. NITI Aayog's net-zero scenario work indicates that development and decarbonisation need to be planned together rather than treated as competing objectives (NITI Aayog, 2026).

Rural-development research highlights the importance of infrastructure, non-farm employment, agricultural productivity, human development, and institutional participation. Rural India is not a single homogeneous space: villages differ in connectivity, income, caste and gender relations, market access, and exposure to climate risk. A contemporary rural strategy must combine farm and non-farm livelihoods, local enterprise, digital access, health, education, and physical connectivity.

Research Gap

Existing policy and academic discussions frequently examine innovation, startups, skilling, sustainability, or rural development separately. Less attention is given to the interdependence among these pillars within the specific long-term framework of Viksit Bharat 2047. This paper addresses that gap by developing an integrated, qualitative synthesis and by identifying the conditions under which each pillar can support sustainable and inclusive growth.

Objectives of the Study

- To examine the contribution of innovation to productivity, governance, and national development.
- To analyse the role of youth capabilities and participation in achieving Viksit Bharat 2047.
- To assess how startups can support employment, diversification, and technological advancement.
- To examine the relationship between environmental sustainability and long-term economic growth.
- To explore how rural development can strengthen inclusion, resilience, and balanced regional development.
- To propose an integrated policy framework for linking these development pillars.

Research Methodology

The study adopts a qualitative descriptive and analytical design. It is based exclusively on secondary information gathered from official policy documents, government and institutional reports, selected academic literature, and international development publications. Sources were selected when they directly addressed one or more of the five themes or provided evidence about India's development constraints and policy responses. Priority was given to official and primary institutional sources.

The material was analysed thematically. First, relevant statements and evidence were organised under innovation, youth, startups, environment, and rural development. Second, cross-cutting constraints—skills, finance, infrastructure, institutions, inequality, and climate risk—were identified. Third, the themes were synthesised to examine how progress in one area can enable or restrict progress in another. The principal limitation is that the paper does not independently test causal relationships or provide original field-level estimates. Its conclusions should therefore be understood as an evidence-informed conceptual synthesis.

Conceptual Framework

The framework proposed here views Viksit Bharat 2047 as an outcome of five interacting capabilities. Innovation produces knowledge and productivity; youth provide human and entrepreneurial capital; startups convert ideas into products and services; environmental sustainability protects the resource base; and rural development extends

capabilities beyond metropolitan centres. Education, finance, digital and physical infrastructure, and accountable institutions act as enabling conditions. The expected outcome is sustainable growth expressed through productivity, decent work, inclusion, resilience, and improved quality of life.

The relationship is iterative rather than linear. Rural problems can generate opportunities for startups and research; youth can develop locally relevant innovations; green technologies can reduce rural vulnerability; and improved rural incomes can expand markets for innovative enterprises. This systems perspective is more appropriate than treating the five themes as independent policy categories.

Role of Innovation in Viksit Bharat 2047

Innovation is central to the transition from an economy based primarily on factor expansion to one based on productivity, knowledge, and problem-solving. It includes scientific research, engineering, process improvement, social innovation, and new institutional arrangements. Artificial intelligence, advanced manufacturing, biotechnology, space applications, clean energy, and digital public infrastructure can improve both private production and public administration. The value of these technologies, however, depends on their affordability, safety, accessibility, and local adaptation.

In agriculture, precision advisory services, weather information, improved seed systems, storage technologies, and digital marketplaces may reduce information asymmetry and post-harvest losses. In governance, digital platforms can simplify access to benefits and reduce transaction costs. Yet innovation policy must address privacy, cybersecurity, algorithmic bias, language barriers, and the exclusion of people who lack devices or reliable connectivity. Public investment in research, university–industry collaboration, open standards, and regional innovation centres is therefore essential.

Youth Empowerment and Participation

Youth are not merely future beneficiaries of development; they are current workers, consumers, researchers, entrepreneurs, volunteers, and public participants. Their contribution depends on the quality of education, health, skills, work opportunities, and social mobility available to them. Skill India and related programmes are valuable, but training must be connected to employer demand, practical experience, apprenticeships, career counselling, and recognition of prior learning.

Youth empowerment also requires attention to gender, rural location, disability, social disadvantage, and digital access. A young person may complete training and still remain excluded if transport, childcare, finance, language support, or safe employment is unavailable. Universities and colleges can strengthen the transition to work through incubation, multidisciplinary projects, local problem-solving, entrepreneurship education, and partnerships with employers. Youth participation in climate action and local governance can further connect national ambition with community-level change.

Startup Ecosystem and Economic Growth

Startups can contribute to Viksit Bharat by introducing new business models, creating specialised employment, commercialising research, and serving underserved markets. Fintech, healthtech, agritech, education technology, climate technology, logistics, and manufacturing startups have the potential to address structural challenges. Startup India has improved formal recognition and policy visibility for entrepreneurs, but ecosystem depth matters more than headline counts.

A resilient ecosystem requires patient early-stage capital, credit guarantees, transparent regulation, procurement opportunities, incubators outside major cities, affordable testing facilities, and mentorship. Government procurement can help startups move from experimentation to scale, especially when procurement criteria reward outcomes rather than only firm size or prior turnover. At the same time, policy should recognise failure as part of experimentation while maintaining safeguards for consumers, workers, data, and public funds.

Startup-led development should not be measured only by valuation or the number of registered entities. More meaningful indicators include survival, productivity, quality employment, women’s participation, regional spread, intellectual-property creation, exports, and solutions for low-income and rural communities.

Environmental Sustainability and Green Growth

Environmental sustainability is a condition for durable development. Climate change can reduce agricultural productivity, damage infrastructure, increase health risks, and intensify livelihood insecurity. Pollution and resource depletion impose costs that are often not reflected in market prices. A developed India must therefore pursue growth that is energy-efficient, resource-efficient, climate-resilient, and socially just.

Priority areas include renewable energy, energy storage, public transport, efficient buildings, circular economy practices, sustainable agriculture, water conservation, waste management, and low-carbon industrial processes. Green innovation can create new industries and employment, but the transition must protect workers and communities affected by changes in energy and production systems. Environmental policies should combine regulation, incentives, transparent monitoring, public participation, and support for small enterprises that face high compliance costs.

Rural Development and Inclusive Growth

Rural development is essential because national averages can conceal major spatial inequalities. The Census 2011-based official statistical record shows the continuing importance of rural India in the country's population structure (Ministry of Statistics and Programme Implementation, 2022). Rural transformation requires more than agricultural subsidies. It requires roads, electricity, broadband, schools, health facilities, financial services, storage, local processing, and reliable market access.

Digital connectivity can enable telemedicine, online learning, digital payments, e-governance, and market information, but connectivity must be accompanied by digital literacy, local-language services, affordable devices, and grievance redressal. Rural entrepreneurship can be strengthened through producer organisations, self-help groups, cooperatives, local service enterprises, food processing, crafts, renewable-energy services, and repair and maintenance networks.

Rural policy should also be climate-sensitive. Water stress, heat, floods, droughts, and changing cropping conditions affect rural households unevenly. Diversified livelihoods, climate-resilient infrastructure, crop insurance, local storage, and accessible extension services can improve resilience. The goal should be to give rural citizens meaningful choices—to farm, work locally, start enterprises, study, or migrate by choice rather than distress.

Major Challenges

- Skill mismatch and inadequate transition from education to decent work.
- Unequal access to finance, research infrastructure, markets, and digital tools.
- Concentration of startups and advanced innovation in a limited number of regions.
- Digital exclusion caused by affordability, language, gender, disability, or low digital literacy.
- Climate change, pollution, water stress, and ecological degradation.
- Weak coordination among central, state, local, educational, and private institutions.
- Implementation gaps, uneven administrative capacity, and limited outcome monitoring.

Policy Recommendations

- Build mission-oriented research programmes that connect universities, industry, government, and communities to national and local development problems.
- Reform education and skilling around foundational learning, digital and green skills, apprenticeships, communication, entrepreneurship, and lifelong learning.
- Create stronger regional startup ecosystems through public procurement, credit guarantees, incubators, testing facilities, and patient capital.
- Make digital public infrastructure inclusive through accessible design, local-language support, offline options, data protection, and effective grievance redressal.
- Adopt a just green-transition strategy combining renewable energy, resource efficiency, climate adaptation, worker protection, and support for small enterprises.
- Treat rural infrastructure and rural innovation as productive investment, not only welfare expenditure.

- Use a Viksit Bharat dashboard with disaggregated indicators for gender, caste, region, rural–urban location, employment quality, emissions, and resilience.
- Encourage meaningful youth participation in research, local governance, climate action, and social entrepreneurship.

Analytical Findings

The thematic analysis produces five connected findings. First, innovation has the greatest developmental value when it solves locally relevant problems and is supported by institutions capable of adoption and scale. Technology alone cannot compensate for weak skills, poor connectivity, or low administrative capacity.

Second, the demographic dividend is a conditional opportunity. A large youth population contributes to development only when education is connected to employability, entrepreneurship, decent work, and participation. Training outcomes should therefore be assessed through employment quality, earnings, mobility, and enterprise creation rather than enrolment numbers alone.

Third, startups are important instruments of diversification but are not substitutes for broad-based industrial and employment policy. Their contribution is strongest when public procurement, finance, research institutions, and markets help promising solutions move beyond the pilot stage. Regional and social inclusion must be built into ecosystem design.

Fourth, environmental sustainability is a productive requirement rather than an external constraint. Climate-resilient infrastructure, renewable energy, resource efficiency, and pollution control can protect health and productivity while creating new economic opportunities. The transition must nevertheless account for distributional effects on workers, consumers, and small producers.

Fifth, rural development is both an equity objective and a growth strategy. Rural infrastructure, digital access, local enterprise, and diversified livelihoods expand capabilities, reduce distress migration, strengthen domestic demand, and create markets for innovation. Rural citizens should be treated as producers and innovators, not only as beneficiaries of welfare programmes.

Limitations and Scope for Future Research

This paper is based on qualitative analysis of secondary sources and therefore does not estimate the independent or combined effect of the five pillars. Official reports may also differ in definitions, reporting periods, and measurement methods. Future studies may use state-level panel data, district-level comparisons, enterprise surveys, or mixed-method designs to examine whether innovation, youth employment, startup activity, green investment, and rural infrastructure produce measurable improvements in income, productivity, and resilience. Further research should also examine gender differences, tribal and aspirational districts, the role of higher education institutions, and the distributional effects of artificial intelligence and the green transition.

Conclusion

Viksit Bharat 2047 is achievable only through an integrated development strategy. Innovation can raise productivity and solve public problems, but it must be accessible and responsibly governed. Youth can transform the demographic opportunity into economic value when education, skills, health, and employment systems work together. Startups can generate new products and jobs when finance, markets, infrastructure, and regulation support sustainable scaling. Environmental sustainability protects the foundations of growth, while rural development ensures that national progress is geographically and socially inclusive.

The principal implication of this analysis is that these pillars should be planned together. India’s success should be judged not only by aggregate economic expansion but also by whether growth creates decent opportunities, reduces regional disparities, strengthens resilience, and remains within ecological limits. A coordinated approach involving government, educational institutions, industry, startups, civil society, and communities is therefore necessary to convert the aspiration of Viksit Bharat 2047 into durable outcomes.

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Good Governance and State Capacity: Institutional Foundations for Building Viksit Bharat 2047

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Abstract

The vision of *Viksit Bharat 2047* seeks to transform India into a developed, inclusive, technologically advanced, and globally influential nation by the centenary of its independence. Achieving this aspiration requires not only sustained economic growth but also a governance system capable of designing, implementing, and monitoring effective public policies. This paper argues that good governance and state capacity together constitute the institutional foundation of India's developmental transformation. While good governance provides the normative framework based on transparency, accountability, participation, responsiveness, and the rule of law, state capacity determines the government's ability to formulate policies, mobilize resources, coordinate institutions, and deliver public services efficiently.

The paper examines recent governance reforms in India, including Direct Benefit Transfers (DBT), Aadhaar-enabled welfare delivery, the Aspirational Districts Programme, Mission Karmayogi, and Digital Public Infrastructure such as UPI and DigiLocker. These initiatives demonstrate how institutional innovation and digital transformation can strengthen public service delivery and enhance citizens' trust in government. At the same time, the study identifies persistent challenges such as bureaucratic inertia, uneven administrative capacity across states, implementation deficits, limited local government capability, and concerns regarding digital inclusion and democratic accountability.

The paper concludes that India's journey towards Viksit Bharat 2047 depends on strengthening public institutions, improving administrative competence, deepening decentralization, promoting ethical leadership, and ensuring citizen-centric governance. Good governance and state capacity should therefore be viewed not merely as administrative ideals but as strategic prerequisites for inclusive development, democratic resilience, and sustainable nation-building.

Keywords: Good Governance; State Capacity; Public Policy; Digital Governance; Viksit Bharat 2047; Public Administration; India.

Introduction

The completion of one hundred years of India's independence in 2047 represents more than a symbolic milestone. It offers an opportunity to evaluate the country's developmental journey and define its future trajectory. The vision of *Viksit Bharat 2047* reflects this long-term aspiration by envisioning India as a developed nation characterized by economic prosperity, social justice, technological leadership, environmental sustainability, and strong democratic institutions. However, transforming this vision into reality requires more than ambitious policy declarations or high economic growth rates. It demands institutions that possess both legitimacy and capability.

Development literature increasingly recognises that economic progress is inseparable from the quality of governance. Nations that have successfully achieved sustained development have generally combined effective public institutions with accountable governance systems. Conversely, countries with weak institutions often struggle to convert policy intentions into tangible outcomes, despite possessing significant financial or natural resources. Thus, governance quality and institutional capacity have emerged as decisive determinants of developmental success.

India's developmental experience illustrates this relationship clearly. During the last decade, the country has undertaken major administrative and technological reforms aimed at improving governance. Programmes such as Direct Benefit Transfers, Aadhaar, Unified Payments Interface (UPI), DigiLocker, Government e-Marketplace (GeM), PM Gati Shakti, and Mission Karmayogi have attempted to reduce leakages, enhance transparency, strengthen accountability, and improve public service delivery. These initiatives demonstrate a growing emphasis on improving both governance quality and administrative capacity.

Nevertheless, important structural challenges remain. Administrative capacity differs considerably across states and local governments. Bureaucratic procedures continue to slow implementation in several sectors. Digital transformation has improved efficiency but has also generated concerns regarding exclusion, privacy, cyber security, and democratic accountability. Consequently, achieving the objectives of Viksit Bharat requires a balanced approach that combines technological innovation with institutional strengthening and citizen participation.

This paper argues that good governance and state capacity are mutually reinforcing pillars of India's developmental transformation. Good governance establishes the principles that guide public action, whereas state capacity provides the institutional capability necessary for implementing those principles effectively. Neither is sufficient in isolation. Transparent institutions without administrative capability cannot deliver results, while capable institutions without accountability risk becoming inefficient or authoritarian. Sustainable development therefore depends upon strengthening both simultaneously.

The study adopts a qualitative and analytical approach by examining major governance reforms, institutional initiatives, and policy developments undertaken in contemporary India. It seeks to explain how improvements in governance and administrative capacity contribute to inclusive development while identifying the institutional challenges that must be addressed to realise the vision of Viksit Bharat 2047.

Methodology

This study uses a qualitative, analytical and documentary research design to examine the relationship between good governance and state capacity in the context of Viksit Bharat 2047. It has five related objectives:

(i) to clarify the conceptual relationship between good governance and state capacity;

(ii) to identify the principal dimensions of state capacity relevant to contemporary Indian governance;

(iii) to examine selected governance reforms as institutional responses to administrative, fiscal, legal-regulatory, and digital-informational requirements;

(iv) to assess the principal implementation challenges affecting these reforms; and

(v) to identify policy priorities for strengthening state capacity while maintaining accountability and citizen-centric governance.

The study addresses three guiding questions:

(i) How do good-governance principles and state capacity complement one another?

(ii) In what ways do selected Indian governance reforms contribute to different dimensions of state capacity?

(iii) What institutional constraints may limit the effectiveness and inclusiveness of these reforms?

The questions are examined through qualitative interpretation rather than through statistical hypothesis testing.

The source-selection process is purposive. The study draws on scholarly works on governance, institutions and state capacity; reports of the World Bank, UNDP, NITI Aayog and the Second Administrative Reforms Commission; and primary policy documents and official information from relevant Government of India institutions and platforms. Government sources were used particularly for describing the design, institutional mandate and reported administrative outputs of DBT, Aadhaar, UPI, DigiLocker, Mission Karmayogi, PM Gati Shakti and the Aspirational Districts Programme. The selected reforms were chosen because they illustrate different but overlapping dimensions of state capacity and because official documentation is available for their institutional design and implementation.

The period covered is 2014–2026, with emphasis on major governance and administrative reforms introduced, expanded or institutionalised during this period and on official evidence available up to 2026. The analysis is organized around four dimensions of state capacity—administrative, fiscal, legal and regulatory, and digital and informational—and considers how selected reforms relate to these dimensions. The approach is interpretive and comparative: reforms are examined for their stated objectives, institutional mechanisms, reported outputs, governance implications, and implementation constraints rather than ranked through a single numerical capacity index.

The study has limitations. It does not use a primary survey, field experiment or original administrative dataset, and therefore does not attempt to establish causal effects of individual reforms. Official programme data are useful for documenting institutional reach and reported performance but may not capture all implementation variations across states and local governments. The reforms also differ substantially in scale, sector and institutional design, making direct

quantitative comparison inappropriate. The findings should therefore be understood as an analytical assessment of institutional patterns and policy implications, not as a causal evaluation of programme impact.

Literature Review

The relationship between governance, institutional quality, and economic development has emerged as one of the most influential themes in contemporary political science and public administration. Earlier development theories primarily emphasized economic variables such as capital accumulation, industrialization, and technological progress. However, since the 1990s, scholars and international organizations have increasingly argued that sustained development depends not only on economic resources but also on the quality of public institutions and the capacity of the state to formulate and implement policies effectively.

The concept of good governance gained international prominence through the World Bank's report *Governance and Development* (1992), which defined governance as the manner in which political power is exercised in managing a country's economic and social resources for development. The report highlighted accountability, transparency, efficiency, predictability, and the rule of law as essential prerequisites for sustainable development. Subsequently, the United Nations Development Programme (UNDP, 1997) broadened the concept by emphasizing participation, responsiveness, inclusiveness, equity, consensus-building, and respect for human rights. Together, these perspectives shifted the focus of development studies from economic growth alone to the institutional processes through which governments serve their citizens. (World Bank, 1992; UNDP, 1997)

Scholarly debates on governance have also highlighted the importance of institutions in shaping development outcomes. Douglass North (1990) argued that institutions reduce uncertainty by creating stable rules and incentives that facilitate economic exchange and political order. Similarly, Daron Acemoglu and James Robinson (2012) demonstrated that countries with inclusive political and economic institutions consistently outperform those governed by extractive institutions. Their work suggests that long-term prosperity depends less on geographical or cultural factors than on the quality of institutions that distribute political authority and economic opportunities.

Parallel to the governance literature, the concept of state capacity has attracted increasing academic attention. Francis Fukuyama (2013) defines state capacity as the ability of governments to formulate and enforce rules, collect revenues, maintain public order, and deliver public services effectively. He argues that successful states are characterized not merely by democratic legitimacy but by competent administrative institutions capable of implementing public policy. Peter Evans (1995) similarly emphasizes the idea of an "embedded autonomous state," where professional bureaucracies maintain sufficient autonomy to formulate long-term developmental policies while remaining closely connected with society and the private sector.

The relationship between governance and state capacity has also been explored through comparative studies of developmental states in East Asia. Johnson (1982), Evans (1995), and Weiss (1998) demonstrate that countries such as Japan, South Korea, and Singapore achieved rapid economic transformation because they combined capable bureaucracies with coherent industrial policies and effective political leadership. These studies indicate that neither market forces nor state intervention alone explains developmental success; rather, institutional effectiveness and administrative competence determine policy outcomes.

Within the Indian context, scholars have increasingly examined governance reforms in relation to administrative modernization and digital transformation. The Second Administrative Reforms Commission (2005–2009) identified transparency, accountability, citizen-centric administration, and ethical governance as the cornerstones of public administration in India. More recent studies by NITI Aayog and the Capacity Building Commission emphasize that India's developmental ambitions require continuous investment in administrative capability, institutional learning, and outcome-based governance. Digital initiatives such as Aadhaar, Direct Benefit Transfers (DBT), Unified Payments Interface (UPI), DigiLocker, and the Government e-Marketplace (GeM) have been widely recognized as important innovations that improve transparency, reduce leakages, and strengthen service delivery. (Second Administrative Reforms Commission, 2005–2009; NITI Aayog, 2024–2025; Capacity Building Commission, 2026)

Nevertheless, the literature also identifies persistent challenges. Scholars have noted that administrative capacity remains uneven across Indian states and local governments, creating significant implementation gaps. Bureaucratic complexity, coordination failures, inadequate human resource development, and disparities in digital infrastructure continue to affect policy effectiveness. Furthermore, while digital governance has enhanced efficiency, it has also raised important concerns regarding privacy, data protection, digital exclusion, and democratic accountability. These debates indicate that

technological innovation alone cannot guarantee good governance unless accompanied by institutional strengthening and citizen participation.

Although the literature on governance and state capacity has expanded considerably, relatively few studies explicitly examine how these two concepts interact in the context of Viksit Bharat 2047. Existing research often treats governance reforms, digital transformation, and administrative capacity as separate themes. This paper addresses that gap by analysing how good governance and state capacity complement each other in achieving India's long-term developmental aspirations. It argues that governance principles provide the normative direction of public policy, while state capacity determines the government's ability to translate these principles into measurable developmental outcomes.

Conceptual Framework: Good Governance and State Capacity

The central proposition of this paper is that good governance and state capacity are complementary and mutually reinforcing dimensions of successful development. While good governance establishes the normative standards that should guide public institutions, state capacity determines whether these standards can be effectively implemented. Understanding their relationship is therefore essential for analysing India's journey towards Viksit Bharat 2047.

Good governance refers to the manner in which public authority is exercised to promote the welfare of citizens through transparent, accountable, participatory, responsive, equitable, and rule-based institutions. It emphasizes not merely the existence of democratic institutions but also the quality of decision-making and the effectiveness with which public policies are implemented. Governance, therefore, is concerned with *how* governments function rather than simply *who* governs.

State capacity, by contrast, refers to the institutional ability of the government to formulate policies, mobilize financial and human resources, coordinate administrative agencies, enforce laws, regulate markets, and deliver public services efficiently. It reflects the operational strength of the state and determines whether public institutions possess the competence required to translate policy objectives into tangible outcomes.

For analytical purposes, this paper conceptualizes state capacity as comprising four interrelated dimensions:

1. Administrative Capacity – the ability of public institutions to implement policies efficiently through competent human resources, professional bureaucracy, inter-agency coordination, and effective service delivery.
2. Fiscal Capacity – the state's ability to mobilize revenues, allocate public resources efficiently, and finance long-term developmental programmes without compromising fiscal sustainability.
3. Legal and Regulatory Capacity – the ability to uphold the rule of law, enforce contracts, regulate markets, protect rights, and ensure accountability through an effective judicial and regulatory framework.
4. Digital and Informational Capacity – the capability to collect reliable data, utilize digital technologies, integrate public databases, and support evidence-based policy making through Digital Public Infrastructure.

State-capacity dimension	Selected reform(s)	Institutional mechanism / evidence	Governance implication
Administrative	Mission Karmayogi; Aspirational Districts Programme	Competency-based capacity building, iGOT learning, district-level convergence, monitoring and performance orientation.	Supports professional capability, coordination and outcome-oriented implementation.
Fiscal	DBT; PM Gati Shakti	Direct transfers and JAM architecture seek to improve delivery efficiency; integrated infrastructure planning supports coordinated public investment.	Strengthens resource-delivery efficiency and coordination, while fiscal outcomes remain dependent on broader budgetary capacity.
Legal and regulatory	Aadhaar; Digital Public Infrastructure	Aadhaar operates within the Aadhaar Act and related safeguards; digital systems require privacy, cybersecurity, data-governance and accountability frameworks.	Shows that digital state capacity requires enforceable legal safeguards and rights protection.

State-capacity dimension	Selected reform(s)	Institutional mechanism / evidence	Governance implication
Digital and informational	Aadhaar; UPI; DigiLocker; ADP; PM Gati Shakti	Digital identity, interoperable payments, verified digital documents, KPI-based district monitoring and GIS-enabled infrastructure planning generate and use administrative information.	Expands the state's ability to integrate information, monitor programmes and deliver services digitally.

These dimensions are closely interconnected. Administrative reforms cannot succeed without adequate financial resources; digital governance requires effective legal safeguards; and fiscal mobilization depends upon institutional legitimacy and citizen trust.

The relationship between good governance and state capacity may therefore be understood as a mutually reinforcing cycle. Governance principles such as transparency, accountability, participation, responsiveness, and rule of law strengthen citizens' confidence in public institutions. Increased public trust enhances voluntary compliance with taxation, encourages cooperation with public programmes, and improves institutional legitimacy. Greater legitimacy, in turn, enables governments to mobilize resources more effectively, invest in administrative modernization, improve service delivery, and further strengthen state capacity. As administrative capacity improves, governments become better equipped to implement governance principles, creating a virtuous cycle of institutional development.

In the context of Viksit Bharat 2047, this conceptual framework suggests that India's developmental success depends not merely on ambitious economic targets but on building institutions that are simultaneously capable, accountable, transparent, innovative, and citizen-centric. Governance without implementation capacity produces policy failures, while administrative capacity without accountability risks inefficiency and erosion of democratic legitimacy. Sustainable development therefore requires a balanced integration of both dimensions.

Accordingly, this paper analyses India's major governance reforms through this integrated framework, arguing that initiatives such as Digital Public Infrastructure, Direct Benefit Transfers, Mission Karmayogi, and the Aspirational Districts Programme are significant because they seek to strengthen both governance quality and state capacity simultaneously. This integrated perspective provides the analytical foundation for evaluating India's progress towards the vision of Viksit Bharat 2047.

Viksit Bharat 2047: Governance Imperatives

The aspiration of Viksit Bharat 2047 represents one of the most ambitious national development agendas in independent India's history. Announced as a long-term vision to coincide with the centenary of India's independence, it seeks to transform the country into a developed, inclusive, innovative, sustainable, and globally competitive nation. Unlike conventional development programmes that focus primarily on economic growth, the Viksit Bharat vision recognizes that development is multidimensional, encompassing social justice, technological advancement, environmental sustainability, institutional resilience, and democratic governance. (Government of India, 2024)

The success of this vision depends not only on achieving higher levels of income or industrial output but also on strengthening the quality of public institutions. International experience demonstrates that countries rarely attain developed status solely through market forces or rapid economic expansion. Rather, long-term development is supported by capable institutions that can formulate sound policies, coordinate public action, regulate markets effectively, and deliver public services efficiently. In this sense, governance becomes the bridge between developmental aspirations and developmental outcomes.

India has witnessed remarkable economic progress over the past three decades. It has emerged as one of the world's fastest-growing major economies, expanded digital connectivity, strengthened financial inclusion, and significantly improved public infrastructure. However, economic growth alone cannot guarantee equitable and sustainable development. Persistent regional disparities, unequal access to quality education and healthcare, environmental pressures, administrative inefficiencies, and implementation deficits continue to challenge inclusive growth. Addressing these issues requires governance systems capable of translating national priorities into measurable improvements in citizens' lives.

The idea of Viksit Bharat therefore places governance at the centre of national development. Good governance ensures that public institutions function transparently, remain accountable to citizens, uphold the rule of law, and respond effectively to changing societal needs. State capacity complements these principles by enabling governments to mobilize

resources, coordinate multiple institutions, implement policies, and evaluate outcomes. Together, they create an institutional ecosystem capable of sustaining long-term development.

Another defining feature of the Viksit Bharat vision is its emphasis on citizen-centric governance. Modern governance is increasingly moving away from traditional hierarchical administration towards collaborative and participatory policymaking. Citizens are no longer viewed merely as beneficiaries of government programmes but as active stakeholders in the development process. Public participation, social accountability, digital engagement, and cooperative federalism are therefore integral components of contemporary governance reforms in India.

Technological transformation has further strengthened this approach. The rapid expansion of Digital Public Infrastructure (DPI), including Aadhaar, UPI, DigiLocker, and other digital platforms, has fundamentally altered the relationship between citizens and the state. These innovations have reduced transaction costs, improved transparency, expanded financial inclusion, and enhanced the efficiency of public service delivery. At the same time, they underscore the importance of balancing technological innovation with privacy protection, cybersecurity, and democratic accountability.

The vision of Viksit Bharat also recognizes that governance cannot remain centralized. India's federal structure requires close coordination among the Union Government, State Governments, Urban Local Bodies, and Panchayati Raj Institutions. Development outcomes increasingly depend upon the administrative capacity of local institutions responsible for implementing policies on the ground. Consequently, strengthening local governance, improving inter-governmental coordination, and investing in human resource development have become essential components of state capacity building.

From a political science perspective, Viksit Bharat 2047 represents an attempt to transition from a welfare-oriented administrative state to a developmental and enabling state. While welfare programmes continue to remain important for ensuring social justice, the contemporary state is also expected to create an environment that promotes innovation, entrepreneurship, competitiveness, and sustainable economic growth. This transformation requires governments to move beyond traditional regulatory functions towards strategic coordination, evidence-based policymaking, digital governance, and collaborative public administration.

Ultimately, the vision of Viksit Bharat 2047 is not simply about achieving a particular level of Gross Domestic Product or per capita income. It is about building institutions that command public trust, uphold democratic values, and possess the administrative competence necessary to deliver quality public services. Development, therefore, must be understood not merely as an economic objective but as a process of institutional transformation in which governance and state capacity reinforce one another.

The central argument of this paper follows directly from this understanding. The realization of Viksit Bharat 2047 depends upon the simultaneous strengthening of good governance and state capacity. Transparent governance without effective implementation produces policy failures, whereas capable institutions without accountability undermine democratic legitimacy. Sustainable development can therefore be achieved only when institutional capability and democratic governance evolve together.

Good Governance and State Capacity in Contemporary India

India's governance reforms during the last decade represent a significant shift from process-oriented administration towards outcome-based governance. Rather than focusing exclusively on expanding government programmes, recent reforms have emphasized improving institutional efficiency, reducing transaction costs, strengthening transparency, and enhancing citizens' access to public services. These initiatives illustrate how governance reforms and state capacity can reinforce one another in advancing national development.

A major example is the Direct Benefit Transfer (DBT) programme, which has transformed the delivery of welfare schemes by transferring financial assistance directly into beneficiaries' bank accounts. Supported by the Jan Dhan–Aadhaar–Mobile (JAM) architecture, DBT is intended to reduce leakages, minimized the role of intermediaries, improved targeting, and increased transparency in public expenditure. Beyond administrative efficiency, DBT has strengthened citizens' confidence in public institutions by making welfare delivery more predictable and accountable. (DBT Mission, Government of India, 2026)

Similarly, the Aadhaar programme has emerged as a foundational element of India's digital governance architecture. As a unique digital identity system, Aadhaar enables accurate identification of beneficiaries across multiple welfare programmes, reducing duplication and improving the efficiency of public service delivery. Although debates regarding

privacy and data protection continue, Aadhaar has expanded the state's informational capacity by enabling better coordination across departments and facilitating evidence-based policymaking. (UIDAI, 2025)

India's Digital Public Infrastructure (DPI) has further expanded the scope of governance reforms. Platforms such as the Unified Payments Interface (UPI), DigiLocker, the Government e-Marketplace (GeM), and the Open Network for Digital Commerce (ONDC) have created interoperable digital ecosystems that simplify interactions between citizens, businesses, and government institutions. These innovations have expanded digital payment and document services and are associated with greater interoperability and administrative convenience. More importantly, they illustrate how technological innovation can complement institutional reform rather than replace it. (NPCI, 2025; Ministry of Electronics and Information Technology, 2025; DigiLocker, 2026)

Another important governance initiative is the Aspirational Districts Programme (ADP), which seeks to reduce regional disparities by focusing on India's relatively underdeveloped districts. Unlike conventional planning models that primarily allocate financial resources, the programme emphasizes real-time data monitoring, district-level competition, convergence among government departments, and continuous performance evaluation. This approach reflects a shift from input-based administration towards outcome-oriented governance and demonstrates how improved institutional coordination can enhance state capacity at the local level. (NITI Aayog, 2025)

Administrative reforms have also focused on strengthening the professional competence of the civil services. Mission Karmayogi, launched as the National Programme for Civil Services Capacity Building, seeks to transform India's bureaucracy from a rule-based administrative structure into a competency-based public service. Through continuous learning, digital training platforms, and performance-oriented capacity development, the programme aims to equip civil servants with the knowledge and skills required to address increasingly complex policy challenges in areas such as digital governance, climate change, artificial intelligence, and public finance. (Capacity Building Commission, 2026)

Infrastructure governance has similarly undergone significant transformation through initiatives such as PM Gati Shakti, which integrates multiple ministries and agencies on a common digital platform to improve planning, coordination, and project implementation. By overcoming departmental fragmentation, the initiative seeks to reduce project delays, optimize public investment, and improve infrastructure outcomes. Such reforms demonstrate that state capacity depends not only on financial resources but also on effective institutional coordination. (Government of India, 2021; Press Information Bureau, 2023)

These reforms collectively indicate a broader transformation in India's governance paradigm. The state is increasingly functioning not merely as a provider of public services but as an enabler, coordinator, and facilitator of development. Digital technologies, institutional reforms, and administrative modernization have strengthened policy implementation while improving transparency and accountability.

Nevertheless, important challenges remain. Administrative capacity continues to vary considerably across states and local governments. The digital divide limits equal access to technology-driven services, particularly among marginalized communities. Coordination between different levels of government remains uneven, while bureaucratic inertia and procedural complexity continue to delay implementation in several sectors. Moreover, rapid digitalization has generated new concerns regarding cybersecurity, privacy, algorithmic bias, and democratic oversight.

Despite these challenges, the available evidence indicates that these governance reforms are contributing to efforts to strengthen governance quality and state capacity. Their long-term significance lies not only in improving administrative efficiency but also in creating institutional foundations capable of supporting the broader developmental aspirations of Viksit Bharat 2047.

Challenges in Building Good Governance and State Capacity

Despite significant progress in governance reforms, India's journey towards Viksit Bharat 2047 continues to face several institutional and administrative challenges. These challenges are not merely technical issues but structural constraints that affect the effectiveness of public policy and the quality of democratic governance.

The first challenge is the implementation gap. India has introduced numerous progressive policies and flagship programmes; however, policy outcomes often vary considerably across states and districts. Differences in administrative capability, financial resources, and institutional coordination frequently create disparities in implementation. Consequently, the success of national initiatives depends not only on policy design but also on the administrative competence of state governments and local institutions.

A second challenge concerns bureaucratic capacity and human resource development. Although the Indian civil service remains one of the country's strongest institutions, it continues to face issues such as staff shortages, procedural complexity, limited specialization, and excessive workload. The increasing complexity of governance in areas such as artificial intelligence, climate change, cybersecurity, digital regulation, and public health requires specialized knowledge that traditional administrative structures were not originally designed to provide. Capacity-building initiatives such as Mission Karmayogi represent important reforms, but sustained investment in professional development remains essential.

The third challenge is the uneven capacity of local governments. The 73rd and 74th Constitutional Amendments envisioned decentralized governance, yet many Panchayati Raj Institutions and Urban Local Bodies continue to face shortages of trained personnel, financial autonomy, and technical expertise. Since public service delivery largely occurs at the local level, strengthening grassroots institutions is indispensable for improving governance outcomes.

Another important challenge is the digital divide. India's Digital Public Infrastructure has transformed governance by expanding financial inclusion and improving service delivery. Nevertheless, disparities in internet access, digital literacy, language barriers, and technological infrastructure continue to exclude sections of the population, particularly in rural and remote areas. Unless these inequalities are addressed, digital governance may unintentionally deepen existing socio-economic disparities.

India must also address concerns regarding privacy, cybersecurity, and data governance. As public administration becomes increasingly data-driven, governments must establish robust legal and institutional safeguards to protect citizens' personal information while ensuring transparency and accountability. Public trust in digital governance depends upon balancing technological innovation with constitutional rights and ethical governance.

Fiscal constraints present another important limitation. Achieving the ambitious developmental goals associated with Viksit Bharat requires sustained public investment in education, healthcare, infrastructure, climate resilience, research, and technological innovation. Maintaining fiscal discipline while financing these priorities remains a complex policy challenge for both the Union and State Governments.

Finally, India's governance system must continue improving judicial efficiency and regulatory quality. Delays in dispute resolution, regulatory uncertainty, and procedural complexity increase the cost of doing business and reduce administrative effectiveness. A predictable legal environment is essential not only for attracting investment but also for protecting citizens' rights and strengthening democratic legitimacy.

Collectively, these challenges indicate that governance reforms cannot be viewed as one-time interventions. Building state capacity is a continuous process requiring institutional learning, administrative modernization, political commitment, and active citizen participation.

Policy Recommendations

Based on the preceding analysis, the following policy recommendations may strengthen India's governance architecture and accelerate progress towards Viksit Bharat 2047.

First, governments should prioritize institutional capacity building alongside policy formulation. Every major policy initiative should be accompanied by systematic investments in administrative capability, digital infrastructure, and human resource development.

Second, India should deepen cooperative and competitive federalism by strengthening coordination between the Union Government, State Governments, and local institutions. Performance-based incentives and knowledge-sharing mechanisms can reduce regional disparities in governance outcomes.

Third, Mission Karmayogi should be expanded to promote continuous professional learning, specialization, leadership development, and evidence-based policymaking across all levels of government.

Fourth, greater fiscal and administrative autonomy should be provided to Panchayati Raj Institutions and Urban Local Bodies, enabling them to deliver public services more effectively while remaining accountable to local communities.

Fifth, Digital Public Infrastructure should continue expanding, but equal emphasis must be placed on digital inclusion, cybersecurity, data protection, and citizen awareness. Technological innovation should enhance democratic governance rather than replace human accountability.

Sixth, governments should increasingly adopt outcome-based governance by measuring policy success through developmental outcomes rather than administrative processes. Performance indicators should focus on improvements in education, health, employment, environmental sustainability, and citizen satisfaction.

Seventh, public institutions should strengthen transparency and accountability by expanding proactive disclosure of information, improving grievance redressal mechanisms, encouraging social audits, and promoting open government data.

Eighth, judicial reforms should continue to improve contract enforcement, reduce case pendency, and strengthen regulatory certainty, thereby enhancing both governance quality and investor confidence.

Finally, governance reforms must remain citizen-centric. Public participation, civil society engagement, academic expertise, and community-based monitoring should become integral components of policy formulation and implementation.

Conclusion

India's aspiration to become a developed nation by 2047 represents one of the most ambitious development projects in the contemporary world. While rapid economic growth remains essential, international experience demonstrates that sustainable development ultimately depends upon the quality of public institutions and the capacity of the state to implement policies effectively. The vision of Viksit Bharat 2047 therefore requires a governance system that is transparent, accountable, responsive, participatory, and capable of delivering high-quality public services.

This study has argued that good governance and state capacity are mutually reinforcing pillars of national development. Good governance provides the normative principles that guide public action, whereas state capacity enables governments to transform those principles into measurable developmental outcomes. Neither can succeed independently. Transparent institutions without implementation capability fail to achieve desired results, while capable institutions lacking accountability risk undermining democratic values and public trust.

The assessment of contemporary governance reforms—including Direct Benefit Transfers, Aadhaar-enabled service delivery, Digital Public Infrastructure, Mission Karmayogi, the Aspirational Districts Programme, and integrated infrastructure planning—indicates that India has made significant progress in modernizing parts of its governance architecture. These reforms have improved administrative efficiency, strengthened transparency, expanded financial inclusion, and enhanced the state's ability to deliver public services. However, challenges relating to bureaucratic capacity, implementation gaps, regional disparities, digital inclusion, fiscal sustainability, and institutional coordination continue to constrain developmental outcomes.

The analysis indicates that achieving Viksit Bharat 2047 requires moving beyond incremental administrative reforms towards comprehensive institutional transformation. Strengthening local governance, investing in professional civil services, deepening cooperative federalism, promoting ethical leadership, and ensuring meaningful citizen participation will be critical to sustaining this transformation.

Ultimately, the success of Viksit Bharat will not be measured solely by the size of India's economy or its technological achievements. It will be determined by the country's ability to build institutions that are capable, accountable, inclusive, resilient, and trusted by citizens. In this respect, good governance and state capacity are not merely instruments of administration; they constitute the institutional foundation upon which a prosperous, democratic, and developed India will be built.

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Viksit Bharat @ 2047: Weaving Indian Ethics and Values into the Framework of National Development

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Abstract

The vision of Viksit Bharat@2047 frames India's centenary of independence as a long-term development horizon. This paper argues that the ethical dimension of development should be treated not as an ornamental addition to economic modernization but as a criterion for judging whether development is inclusive, sustainable and human-centred. The argument is developed through a conceptual and interpretive analysis of Indian ethical traditions, contemporary development ethics, constitutional values, National Education Policy 2020, and recent policy documents concerning Viksit Bharat. The paper brings Indian concepts such as dharma, ahimsa, satya, karuna, seva, sarvodaya and vasudhaiva kutumbakam into dialogue with the capability approach and the broader literature on development ethics. It proposes that the relationship between values and development can be understood through four linked propositions: development expands meaningful human capabilities; institutions translate values into rules and accountability; economic activity carries social and environmental responsibilities; and technological progress should be evaluated by its effects on human dignity, inclusion and agency. The paper also identifies an important limitation: Indian ethical traditions are internally diverse and cannot be treated as a single, uniform code for public policy. Their contemporary relevance therefore depends on critical interpretation and compatibility with constitutional principles, pluralism and equal citizenship. The paper concludes that weaving Indian ethics into Viksit Bharat requires institutional mechanisms—ethical governance, value-based education, responsible business, environmental stewardship, inclusive digital transformation and youth civic engagement—rather than reliance on moral exhortation alone. Such an approach connects cultural resources with measurable developmental concerns while keeping human dignity, justice and sustainability at the centre of the development process.

Keywords: Viksit Bharat@2047; Indian ethics; development ethics; dharma; constitutional values; capability approach; sustainable development; value-based education; youth

INTRODUCTION

Viksit Bharat@2047 is a long-term national development horizon centred on the centenary of India's independence. Recent policy documents associated with the vision describe it in multidimensional terms, including economic competitiveness, sustainability, social inclusion, human capital, technological transformation, good governance and global engagement (NITI Aayog, 2025). The breadth of these objectives creates a fundamental analytical question: what should count as successful development? If development is understood only through aggregate output, infrastructure or technological capacity, important dimensions of human well-being may remain outside the assessment. Development ethics provides a way of addressing this problem because it treats development as a normative process involving judgments about human flourishing, justice, freedom, responsibility and the distribution of opportunities (Deneulin, 2013).

The present paper approaches Indian ethics in this broader sense. It does not claim that India possesses one homogeneous ethical system, nor does it suggest that ancient concepts can simply be transferred into modern institutions. Indian intellectual traditions are internally diverse, historically changing and represented through different philosophical, religious and social schools. Kaur (2022), for example, highlights the relationship among dharma, karma and niti while distinguishing ethical reflection from a narrowly legalistic understanding of morality. The analytical task, therefore, is to identify value principles that can enter contemporary public reasoning without treating tradition as beyond criticism or constitutional scrutiny.

This distinction is important because a normative framework becomes useful for development only when values are translated into institutional practices and publicly accountable standards. Dharma, for instance, can be interpreted in contemporary public life through duty, responsibility and integrity; ahimsa through non-violence, tolerance and the reduction of avoidable harm; seva through public service; and sarvodaya through concern for broad-based welfare. These

interpretations should not displace constitutional principles. Rather, they can be placed in dialogue with constitutional commitments to justice, liberty, equality and fraternity, which provide a common civic framework for a plural democratic society (Constitution of India, 1950).

The central argument of the paper is therefore analytical rather than merely celebratory: Indian ethical resources can contribute to Viksit Bharat only when they are converted into institutional norms, educational practices, economic responsibilities and measurable outcomes that expand human capabilities while protecting dignity, equality and ecological sustainability. This formulation also brings the paper into conversation with Amartya Sen's capability approach, in which development is concerned with the substantive freedoms people have to lead lives they have reason to value (Sen, 1999). The connection is useful because it allows ethical traditions to be considered not only as ideals but also in relation to the actual opportunities available to citizens.

OBJECTIVES OF THE STUDY

- To examine the relationship between Indian ethical traditions and contemporary ideas of development.
- To develop an analytical framework connecting ethical values with governance, education, economic activity, social inclusion, environmental sustainability and technology.
- To relate Indian ethical concepts to the capability approach and contemporary development ethics.
- To examine how constitutional values can provide a plural and democratic framework for interpreting Indian ethical traditions.
- To identify practical institutional pathways through which ethics can become part of the implementation of Viksit Bharat@2047.

METHODOLOGY AND ANALYTICAL FRAMEWORK

This is a conceptual, qualitative and interpretive study based on secondary sources. The analysis draws upon selected classical and modern writings on Indian ethics, development ethics and Gandhian thought; the Constitution of India; National Education Policy 2020; recent NITI Aayog publications on Viksit Bharat; and the United Nations 2030 Agenda for Sustainable Development. No primary survey or statistical estimation is undertaken. The purpose is to construct an analytical argument and identify institutional implications rather than to measure the causal effect of any particular value on development outcomes.

The analytical framework has four levels. First, the paper identifies a normative value: for example, dharma, ahimsa, seva, trusteeship or universal human fellowship. Second, it asks what institutional principle may reasonably correspond to that value, such as accountability, non-discrimination, public service, responsible ownership or cooperation. Third, it identifies a developmental domain in which the principle can operate—governance, education, economy, society, environment or technology. Fourth, it asks what kind of outcome would indicate that the value has been meaningfully institutionalised, such as improved access, reduced exclusion, greater transparency, protection of dignity, ecological responsibility or expanded capabilities.

This framework avoids two opposite errors. The first is romanticisation: assuming that invoking an Indian value automatically makes a policy ethical. The second is reductionism: treating development as a purely economic or technical process. A value has public significance only when it can be interpreted through reasoned argument, applied through institutions, and assessed against constitutional and human-development standards.

LITERATURE REVIEW

Development as a Normative and Human-Centred Process

The literature on development has increasingly questioned the adequacy of measuring progress solely through income or material output. Sen (1999) conceptualises development as expansion of substantive freedoms, shifting attention from resources alone to what people are actually able to do and be. Deneulin (2013) similarly argues that development is a normative project because it concerns the improvement of people's lives and therefore requires ethical reflection. Gasper (1997), in comparing capability-based approaches, shows that questions about well-being and justice cannot be separated from assumptions about human agency and values. These perspectives support the present paper's proposition that Viksit Bharat requires a conception of development that includes, but is not exhausted by, economic growth.

The United Nations 2030 Agenda likewise links economic development with social inclusion, environmental protection, dignity, equality and accountable institutions. The Sustainable Development Goals are explicitly integrated around economic, social and environmental dimensions rather than treating them as independent objectives (United Nations, 2015). This provides an international comparative context in which the paper's argument about ethical development can be situated.

Indian Ethics and Contemporary Relevance

Indian ethical thought is plural rather than monolithic. Its traditions include diverse accounts of duty, conduct, non-violence, compassion, self-discipline, social responsibility and the good life. Kaur (2022) discusses dharma and niti as important dimensions of Indian ethical reflection and stresses their practical orientation. Radhakrishnan's work on Indian philosophy similarly presents Indian thought as concerned with the relationship between knowledge, conduct and the nature of human life (Radhakrishnan, 2009). The relevance of these traditions to development should therefore be approached through interpretation rather than literal transplantation.

Gandhian thought provides a particularly important bridge between ethics and social-economic organisation. Trusteeship connects ownership and economic activity with obligations toward social welfare. Recent scholarship has examined trusteeship in relation to contemporary corporate social responsibility and the institutional regulation of business in India (Mohapatra, 2021). Chakrabarty (2014) likewise interprets trusteeship as a conception of business responsibility and links it to Gandhi's attempt to connect economic actors with wider social purposes. These studies make it possible to move beyond a general invocation of Gandhi and examine the institutional implications of ethical economic behaviour.

Research Gap

Existing discussions often examine either Indian philosophical values or the policy dimensions of Viksit Bharat. A stronger analytical bridge is needed between the two. In particular, there is scope to specify how a value becomes an institutional norm, how that norm can operate in different developmental sectors, and how it can be assessed without assuming that traditional values are automatically applicable. This paper addresses that gap by proposing a value–institution–domain–outcome framework and by placing Indian ethical resources in dialogue with constitutional values and development ethics.

INDIAN ETHICAL TRADITIONS AS DEVELOPMENT RESOURCES

Dharma is interpreted in this paper primarily as duty, responsibility and conduct oriented toward a larger moral order, rather than as a synonym for religion. In a contemporary public context, the concept can inform discussions of institutional responsibility, professional integrity and civic duty. Its practical significance lies in the proposition that rights and opportunities are accompanied by responsibilities. However, in a constitutional democracy, the meaning of duty must remain consistent with equal citizenship and fundamental rights.

Ahimsa can be interpreted beyond the narrow absence of physical violence. In contemporary development, it may be associated with non-discrimination, peaceful conflict resolution, respect for vulnerable persons and avoidance of avoidable social or ecological harm. Such an interpretation does not make ahimsa a complete policy formula; rather, it supplies a moral orientation that can inform institutional choices.

Satya, understood as truthfulness, has direct relevance to public communication, academic integrity, financial reporting and evidence-based decision-making. Seva, or service, can be translated into the ethics of public administration and professional responsibility. Karuna, or compassion, draws attention to the lived experience of people affected by policies and institutions. Sarvodaya, associated particularly with Gandhian thought, foregrounds welfare that is not restricted to privileged groups. Vasudhaiva Kutumbakam can be interpreted as an ethical orientation toward cooperation and shared human responsibility, while remaining compatible with the constitutional status of equal citizenship.

These concepts should not be treated as substitutes for law, public policy or empirical evidence. Their contribution is at the level of ethical orientation and public reasoning. Their institutional value depends on how they are interpreted, contested and translated into rules, incentives and accountability mechanisms.

ETHICAL GOVERNANCE AND PUBLIC ADMINISTRATION

Governance is the first institutional field in which the paper's argument can be tested. If dharma is understood as responsibility, its administrative expression would include impartiality, integrity, reason-giving and accountability. If

satya is taken as truthfulness, its institutional expression includes accurate public information, transparent records and protection of the integrity of evidence. If seva is understood as service, public administration should be evaluated partly by accessibility, responsiveness and respect for citizens.

The constitutional framework is central here. The Preamble commits the Republic to justice, liberty, equality and fraternity, including dignity and unity (Constitution of India, 1950). These values provide a common civic basis for interpreting ethical traditions in a plural society. The role of Indian ethics, therefore, is not to create a parallel source of citizenship rights but to deepen the ethical practice of institutions that are already constitutionally accountable.

Digital governance can strengthen transparency and access, but technology does not automatically produce ethical administration. Digital systems can reproduce exclusion if citizens lack connectivity, literacy or accessible grievance mechanisms. The ethical test is therefore not simply whether a service is digitised but whether digitisation expands meaningful access while protecting privacy, fairness and human agency. Recent policy work on Digital Public Infrastructure similarly frames technology as an instrument for inclusive socio-economic development rather than as an end in itself (NITI Aayog, 2026).

EDUCATION AND VALUE FORMATION

Education is a critical mechanism through which values become durable social practices. National Education Policy 2020 explicitly emphasises not only cognitive development but also social, ethical and emotional capacities, while recognising the relevance of Indian knowledge and thought (Ministry of Education, 2020). This provides a policy basis for connecting value education with the broader development agenda.

The challenge is to avoid treating value education as moral preaching. Ethical education should involve critical reasoning, dialogue, case analysis, community engagement and reflection on competing values. Students can examine issues such as academic integrity, digital misinformation, environmental responsibility, gender equality, financial ethics and professional accountability. Such an approach makes values practical and contestable rather than merely declarative.

Higher education institutions can operationalise this approach through community engagement, service-learning, research ethics, environmental initiatives, entrepreneurship with social responsibility, and interdisciplinary study of Indian knowledge traditions. Teachers also have an important role because institutional culture influences whether stated values are experienced as credible. The objective is not to produce uniformity of belief but to develop the capacity to reason ethically in conditions of diversity and uncertainty.

ECONOMIC DEVELOPMENT, BUSINESS ETHICS AND TRUSTEESHIP

Economic development creates opportunities for employment, innovation and improved living standards, but it also involves choices concerning distribution, labour, ownership, environmental costs and public accountability. A development model guided by ethics must therefore ask not only how much is produced, but who benefits, who bears the costs and whether economic activity expands human capabilities.

Gandhi’s idea of trusteeship is relevant to this discussion because it reframes economic ownership as carrying obligations toward society. Contemporary scholarship has examined trusteeship alongside corporate social responsibility and argues that the concept can illuminate questions of business responsibility and sustainability (Mohapatra, 2021). Chakrabarty (2014) similarly discusses trusteeship as a conception of the relationship between business houses and social welfare. The modern application, however, should not depend solely on voluntary morality. Corporate responsibility requires a combination of law, regulation, stakeholder accountability, transparency and ethical organisational culture.

This is where the analytical framework becomes significant. The ethical value is stewardship; the institutional principle is responsible use of economic power; the domain is corporate and entrepreneurial activity; and the outcomes include fair treatment of workers, responsible environmental practices, community impact and transparent governance. Corporate social responsibility can be one mechanism, but ethical business is broader than statutory expenditure. It includes labour practices, supply-chain responsibility, consumer protection, financial integrity and the internal culture of decision-making.

Inclusive economic development also requires attention to rural populations, women, informal workers, persons with disabilities and other groups whose capabilities may be constrained by unequal access to assets, markets, skills and institutions. The ethical principle of sarvodaya is relevant here as a normative reminder that aggregate growth should be examined alongside distribution and participation.

SOCIAL HARMONY, PLURALISM AND INCLUSION

India's diversity makes social inclusion a central component of development. Ethical development cannot be reduced to aggregate welfare if sections of society experience systematic exclusion. The constitutional commitment to equality, dignity and fraternity provides a civic foundation for addressing discrimination, while ethical traditions can contribute concepts of compassion, mutual responsibility and peaceful coexistence.

The idea of sarva dharma sambhava may be read as an orientation toward equal respect across religious traditions, while vasudhaiva kutumbakam may be interpreted as an ethic of wider human fellowship. Such concepts should be used carefully: they should not erase differences among communities or replace legal protections with appeals to harmony. A robust model of social harmony must allow disagreement, protect individual rights and provide institutional mechanisms for addressing discrimination and conflict.

Youth and civil society can strengthen this process through volunteering, community service, environmental initiatives, cultural activities and democratic participation. The objective is to build social trust without demanding uniformity. In this sense, ethical development is compatible with pluralism: citizens can hold different philosophical or religious commitments while sharing constitutional standards of dignity, equality and non-discrimination.

ENVIRONMENTAL ETHICS AND SUSTAINABLE DEVELOPMENT

Environmental sustainability provides a particularly clear test of the relationship between ethics and development. The United Nations 2030 Agenda treats economic growth, social inclusion and environmental protection as interconnected dimensions of sustainable development (United Nations, 2015). Recent Viksit Bharat policy documents likewise place sustainability alongside growth and inclusion (NITI Aayog, 2025).

Indian traditions contain multiple examples of reverence for nature, moderation and interdependence. These ideas can contribute to an environmental ethic, but they should not be romanticised as proof that traditional societies were uniformly sustainable. The stronger analytical claim is that selected principles—moderation, restraint, responsibility toward living systems and community stewardship—can support contemporary environmental reasoning when combined with modern science and evidence.

The institutional implications include sustainable production, resource efficiency, responsible land and water management, renewable energy, waste reduction and environmental education. Educational institutions can translate these principles into eco-clubs, audits, conservation projects and curriculum-based learning. Businesses can incorporate environmental costs into investment and production decisions. Public authorities can use transparent environmental assessment and monitoring. The ethical principle becomes meaningful when it changes incentives, practices and accountability.

TECHNOLOGY, ARTIFICIAL INTELLIGENCE AND HUMAN VALUES

Technological capability is an important component of a developed economy, but technological progress raises questions of privacy, bias, employment, access and accountability. The ethical issue is not whether technology is good or bad in the abstract; it is whether its design and use expand human capabilities without producing unjustifiable harms or exclusions.

A human-centred approach would place dignity, agency and fairness alongside efficiency. For artificial intelligence, this implies attention to data governance, explainability where appropriate, non-discrimination, cybersecurity, accountability and opportunities for human review. Digital inclusion is equally important. A service that is technically available but practically inaccessible to people with limited connectivity, language barriers or low digital literacy cannot be considered fully inclusive.

The ethical traditions discussed in this paper can provide broad orientations—responsibility, non-harm, truthfulness and service—but they do not provide technical rules for AI governance. Technical regulation must therefore draw upon law, computer science, public policy, human rights and empirical evidence. Indian ethical thought can contribute to the normative conversation, but it should operate in dialogue with contemporary institutions and multidisciplinary expertise.

YOUTH, CITIZENSHIP AND NATION-BUILDING

Young people occupy a central position in the long time horizon of 2047. Their contribution should not be understood only in terms of labour-market productivity. Youth participation also includes entrepreneurship, research, volunteering,

environmental stewardship, cultural creativity and civic engagement. The ethical objective is to create conditions in which young people can develop capabilities and exercise agency responsibly.

National identity in a constitutional democracy can be connected with service, responsibility and respect for pluralism. This does not require a single cultural identity. Instead, civic participation can be grounded in shared constitutional commitments and in the recognition that development is a collective process. Higher education institutions can support this through service-learning, innovation challenges, social entrepreneurship, student research, community projects and ethical leadership programmes.

INDIA'S GLOBAL ROLE AND THE ETHICS OF INTERDEPENDENCE

The idea of vasudhaiva kutumbakam provides a useful conceptual entry point for considering global interdependence. In contemporary terms, the principle can be connected to cooperation on climate change, public health, knowledge exchange, disaster response and sustainable development. It should not be treated as a claim of cultural superiority; its analytical value lies in framing global challenges as requiring shared responsibility.

The international relevance of an ethical development model also depends on institutional credibility at home. Global leadership is strengthened when domestic institutions demonstrate accountability, respect for rights, social inclusion and environmental responsibility. The ethical dimension of global engagement therefore has both external and internal components: cooperation with other countries and the quality of institutions experienced by citizens.

DISCUSSION: FROM VALUES TO INSTITUTIONS

The principal contribution of this paper is the proposition that the relationship between Indian ethics and Viksit Bharat should be analysed as a process of institutional translation. Values alone do not produce development outcomes. The following sequence is therefore proposed:

- Value: identify the ethical principle, such as responsibility, non-harm, truthfulness, service or stewardship.
- Interpretation: define the principle in a manner compatible with constitutional democracy, pluralism and contemporary knowledge.
- Institution: translate the principle into rules, procedures, incentives, professional standards and accountability mechanisms.
- Domain: apply the institutional principle to governance, education, business, society, environment or technology.
- Outcome: assess whether the application improves access, dignity, inclusion, sustainability, trust or substantive human capability.

This framework also clarifies why normative discussion must be accompanied by supporting scholarship. Development ethics establishes that development involves value judgments; the capability approach provides a way of examining whether people possess substantive opportunities; constitutional values establish a democratic framework; and scholarship on Gandhian trusteeship and Indian ethics illustrates how traditional concepts can be critically interpreted in contemporary contexts (Deneulin, 2013; Sen, 1999; Kaur, 2022; Mohapatra, 2021).

The framework also introduces a necessary caution. Indian ethical traditions cannot be treated as a single, uncontested repository of answers. Concepts have different meanings across philosophical schools and historical contexts, and some historical practices associated with Indian society may conflict with contemporary commitments to equality and individual dignity. The appropriate approach is therefore selective, critical and dialogical: retain ethically defensible principles, subject them to public reasoning, and assess them through constitutional and human-development standards.

PRACTICAL FRAMEWORK FOR VIKSIT BHARAT@2047

Ethical value	Institutional translation	Development domain	Possible indicators
Dharma / responsibility	Duty, integrity, accountability	Governance & professions	Transparency, grievance redressal, compliance, public trust
Satya / truthfulness	Evidence integrity and honest disclosure	Education, media, finance	Academic integrity, accurate reporting, disclosure quality
Ahimsa / non-harm	Conflict prevention, non-discrimination, harm reduction	Society, technology, environment	Safety, inclusion, reduced exclusionary practices

Ethical value	Institutional translation	Development domain	Possible indicators
Seva / service	Citizen-centred public service	Public administration & education	Accessibility, responsiveness, service quality
Sarvodaya / broad welfare	Inclusive distribution and participation	Economy & social policy	Access, employment, inclusion, capability expansion
Trusteeship / stewardship	Responsible use of economic power	Business & CSR	Worker welfare, environmental performance, stakeholder accountability
Vasudhaiva Kutumbakam	Cooperation and shared responsibility	Global engagement	Partnerships, humanitarian cooperation, sustainability collaboration

The framework is intended as an analytical and practical guide rather than a claim that every ethical concept can be measured directly. Indicators should be selected according to the institutional context and supported by reliable evidence. The central point is that values become developmentally relevant when they influence decisions, institutions and outcomes.

LIMITATIONS OF THE STUDY

The paper is conceptual and does not empirically test whether particular Indian values improve specific development indicators. The interpretation of Indian ethical traditions is necessarily selective and cannot represent the full diversity of Indian philosophical, religious and social thought. In addition, Viksit Bharat@2047 is an evolving policy vision, so institutional priorities and implementation strategies may change over time. Future research can therefore test the proposed framework through comparative case studies, institutional surveys, citizen-experience research and sector-specific analysis.

CONCLUSION

The central issue in Viksit Bharat@2047 is not whether economic, technological and infrastructural progress is important; it is how such progress should be evaluated and governed. Development ethics demonstrates why questions of dignity, justice, freedom, responsibility and sustainability are intrinsic to development rather than external moral additions. Indian ethical traditions offer a substantial body of concepts through which these questions can be explored, but their contemporary relevance depends upon critical interpretation and institutional translation.

Dharma can inform responsibility and integrity; satya can strengthen commitments to truth and evidence; ahimsa can support non-discrimination and harm reduction; seva can deepen the ethic of public service; sarvodaya can direct attention toward broad-based welfare; trusteeship can illuminate responsibilities associated with economic power; and vasudhaiva kutumbakam can provide an ethic of cooperation. None of these concepts, by itself, is a policy programme. Their value lies in helping institutions articulate the purposes and responsibilities that should guide development.

The Constitution provides an essential civic framework for this process through justice, liberty, equality and fraternity. The capability approach further helps shift attention from aggregate resources to the substantive opportunities available to people. Sustainable development frameworks add the requirement that present progress should not undermine ecological and intergenerational well-being. Taken together, these perspectives support a model in which economic growth, social inclusion, institutional integrity, environmental sustainability and technological progress are treated as interconnected dimensions of development.

The practical implication is that weaving Indian ethics into Viksit Bharat should not remain at the level of slogans or symbolic references to tradition. It should be visible in institutional rules, educational practices, responsible business behaviour, environmental management, digital governance, citizen participation and mechanisms of accountability. The success of an ethical development framework should ultimately be judged by whether it expands human capabilities, protects dignity, reduces unjust exclusion and sustains the social and ecological foundations of future well-being. In this sense, Indian ethical thought can contribute to the Viksit Bharat discourse not as a substitute for modern institutions, but as a source of normative reflection that can help clarify what development is for and how it should be pursued.

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A Study on challenges of Urban Development project with reference to Ranchi Smart city

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Abstract

Ranchi Smart City Corporation Limited (RSCCL), established on 30th September 2016, functions as a Special Purpose Vehicle (SPV) responsible for the implementation of smart city initiatives in Ranchi. The corporation is mandated to plan, strategize, design, develop, manage, operate, and monitor urban development projects in alignment with the Smart Cities Mission launched by the Government of India, in coordination with the State Government.

Within the broader framework of *Viksit Bharat 2047*, which envisions a developed, technologically advanced, and sustainable India by the centenary of independence, urban transformation plays a critical role. The Ranchi Smart City Project embodies this vision by emphasizing improved urban infrastructure, digital governance, environmental sustainability, and enhanced citizen engagement.

However, despite notable progress under the Smart Cities Mission, the implementation of urban development projects in Ranchi continues to face several challenges that affect their efficiency, inclusiveness and long-term impact. These challenges are evident across key sectors such as urban mobility, solid waste management, digital service delivery and citizen-centric infrastructure development.

This study, titled *"A Study on Challenges of Urban Development Projects with Reference to Ranchi Smart City,"* adopts a mixed-methods approach incorporating spatial analysis, policy review and stakeholder consultations to critically examine ongoing initiatives. It evaluates the effectiveness, scalability and sustainability of these projects while identifying structural, administrative, financial, and socio-political constraints.

Furthermore, the research highlights key opportunities and proposes strategic interventions necessary to enhance project outcomes and governance mechanisms. By bridging the gap between local-level urban initiatives and national developmental aspirations, the study aims to position Ranchi as a potential model for smart and sustainable urban development, contributing meaningfully to the realization of the Viksit Bharat 2047 vision.

Keywords: Smart Cities, Urban Development, Ranchi Smart City, Governance, Infrastructure, India, Viksit Bharat 2047

Introduction

A developed nation is a sovereign state marked by a high standard of living, robust technological advancement and a post-industrial economy where the service sector drives wealth creation.

India is currently navigating a steady upward trajectory on the global stage, evidenced by its rise to rank 130 out of 193 countries in the United Nations Development Programme's 2025 Human Development Report (HDR). Capitalizing on this momentum, the nation stands at the precipice of a transformative era, actively pursuing the ambitious vision of Viksit Bharat 2047—a developed, technologically advanced and sustainable nation by its independence centenary.

A central pillar of this initiative is a massive push for holistic infrastructure development across physical and digital sectors. Because rapid urbanization has made cities the primary engines of economic growth and social progress, modernizing transportation networks and establishing sustainable, tech-driven urban centers are essential to achieving this national aspiration.

To address the urgent need for innovative city management, the Government of India launched the Smart Cities Mission on June 25, 2015. This cornerstone initiative targets 100 designated cities, aiming to drive comprehensive urban regeneration through integrated planning, intelligent technologies and citizen-centric governance. Each city is tasked with developing a model of sustainable urban living that substantively contributes to the national developmental agenda.

Ranchi, the capital of Jharkhand, was selected in 2016 as one of the 13 cities under the mission's fast-track category. Its journey represents a paradigm shift toward technology-driven urban development and serves as a vital microcosm for India's broader transformation.

Spearheaded by the Ranchi Smart City Corporation Limited (RSCCL) since September 2016, the mandate is expansive. RSCCL is responsible for the planning, design, execution, and continuous monitoring of urban projects. The success of Ranchi's initiatives directly feeds into the broader narrative of Viksit Bharat 2047, demonstrating how integrated urban planning can foster economic resilience and elevate the quality of life.

Despite the significant impetus provided by the Smart Cities Mission, the path to sustainable development is fraught with formidable obstacles. Urban development projects in Ranchi—representative of many Tier-II and Tier-III cities across India—grapple with multifaceted hurdles that threaten their efficiency, inclusivity and long-term viability.

Literature Review

A developed nation is widely understood as a sovereign state marked by a high standard of living, robust technological advancement and a post-industrial economy driven primarily by the service sector. India is currently navigating a steady upward trajectory on the global stage, evidenced by its rise to rank 130 out of 193 countries in the United Nations Development Programme's 2025 Human Development Report (HDR). Capitalizing on this momentum, the nation is actively pursuing the ambitious vision of *Viksit Bharat 2047*—aiming to become a developed, technologically advanced and sustainable nation by its independence centenary.

A central pillar of this initiative is a massive push for holistic infrastructure development. Because rapid urbanization has positioned cities as the primary engines of economic growth, modernizing transportation networks and establishing sustainable, tech-driven urban centers are essential. To address this, the Government of India launched the Smart Cities Mission on June 25, 2015. Targeting 100 designated cities, the mission aims to drive comprehensive urban regeneration through integrated planning, intelligent technologies and citizen-centric governance. Each city is tasked with developing a model of sustainable urban living that substantively contributes to the national developmental agenda.

Research Methodology

To systematically investigate the impediments hindering optimal project outcomes in Ranchi and to evaluate their alignment with the Viksit Bharat 2047 vision, this study employs a robust, multidimensional research design. The methodology is structured to capture both the macro-level policy framework and the micro-level ground realities of urban development in a Tier-II city.

Research Design

This study uses a case-study research design with a mixed-source evidence strategy. The study combines documentary/secondary evidence, stakeholder evidence where actually collected, and spatial evidence where a reproducible spatial dataset is available. Because the present manuscript does not report a respondent count, sampling frame, interview dates, interview guide, coding protocol, GIS software/version, spatial datasets, or statistical output, claims that depend on unreported primary or spatial analysis are treated as analytical interpretations rather than independently verified empirical results. The revised protocol below specifies the procedures required for replication.

Study Area and Scope

The unit of analysis is the Ranchi Smart City Project and the institutional/project activities implemented or proposed through Ranchi Smart City Corporation Limited (RSCCL). The geographical scope is Ranchi, Jharkhand, with particular attention to the Area Based Development (ABD) component and pan-city initiatives documented in official project materials. The thematic scope covers four domains used in the original study: (1) urban mobility, (2) solid waste management, (3) digital/e-governance service delivery, and (4) citizen-centric infrastructure. Project boundaries and intervention descriptions should be taken from the cited RSCCL/Smart City Proposal documents rather than inferred from the generic term 'Ranchi Smart City.'

- Urban Mobility
- Solid Waste Management Systems
- Digital Service Delivery

- Citizen-Centric Infrastructure Development

Data Collection Methods

Data collection is organized into three evidence streams.

A. Documentary/secondary evidence.

(i) RSCCL's official About, Mission/Vision and project pages

(ii) Ranchi Smart City Proposal and its annexures

(iii) Ministry of Housing and Urban Affairs (MoHUA) Smart Cities Mission documents

(iv) Government of India parliamentary answers concerning Ranchi

(v) Comptroller and Auditor General (CAG) audit material relevant to the Smart Cities Mission and Jharkhand

(vi) environmental-clearance/project documents

(vii) peer-reviewed or institutional studies used for contextual interpretation. For every project-specific claim, record the document title, issuing institution, publication/update date, page/section, URL or document identifier, and date accessed.

B. Primary stakeholder evidence.

If interviews are undertaken, use purposive sampling with clearly defined stakeholder strata: RSCCL/project officials; municipal/state utility officials; contractors/executing agencies; planners/technical professionals; and residents/community representatives. Record the number approached, number interviewed, inclusion criteria, interview dates, mode, approximate duration, consent procedure, interview guide, and saturation rule. Use the same core questions across stakeholder groups, with role-specific probes. Transcribe interviews, remove identifying information, assign participant codes, and maintain an audit trail from transcript → code → theme → finding. No statement should be described as a 'stakeholder consultation finding' unless the corresponding primary-data record exists.

C. Spatial evidence. For each spatial claim, specify the dataset (e.g., master plan, project GIS layer, satellite imagery), source/provider, acquisition date, coordinate reference system, spatial resolution/scale, GIS software and version, preprocessing steps, analytical operations, and validation procedure. Map project footprints, ABD boundaries, transport corridors, major infrastructure and other study variables only from traceable datasets. Where such data are unavailable, describe the point as a documented project feature or research interpretation, not as a result of original GIS analysis.

A. Policy Review (Secondary Data) A rigorous review of existing literature, policy frameworks and institutional documents forms the foundational baseline of the study. Sources include:

- Official reports, Detailed Project Reports (DPRs), and execution guidelines from the RSCCL.
- Frameworks and progress reports from the Ministry of Housing and Urban Affairs (MoHUA) regarding the Smart Cities Mission.
- Documentation detailing the national developmental aspirations of *Viksit Bharat 2047* and the UNDP Human Development Reports.

B. Stakeholder Consultations (Primary Data) To understand the ground-level socio-political and administrative realities, primary qualitative data is collected through structured and semi-structured interviews. Target stakeholder groups include:

- RSCCL officials, municipal authorities and urban planners.
- Executing agencies and private contractors involved in project implementation.
- Local citizens and community representatives to gauge inclusivity and the actual impact of digital governance and infrastructure.

C. Spatial Data Collection To assess physical infrastructure and urban sprawl, spatial data (such as city master plans, land-use maps, and satellite imagery) is collected to visually map project footprints, land acquisition zones and baseline infrastructure deficits.

Parameters of Evaluation

Each project feature is evaluated using four constraint domains: structural/infrastructure, administrative/governance, financial, and socio-political/inclusion. For reproducibility, each claim is coded as one of: (a) Verified project fact—directly supported by an official project/government source; (b) Documentary interpretation—an inference drawn from one or more documents; (c) Primary empirical finding—supported by reported stakeholder/field data; or (d) Research recommendation—normative proposal by the authors. Only categories (a) and (c) should be presented as direct empirical evidence. Documentary interpretations must identify the source basis, and recommendations must not be written as observed facts.

- Structural & Infrastructure Constraints: Baseline deficits limiting the deployment of smart technologies.
- Administrative Constraints: Governance fragmentation and inter-agency coordination issues.
- Financial Constraints: Over-reliance on government funding and the lack of self-sustaining revenue models.
- Socio-Political Constraints: Issues related to land acquisition, social equity and citizen participation.

Data Analysis Techniques

Documentary analysis: extract project facts into an evidence matrix containing claim, source, date, page/section, and verification status.

Qualitative analysis: apply a transparent thematic-analysis sequence—familiarisation, initial coding, codebook development, theme construction, review, definition/naming of themes, and evidence mapping. A second coder should independently code a subset of transcripts/documents where feasible, with disagreements resolved through discussion and an audit trail.

Spatial analysis: conduct only the GIS procedures for which the named datasets are available; document projection, geoprocessing, distance/connectivity measures, classification rules and map validation.

Comparative assessment: compare verified Ranchi project objectives and implementation features with Smart Cities Mission objectives. Avoid numerical 'effectiveness' claims unless a defined indicator, baseline, observation period and calculation method are supplied.

Quality assurance: triangulate important claims across at least two independent authoritative sources where possible; flag contradictions; preserve the original wording of source documents for contested facts; and distinguish verified facts from interpretation and recommendations throughout the results.

- Qualitative Analysis: Thematic analysis of the stakeholder interview transcripts to extract recurring operational hurdles, governance gaps, and social inclusivity concerns.
- Comparative Assessment: Evaluating the current progress and outcomes of RSCCL projects against the stated objectives of the Smart Cities Mission and the overarching goals of Viksit Bharat 2047 to determine actual effectiveness and future scalability.

Overview of Ranchi Smart City Project

The Ranchi Smart City Project represents a critical paradigm shift in the urban landscape of Jharkhand’s capital, acting as a vital microcosm for India's broader urban transformation. Selected in 2016 as one of the 13 fast-track cities under the Government of India’s Smart Cities Mission (launched on June 25, 2015), Ranchi is tasked with demonstrating a scalable model of sustainable, technology-driven urban living.

Institutional Framework and Mandate

The execution of this ambitious initiative is spearheaded by the Ranchi Smart City Corporation Limited (RSCCL). Established on September 30, 2016, RSCCL functions as a Special Purpose Vehicle (SPV) operating in coordination with the State Government.

The mandate of the RSCCL is expansive and multifaceted. As the central nodal agency, it is responsible for the end-to-end lifecycle of urban development initiatives. Its core duties encompass:

- Planning and strategizing urban blueprints.
- Designing and developing smart infrastructure.

- Managing, operating, and continuously monitoring project execution.

Core Pillars and Strategic Vision

The Ranchi Smart City Project is fundamentally designed to align with the overarching national vision of Viksit Bharat 2047 which seeks to establish a developed, technologically advanced, and sustainable India. To translate this macro-level vision into micro-level reality, the RSCCL emphasizes four foundational pillars:

1. Improved Urban Infrastructure: Modernizing physical baseline systems to support future growth.
2. Digital Governance: Leveraging intelligent technologies to streamline city administration and management.
3. Environmental Sustainability: Integrating eco-friendly practices and resilient urban planning.
4. Enhanced Citizen Engagement: Ensuring that development is inclusive and responsive to the needs of the local populace.

Key Sectors of Intervention

To elevate the quality of life and foster economic resilience the ongoing projects under the RSCCL specifically target critical urban sectors. The primary areas of intervention include:

- Urban Mobility: Developing seamless, accessible, and sustainable transportation networks.
- Solid Waste Management Systems: Establishing efficient, long-term waste processing and sanitation mechanisms.
- Digital Service Delivery: Creating equitable access to municipal and governance services through tech-enabled platforms.
- Citizen-Centric Infrastructure: Constructing physical and social infrastructure that caters directly to community requirements.

The Operational Reality

While the establishment of the RSCCL and the influx of Smart City Mission guidelines have provided significant impetus, the project’s execution reflects the complex realities of developing a Tier-II city. The transition from traditional urban planning to a smart city model requires overcoming deeply entrenched structural, administrative, financial and socio-political hurdles. Consequently, the Ranchi Smart City Project serves not only as a blueprint for modern urban development but also as a vital testing ground for identifying and resolving the inherent challenges of scaling "smart" solutions in emerging Indian cities.

Analysis of Challenges

While the Ranchi Smart City Corporation Limited (RSCCL) possesses a robust institutional mandate designed to mirror the national aspirations of *Viksit Bharat 2047*, ground-level implementation reveals significant bottlenecks. Data synthesized from policy reviews, spatial analyses and stakeholder consultations indicate that transitioning a traditional Tier-II city into a technology-driven urban center is fraught with multidimensional hurdles. These challenges directly impact the efficiency, inclusivity, and sustainability of the city's four critical intervention sectors: Urban Mobility, Solid Waste Management, Digital Service Delivery and Citizen-Centric Infrastructure.

Based on the parameters established in the research methodology, the challenges are critically analyzed across four primary domains:

Structural and Infrastructure Constraints

The integration of advanced "smart" solutions relies entirely on the strength of a city's existing foundation. In Ranchi, baseline infrastructure deficits frequently neutralize the benefits of technological interventions.

- Urban Mobility Bottlenecks: Official Ranchi Smart City materials identify an objective of an efficiently managed, IT-enabled traffic and transportation system. The available project documentation supports the existence of this intervention objective, but the present manuscript does not report a GIS dataset or reproducible spatial analysis demonstrating that narrow arterial roads and unplanned sprawl are the measured causes of implementation constraints. Therefore, the latter is retained as an analytical interpretation rather than presented as a measured spatial finding.

- Inadequate Solid Waste Foundations: Ranchi's Smart City Proposal and RSCCL materials explicitly include solid-waste-management and ICT-enabled waste-management components. However, the manuscript does not report an inventory of processing capacity, segregation facilities, waste quantities, or operational-performance indicators. Accordingly, a deficiency in these facilities should be verified against current project/municipal records before being stated as a measured project outcome.
- Retrofitting Complexities: Unlike greenfield projects built from scratch, retrofitting smart citizen-centric infrastructure into densely populated, organically grown historical areas of Ranchi presents immense structural and logistical challenges.

Administrative and Governance Constraints

Despite the RSCCL functioning as a centralized Special Purpose Vehicle (SPV), the urban governance landscape remains highly fragmented.

- Inter-Agency Coordination: The execution of smart city projects requires synchronized efforts between the RSCCL, the Ranchi Municipal Corporation (RMC), state utility boards, and private contractors. Fragmented governance and overlapping jurisdictions frequently lead to bureaucratic friction and delayed approvals.
- Execution Delays: Delays and cost overruns should be treated as project-specific empirical claims only where supported by dated tender, contract, progress, audit, or parliamentary records. The revised study therefore recommends documenting the original schedule, revised schedule, contract value, revised cost and completion status for each cited project before attributing delays to inter-agency coordination.
- Capacity Deficits: There is often a technical capacity gap within traditional municipal bodies to effectively manage, operate and continuously monitor complex, technology-driven urban assets post-implementation.

Financial Constraints

Financial viability remains one of the most critical vulnerabilities threatening the long-term scalability of the Ranchi Smart City Project.

- Over-reliance on Government Grants: The Smart Cities Mission is centrally sponsored, and official audit material confirms the funding architecture of the Mission. For Ranchi specifically, the magnitude of dependence should be demonstrated using RSCCL financial statements, sanctioned/released amounts and project expenditure data for a defined period. Without that project-level financial series, the statement is best treated as a financial-risk hypothesis rather than a quantified finding.
- Lack of Self-Sustaining Revenue Models: To be truly scalable, a smart city must generate its own capital. Currently, there is a deficit in robust monetization strategies—such as user charges for smart services or successful Public-Private Partnerships (PPPs)—that are necessary to make these Tier-II city projects financially self-sustaining.

Socio-Political Constraints

Urban development must balance technological advancement with social equity. In Ranchi, socio-political dynamics present formidable barriers to achieving the inclusive vision of *Viksit Bharat 2047*.

- Land Acquisition Hurdles: Land acquisition and land development are important project-specific issues because the Ranchi Smart City model includes an Area Based Development component. Official project/legal documents should be used to identify the land source, acquisition/transfer mechanism, affected parcels and any documented disputes. The present manuscript does not provide a case-by-case legal or stakeholder dataset, so resistance and protracted conflicts should not be reported as measured findings without that supporting evidence.
- The Digital Divide and Service Delivery: While the mission emphasizes "Digital Governance," unequal access to digital literacy and internet connectivity among marginalized urban populations threatens to exacerbate existing social inequalities. Digital service delivery risks becoming exclusive rather than universally accessible.
- Deficient Citizen Participation: Citizen participation is an explicit element of the Ranchi Smart City vision and project documentation. The manuscript, however, does not report the number or composition of consulted citizens, questions asked, responses obtained, or a coding procedure. Consequently, a measured 'gap' between project design and citizen needs cannot be claimed from the current record; it should be presented as a research proposition unless primary consultation evidence is added.

The operational reality of Ranchi highlights a critical disconnect between the macro-level ambitions of the Smart Cities Mission and the micro-level structural, financial and social constraints of a Tier-II Indian city. Addressing these specific pain points is not merely an administrative necessity; it is a prerequisite for ensuring that Ranchi's urban development is genuinely scalable, sustainable and aligned with the overarching developmental agenda of *Viksit Bharat 2047*.

Project-Specific Evidence Verification

Claims in the original manuscript that are not presently reproducible from the reported methods—particularly statements framed as results of 'spatial analysis,' 'stakeholder consultations,' measured infrastructure deficits, cost overruns, citizen-participation gaps, or financial dependence—have therefore been qualified. A final empirical version should add the underlying datasets, respondent/sample information, interview records, project-level financial/progress tables, and GIS methods before presenting these claims as direct findings.

UNDP independently verifies the statement that India ranked 130 of 193 countries in the 2025 Human Development Report, with an HDI value of 0.685 for 2023. This national statistic is contextual evidence, not evidence of Ranchi Smart City project performance.

CAG audit evidence confirms the Smart Cities Mission's SPV/funding architecture and identifies RSCCL as the Ranchi SPV. The audit evidence supports institutional/funding-context statements, but it does not by itself prove every Ranchi-specific operational problem stated in the manuscript. Such findings require project-level progress, financial, contractual, field, or interview evidence.

Government of India parliamentary evidence confirms that Ranchi was selected in the Fast Track round in May 2016 and describes the greenfield Ranchi Smart City development and its planned infrastructure/services. The cited parliamentary answer reports a greenfield development area of 656 acres, while other RSCCL documents use different ABD figures for different planning/land components. Therefore, the manuscript should avoid treating 647.08, 647.30, 656, or 341 acres as interchangeable. Each figure must be accompanied by its source and the precise meaning of the area.

Verification of the revised project-specific evidence was undertaken against official RSCCL material, the Government of India's parliamentary record, CAG material, the Ranchi Smart City Proposal, and UNDP's Human Development Report 2025. RSCCL confirms that Ranchi Smart City Corporation Limited was incorporated on 30 September 2016 as the SPV for executing Ranchi smart city projects and describes its planning, development, management, operation and monitoring functions. The official RSCCL portal also documents pan-city and Area Based Development components and identifies transport, solid waste management, sewerage/drainage, IT connectivity, digitization, e-governance and public participation as project/service areas.

Discussion

The critical analysis of the Ranchi Smart City Project reveals a complex operational landscape where the ambitious, macro-level vision of *Viksit Bharat 2047* intersects with the micro-level realities of a Tier-II Indian city. The findings from this study corroborate the broader academic discourse—such as Kundu's (2020) concerns regarding financial sustainability and Nayak's (2019) observations on governance fragmentation—while contextualizing them within Ranchi's specific socio-political and structural environment.

The discussion of these findings underscores that deploying technology in a vacuum is insufficient for sustainable urban transformation. True "smart" development requires a holistic approach that concurrently addresses baseline infrastructural deficits, governance overlaps, financial independence and social inclusivity.

Interpreting the Disconnect

The operational hurdles in Ranchi highlight a fundamental friction between top-down policy formulation and bottom-up execution:

- The Retrofitting Dilemma: The strategy of superimposing smart technologies onto inadequate legacy infrastructure is inherently flawed. As seen in Ranchi's urban mobility and waste management sectors, technological solutions (like smart traffic lights or waste tracking) cannot compensate for a lack of physical road space or mechanical processing plants.
- The SPV Paradox: While the creation of the Ranchi Smart City Corporation Limited (RSCCL) as a Special Purpose Vehicle was intended to bypass traditional bureaucratic delays, it has inadvertently created parallel governance structures. The friction between the RSCCL and traditional bodies like the Ranchi Municipal

Corporation (RMC) demonstrates that without legal and functional integration, SPVs can complicate rather than streamline urban management.

- The Exclusivity of "Smart" Solutions: The socio-political constraints identified in Ranchi serve as a crucial warning. If digital literacy and equitable land development are not prioritized, smart city projects risk gentrifying urban spaces and alienating marginalized populations, directly contradicting the inclusive ethos of *Viksit Bharat 2047*.

Strategic Interventions and Recommendations

To overcome these systemic bottlenecks and reposition Ranchi as an exemplary model for Tier-II urban development, the following strategic interventions are proposed:

- Phased Infrastructure Upgrades (Fixing the Baseline): Prior to deploying high-end technological solutions, capital must be diverted to strengthening baseline physical civic amenities. A phased approach—where basic road widening, drainage clearing, and physical waste segregation facilities are established *before* digital tracking is implemented—will ensure that smart technologies yield actual functional benefits.
- Integrated Governance and Capacity Building: To resolve inter-agency friction, an Integrated Command and Control framework must be established that legally mandates synchronized operations between the RSCCL, RMC and state utilities. Furthermore, systematic capacity-building programs must be introduced to upskill municipal workers, ensuring they can independently operate and maintain smart assets post-deployment.
- Developing Self-Sustaining Financial Models: Ranchi must pivot away from a grant-dependent model to ensure long-term viability. This can be achieved by innovating localized revenue streams, such as introducing municipal bonds, implementing tiered user charges for premium smart digital services, and fostering robust Public-Private Partnerships (PPPs) that incentivize private investment in urban mobility and waste management.
- Fostering Bottom-Up Citizen Engagement: To address land acquisition hurdles and the digital divide, planning must become genuinely citizen-centric. This requires transitioning from passive stakeholder consultation to active community participation in the design phase. Implementing accessible digital literacy programs and establishing localized community grievance redressal mechanisms will ensure that marginalized voices shape the city's development.

Conclusion of Findings

The Ranchi Smart City project profoundly illustrates the complexities of urban transformation in developing economies, serving as a vital stress test for India’s urban development policies. While the initiative has successfully established a foundational framework through planned infrastructure and smart solutions, its overall impact remains significantly constrained. Ongoing challenges—spanning governance inefficiencies, structural financial dependencies, socio-economic inequalities and environmental concerns—reveal the deep-rooted structural growing pains experienced by emerging cities across the nation. The multifaceted hurdles identified in this study are not unique to Ranchi; rather, they are representative of the systemic barriers facing Tier-II and Tier-III cities throughout India.

To overcome these constraints, future urban policies must pivot away from isolated technological interventions and focus squarely on holistic, systemic reforms. The extent to which Ranchi Smart City fulfills its overarching mandate will depend entirely on its capacity to move beyond localized infrastructure initiatives and deliver inclusive, sustainable, and city-wide development. By acknowledging these constraints and actively pivoting toward the proposed strategic interventions, local governments can dismantle entrenched administrative silos, enhance institutional capacity, and foster self-sustaining urban ecosystems. Furthermore, it is imperative that development extends beyond strictly designated "smart areas" to ensure equitable access to urban services for all citizens.

Ultimately, resolving the localized hurdles in Ranchi is a critical prerequisite for achieving the grand, national developmental aspirations encapsulated in *Viksit Bharat 2047*. Without focused efforts to bridge the gap between technological ambition and ground-level execution, Ranchi is likely to achieve only partial progress toward the goals of a developed nation. Realizing the ambitious vision of *Viksit Bharat 2047* will require the recognition that true urban evolution demands not just technological progress, but a comprehensive approach firmly grounded in social inclusivity, environmental resilience, and strong, adaptable governance.

This study concludes that the Ranchi Smart City Project should be assessed not only by the presence of smart technologies or individual infrastructure assets, but by the extent to which those interventions are institutionally

coordinated, financially sustainable, spatially connected and socially inclusive. Verified project documents establish RSCCL as the SPV responsible for planning, implementing, managing, operating and monitoring Ranchi's Smart City initiatives, while official project materials identify mobility, solid waste management, digital/e-governance, basic infrastructure and public participation as important components of the planned urban transformation.

The evidence review also demonstrates the importance of methodological discipline in evaluating Ranchi. Several challenges identified in the original manuscript are plausible and consistent with the project's institutional and planning context, but they cannot all be treated as directly observed empirical findings because the original version does not report sufficient primary-data, spatial-data or project-level financial details to reproduce the analyses.

The strongest conclusion, therefore, is that Ranchi's smart-city transformation involves a continuing implementation problem in which technological ambition must be matched by physical infrastructure, inter-agency coordination, accountable financing, operational capacity and meaningful citizen participation.

For future evaluation, the study should establish a project-level evidence baseline containing schedules, budgets, physical progress, service indicators, spatial layers and stakeholder evidence. Such a baseline would allow subsequent researchers to measure whether interventions reduce travel time, improve waste-service performance, expand access to digital services, improve public-space/infrastructure quality, and distribute benefits equitably across communities. In this sense, Ranchi can provide a useful case for understanding how Smart Cities Mission interventions are translated into city-level outcomes, but conclusions about effectiveness and sustainability should remain proportional to the evidence actually collected.

Overall, Ranchi's experience suggests that a sustainable smart city is not created by technology alone. Its long-term success depends on integrating physical infrastructure, digital systems, institutional capacity, financial resilience and citizen-centred governance. These conditions are also consistent with the broader objective of inclusive and sustainable urban development associated with the Viksit Bharat 2047 vision.

Recommendations

To overcome the systemic bottlenecks identified in the Ranchi Smart City Project and reposition it as an exemplary, scalable model for Tier-II urban development, a shift from isolated technological fixes to holistic, systemic reform is required. The following strategic recommendations are proposed across four critical domains:

1. Phased Infrastructure Upgrades (Fixing the Baseline): Superimposing smart technologies onto inadequate legacy infrastructure is inherently flawed. Capital and planning must first be diverted to strengthening baseline physical civic amenities.

- Sequential Deployment: Implement a phased development approach. Basic physical upgrades—such as road widening, drainage clearing and the construction of physical waste segregation facilities—must be completed *before* deploying high-end technological overlays like smart traffic lights or digital waste tracking.
- Functional Synergy: Ensure that digital technologies are only integrated where they can yield actual, measurable functional benefits based on the physical capacity of the environment.

2. Integrated Governance and Capacity Building To resolve the "SPV Paradox" and eliminate inter-agency friction between the Ranchi Smart City Corporation Limited (RSCCL) and traditional bodies like the Ranchi Municipal Corporation (RMC), governance structures must be unified.

- Command and Control Framework: Establish a legally mandated Integrated Command and Control framework that synchronizes the operations, approvals and jurisdictions of the RSCCL, RMC, state utility boards and private contractors.
- Skill Development: Introduce systematic capacity-building and upskilling programs for traditional municipal workers. This will bridge the technical capacity gap, ensuring local bodies can independently operate, manage, and maintain smart assets post-deployment.

3. Developing Self-Sustaining Financial Models Financial viability remains a critical vulnerability. Ranchi must pivot away from its over-reliance on fluctuating central and state government grants to ensure long-term project sustainability.

- Innovative Revenue Streams: Localize capital generation by introducing municipal bonds and implementing tiered user charges for premium smart digital services.

- Public-Private Partnerships (PPPs): Foster robust, transparent PPP models specifically designed to incentivize private investment in capital-intensive sectors like urban mobility and solid waste management.

4. Fostering Bottom-Up Citizen Engagement and Spatial Equity To prevent the gentrification of urban spaces and address formidable socio-political constraints, planning must become genuinely citizen-centric and inclusive.

- Active Community Participation: Transition from passive stakeholder consultations to active community participation during the early design phases. This approach can help mitigate resistance to land acquisition and ensure projects meet localized needs.
- Bridging the Digital Divide: Implement accessible digital literacy programs alongside the rollout of "Digital Governance" services to ensure marginalized urban populations are not alienated.
- Localized Grievance Redressal: Establish robust community grievance mechanisms to give citizens a direct voice in shaping and correcting the city's development trajectory.
- Expanding the Development Footprint: Deliberately extend infrastructure development and smart solutions beyond strictly designated "smart areas." Ensuring city-wide, equitable access to urban services is a prerequisite for fulfilling the inclusive ethos of Viksit Bharat 2047.

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Note on evidence status: Project-specific statements in this revised paper are distinguished between verified documentary facts, documentary interpretations, primary empirical findings, and recommendations. The paper should not report an interview, GIS, statistical, financial or field result unless the underlying data and procedures are documented in the methodology and retained in the research record.

Viksit Bharat @ 2047: Strengthening India's Economic Future through MSMEs, Startups and Financial Inclusion

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Abstract

India's Viksit Bharat @ 2047 ambition calls for a development pathway that combines productive enterprise growth with technological innovation and broad-based participation in formal finance. This paper examines micro, small and medium enterprises (MSMEs), Department for Promotion of Industry and Internal Trade (DPIIT)-recognised startups, and financial inclusion as three potentially complementary pillars of this transition. It undertakes a structured descriptive review of secondary evidence from government reports, parliamentary disclosures, administrative databases and published scholarship. Official reporting indicates that MSMEs account for approximately 31.1% of gross domestic product, 35.4% of manufacturing output and 48.58% of exports. As of 31 March 2026, more than 2.23 lakh startups had received DPIIT recognition and were associated with over 23.36 lakh reported direct jobs. PMJDY accounts rose from 42.20 crore in March 2021 to 57.11 crore in November 2025, while UPI volume increased from 4,595.61 crore transactions in FY2021–22 to 24,161.69 crore in FY2025–26. These measures demonstrate scale and institutional reach, not causal effects on productivity, welfare or economic growth. The paper develops an integrated enterprise–innovation–finance framework, identifies measurement limitations and proposes an outcome-oriented policy agenda emphasising productivity, startup survival, credit quality, digital capability and regional inclusion. Its contribution is an evidence-qualified synthesis rather than an econometric test of developmental impact.

Keywords: Viksit Bharat @ 2047; MSMEs; startup ecosystem; financial inclusion; PMJDY; UPI; economic development.

Introduction

The vision of Viksit Bharat @ 2047 places economic transformation within a long-term national agenda that extends beyond the expansion of aggregate output. A more developed economy must also sustain improvements in productivity, employment quality, innovation, enterprise competitiveness and opportunity across social and geographic groups. The extent to which businesses and households can participate in markets and finance is therefore as important as aggregate growth. The present study focuses on three institutional domains through which this participation may be broadened: micro, small and medium enterprises (MSMEs), startups and financial inclusion.

MSMEs are a large and heterogeneous enterprise category spanning manufacturing, services and trade. The Economic Survey 2025–26 reports contributions of approximately 31.1% of GDP, 35.4% of manufacturing and 48.58% of exports (Ministry of Finance, 2026a). These estimates establish the macroeconomic significance of the sector; they do not, however, reveal the productivity or profitability of a typical enterprise. The distinction matters because enterprises range from subsistence-oriented micro units to competitive exporters and technology-intensive suppliers. Policies that increase the number of registered enterprises may not generate proportionate gains in income or output unless the environment for enterprise performance also improves.

India's recognised startup ecosystem provides another dimension. Formal recognition under the Startup India initiative has expanded rapidly since 2016. By 31 March 2026, the reported cumulative number of recognised entities exceeded 2.23 lakh and associated direct jobs exceeded 23.36 lakh (Ministry of Commerce and Industry, 2026a). These aggregates capture the scale of the recognised ecosystem but cannot be equated with survival, scale-up success or net employment creation. Startup policy must consequently be assessed in relation to innovation diffusion, business continuity and the commercial application of new technologies as well as recognition counts.

Financial inclusion provides a third component of the enabling environment. Access to a transaction account, a reliable payment system and appropriate financial products may improve households' and enterprises' ability to save, pay, receive transfers and participate in markets. Yet ownership of a bank account is analytically distinct from meaningful usage, affordable credit or financial resilience. The Global Findex framework emphasises the need to distinguish access from actual use of payment, saving and borrowing services (Demirgüç-Kunt et al., 2022). India's Pradhan Mantri Jan-Dhan Yojana (PMJDY) and Unified Payments Interface (UPI) offer measurable indicators of the expansion of financial infrastructure, even though they do not directly measure the welfare impact of that expansion.

These domains may reinforce one another: financial services can facilitate enterprise transactions; startups may produce technological solutions that MSMEs adopt; and MSMEs may provide customers, distribution channels and production capacity for new ventures. Such linkages are plausible mechanisms, not findings of causal identification. This paper therefore asks what the available data demonstrate, how the domains may be connected, and which constraints limit their potential contribution to Viksit Bharat @ 2047.

Literature Review and Conceptual Foundations

Entrepreneurship, innovation and productive transformation

Schumpeter (1934) presented entrepreneurship as the introduction of new combinations of resources, processes, products and markets. The approach is useful for understanding startups as potential vehicles for experimentation and technological change. However, the creation or administrative recognition of a firm is not itself evidence that a commercially consequential innovation has occurred. Innovation-related outcomes should be assessed using indicators such as new products, patents, technology diffusion, commercialisation, customer adoption and productivity gains. These distinctions are especially important when policy reports rely on cumulative counts of recognised entities.

MSMEs represent a complementary rather than identical dimension of entrepreneurship. Their aggregate importance arises from numerous production and service relationships, including supplier networks, local markets and export activities. MSME performance is shaped by firm capabilities, access to working capital, infrastructure, management practices and timely buyer payments. The Ministry of Finance (2026a) discusses structural transformation and industrial competitiveness, while the Ministry of Micro, Small and Medium Enterprises (2026) documents measures aimed at improving MSME export participation and market access. Such interventions are potential enabling conditions; their effectiveness requires outcome-based evaluation.

Financial development, access and use

Financial development can broaden opportunity by reducing barriers to savings, payments and investment. Beck et al. (2007) found that financial development was associated with improvements in the income position of poorer groups across countries, indicating the distributional importance of financial systems. Sharma (2016), using Indian time-series evidence from 2004–2013, reported relationships between dimensions of financial inclusion and economic growth. The empirical designs, periods and measures of these studies differ from the present documentary study, so their results cannot be transferred mechanically to the 2021–2026 indicators examined here.

Sen's (1999) capability perspective is also relevant: developmental progress concerns what people can effectively do with available resources and opportunities. From this viewpoint, the availability of a bank account or payment interface is a necessary infrastructure component for some activities, but not a sufficient measure of expanded capability. The Global Findex further distinguishes account ownership, digital payments, saving, borrowing and financial resilience (Demirgüç-Kunt et al., 2022). The distinction is critical to interpreting PMJDY and UPI statistics without overstating their developmental implications.

Digital public infrastructure and the enterprise ecosystem

India's digital financial infrastructure may reduce frictions in receiving customer payments, recording business transactions and connecting users across providers. In practice, adoption depends on connectivity, interoperable systems, affordability, trust, access to devices and digital literacy. Growth in aggregate transactions can reflect wider adoption, higher frequency of use, changes in payment choice or several of these mechanisms simultaneously. Without matched enterprise and household information, the effect of such infrastructure on profits, investment and welfare remains unobserved. The literature therefore motivates an integrated but carefully qualified framework linking finance, entrepreneurship and enterprise performance.

Research Gap, Questions and Objectives

Official reporting provides extensive information about MSME registration and output, startup recognition and employment, PMJDY accounts and UPI transactions. These measures are usually presented in different administrative series and are not designed to quantify joint development effects. The practical research gap addressed here is interpretive: existing aggregate indicators require a coherent explanation of what they represent, how the three domains may interact and which outcome measures would be needed to test developmental claims. The study does not claim to be a systematic literature review or to establish the absence of earlier integrative research.

The investigation is guided by three questions. First, what do verified official indicators show about the scale and recent development of MSMEs, startups and formal financial infrastructure? Second, which enterprise–innovation–finance linkages are theoretically plausible, and where does the available evidence stop short of demonstrating them? Third, how might policy measurement move from inputs and registrations toward productivity, survival, inclusive participation and quality of employment?

Accordingly, the objectives are to (a) document the economic contribution and administrative formalisation of MSMEs; (b) examine startup recognition and reported employment; (c) assess PMJDY and UPI expansion using comparable reference periods; (d) develop a conceptual account of interaction among the domains; and (e) identify policy and research priorities consistent with the limitations of secondary data.

Research Methodology

Design and evidence base

The study uses a descriptive and interpretive secondary-data design. It does not collect primary data, estimate a regression model or conduct statistical tests of causal effects. Quantitative information is drawn from Ministry of Finance publications, the Department of Financial Services annual report, Ministry of MSME releases and DPIIT statistics issued by the Ministry of Commerce and Industry. Published scholarly sources inform interpretation. Data are selected for their relevance to one of four dimensions: enterprise economic contribution and registration, recognised startup formation and reported employment, banking access, and digital payment activity.

Coverage and comparability rules

The principal analysis covers approximately FY2021–22 to FY2025–26 wherever comparable completed-year observations are available, with additional historical benchmarks for MSME GDP and PMJDY. The cut-off for reported startup stocks is 31 March 2026; the latest PMJDY observations used in its original audited annual-report series are for November 2025. The reference date is stated beside each indicator rather than suggesting that every measure was observed at the same time. Figures from different administrative classifications are not combined into one synthetic growth series. In particular, Udyam and Udyam Assist registrations are identified separately, annual startup recognition is distinguished from cumulative recognition, and financial-year UPI totals are not mixed with partial-year figures.

Analytical procedure and safeguards

The analysis proceeds by verifying selected figures against identifiable official releases, displaying data in tables with source notes, describing direction and scale, and comparing indicators with the corresponding conceptual outcome. Some simple percentage changes are calculated only for comparable observations, with rounding noted. Statements are explicitly separated into documented observations, plausible mechanisms and policy proposals. Because there is no counterfactual or enterprise-level linkage, no observed trend is interpreted as proof that one programme caused GDP growth, entrepreneurship or household welfare improvement.

Results and Interpretation

MSMEs: macroeconomic contribution, exports and formalisation

The MSME sector occupies an important position in production and trade. Table 1 presents selected official indicators but intentionally does not combine the figures into a continuous series. The historical gross value added (GVA) estimate and the later headline GDP figure originate in different reporting releases; export figures similarly depend on the definition and reference period adopted by the issuing agency.

Table 1. Selected official indicators of MSME economic contribution

Indicator	Reported value	Period / qualification
MSME GVA as share of GDP	30.1%	FY2022–23
MSME share of manufacturing output	35.4%	Reported in Economic Survey 2025–26
MSME contribution to GDP	31.1%	Reported in Economic Survey 2025–26
MSME share of exports	48.58%	Economic Survey 2025–26 headline
Exports of MSME-specified products	48.55%	FY2024–25 merchandise exports

Sources: Ministry of Micro, Small and Medium Enterprises (2024, 2026); Ministry of Finance (2026a). The 48.58% headline and 48.55% product-based export measure are not treated as identically defined observations.

The Economic Survey 2025–26 reports 31.1% for GDP, 35.4% for manufacturing and 48.58% for exports (Ministry of Finance, 2026a). A separate Ministry of MSME release places MSME-specified products at 48.55% of India's merchandise exports in FY2024–25 (Ministry of Micro, Small and Medium Enterprises, 2026). Both are valid source-specific descriptions, but they should not be used as a single historical series without harmonising their definitions. Similarly, a 2024 ministry release placed MSME GVA at 30.1% of GDP in FY2022–23 (Ministry of Micro, Small and Medium Enterprises, 2024). The observations establish significance, not the sector's incremental contribution to GDP growth.

Formal registration has also widened. On 4 July 2025, the ministry reported more than 3.80 crore registrations on Udyam and over 2.72 crore on Udyam Assist, together exceeding 6.5 crore enterprise records; it also referred to approximately 28 crore employment opportunities reported through the registration system (Ministry of Micro, Small and Medium Enterprises, 2025). Udyam Assist was introduced to facilitate recognition of informal micro-enterprises. As these administrative systems reflect different coverage rules, the rise in combined registration should be interpreted as expanding institutional visibility rather than a directly measured increase in the population of operating enterprises or independently verified jobs.

For Viksit Bharat, the policy issue is whether formal visibility enables measurable improvements in productivity, timely credit, better payment discipline, technology upgrading and remunerative employment. More registered units may be an enabling first step, but their performance must be tracked after registration. Comparable enterprise-level cohorts would be needed to examine whether formalisation is followed by higher sales, wages, profits, survival or export participation.

DPIIT-recognised startups and reported employment

Startup India has created a recognisable administrative category for eligible ventures. Official reporting confirms accelerated annual recognition in FY2025–26 and increasing cumulative recognition since launch. The relevant distinctions between annual additions, cumulative recognised entities and reported direct jobs are made explicit in Table 2.

Table 2. DPIIT-recognised startups: annual and cumulative measures

Measure	FY2024–25	FY2025–26 / as of 31 Mar 2026
Newly recognised entities	36,400+	55,200+
Direct jobs reported for those years	366,870+	499,400+
Cumulative recognised startups	—	223,000+
Cumulative reported direct jobs	—	2,336,000+
Recognised entities with at least one woman director/partner	—	107,000+

Source: Ministry of Commerce and Industry (2026a). Annual additions and jobs refer to the respective financial years; cumulative figures refer to the position as of 31 March 2026.

The government reports that annual startup recognitions grew by 51.6% and annual direct jobs reported by recognised startups grew by 36.1% in FY2025–26 relative to FY2024–25 (Ministry of Commerce and Industry, 2026a). The official release also reports more than 1.07 lakh recognised entities with at least one woman director or partner. That indicator should not be confused with a measure of women’s controlling ownership, independent managerial authority or realised entrepreneurial earnings.

Recognition and employment totals are useful ecosystem measures; however, they contain no firm-level counterfactual. The official status data reported for 31 January 2026 identify 6,789 recognised startups categorised as closed in the relevant MCA records, which demonstrates why closure status should be monitored in addition to cumulative registrations (Ministry of Commerce and Industry, 2026b). This count should not be converted into a survival rate without careful treatment of cohorts, registration dates, possible status lags and the relevant population at risk.

An improved outcome dashboard would report a cohort’s active status after three and five years, employees retained, revenue progression, technology adoption, commercialised innovation and regional distribution. These are preferable to treating recognition as an endpoint, especially when evaluating the transition from entrepreneurship promotion to productive, sustainable firms.

Financial inclusion: PMJDY access and balances

PMJDY provides a direct measure of the expansion of basic bank-account infrastructure. The Department of Financial Services (2026) reports sustained increases in accounts, deposits and RuPay cards (Table 3). These indicators differ in interpretation: the account series measures recorded access, deposit balances indicate funds held at reporting dates and card issuance reflects availability of an associated payment instrument.

Table 3. PMJDY accounts, deposits and RuPay cards

Reference date	Accounts (crore)	Deposits (₹ crore)	RuPay cards (crore)
March 2021	42.20	145,551	30.90
March 2023	48.65	198,844	32.94
March 2025	55.18	260,387	37.85
November 2025	57.11	274,033	39.39

Source: Department of Financial Services (2026), Annual Report 2025–2026. November is a point-in-time observation rather than a completed financial-year endpoint.

The number of accounts grew by 14.91 crore between March 2021 and November 2025, an increase of approximately 35.3% from the initial level. Reported balances increased by ₹128,482 crore over the same dates (Department of Financial Services, 2026). The data also show a substantial female presence in account ownership: 31.85 crore accounts, approximately 55.8% of the November 2025 total, were held by women according to that annual report. These aggregates are meaningful indicators of reach, but they cannot establish how frequently accounts are used or whether the account holder receives affordable productive credit.

A stronger account-usage assessment would examine active transaction frequency, average balances adjusted for price changes, account dormancy, formal saving, insurance uptake, access to appropriately priced credit and complaint resolution. Such measures could help distinguish initial access from sustained financial participation. Care is required not to infer increased financial resilience solely from the growth of total deposit balances, which can also reflect the number of accounts, transfer activity and other compositional effects.

UPI: a completed-year digital payment series

The original manuscript used the Economic Survey 2024–25 statistical appendix, in which the FY2024–25 row ended in December 2024. This revision substitutes a fully completed financial-year series published by the Ministry of Finance in July 2026. The revised data avoid conflating nine-month totals with twelve-month observations.

Table 4. UPI transaction volume and value: completed financial years

Financial year	Volume (crore transactions)	Value (₹ lakh crore)
2021–22	4,595.61	84.16
2022–23	8,371.44	139.15
2023–24	13,112.95	199.95
2024–25	18,586.60	260.56
2025–26	24,161.69	314.23

Source: Ministry of Finance (2026b), based on information supplied by the National Payments Corporation of India. All rows represent completed financial years.

UPI transaction volume increased from 4,595.61 crore in FY2021–22 to 24,161.69 crore in FY2025–26, a rise of approximately 426%. The reported value expanded from ₹84.16 lakh crore to ₹314.23 lakh crore, approximately 273% above the base-year level (Ministry of Finance, 2026b). As a result, transaction numbers increased more quickly than total reported value over the period. This pattern is compatible with the growing use of UPI for relatively smaller payments, although the available aggregate table alone cannot confirm the composition of users or merchants.

The volume of payments is not a measure of household income or enterprise profit. One payment may substitute for cash; several transactions may represent transfers between the same participants; and payment frequency can rise without a corresponding increase in final economic output. The development-relevant question is whether reliable, low-friction digital transactions support measurable improvements in business operations, consumer convenience, formal financial use and risk management. Answering it requires data beyond aggregate UPI volumes.

An Integrated Enterprise–Innovation–Finance Framework

The evidence supports a framework of possible complementarity rather than a demonstrated causal chain. MSMEs provide diverse production capacity and local market relationships; startups may contribute innovation and specialised services; and accessible banking and digital payment systems may facilitate transactions, saving and appropriately designed credit. Any benefits from linkage depend on enterprise capabilities, infrastructure, skills and institutional quality. Table 5 makes the implied mechanisms and testable indicators explicit.

Table 5. Proposed transmission mechanisms and indicators for future evaluation

Linkage	Potential mechanism	Outcome indicator needed
Formal finance → MSMEs	Working-capital access and lower payment frictions	Credit terms; payment delays; investment; output per worker
Startups → MSMEs	Technology and business-service diffusion	Adoption rates; efficiency; sales; quality of output
MSMEs → startups	Supplier, client and distribution opportunities	Contract volume; revenue retention; scale-up
Digital payments → firms	Transaction convenience and digital records	Adoption; costs; reconciliation time; fraud incidence
Financial inclusion → households	Use of savings, payments and risk products	Active use; resilience; affordable formal borrowing
All domains → regional opportunity	Broader market participation and enterprise networks	Rural coverage; women's outcomes; job quality

Note. This table is an analytical framework developed for the present paper. Mechanisms are hypotheses for future testing, not effects established by the descriptive data.

The framework suggests three complementary channels. The first is a finance channel: timely payments, accessible transaction accounts and responsible credit may ease liquidity constraints that otherwise inhibit enterprise investment. The second is a technology channel: startup innovations can potentially improve accounting, marketing, logistics, production and access to customers for smaller firms. The third is a market channel: expanding MSMEs can offer supply-chain partnerships, distribution opportunities and commercial demand for innovative ventures. The three channels operate within regulatory, infrastructure and human-capital conditions. A weak link in any one may reduce the effectiveness of the others.

This interpretation also separates "formalisation" from "developmental outcomes". Registration, recognition, bank accounts and payment transactions are mostly activity or access indicators. Productivity, employment quality, revenue growth, business survival, innovation diffusion, financial resilience and regional inclusion are outcome indicators. Public statistics support the former more consistently than the latter. Viksit Bharat monitoring should therefore report both sets separately rather than treating increases in administrative counts as sufficient evidence of economic upgrading.

Constraints and Policy Priorities

Shift measurement from reach to economic outcomes

The first recommendation is to improve reporting architecture. Enterprise registration cohorts should be followed over time to observe continuing operation, employment, turnover and access to finance. Startup data should distinguish annual new recognition, total recognised firms, operating status and firm age; job numbers should clarify whether they are employment stocks or newly reported jobs. PMJDY and UPI reporting should complement access and transaction volumes with active usage, consumer capability and service quality. These changes would make programme assessment more informative without implying that one indicator can substitute for another.

Address the financing and payment bottleneck

Delayed receivables, limited collateral and high information costs can constrain smaller businesses even after registration. Mechanisms such as the Trade Receivables Discounting System (TReDS) and credit-guarantee support seek to address aspects of these constraints. The Ministry of MSME (2026) describes initiatives in market access and export competitiveness, but policy appraisal should test actual reductions in payment time and financing costs. Greater formal availability of credit should also be evaluated against debt service burdens, lender incentives and business viability.

Promote adoption, not only availability, of technology

Digital tools will be most useful when firms can integrate them into actual operations. Digital payment acceptance, for example, may be easier to scale than the use of inventory software, secure recordkeeping, customer analytics or export compliance systems. Training, advisory services, interoperable solutions and cybersecurity awareness should accompany infrastructure expansion. Outcomes could be assessed using time saved, reduction in transaction errors, measurable cost savings and improved sales conversion rather than downloads or registration counts alone.

Improve the conditions for startup survival and collaboration

A stronger startup ecosystem requires more than initial recognition. Mentoring, incubator quality, procurement access, intellectual-property support and reliable demand are important potential enablers of commercially viable firms. The Ministry of Commerce and Industry (2026a) documents government-supported seed funding, funds-of-funds and

public procurement initiatives; their developmental effectiveness should be evaluated through cohort outcomes and additionality. Collaboration programmes between startups and MSMEs may be assessed through sustained contracts, technology adoption and jointly measurable productivity improvements.

Deepen inclusive and responsible financial participation

Access to digital finance should be considered alongside protection from fraud, affordability, privacy, usability and financial literacy. PMJDY's substantial share of women account holders is relevant to inclusion, but accounts should not be taken as proof of economic empowerment. Effective participation depends on access to safe products, the ability to transact independently and opportunities for productive use. Regional and gender-disaggregated research is necessary to identify where gaps persist rather than assuming that national-level infrastructure is equally accessible everywhere (Demirgüç-Kunt et al., 2022; Sen, 1999).

Discussion: Implications for Viksit Bharat @ 2047

Three findings stand out. First, the MSME sector remains economically significant, as indicated by its reported contributions to GDP, manufacturing and merchandise exports. Second, the number of DPIIT-recognised startups and associated reported jobs expanded substantially through March 2026. Third, the banking and payment architecture broadened through PMJDY and UPI, as measured by account access and payment transactions. These observations are supported by official data; however, they represent different underlying populations and units and are not directly additive.

The most significant interpretive issue is the distinction between capacity and outcome. Registration may make firms visible to institutions but does not automatically improve their production efficiency. Startup recognition can signify formal eligibility or entry into a policy ecosystem but does not establish commercial success. Account ownership can improve access without demonstrating active use, while transaction growth may indicate widespread acceptance of a payment method without proving new value creation. A policy narrative that equates all these indicators with development risks exaggerating the available evidence.

The integrated interpretation remains important despite these limits. Financial infrastructure may lower some transaction barriers for firms; startups can potentially supply productivity-enhancing applications; and MSMEs can serve as an extensive network for diffusion, supply relationships and entrepreneurship outside leading metropolitan centres. These complementarities provide a credible basis for future investigation and targeted interventions. They are not an empirically estimated multiplier effect and should not be presented as one.

A practical Viksit Bharat monitoring system would therefore combine a small number of high-quality outcome metrics with administrative coverage indicators. These could include MSME real value added per worker, credit terms and payment delays, startup five-year survival and employment retention, active financial-account usage, business-facing digital payments, and regional differences in enterprise performance. Gender-specific indicators should measure ownership and decision-making alongside participation. Where feasible, linkages should be tested using matched firm datasets, quasi-experimental designs or longitudinal analysis rather than cross-sector aggregate correlations.

Conclusion

India's recent expansion in MSME formalisation, recognised startup activity and financial infrastructure provides an important institutional base for economic transformation. Official sources document the macroeconomic role of MSMEs, the rise of DPIIT-recognised startups and their reported direct jobs, growth in PMJDY accounts and balances, and rapid increases in UPI transaction volume. Taken together, the evidence indicates that enterprise visibility, entrepreneurial recognition and payment capacity have grown, although the measures refer to different concepts and reporting periods.

This paper's main contribution is to integrate these observations into a testable enterprise–innovation–finance framework while maintaining a clear boundary between evidence and inference. The promise of MSMEs, startups and financial inclusion for Viksit Bharat @ 2047 lies not simply in the numbers registered, recognised or transacted but in whether expanded capabilities translate into higher productivity, durable firms, quality employment, greater financial resilience and more balanced regional opportunity. Such outcomes require coordinated attention to finance, markets, skills, technology, regulatory processes and implementation capacity. Future policy evaluations should therefore prioritise measurable outcomes over headline administrative scale.

Limitations and Directions for Future Research

The study relies on published secondary information and does not validate administrative microdata or conduct primary fieldwork. Reporting dates differ, particularly between PMJDY's November 2025 stock, UPI's complete FY2025–26 flows and startup recognition as of March 2026. Sectoral statistics may use different definitions and coverage; reported

direct jobs and registrations are not equivalent to independently estimated employment or enterprise survival. The review of academic literature is selective rather than systematic. Therefore, the propositions in the conceptual framework must not be read as statistically tested relationships.

Future research should link firm-level MSME records with credit, payment and operating outcomes; study survival and scale-up among startup cohorts; and examine whether digital payments change enterprise performance after accounting for initial firm differences. Household surveys should assess account activity, insurance, affordable credit, financial resilience and the agency of women users. State- and district-level comparative studies would also help identify geographic disparities hidden in national totals. Where data permit, carefully designed panel, difference-in-differences or other causal research designs could test whether finance and innovation linkages improve outcomes, rather than inferring such improvements from concurrent aggregate trends.

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From Access to Innovation: A Critical Review of India's Education Policy Evolution, Employability and the Viksit Bharat @2047 Vision

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Abstract

India's post-Independence education policies enlarged institutional capacity, strengthened the normative commitment to educational opportunity and created an increasingly qualified population. Yet educational participation and credential attainment cannot, by themselves, establish learning quality, productive employment or national innovation capacity. The National Education Policy (NEP) 2020 attempts to address several historical separations through competency-based education, multidisciplinary learning, vocational integration, credit mobility and research-oriented institutional development. This paper undertakes a structured, critical review of India's education-policy trajectory from 1947 to October 2026 and examines its relevance to employment transformation and the Viksit Bharat @2047 aspiration. The analysis synthesises major policy texts, official education and labour-force statistics, research-and-development indicators, and selected peer-reviewed and institutional literature. Recent evidence illustrates both progress and unfinished tasks: the higher education gross enrolment ratio reached 30.0% in 2023–24, school-stage participation and retention indicators improved in 2025–26, but foundational learning, education-to-work transitions and research intensity require sustained attention. India's reported gross domestic expenditure on R&D was 0.84% of GDP in 2023–24. The analysis proposes an Education–Employment–Innovation (EEI) framework, distinguishing policy inputs, institutional implementation, competencies, labour-market absorption and knowledge creation. It argues that effective reform requires outcome-sensitive financing, stronger foundational learning, portable and quality-assured credentials, regional industry–academia ecosystems, wider research participation and disaggregated evaluation. A phased roadmap to 2047 identifies implementers and measurable indicators. The study contributes an integrated policy-evaluation framework rather than a causal estimate of NEP 2020's impact.

Keywords: National Education Policy 2020; Viksit Bharat 2047; human capital; employability; higher education; research and development; India; education policy review

Introduction

India's ambition to become a developed, inclusive and innovation-capable economy by 2047 makes the effectiveness of education policy a strategic question. For decades, the policy agenda has attempted to reconcile mass access, social justice, linguistic and regional diversity, professional manpower requirements and the pursuit of excellence. These are not interchangeable objectives. A system can enrol more learners without producing commensurate gains in reading, numeracy, scientific capabilities, job quality or technological originality. Equally, the distribution of educational opportunities can improve while regional disparities in institutional resources persist. The relevant policy question therefore extends beyond how many students enter educational institutions to what they learn, what opportunities follow and how educational capability contributes to social and economic transformation.

The historical achievements are considerable. The Ministry of Education's All India Survey on Higher Education (AISHE) reports that enrolment increased from 3.42 crore in 2014–15 to 4.50 crore in 2023–24, while the higher education gross enrolment ratio (GER) rose from 23.7% to 30.0% over the same interval (Ministry of Education [MoE], 2026a). Female GER reached 31.2% in 2023–24. These are indicators of expanding participation, not direct measurements of employability, labour productivity or academic quality. AISHE GER measures enrolment relative to the projected population aged 18–23, and its published series uses projections based on the 2011 Census (MoE, 2026a). Its interpretation must respect that denominator.

The National Education Policy 2020 identifies foundational literacy and numeracy, multidisciplinary education, a flexible learning architecture, vocational integration, technology and research as linked reform priorities (MoE, 2020).

It sets an aspirational 50% higher education GER by 2035 and recommends increasing combined public expenditure on education towards 6% of GDP. These are policy objectives; neither the wording of the policy nor the availability of digital reform platforms demonstrates that they have been achieved. The distance between institutional reform and realised outcomes motivates a critical appraisal of both policy continuity and policy novelty.

The Viksit Bharat @2047 discourse adds a longer temporal horizon. In economic terms, the transition from middle-income status requires more than a larger labour supply or greater credential production. The World Bank (2024) distinguishes investment, technology infusion and innovation as complementary capabilities that economies must progressively develop. This suggests a central role for education not simply in supplying workers but in supporting technological absorption, organisational learning, research, entrepreneurship and citizen capabilities. Nevertheless, education is only one determinant of those outcomes: labour demand, industrial policy, health, gender norms, finance, infrastructure and governance are also consequential.

This study addresses five questions: (1) How have education-policy priorities evolved since Independence? (2) What do official indicators reveal, and not reveal, about the links between education and employment? (3) Which NEP 2020 mechanisms plausibly improve competency development and institutional flexibility? (4) What constraints affect implementation across India's varied contexts? and (5) Which sequenced interventions could make education more consequential for the 2047 development horizon? The paper's principal contribution is an integrated Education–Employment–Innovation (EEI) evaluation framework and a measurable policy roadmap, bringing school learning, post-secondary pathways, labour-market absorption and research institutions into a single analytical account.

Theoretical lenses and the policy-evaluation framework

Human capital theory treats education and training as investments capable of enhancing workers' productive knowledge and earning potential (Schultz, 1961). Endogenous growth theory places accumulated knowledge, human capital and incentives for technological change within the growth process itself (Romer, 1990). These approaches help explain why learning and research institutions may matter for national development. They do not imply that every additional year of schooling generates identical returns, that degrees are accurate proxies for ability or that the supply of graduates automatically creates suitable jobs.

Three complementary perspectives temper a narrowly instrumental view. First, Sen's (1999) capability approach locates education within substantive freedoms, including the ability to participate in social, political and economic life. Educational success should therefore include equity and agency rather than wages alone. Second, Spence's (1973) signalling model shows why employers may use qualifications as indicators under imperfect information; rising credential requirements can occur without proportionate improvements in underlying productivity. Third, Hanushek and Woessmann (2008) emphasise measured cognitive skills rather than years of schooling alone. Their international analysis is not an India-specific policy-impact estimate, but it provides a reason to examine learning outcomes alongside enrolment.

Technological change also complicates linear narratives about skills and jobs. Autor (2015) explains that automation can substitute for some tasks while complementing others. Goldin and Katz (2008) show how educational supply and technological change interact with the wage structure, although their historical analysis centres on the United States. For India, these insights motivate greater attention to adaptable competencies, work organisation and the capacity of firms to use skills—not only the volume of training provision. The World Economic Forum's employer survey identifies artificial intelligence, data-related occupations and information security among expected growth areas in India, but survey expectations must not be treated as observed employment counts (World Economic Forum [WEF], 2025).

The resulting EEI framework proposes five linked stages: policy inputs and rights → institutional capacity and implementation → demonstrable learning and transferable competencies → employment quality and productive absorption → research, technological diffusion and innovation. Equity, state capacity, industrial demand, geography and digital access moderate each stage. The framework is evaluative, not causal proof. A reform can succeed at its first stage—for example, by creating a credit repository—while its downstream contribution to income, job matching or innovation remains unmeasured.

Table 1. Education–Employment–Innovation evaluation domains

Domain	Illustrative indicators	Interpretive caution
Access and equity	GER, enrolment, transition, disaggregated participation	Participation is not measured proficiency.
Learning and capability	Reading, numeracy, applied assessment, completion	Different tests cover different ages and populations.
Mobility and pathways	Credit transfers, vocational progression, apprenticeship completion	Registration and credit upload are not successful mobility.
Employment and productivity	Employment by education, work quality, earnings, transitions	Labour demand and survey design shape estimates.
Knowledge creation	GERD/GDP, research quality, collaborations, technology transfer	Spending, publications and patents measure different outputs.

Note. EEI is a proposed synthesis developed for this paper. Indicators require source-specific definitions and appropriate disaggregation.

Methods and scope

Review design and evidence hierarchy

This article is a structured critical narrative policy review with descriptive secondary-data analysis. It is not a systematic review, a meta-analysis, a primary survey or an econometric estimate of policy effects. The documentary corpus consists of: (a) original or officially reproduced national policy texts and legal instruments; (b) official statistical releases for education, labour markets and research; (c) research reports from established public or multilateral institutions; and (d) selected peer-reviewed theoretical contributions. Source selection was purposive, guided by direct relevance to the five research questions, authority of the issuing institution, ascertainable publication dates, transparent definitions and applicability to India. Material publicly available by 25 October 2026 was eligible. Foundational works and historical policies were retained regardless of age.

The analysis proceeds through a historical periodisation of policy objectives; an indicator-based review of access, learning, employment and research; a policy-mechanism comparison of NEP 2020 reforms; and a synthesis of implementation risks and proposed interventions. Official sources take priority for the numerical baseline. Where an interpretation comes from employer surveys or institutional reports, its evidence type is identified rather than merged with official population statistics. The recommendations are constructed through policy reasoning and assessment of the evidence gaps, not presented as empirically validated treatments.

Statistical comparability and limitations

The statistical indicators are intentionally selective. AISHE 2023–24 concerns the higher education system in that academic year; UDISE+ 2025–26 concerns school institutions in a later academic year; the Periodic Labour Force Survey (PLFS) annual report for 2025 describes the January–December 2025 survey period; and R&D expenditure data reported in 2026 cover 2023–24 (MoE, 2026a, 2026b; Ministry of Statistics and Programme Implementation [MoSPI], 2026; Department of Science and Technology [DST], 2026). These series should not be interpreted as a single contemporaneous cross-sectional dataset. Neither their coexistence nor broad trend correlation establishes policy impact.

A particularly important qualification is that the PLFS sampling framework was revised in January 2025, and MoSPI (2026) cautions that resulting estimates may not be strictly comparable with earlier annual series. The present review consequently reports 2025 figures as levels and avoids unqualified causal claims about pre/post-2025 changes. Likewise, school assessment findings from rural household surveys cannot be generalised to all urban schools without an appropriate sampling basis. No regressions, significance tests, effects, p-values or confidence intervals have been fabricated or inferred from aggregated reports.

A limitation of this approach is that cross-institutional secondary data do not identify the counterfactual outcomes that would have occurred without NEP 2020. Implementation varies across institutions and states, and several downstream outcomes lack comparable longitudinal measures. The resulting contribution is an evidence-structured policy assessment and research agenda, not a causal judgement that any policy has succeeded or failed in isolation.

Policy evolution from Independence to NEP 2020

Reconstruction, universities and national capability: 1947–1968

Post-Independence educational reconstruction had to address profound deficits in schooling, social access, infrastructure and institutional capacity. The University Education Commission (1948–49) and Secondary Education Commission (1952–53) preceded the Education Commission chaired by D. S. Kothari (1964–66). The National Policy on Education of 1968 explicitly acknowledged these earlier commissions and the central role assigned to science, technology, equity and national integration (Government of India, 1968). In an economic setting concerned with national planning, industrial capacity and state-led institution building, advanced professional and scientific education acquired strategic significance.

A strength of this phase was its recognition that education was an instrument of broad social development rather than simply a private investment. At the same time, the scale of unmet basic needs constrained implementation. The post-Independence programme cannot fairly be assessed using contemporary artificial-intelligence or digital-skills criteria; its primary obligations involved system creation, access, teaching capacity and nation building. The appropriate historical question is whether a sufficiently inclusive foundation was constructed for subsequent mass education and technological learning.

From the 1968 policy to NPE 1986/1992

The 1968 policy established important commitments to equality of educational opportunity, language and science education and the quality of provision (Government of India, 1968). The National Policy on Education 1986, as modified in 1992, responded to persistent inequalities and the need to improve access and quality, including attention to disadvantaged groups, teachers and vocational opportunities (Government of India, 1992). The policy text itself reflects continuity: the 1986/1992 document assessed the 1968 framework while arguing for renewed action.

The beginning of market-oriented economic reform in 1991 altered the demand for professional, technical and service-sector capacities. However, attributing India's later services-led growth to a single education policy would disregard telecommunications investment, urban agglomeration, English-language capabilities, global outsourcing demand and enterprise strategy. Historical interpretation requires distinguishing policy intent (what the state sought), provision (what institutions could deliver) and outcomes (what learners and employers experienced). The recurring difficulty was how to extend opportunity while maintaining credible instructional quality across an increasingly differentiated system.

Rights-based expansion and the limits of access metrics

The Right of Children to Free and Compulsory Education Act, 2009 established an enforceable legal framework for free and compulsory elementary education for children in the specified age range (Government of India, 2009). The rights-based turn made educational access an obligation rather than only a planning aspiration. Public programmes also expanded schooling infrastructure and targeted inclusion. Yet the legal right to attend school is not equivalent to mastery of foundational competencies. The World Bank (2018) warns against confusing schooling with learning; this distinction is especially relevant when progression into higher grades is possible despite persistent skill gaps.

An additional consideration is that a human-capital interpretation of education must not displace constitutional and social objectives. Literacy, gender equality, social participation and inclusion have intrinsic value even where immediate labour-market payoffs are difficult to observe. A coherent policy review should therefore reject the false choice between equal access and productivity. Weak foundations undermine both economic and social returns, while exclusion from quality learning narrows the future pool of potential innovators.

NEP 2020: continuity and discontinuity

NEP 2020 does not begin from a policy vacuum. Its attention to equity, teacher preparation, vocational learning and scientific capability continues earlier commitments. Its more distinctive contribution is the ambition to reorganise pathways between domains of learning: the 5+3+3+4 curricular architecture, reduced separation between academic and vocational streams, competency-oriented assessments, flexible undergraduate options, multidisciplinary institutions and expanded research support (MoE, 2020). Such integration could reduce fragmentation if accompanied by curricula, faculty capacity, standards and sufficient institutional resources.

The shift is best understood as a proposed move from capacity expansion alone towards portable, demonstrable and adaptable capabilities. The claim must remain conditional. Credit structures and policy texts can make mobility technically possible, but they cannot ensure course availability, interoperable assessment, recognition by receiving institutions or a stronger local labour market. These outcomes require independent evaluation.

Table 2. Historical policy transitions and their contemporary relevance

Period and instrument	Primary historical emphasis	Question carried into 2047
Commissions, 1948–1966; NPE 1968	Institution building, scientific capacity, equal opportunity	Are basic learning and institutional resources sufficiently distributed?
NPE 1986; modifications 1992	Inclusion, school quality, professional and vocational pathways	Does expanded provision generate meaningful competencies?
RTE Act, 2009; associated access expansion	Legal entitlement to elementary schooling	Can rights-based access be paired with verified learning and retention?
NEP 2020 and enabling frameworks	Multidisciplinary study, competencies, mobility, research	Do reforms improve access and demonstrable downstream outcomes?

Sources: Government of India (1968, 1992, 2009); MoE (2020). Note: The final column is the author's evaluative synthesis, not a historical quotation.

Structural diagnostics: access, learning and the labour market

Participation has grown, but access remains differentiated

AISHE shows a meaningful expansion in higher education participation. Enrolment reached 4.50 crore in 2023–24 and overall GER was 30.0%. Female GER (31.2%) exceeded the overall figure, and the reported gender parity index was 1.08. However, Scheduled Caste GER (27.8%) and Scheduled Tribe GER (22.8%) remained below the national figure (MoE, 2026a). The implication is not that enrolment growth has been inconsequential; rather, aggregate progress coexists with social-group differences that should be examined alongside state, income, disability and institution-type indicators. Higher education quality, research facilities and graduate pathways are also unevenly distributed across institutions.

School-system indicators reveal another component of the pipeline. UDISE+ 2025–26 reports around 24.72 crore school students and 1.03 crore teachers, a secondary-stage GER of 71.7%, and a secondary-stage dropout rate of 7.0%, compared with 8.2% in the preceding UDISE+ edition (MoE, 2026b). While these are encouraging administrative indicators, they must be read within the report's schooling-stage definitions; administrative indicators do not directly measure the effectiveness of classroom instruction. The same release records secondary-stage retention at 51.9%, which merits further examination before claims of near-universal continuous progression are made.

The foundational learning constraint

Education-to-employment arguments often begin too late, with colleges or graduate recruitment. The accumulation of advanced mathematical reasoning, digital proficiency and professional communication depends on earlier reading and numerical capabilities. The Annual Status of Education Report (ASER) 2024 found that, across sampled rural India, 27.1% of children in Standard III could read a Standard II-level text and 33.7% could perform at least basic subtraction. Among Standard V children, 48.8% could read a Standard II-level text, and 30.7% could perform a division problem (ASER Centre, 2025). These measures improved relative to 2022 for several tasks, yet they show that a substantial proportion of children had not attained the assessed competency.

ASER is a household-based rural assessment, not a representative test of every urban and rural enrolled child. Its strength lies in making foundational learning visible beyond school registration data. NITI Aayog's 2026 school-education analysis similarly emphasises teacher support, assessment, school structures and vocational infrastructure as implementation concerns (NITI Aayog, 2026). The combination suggests that improving post-secondary employability is inseparable from elementary and secondary educational quality. Universities cannot reliably compensate for accumulated foundational deficits solely by adding short employability modules near graduation.

What employment data can and cannot show

The PLFS annual report for 2025 reports a usual-status unemployment rate of 6.5% among persons aged 15 years and above with secondary education or higher (MoSPI, 2026). This is an unemployment estimate for a specified

educational group and labour-force denominator. It is not the percentage of graduates considered unfit for work, not the placement rate of graduating students and not an employer skill test. In the same report, the worker-population ratio was 57.4% and labour-force participation was 59.3% for persons aged 15 years and above, with major gender differences. These figures provide labour-market context but do not identify a single education-driven mechanism.

The ILO–Institute for Human Development *India Employment Report 2024* studies youth employment, education and skills over a longer historical period and highlights the challenge of connecting educational gains to satisfactory employment opportunities (International Labour Organization [ILO] & Institute for Human Development [IHD], 2024). Its longitudinal analysis and the 2025 PLFS release should not be mechanically combined into a single uninterrupted employment trend, particularly in view of the latter's sampling redesign. Nor should employer-produced reports estimating 'employability' be directly equated with population unemployment rates: such studies may use different candidate samples, tests, skill thresholds and target occupations.

The conceptual distinction matters for policy. Employability can refer to a person's capacity to obtain and sustain suitable work; employment records realised labour-market participation; and employment quality concerns earnings, conditions, security and career progression. A person may possess strong skills while unable to find a job in a weak regional market. Conversely, a person may be employed below their qualification level. Training policy is more likely to be effective when coordinated with enterprise investment, local demand and credible work-based progression.

Technological transformation and the supply–demand problem

Employer expectations published in the WEF's *Future of Jobs Report 2025* indicate strong interest among participating Indian firms in artificial intelligence, data-related specialisms, digital security and technological adoption (WEF, 2025). The appropriate inference is that institutions should strengthen foundational digital literacy, quantitative reasoning, domain knowledge, communication and opportunities for higher-level specialisation. It would be inappropriate to infer from survey expectations the future number of jobs in India or promise employment merely through short AI certificates.

Beyond software occupations, the 2047 pathway involves manufacturing design, electronics, sustainable energy, logistics, agriculture, health services, public administration and care work. Broad capability development should combine discipline-specific technical expertise with transferable capacities, including critical reasoning, problem formulation, collaboration, ethical judgement and continuous learning. The industrial system must also have the investment and management capacity to absorb graduates productively. Education reform therefore belongs within a larger employment and innovation strategy, not a stand-alone supply-side solution.

Table 3. Verified baseline indicators and their limits

Indicator	Reported value and period	Interpretation and source
Higher education enrolment	4.50 crore, 2023–24	AISHE institutional enrolment (MoE, 2026a).
Higher education GER, ages 18–23	30.0%, 2023–24	Uses 2011-Census-based population projections (MoE, 2026a).
Female / SC / ST higher education GER	31.2% / 27.8% / 22.8%, 2023–24	Disaggregated access, not learning outcomes (MoE, 2026a).
Secondary-stage GER	71.7%, 2025–26	UDISE+ stage classification (MoE, 2026b).
Rural Standard III reading at Standard II level	27.1%, 2024	ASER sampled rural households (ASER Centre, 2025).
Unemployment, secondary education and above, ages 15+	6.5%, 2025	PLFS usual status; not a graduate employability measure (MoSPI, 2026).
GERD/GDP	0.84%, 2023–24	National R&D intensity (DST, 2026).

Note. Figures describe different reference populations and periods and must not be pooled as a single observational sample.

NEP 2020: mechanisms, potential and evidence gaps

Competency-based and multidisciplinary learning

NEP 2020 seeks to reduce rigid divisions among disciplines, professional education and vocational learning while foregrounding critical thinking and experiential pedagogy (MoE, 2020). The rationale is credible: modern problem-solving frequently crosses engineering, commerce, humanities, social science and natural-science boundaries. For

instance, renewable-energy systems require technical design, finance, regulations, environmental assessment and community participation; applied data science requires quantitative capability, field knowledge and ethical governance. Multidisciplinary exposure can support such integration, but compulsory breadth without sufficient depth risks becoming a catalogue of superficial courses.

A genuine competency orientation requires carefully specified learning outcomes, opportunities for application, formative feedback and valid assessments. Merely redesigning a course title or converting marks into credits cannot establish competency. Performance-based capstones, supervised projects and external moderation are possible implementation tools. Their usefulness should be assessed through demonstrated student work and institutional learning audits rather than counts of curricular revisions.

Flexible undergraduate structures and credit portability

The UGC's *Curriculum and Credit Framework for Undergraduate Programmes* provides a framework for flexible programmes and multiple entry–exit pathways (University Grants Commission [UGC], 2022). The National Credit Framework (NCrF) of 2023 seeks to integrate academic education, vocational learning and relevant experience within a common approach to credit assignment and mobility (UGC, 2023a). The Academic Bank of Credits (ABC) provides digital infrastructure for recognised academic credit storage and transfer. Together, these instruments could ease transitions between institutions and types of learning, particularly for students whose education is interrupted by employment, migration or household responsibilities.

Implementation quality remains decisive. A transferred credit has educational value only if learning outcomes are recognised by the destination institution, the course is available, credit validity rules are clear and the process does not impose prohibitive administrative costs. The existence of large numbers of learner identifiers or uploaded grade records is evidence of system use, not proof of completed inter-institutional transfers, better course completion or labour-market gains. A credible evaluation should measure attempted and successful credit transfers, rejected applications, time to decision, student satisfaction, completion patterns and differences by social group or institution type.

Vocational education, apprenticeships and work-integrated learning

NEP 2020's efforts to connect vocational and general education respond to a long-standing status hierarchy that often treats academic pathways as prestigious and practical training as residual. Introducing vocational exposure from the middle grades, creating practical projects and facilitating recognition of prior learning can expand informed choice (MoE, 2020; UGC, 2023a). Yet effective vocational education is equipment-intensive and depends on experienced instructors, safety standards, working connections with employers and opportunities for progression.

There are at least three implementation risks. First, a vocational subject without functional labs may become another theory examination. Second, assigning students prematurely to low-status tracks may reproduce socioeconomic segmentation. Third, placements labelled as internships may offer weak supervision or replace ordinary labour without reliable skill development. Policy should therefore emphasise voluntary, reversible and progression-compatible pathways, independently assessed competencies, protected students and employer accountability. NITI Aayog (2026) documents school-system concerns about vocational infrastructure and trainer availability that support this emphasis.

Teachers, faculty and institutional autonomy

Quality reform depends on sustained teacher and faculty development. A uniform mandate to teach through active learning cannot be realised if classes are overcrowded, specialist vacancies persist, laboratories are unusable or faculty lack time for curricular redesign. Greater institutional autonomy may support experimentation and responsiveness, but autonomy without transparent academic review and financial accountability can also increase inconsistency. The suitable design combines clarity about minimum standards with room for locally relevant curricula, credible assessments and independent quality assurance.

In higher education, the challenge is particularly acute for teaching-intensive and state-affiliated colleges. Elite research institutions can implement interdisciplinary laboratories and industry partnerships more easily than resource-constrained colleges. Competitive funding alone may therefore reinforce existing inequalities. A differentiated approach should maintain excellence incentives while also supporting basic laboratories, libraries, faculty training, digital accessibility and regional consortia.

Internationalisation and research orientation

The UGC's 2023 regulations provide a framework for approved foreign higher educational institutions to establish Indian campuses (UGC, 2023b). International collaboration may enrich research networks, curricula and student opportunity, but foreign branding is not a reliable proxy for academic quality or equitable access. Relevant evaluation questions include research collaboration, transparent tuition and financial support, recognition of qualifications, faculty exchange and demonstrated benefits to Indian institutions. The ambition to become an international knowledge destination is better operationalised through academic quality and openness than through reputational slogans.

The Anusandhan National Research Foundation Act, 2023 establishes a statutory basis for strategic support for research, innovation and entrepreneurship across multiple fields (Government of India, 2023). Its promise will depend on accessible competitive funding, governance transparency, peer review, research ethics and links between major institutions and less research-intensive universities. A legal foundation creates a mechanism; its research outputs and distributional effects require later evaluation.

Table 4. NEP-related mechanisms: theory of change and proposed evidence tests

Mechanism	Intended educational or economic contribution	Outcome evidence required
Competency-oriented curricula	Stronger demonstrable learning and adaptability	Independently moderated assessments and student work.
Multidisciplinary UG pathways	Integrative problem-solving and flexible specialisation	Depth of competencies, completion and graduate transitions.
ABC and NCrF	Credit portability, return to learning, recognition of skills	Completed transfers, acceptance rates and equity of access.
Vocational exposure and apprenticeships	Better occupational transitions and applied learning	Verified skill acquisition, supervision and quality employment.
Research foundation and collaborations	Wider knowledge production and technology diffusion	Grants awarded, research quality, collaborations and benefits.

Sources: MoE (2020); UGC (2022, 2023); Government of India (2023). The outcome tests are proposed by this article.

The Viksit Bharat @2047 horizon: beyond the credential economy

The demographic dividend is contingent

A relatively large working-age population can support growth only when individuals possess relevant capabilities and when suitable opportunities exist. Describing India's demographic profile as a guaranteed 'dividend' hides the essential conditions: basic health, educational quality, women's opportunity, mobility, industrial investment and productive demand. The costs of failure may include underemployment and social exclusion; equally, rapid skilling without demand-side policies could produce a pool of frustrated credential holders. The development objective is therefore productive and equitable participation over the life course, not maximising degree numbers in isolation.

Women's higher education participation and women's realised labour-market participation must be assessed separately. The gap between capability and paid employment can reflect care responsibilities, safety, discriminatory hiring, transport costs, occupational composition and local wage opportunities. A policy recommendation restricted to curriculum revision would miss those structural constraints. Effective transition support needs safe mobility, accessible childcare, credible placement services, flexible learning and better measurement of employment quality.

From technology consumption to innovation capacity

At the national level, India reported gross domestic expenditure on research and development (GERD) of ₹244,767.81 crore in 2023–24, equivalent to 0.84% of GDP (DST, 2026). Its ratio was 0.66% in 2019–20, 0.64% in 2020–21, 0.83% in 2021–22 and 0.82% in 2022–23; the series therefore shows changes over time rather than an unbroken monotonic increase. Higher education institutions accounted for 12.6% of total GERD in 2023–24, while the report's public/private sector definition assigns 51.8% to the private sector (DST, 2026). These categories must be interpreted according to DST classifications, which group institutions differently from everyday usage of 'public' and 'private'.

The policy relevance is not that an international spending percentage can be imported mechanically as a target, nor that expenditure guarantees useful research. Rather, an innovation system requires a sufficiently broad base of capable researchers, reliable laboratories, research infrastructure, clear project selection, reproducibility, industry absorption

and long-term funding. Public investment can sustain foundational and socially valuable research that private firms may underprovide; firms can complement it through application, experimentation and scale-up. The ANRF offers one institutional route for widening and coordinating that ecosystem, but its effectiveness should be assessed through competitive access and research outcomes rather than announcements alone.

A developed knowledge economy also needs organisational innovation and technology diffusion beyond frontier patents. Small and medium enterprises, public hospitals, local governments, agricultural organisations and schools may improve productivity through adapting proven technologies. The World Bank's (2024) distinction among investment, technology infusion and innovation is useful: India must strengthen the ability to absorb and improve technologies while also developing indigenous research. Education policy can support both functions through continuing professional development, applied research centres, extension services and cross-sector networks.

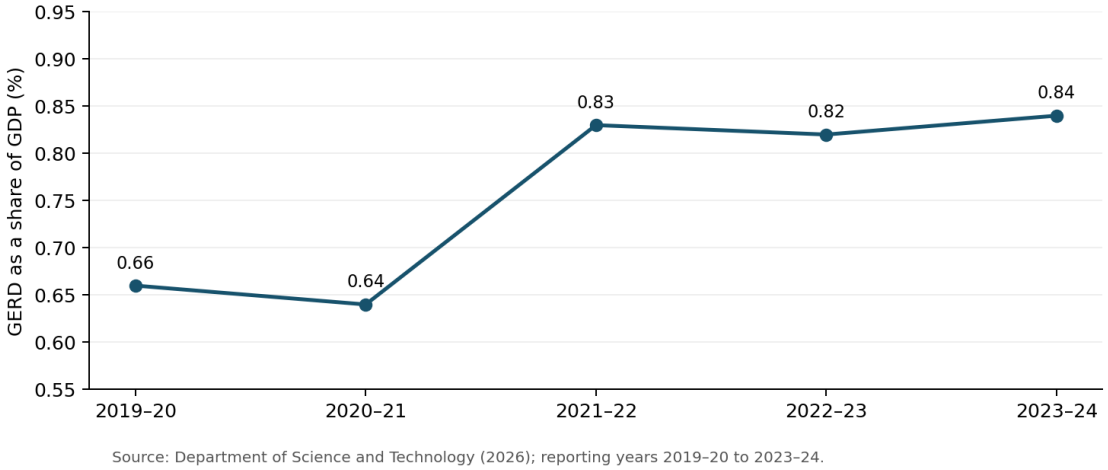


Figure 1. Gross domestic expenditure on research and development as a percentage of GDP in India, 2019–20 to 2023–24. Source: DST (2026). Data are fiscal-year observations, not projections.

The middle-income transition and the quality of work

Moving towards higher-value activities is often described as shifting from inexpensive labour or services to intellectual property and advanced production. In reality, competitive economies combine efficient services, manufacturing, logistics, agricultural innovation and sophisticated knowledge industries. Not every graduate needs to work in frontier science, and not every valuable innovation results in a patent. Education policy should support differentiated pathways—technicians, skilled trades, nurses, accountants, teachers, researchers, designers, entrepreneurs and administrators—while ensuring that movement between pathways remains possible.

Employers face their own constraints. Firms may not offer complex tasks, invest in worker development or reward high-level competencies even where educated people are available. Hence reforms should jointly cultivate demand for skills through productive investment, innovation procurement, standards adoption and business support. A solely supply-side 'skills gap' narrative risks attributing unemployment or low wages to individual educational deficiencies without adequately examining the quantity and quality of available jobs.

Internationalisation without neglecting domestic equity

International academic links can increase access to ideas, research equipment, research mentorship and professional networks. They may also create pressure to improve programme evaluation and global compatibility. Nevertheless, the goal of becoming a knowledge hub should not displace the needs of regional colleges serving first-generation learners. Successful internationalisation would be demonstrated through research quality, equitable scholarships, reciprocal collaboration, recognised programmes and relevant local spillovers, not only institutional memoranda or the number of foreign campuses.

Implementation constraints and policy tensions

Federal coordination and uneven capacity

Education is a concurrent constitutional subject, so national policy is implemented through varied state departments, universities, school systems and regulators (MoE, 2020). The principal tension is between a common reform ambition

and the unequal fiscal and administrative capacity to carry it out. National targets may be useful signals, but identical mandates can impose disproportionate costs on small colleges, remote schools and poorer states. Central support should be structured around transparent need measures and verifiable local improvement, with regional flexibility in execution.

Financing and the limits of technology-first solutions

Public spending is necessary but its composition matters. The NEP's 6%-of-GDP aspiration concerns combined public expenditure rather than simply the Union education ministry's budget. PRS Legislative Research (2026) reports that combined public education expenditure was estimated at 4.1% of GDP in 2022–23, emphasising the distance between the aspiration and available fiscal estimates. Comparisons across years or agencies require scrutiny of budget versus actual expenditure, revenue versus capital classifications and denominator revisions.

Digital platforms can lower transaction costs, yet hardware availability does not imply effective instruction. Rural connectivity, electricity reliability, assistive technologies, language accessibility, trained educators and maintenance budgets matter. A balanced financing approach should protect recurring expenditures—teachers, libraries, counselling, repair and academic support—rather than prioritising visible capital procurement alone. Public dashboards should track the functioning and use of assets, not merely procurement counts.

Quality assurance, incentives and equity

When regulatory compliance is measured primarily by enrolment, examination completion, placement advertisements or credit uploads, institutions can optimise recorded indicators without improving substantive outcomes. Quality assurance should therefore triangulate administrative data with independent learning assessments, student experience, graduate outcomes, employer feedback and qualitative review. Such monitoring must be contextual: penalising institutions that serve the most disadvantaged populations for low raw outcomes could discourage inclusion. Results should be reported with relevant starting points, institution profiles and changes over time.

Academic autonomy and accountability need to be designed together. Peer review of research, integrity safeguards, fair procurement and transparent programme evaluations can reduce the temptation to treat publication counts or patents as ends in themselves. Careful monitoring should also address adverse consequences such as narrowed curricula, excessive administrative reporting, internship exploitation, exclusion of students with disabilities or the devaluation of liberal learning.

Strategic imperatives: a phased Education–Employment–Innovation roadmap

The following roadmap is a set of recommendations from this review. Its milestones are not Government of India commitments, causal forecasts or statements that particular outcomes will be achieved. Each proposed intervention requires costing and feasibility assessment before adoption. The implementation logic is sequential: build reliable learning and data foundations first; improve pathways and employment transitions next; deepen diffusion and research capacity; and then strengthen international performance and inclusive prosperity.

Phase I, 2027–2030: secure minimum capability and data quality

First, prioritise foundational reading, numeracy and subject-specific teacher support, especially in districts with persistent learning deficits. The MoE, state education departments, SCERTs, DIETs, school leaders and locally relevant support organisations should jointly implement diagnostic assessments, mentoring, instructional-material support and verified remediation. Proposed monitoring indicators are independently measured foundational proficiency, attendance, successful progression by social category and the share of teachers receiving sustained pedagogical coaching. Administrative improvements must be interpreted with the same sampling and reporting definitions across periods.

Second, create a national but federated education-to-work evidence standard. Institutions would publish comparable graduate outcomes at 6, 12 and 24 months after completion, distinguishing further study, work-seeking, salaried employment, self-employment and work outside the field of study. Participation should be voluntary and privacy-protective, with robust consent and limited data retention. Nonresponse bias, income non-disclosure and regional employment conditions would be documented. Such a system could substantially improve the evidence base for future reform evaluation.

Phase II, 2031–2035: make pathways transferable and occupationally meaningful

Credit portability should move from administrative possibility to documented educational mobility. UGC, higher education institutions and relevant vocational regulators could standardise expected learning outcomes, publish transparent equivalence rules and introduce time-bound appeals for refused credit transfers. Pilot evaluations should compare actual progress and completion of mobile learners with suitably matched non-mobile learners. Indicators include accepted transfer applications, credit-loss rates, completion following re-entry, learner satisfaction and disaggregated participation.

Work-integrated learning should be co-designed with sector skill bodies, employers, institutions and worker representatives. The aim is not to mandate internships irrespective of sector but to develop supervised experiences with defined learning tasks, safe conditions and assessment. Academic credit would require a verified learning portfolio rather than a certificate of attendance alone. Graduate transition services should include entrepreneurship support and public-career pathways as well as private placements. The same reforms must protect broad academic education, civic capacity and scholarly independence.

Phase III, 2036–2040: deepen regional research and technology diffusion

ANRF-linked and complementary funding could support shared regional laboratories, equipment pools, applied research consortia and mentorship links between established research centres, state universities and teaching-intensive colleges. Competitive evaluation should consider research quality, reproducibility, social relevance and partnership benefits, with transparent peer review and safeguards for conflicts of interest. Multi-year grants should include maintenance, technician support and training, not only initial equipment purchase. Indicators include quality-assured outputs, external collaboration, functioning infrastructure, grants reaching underrepresented regions and documented uptake by firms or public services.

Research policy must avoid a narrow patent-count incentive. Some public benefits emerge as open-source tools, local-language resources, clinical practices, agricultural methods, improved teaching processes or organisational innovation. Evaluation portfolios should record research outputs and downstream use, disaggregated by field. Technology transfer offices should be developed as professional services, not simply renamed administrative units.

Phase IV, 2041–2047: evaluate capabilities and inclusive returns

The final phase should focus on whether reforms are reflected in sustained competencies, job quality, innovation capability and inclusive participation. Independent evaluation should compare feasible counterfactuals where programmes were rolled out in different places or times; use population-representative data where possible; and document unintended effects. International benchmarking should rely on transparent, comparable measures of learning and research quality rather than university ranking positions alone. The objective is an adaptive system in which individuals can retrain, move across educational pathways and participate in productive and civic life throughout adulthood.

Table 5. Proposed, measurable roadmap towards 2047

Phase	Priority and suggested lead actors	Indicators for independent monitoring
2027–2030	Learning recovery and harmonised data; MoE, states, SCERTs, DIETs	Foundational proficiency, subgroup gaps, teacher coaching, graduate tracer response quality.
2031–2035	Credit mobility and quality work-based learning; UGC, HEIs, skills regulators, employers	Successful transfers, re-entry completion, assessed apprenticeships, employment quality.
2036–2040	Regional research ecosystems; ANRF, DST, universities, industry, state councils	Research-quality measures, collaborations, equipment use, regional reach, technology uptake.
2041–2047	Lifelong learning and inclusive competitiveness; cross-ministerial and independent evaluators	Adult reskilling participation, productivity-related outcomes, equitable job transitions, research impact.

Note. This table proposes responsibilities and measurement categories; it does not imply that funds have been appropriated or targets formally adopted.

Governance architecture and safeguards

A practical implementation structure would include a small common set of national outcome definitions, interoperable state-level reporting, periodic external assessments and independent public dashboards. Measurement should occur at multiple levels without imposing the same bureaucratic burden on every school or college. Appropriate evaluation

design would distinguish implementation fidelity, intermediate outcomes and longer-term impacts. Public reporting should describe missingness, changes in methodology and uncertainty; where a measure is too weak for a quantitative claim, structured qualitative review should be preferred.

Financing can be organised into three complementary windows: foundational equity grants for institutions serving disadvantaged communities; capability-building grants for faculty development, curricula and equipment; and competitive research/innovation grants assessed by credible peer review. This mixed system limits the risk that high-capacity institutions monopolise all additional resources. Student voice, disability access, gender safety, academic freedom and data privacy are cross-cutting requirements rather than optional benefits.

Discussion: what constitutes credible success?

The assembled evidence supports a qualified conclusion. India's education system has broadened substantially, and the latest releases contain indications of progress in participation and several school-stage indicators. The same evidence also highlights serious foundational-learning gaps, differences in educational access across social groups and a national R&D intensity that warrants attention within the innovation agenda. However, the paper does not establish that NEP 2020 caused the observed changes, that all graduates lack employability or that a fixed percentage of research expenditure would automatically generate developed-economy status.

Policy evaluation is especially susceptible to three reasoning errors. The first is input–outcome substitution: reporting the establishment of an institution or portal as if it demonstrates learning or better work. The second is denominator slippage: confusing unemployment among educated members of the labour force with the fraction of graduates lacking competencies, or mixing school GER with higher education GER. The third is temporal attribution: treating observations published after a policy as effects of that policy without accounting for pandemic disruption, demographic changes, state reform trajectories and labour-demand conditions. The EEI framework is designed to keep these distinctions visible.

The policy recommendations also carry trade-offs. Stronger outcome measurement may encourage teaching to tests; industry involvement may narrow curricula; research competition may amplify institutional inequality; internationalisation may primarily benefit wealthier students; and digital infrastructure may crowd out ongoing instructional support. None of these trade-offs requires abandoning reform, but each requires explicit safeguards. A socially valuable education system cultivates economic capabilities alongside democratic participation, critical inquiry, ethical judgement and cultural and linguistic inclusion. A narrowly instrumental 'employment pipeline' is insufficient as a comprehensive national educational vision.

Conclusion

India's post-Independence education reforms created foundations of access, public institutions, professional learning and educational rights. NEP 2020 extends that history through a proposed redesign of learning structures, credit mobility, vocational integration, institutional flexibility and research support. The most important unresolved policy task is to convert these instruments into verified capability gains without weakening equity or reducing educational value to short-term recruitment needs. Official indicators demonstrate expansion, but learning, employment and research statistics concern distinct outcomes and cannot be merged into a simple success narrative.

The proposed Education–Employment–Innovation framework places foundational proficiency, portable learning pathways, quality work, technology diffusion and research institutions in a coherent sequence, while recognising the influence of state capacity and economic demand. The accompanying roadmap recommends phased measurement, protected foundational financing, regionally distributed capability building, industry–academia collaboration and independently evaluated research support. For Viksit Bharat @2047, education policy should be assessed not only by the number of graduates it produces but by the breadth of their freedoms, the quality of their capabilities, the opportunities available to them and the knowledge they can help society create. A subsequent research agenda should test particular reform mechanisms with appropriate longitudinal or quasi-experimental designs, rather than attributing national economic outcomes to policy texts alone.

Declarations and transparency

Study design and data availability. This is a review of published policy instruments, official aggregates and publicly available scholarship; no human participants were recruited and no confidential microdata were analysed. Source URLs and the data-definition register are supplied below.

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27. Appendix A. Source and verification register

Report and reporting period	Statistic used	What was verified	Key restriction
AISHE 2023–24, issued July 2026	4.50 crore; GER 30.0%; female GER 31.2%; SC 27.8%; ST 22.8%	MoE 8 July 2026 release against AISHE repository	18–23 denominator uses 2011-based projections.
UDISE+ 2025–26, issued July 2026	24.72 crore; secondary GER 71.7%; dropout 7.0%; retention 51.9%	MoE UDISE+ release and August 2026 backgrounder	School-stage definitions; institutional reporting.
ASER (Rural) 2024, published 2025	Std III reading 27.1%, subtraction 33.7%; Std V reading 48.8%, division 30.7%	ASER full-report summary tables	Rural household survey, not universal school test.
PLFS Annual Report 2025, released March 2026	Secondary+ usual-status UR 6.5%; WPR 57.4%; LFPR 59.3%	MoSPI/PIB release	Sample redesigned January 2025; not employability test.
DST R&D 2023–24, reported July 2026	GERD ₹244,767.81 crore; GERD/GDP 0.84%; HEI share 12.6%	DST parliamentary response tables	Different period from 2025–26 education releases.
UGC NCrF April 2023	Credit recognition, accumulation, transfer and prior learning	Official high-level committee report	Mechanism, not evidence of achieved outcomes.

OCCUPATIONAL STRESS AND MENTAL WELL-BEING AMONG WORKING PROFESSIONALS: IMPLICATIONS FOR HUMAN DEVELOPMENT TOWARDS VIKSIT BHARAT @ 2047

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Abstract

Modern corporate workplaces have intensified psychological strain and workplace stress across diverse economic sectors in India. This study analyzes the complex interrelationship between workplace stressors and employee psychological health, situating its significance within the broader developmental roadmap of Viksit Bharat @ 2047. As the country transitions into a technology-intensive, knowledge-driven developed nation, protecting workforce well-being is vital for sustainable economic growth. Adopting a descriptive and analytical secondary research framework, this study synthesizes empirical findings published in international labor databases (WHO, ILO) and national corporate wellness benchmarks (including Deloitte workplace surveys and industry assessments). The synthesis indicates that unmanaged occupational stress negatively affects workforce productivity, psychological resilience, and institutional stability. Technologically demanding fields, especially Information Technology (68%) and Healthcare (62%), exhibit elevated stress indices. Across demographic segments, early-career employees (ages 22–30) experience high baseline anxiety (61%) due to employment market entry pressures, whereas female professionals face substantial work-life friction (representing 55.3% of severely affected cohorts) owing to overlapping domestic and occupational responsibilities. Meanwhile, corporate wellness adoption rates have grown progressively from 24% in 2020 to 40% in 2025. The paper concludes that establishing formal employee assistance programs, flexible scheduling frameworks, empathetic leadership models, and supportive public policy standards are essential prerequisites for nurturing sustainable human capital for 2047.

Keywords: Occupational Stress, Mental Well-Being, Human Capital, Viksit Bharat @ 2047, Work-Life Balance.

INTRODUCTION

Occupational stress has developed into a critical public health and institutional challenge in contemporary work environments. Accelerated digitalization, aggressive market competition, and continuous performance appraisal systems have redefined traditional workplace expectations (Robbins & Judge, 2019). Modern organizational frameworks demand rapid adaptability, constant availability, and substantial cognitive effort from employees. While digital platforms support operational responsiveness, they frequently induce technostress by weakening the separation between professional obligations and personal recovery intervals. Consequently, persistent exposure to heavy workloads and ambiguous role responsibilities leads to cumulative mental fatigue, professional burnout, and psychological strain.

From a macroeconomic perspective, employee psychological health directly influences institutional resilience and overall economic output. The World Health Organization (2022) defines mental well-being not merely as the absence of mental illness, but as an integrated condition in which individuals can cope effectively with typical stressors, perform productively, realize their personal potential, and contribute meaningfully to their communities. When persistent stress pervades an organization, its impact appears through increased absenteeism, presenteeism, elevated voluntary turnover, and diminished innovative problem-solving. A resilient workforce therefore forms the bedrock of national economic stability.

India is presently situated at a pivotal demographic inflection point, characterized by one of the largest young workforces in the world. The national development blueprint, *Viksit Bharat @ 2047*, targets the elevation of the country into a fully developed economy by the centenary year of Indian independence (International Labour Organization, 2020). Achieving this developmental transition relies on sustained expansion across high-technology domains, advanced manufacturing, digital infrastructure, and financial services—sectors that depend directly on

energetic human capital. A fatigued and chronically stressed workforce cannot sustain prolonged macroeconomic growth. High levels of occupational distress inflate corporate operational expenses through healthcare spending, accelerate talent loss, and disrupt workplace equilibrium. Addressing occupational stress is thus both an institutional necessity and an urgent developmental priority. This study examines workplace well-being through the lens of sustainable human development, highlighting that an emotionally secure and healthy workforce is central to realizing India's 2047 aspirations.

LITERATURE REVIEW

Theoretical inquiries into workplace strain are largely built upon classical organizational psychology principles. Karasek's Demand-Control framework demonstrates that psychological distress peaks when employees face high job pressures accompanied by limited personal decision-making discretion. Within contemporary knowledge-based enterprises, this dynamic is expanded by the Job Demands-Resources (JD-R) model, which notes that excessive operational pressures (tight turnaround targets, role ambiguity, continuous digital reachability) deplete mental resources, resulting in chronic burnout if corresponding organizational resources (such as supportive leadership, work autonomy, and developmental feedback) are lacking (Dessler, 2020).

Cross-national empirical surveys consistently indicate rising workplace exhaustion. The World Health Organization (2022) notes that clinical anxiety and depressive conditions cost the global economy billions of Rs. each year in lost productivity. In the Indian corporate landscape, these pressures are compounded by societal expectations, aggressive hiring market benchmarks, and the rapid rollout of hybrid working arrangements that blur work-life boundaries.

National studies, such as the Deloitte Workplace Mental Health Survey (2023), demonstrate that a considerable proportion of Indian corporate professionals report ongoing exhaustion, yet formal organizational mechanisms remain underutilized due to social hesitation and organizational culture hurdles. Human resource management literature increasingly highlights the protective function of emotional intelligence (EI). Goleman (1995) showed that professionals possessing emotional competencies navigate social friction more effectively and maintain psychological balance under high-pressure conditions. However, personal coping practices alone cannot compensate for fundamentally unsupportive structural working conditions. Sustainable workforce development demands both individual resilience building and systemic organizational policy improvements.

OBJECTIVES OF THE STUDY

1. To identify and examine the key structural, technological, and organizational drivers of occupational stress among Indian corporate professionals.
2. To assess the documented effects of chronic workplace pressure on psychological stability and organizational productivity.
3. To evaluate cross-sectoral, age-stratified, and gender-differentiated empirical trends regarding workplace anxiety and work-life friction.
4. To analyze the strategic importance of structured corporate wellness frameworks in advancing the human capital goals of Viksit Bharat @ 2047.
5. To suggest evidence-based organizational interventions and public policy measures to support employee retention and workplace well-being.

CORE RESEARCH PROPOSITIONS

To structure this secondary descriptive and analytical inquiry without claiming primary inferential statistical validation, the paper is framed around four core analytical propositions:

- Proposition 1: Elevated workplace stress exhibits an inverse relationship with psychological stability, employee engagement, and subjective well-being.
- Proposition 2: Pronounced work-life imbalance corresponds with heightened emotional fatigue and domestic role conflict, showing observable gender differences.
- Proposition 3: Professionals working within digitally intensive (Information Technology) and high-acuity environments (Healthcare) exhibit elevated stress indicators relative to traditional operational fields.

- Proposition 4: Structured institutional wellness programs correlate positively with employee retention, psychological balance, and organizational productivity.

RESEARCH METHODOLOGY

This study uses a descriptive and analytical secondary research design to examine workplace health patterns across key segments of the Indian corporate economy. Synthesizing findings from institutional whitepapers, industrial assessments, and peer-reviewed journals provides a macro-level perspective on workplace well-being.

Data Sources and Transparency:

Secondary information was gathered from the following repositories:

- Global labor and health reports published by the World Health Organization (WHO) and the International Labour Organization (ILO).
- National corporate wellness studies, including the Deloitte Workplace Mental Health Survey Reports (2022–2023) and ASSOCHAM industry reports.
- Peer-reviewed literature in organizational psychology, organizational behavior, and human resource management.
- Official national developmental blueprints and economic policy frameworks related to human capital for 2047.

Analytical Approach:

Extracted secondary metrics—such as industry-level stress percentages, age-stratified anxiety patterns, gender-differentiated work-life friction indicators, and multi-year corporate wellness adoption trends (2020–2025)—were synthesized into comparative analytical tables to evaluate the propositions and ground the policy discussion in documented findings.

EMPIRICAL OBSERVATIONS AND ANALYSIS

Sector-Wise Distribution of Occupational Stress

Aggregated data demonstrates that workplace stress represents a widespread institutional risk across Indian corporate sectors, particularly within high-intensity, technology-driven industries.

Table 1: Sector-Wise Comparison of Stress Indices and Manifested Symptoms

Professional Sector	Documented Stress Level (%)	Primary Systemic Stressors Identified	Dominant Manifested Symptoms
Information Technology (IT)	68%	Technostress, continuous upskilling demands, tight delivery milestones, night shift rotations	Sleep disruption, cognitive exhaustion, depersonalization
Healthcare	62%	Extended shift patterns, high patient loads, continuous emotional labor	Compassion fatigue, acute anxiety, physical burnout
Banking & Finance	58%	Aggressive quarterly targets, tight regulatory scrutiny, compliance risks	Hypertension indicators, persistent anxiety, reduced morale
Manufacturing	53%	Rigid physical schedules, production quotas, occupational safety hazards	Musculoskeletal strain, chronic physical fatigue
Education	49%	Administrative overburdens, hybrid teaching formats, limited resource ratios	Emotional depletion, diminished professional efficacy
Public Sector / Administration	45%	Procedural delays, role stagnation, public accountability tensions	Bureaucratic apathy, lower engagement, career dissatisfaction

Note. Synthesized composite indicators derived from national corporate health metrics, industry whitepapers, and multi-sectoral human resource evaluations (2022–2024).

As displayed in Table 1, the Information Technology sector reports the highest stress index (68%), followed closely by Healthcare (62%). These elevated levels reflect continuous digital connectivity, high-stakes operational environments, and compressed project timelines.

Demographic and Socio-Economic Stress Vectors

Workplace strain also exhibits observable variations across age groups and gender cohorts.

Table 2: Age-Wise Anxiety Distribution and Coping Capacity

Age Cohort (Years)	Documented Anxiety Level (%)	Primary Underlying Career Stressors	Observed Psychological Coping Profile
22–30	61%	Entry-level market competition, job insecurity, entry-stage compensation constraints	Developing / Vulnerable (Higher tendency toward voluntary turnover)
31–40	54%	Mid-management pressures, work-life overlap, career trajectory plateaus	Moderate (Reliance on informal coping mechanisms)
41–50	43%	Technological adaptation friction, organizational restructuring, dependent care obligations	High (Stabilized career expectations and coping experience)
51+	35%	Health preservation, retirement transition, career succession planning	Very High (Established psychological resilience)

Note. Consolidated from secondary multi-cohort corporate health surveys (2022–2024); illustrates the inverse trend between professional experience and acute workplace anxiety indicators.

Table 2 demonstrates an inverse relationship between career stage and acute anxiety levels. Early-career professionals (aged 22–30) record the highest anxiety level (61%), driven by initial career uncertainties and developing coping mechanisms.

Gender Disparity in Work-Life Conflict:

Secondary surveys tracking domestic and professional role overlap reveal substantial gender disparities. Among professionals reporting severe work-life friction, 55.3% are female professionals, compared to 44.7% male professionals. This division highlights the persistent "double burden," where female employees handle demanding job deliverables while shouldering a disproportionate share of unremunerated household and family care responsibilities.

Longitudinal Trajectory of Corporate Wellness Interventions

In response to growing workplace fatigue, corporate enterprises have gradually expanded internal mental health and wellness provisions.

Table 3: Multi-Year Corporate Wellness Adoption Trends (2020–2025)

Calendar Year	Corporate Adoption Rate (%)	Primary Focus of Wellness Programs	Documented Employee Utilization Level
2020	24%	Emergency crisis counseling, transition support for remote operations	Low (Social stigma regarding psychological support)
2021	27%	Hybrid work guidelines, online stress awareness webinars	Low to Moderate
2022	31%	Formal Employee Assistance Program (EAP) implementation, mindfulness apps	Moderate (Gradual decline in corporate hesitation)
2023	34%	Group insurance policies covering outpatient psychological support	Moderate
2024	37%	On-site counseling provisions, mandatory rest periods, manager empathy training	High
2025 (Projected)	40%	Comprehensive institutional wellness frameworks, AI-guided stress tracking, full care benefits	Very High (Normalization of workplace mental health)

Note. Compiled from corporate wellness industry reports (2020–2025), reflecting the shift from viewing wellness as an optional benefit to treating it as a core business necessity.

Adoption rates rose from 24% in 2020 to 40% in 2025, demonstrating an institutional transition from ad-hoc emergency measures to formal well-being policies.

FINDINGS AND DISCUSSION

The secondary empirical synthesis supports the analytical propositions of the study:

- Support for Propositions 1 and 2: The synthesized data indicates that high occupational stress is linked with adverse psychological symptoms, including chronic insomnia, emotional depletion, and elevated anxiety. Work-life friction remains a key driver of employee strain, particularly among female professionals (55.3% representation among acutely affected cohorts) due to overlapping professional and domestic obligations.
- Support for Proposition 3: Sectoral differences are notable. Fast-paced, technology-driven, and high-acuity environments (IT at 68%, Healthcare at 62%) report higher stress indices than traditional sectors, largely due to constant digital availability, heavy operational responsibilities, and tight delivery schedules.
- Demographic Vulnerabilities: Early-career workers (aged 22–30) experience the highest baseline anxiety (61%), pointing to the need for structured onboarding mentorship, stress mitigation resources, and early-career support.
- Support for Proposition 4: The multi-year increase in corporate wellness adoption (reaching 40% in 2025) reflects growing organizational recognition that mental well-being directly impacts workforce retention, reduces absenteeism, and sustains operational performance.

STRATEGIC INTERVENTIONS FOR VIKSIT BHARAT @ 2047

To build a sustainable, productive workforce aligned with India's long-term developmental goals, the following multi-tiered interventions are recommended:

1. Institutionalizing Formal Employee Assistance Programs (EAPs):

Enterprises should move beyond surface-level wellness activities and establish fully confidential Employee Assistance Programs. Providing confidential access to certified psychologists, counseling sessions, crisis helplines, and stress management tools helps normalize psychological support in the workplace.

2. Implementing Flexible Work Configurations:

To mitigate work-life friction, organizations should establish core working hours, hybrid arrangements, and explicit "right-to-disconnect" policies outside normal duty schedules. These boundaries provide necessary recovery periods, enabling professionals—particularly women—to balance career growth with personal commitments.

3. Cultivating Empathetic Leadership and Emotional Intelligence:

Unsupportive management practices remain a key source of workplace anxiety. Organizations should conduct leadership training centered on emotional intelligence (Goleman, 1995), active listening, and early burnout identification. Transitioning from micromanagement toward supportive, results-based leadership helps alleviate preventable workplace tension.

4. Formulating National Psychosocial Workplace Standards:

Achieving the developmental aims of Viksit Bharat @ 2047 requires supportive public policy frameworks. Policymakers and industry organizations (such as NASSCOM and CII) should collaborate to create standardized workplace psychosocial wellness guidelines. Policies should encourage corporate mental health insurance coverage, promote reasonable workload limits, and incentivize institutions that maintain supportive workplace environments.

CONCLUSION

Occupational stress has transitioned from an isolated individual health concern into a critical macroeconomic and institutional challenge. The empirical synthesis presented in this study demonstrates that pervasive technostress, accelerated work cycles, and persistent work-life friction impose a profound cognitive and emotional toll on the workforce—disproportionately affecting tech-intensive sectors, female professionals, and early-career talent. When unmitigated, these stressors manifest as systemic productivity drains, elevated attrition rates, and diminished creative innovation, directly eroding the foundational human capital of the nation.

As India accelerates toward the centenary of its independence under the transformative roadmap of *Viksit Bharat @ 2047*, human capital remains the single most strategic driver of its competitive advantage. A world-class knowledge economy, technological leadership, and manufacturing excellence cannot be sustained by an emotionally depleted and burned-out workforce. Genuine national development cannot be evaluated solely through fiscal aggregates, industrial outputs, or gross domestic product metrics; it must intrinsically encompass the psychological well-being, dignity, and resilience of the human labor driving that expansion.

Ultimately, building a resilient corporate ecosystem requires a paradigm shift from viewing employee well-being as a discretionary welfare benefit to prioritizing it as an indispensable economic investment. By embedding institutionalized wellness architectures, establishing clear digital boundaries, cultivating emotionally intelligent leadership, and enacting protective public policies, Indian enterprises and policymakers can safeguard workforce vitality. Nurturing a healthy, motivated, and mentally secure working population will provide the vital social and institutional bedrock needed to transform the vision of a developed India by 2047 into an enduring reality.

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Comparative study on marketing strategy of Tata motors India limited and Hyundai motors India limited

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Abstract

The Indian automobile industry has emerged as a highly competitive and dynamic sector, compelling firms to adopt innovative and adaptive marketing strategies. This study presents a comparative analysis of the marketing strategies of Tata Motors Limited and Hyundai Motor India Limited over the last five years using four key performance parameters: turnover, market share, sales volume, and sales points. The objective is to evaluate the relative effectiveness of their marketing approaches in the Indian automobile industry. The analysis reveals that Tata Motors demonstrates stronger growth momentum across most parameters, indicating an aggressive expansion strategy, improved market penetration, and increasing consumer acceptance. In contrast, Hyundai Motor India exhibits a more stable and consistent growth pattern, reflecting a mature and controlled marketing approach. While both companies show fluctuations due to changing market dynamics, Tata Motors outperforms Hyundai in terms of overall growth and competitive positioning. The findings suggest that Tata Motors' marketing strategy has been more effective in driving business performance during the study period, whereas Hyundai maintains stability through gradual improvements. The study contributes to understanding how different strategic approaches influence organizational growth and market competitiveness in the automobile sector.

Keywords: Marketing Strategy, Turnover Growth, Market Share, Sales Performance

Introduction

The Indian automobile industry has become one of the most dynamic and competitive industries in the global market and continues to play a significant role in the economic development of the country in 2026. The industry contributes substantially to India's Gross Domestic Product (GDP), industrial growth, employment generation, and export performance. Rapid urbanization, increasing disposable income, technological advancement, expansion of road infrastructure, and changing consumer preferences have significantly transformed the automobile sector in recent years. Moreover, the growing demand for electric vehicles, smart mobility solutions, and environmentally sustainable transportation has intensified competition among automobile manufacturers operating in India.[1] In such a competitive environment, effective marketing strategy has emerged as a crucial factor for attracting customers, increasing sales performance, strengthening market share, and ensuring long-term business sustainability.

Among the major automobile companies operating in India, Tata Motors and Hyundai Motor India Limited have developed strong market positions through different but highly effective marketing strategies. Tata Motors, one of India's leading automobile manufacturers and a flagship company of the Tata Group, has focused primarily on affordability, safety, innovation, and sustainable mobility. During the last five years, the company has achieved remarkable growth through aggressive expansion in the electric vehicle segment with products such as Nexon EV, Punch EV, and Tiago EV. Tata Motors has also strengthened its market presence by improving vehicle design, introducing advanced safety features, and expanding its dealership and service network across urban, semi-urban, and rural areas. The company's marketing strategy mainly targets middle-income and value-conscious consumers seeking affordable and reliable vehicles with modern technology.

On the other hand, Hyundai Motor India Limited, a wholly owned subsidiary of Hyundai Motor Company, South Korea, has maintained its position as one of the most trusted and technologically advanced automobile brands in India. Hyundai's marketing strategy is based on product differentiation, innovation, premium design, and customer satisfaction. The company has successfully attracted urban and aspirational consumers by offering feature-rich vehicles equipped

with advanced technology, connected car features, fuel efficiency, and superior comfort. Hyundai has also adopted strong digital marketing practices, celebrity endorsements, integrated promotional campaigns, and customer relationship management strategies to strengthen its brand image and customer loyalty.[2] Furthermore, the company's extensive dealership and service network has contributed significantly to maintaining stable sales and market share in the Indian automobile sector. The increasing competition between Tata Motors and Hyundai Motor India Limited reflects two different strategic approaches within the Indian automobile market. Tata Motors emphasizes affordability, sustainability, electric mobility, and mass-market penetration, whereas Hyundai focuses on technological advancement, premium positioning, innovation, and customer experience. Both companies have shown significant progress in terms of turnover, market share, sales volume, and sales points during the last five years, making them important subjects for comparative analysis.

Therefore, the present study aims to conduct a comparative analysis of the marketing strategies of Tata Motors and Hyundai Motor India Limited using four major parameters: turnover, market share, sales volume, and sales points from 2021 to 2025. The study seeks to evaluate how different marketing strategies influence business performance, competitive advantage, and customer reach in the Indian automobile industry. The findings of the study will provide valuable insights for academicians, researchers, policymakers, and business organizations interested in understanding marketing effectiveness and strategic management in the automobile sector.

Literature review

The study compared consumer preferences and buying patterns between Maruti Suzuki and Hyundai Motor India in the Indian automobile industry. The research found that brand loyalty, fuel efficiency, comfort, product features, and after-sales service significantly influence customer buying decisions. The study revealed that Maruti Suzuki was preferred for better after-sales service and customer satisfaction, while Hyundai was favored for comfort, interior design, and modern features. Using ANOVA analysis, the study concluded that consumer buying behavior has a significant impact on the purchase of Maruti Suzuki and Hyundai cars. It further suggested that automobile companies should focus on effective marketing strategies, customer care, and service quality to retain customers and improve satisfaction.[3]

The paper focuses on the implementation of manufacturing and quality improvement practices in organizations. It highlights important improvement activities such as Enterprise Resource Planning (ERP), Total Quality Management (TQM), Statistical Process Control (SPC), Just-in-Time (JIT), benchmarking, employee empowerment, and workforce involvement. The study also examines key order-winning criteria including product durability, conformance quality, efficiency, product range, new product development speed, after-sales service, competitive price, and product versatility. The paper emphasizes that adopting modern management and quality practices can improve organizational efficiency, product quality, customer satisfaction, and overall competitiveness in the manufacturing sector.[4]

Choudhury et al. (2019) examined branding strategies and consumer buying behaviour in the automobile sector through an extensive literature review. The study identified 22 major variables influencing customers' car purchase decisions, emphasizing the importance of branding, emotional appeal, digital marketing, online consumer experience, price, product quality, and brand trust. The authors highlighted that information search plays a crucial role in the buying process and suggested that automobile companies and dealers should adopt effective branding and promotional strategies to attract customers and improve sales performance. The study also noted that personalized online experiences and customer-focused marketing significantly influence consumer preferences and brand acceptance in the competitive automobile market.[5]

The study by Shruti Chauhan (2023) examines the impact of marketing strategies on the Indian automobile industry, focusing on companies such as Maruti Suzuki, Tata Motors, Kia, and MG. The paper highlights the importance of branding, advertising, pricing, customer engagement, and digital marketing in increasing market share and profitability. It also discusses the role of modern marketing tools such as social media, SEO, influencer marketing, and promotional strategies in influencing consumer behaviour. The study concludes that effective marketing strategies, product innovation, and customer-oriented approaches are essential for sustaining competitiveness and growth in the rapidly changing Indian automobile market.[6]

The study on determinants of success in the Indian automobile market provides a comparative analysis of Maruti Suzuki and Hyundai Motor India by examining factors such as consumer satisfaction, resale value, after-sales service, localisation strategies, brand trust, and competitive positioning. The paper highlights that strong distribution networks, quality service, product diversification, and customer retention strategies significantly influence market leadership in the Indian automobile sector. It further explains that cost competitiveness, innovation, supplier development, and strategic positioning help firms sustain long-term growth in emerging markets. The study concludes that both companies have achieved success through different strategic strengths, with Maruti focusing on affordability and service reach, while Hyundai emphasizes technology, design, and premium customer perception.[7]

The study by Ranjeet Verma examined relationship marketing practices among passenger car brands in India, particularly Maruti Alto, Hyundai Santro Xing, and Tata Indica. The research emphasized the importance of customer relationship management, grievance handling, communication channels, and service recovery in building brand loyalty and customer satisfaction. Using primary data collected from 450 customers across Haryana, Punjab, and NCR, the study found that Maruti Alto performed better in maintaining customer relationships, handling complaints, and recovering from service failures. In contrast, Hyundai Santro Xing and Tata Indica showed weaker performance in periodic customer communication and grievance resolution. The paper concluded that effective relationship marketing strategies significantly influence customer retention, positive brand image, and long-term competitiveness in the Indian automobile industry.[8]

Research Gap

Previous studies on the Indian automobile industry have mainly focused on customer satisfaction, consumer behavior, brand loyalty, and general marketing strategies of automobile companies. Several researchers have analyzed the marketing practices of Tata Motors and Hyundai Motor India Limited separately; however, limited research has been conducted on a direct comparative analysis of the marketing strategies of these two companies. Earlier studies also focused only on individual aspects such as product quality, customer perception, or promotional activities rather than combining multiple performance indicators.

Furthermore, very few studies have examined the comparative marketing performance of Tata Motors and Hyundai Motors India Limited using important parameters such as revenue, sales volume, market share, and sales points over a recent five-year period. Therefore, the present study attempts to fill this gap by providing a comprehensive comparative analysis of the marketing strategies and organizational performance of Tata Motors and Hyundai Motors India Limited based on four major parameters.

Objective of the study

- To compare the marketing strategies of Tata Motors and Hyundai Motor India Limited in the Indian automobile industry.
- To examine the growth performance of both companies based on revenue, sales volume, market share, and sales points.
- To evaluate the effectiveness of customer-centric marketing practices followed by both companies.
- To understand the impact of marketing strategies on organizational performance and customer satisfaction.

1. Comparative Analysis of Marketing Strategies

Basis of Comparison	Tata Motors	Hyundai Motors India Limited
Product Strategy	Focuses on affordability, safety, SUVs, and electric vehicles	Focuses on premium design, technology, and comfort
Pricing Strategy	Competitive and value-based pricing	Premium yet competitive pricing
Target Customers	Middle-income and safety-conscious consumers	Urban and aspirational consumers
Innovation Focus	Electric mobility and safety innovation	Smart technology and premium features
Promotion Strategy	Safety and sustainability-focused campaigns	Technology and lifestyle-focused campaigns
Distribution Network	Expanding dealership network across India	Strong and established dealership network

Basis of Comparison	Tata Motors	Hyundai Motors India Limited
Brand Positioning	Reliable, safe, and affordable Indian brand	Premium, modern, and technology-driven global brand
Customer Appeal	Value-for-money and practical vehicles	Stylish, feature-rich, and premium vehicles

The comparison shows that both Tata Motors and Hyundai Motors India Limited have adopted different but effective marketing strategies to succeed in the Indian automobile market. Tata Motors mainly targets value-conscious consumers by offering affordable, safe, and innovative vehicles, especially in the electric vehicle segment. Its strategy strongly focuses on safety, sustainability, and local market adaptation.

In contrast, Hyundai Motors India Limited targets customers seeking premium quality, advanced technology, and modern features. Hyundai's strong focus on design, customer experience, and technology has helped it maintain a strong urban customer base and brand loyalty. Both companies have effectively utilized the marketing mix framework to strengthen their market presence. However, Tata Motors has gained rapid growth momentum in recent years through electric mobility and safety-oriented branding, while Hyundai continues to maintain a stable and premium brand image in the Indian automobile industry.

Research methodology

The present study is descriptive and comparative in nature and is based entirely on secondary data collected from annual reports of Tata Motors and Hyundai Motor India Limited, SIAM reports, journals, company websites, and automobile industry publications. The study covers a five-year period from 2020 to 2025 to examine and compare the marketing performance of both companies in the Indian automobile industry. Four major parameters revenue, sales volume, market share, and sales points have been selected for analysis because they are important indicators of organizational growth, customer demand, competitive position, and distribution strength. Comparative analysis, percentage analysis, and trend analysis methods have been used to evaluate the performance of both companies. The research aims to understand how different marketing strategies adopted by Tata Motors and Hyundai Motors India Limited influence customer satisfaction, brand value, and overall business growth.

Period of study – 2020 -2025

2. Hypothesis testing

Null Hypothesis (H_0)

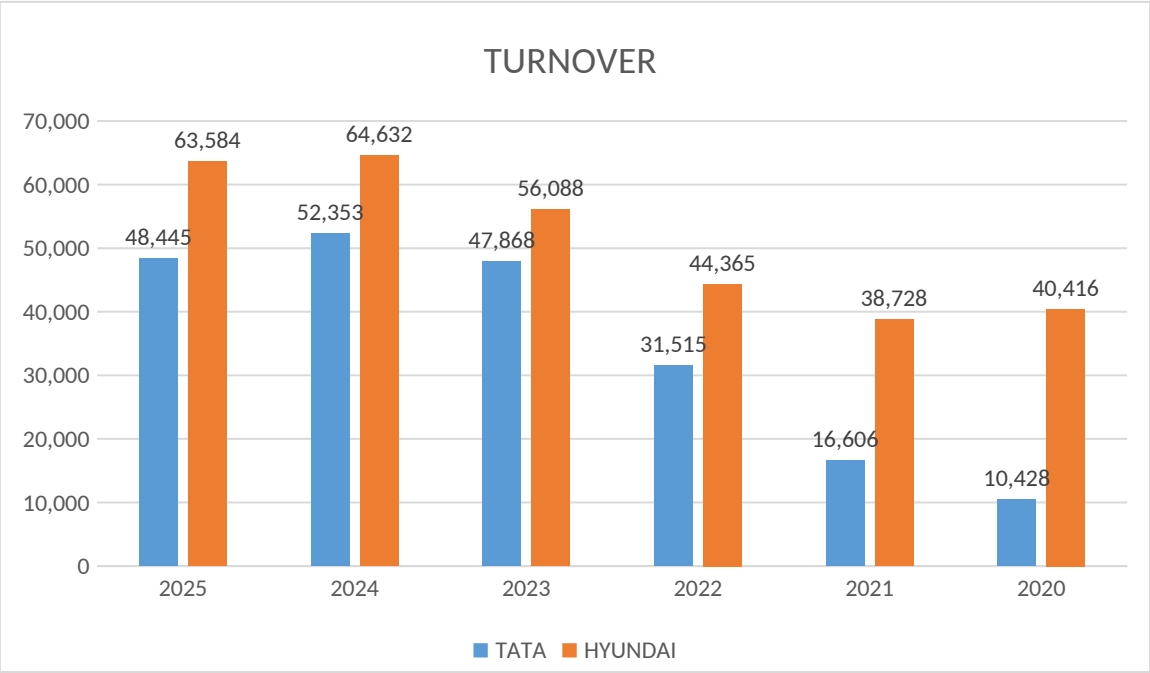
There is no significant difference between the marketing performance of Tata Motors and Hyundai Motors India Limited.

Alternative Hypothesis (H_1)

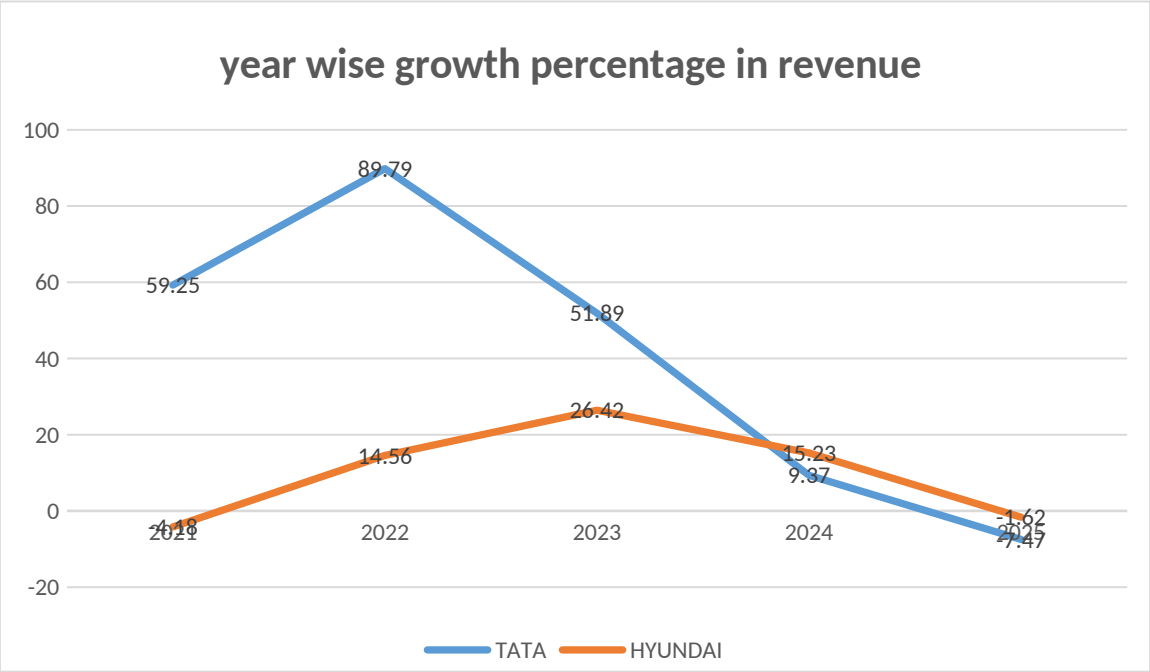
The marketing strategy of Tata Motors is more effective than that of Hyundai Motor India Limited

I. Turnover

Turnover refers to the total revenue earned by a company through the sale of goods and services during a specific financial period. It is an important indicator of business performance, market demand, and organizational growth. In the automobile industry, turnover reflects the effectiveness of marketing strategies, product acceptance, and customer satisfaction. A higher turnover indicates strong sales performance, better market presence, and improved financial stability. In this study, turnover is used as one of the major parameters to compare the marketing performance of Tata Motors and Hyundai Motor India Limited over the last five years.



Source – Annual reports of Tata motors 2021-22, 2024 - 25 and Hyundai motors 2021 -22, 2024 - 25



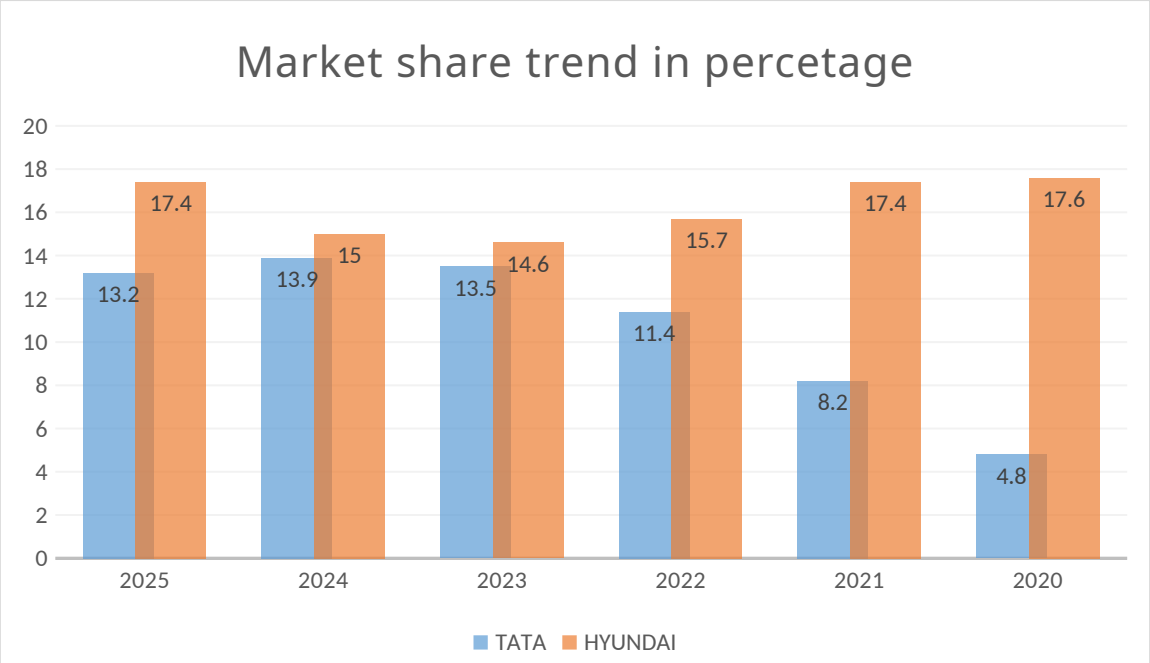
The turnover analysis of Tata Motors and Hyundai Motor India Limited from 2020 to 2025 highlights major differences in their financial growth patterns and marketing effectiveness. Hyundai Motor India maintained higher turnover throughout the study period, increasing from ₹40,416 crore in 2020 to ₹63,584 crore in 2025, which reflects strong brand positioning, stable customer demand, premium product strategy, and an established dealership network. Although the company experienced slight declines in 2021 (-4.18%) and 2025 (-1.62%), its growth remained consistent and financially stable, with an average turnover growth rate of around 10.08%.

In contrast, Tata Motors demonstrated rapid and aggressive expansion during the same period. The company's turnover increased significantly from ₹10,428 crore in 2020 to ₹48,445 crore in 2025. Tata Motors recorded exceptionally high year-wise growth rates of 59.25% in 2021, 89.79% in 2022, and 51.89% in 2023, mainly due to rising demand for SUVs and electric vehicles, competitive pricing, safety-focused branding, and successful products such as the Tata Nexon EV and Tata Punch. Although the growth rate slowed to 9.37% in 2024 and declined to -7.47% in 2025, Tata Motors still achieved a significantly higher average growth rate of approximately 40.57%, indicating stronger expansion and market penetration.

Overall, Hyundai Motor India demonstrated greater financial stability and controlled long-term growth, while Tata Motors showed faster expansion, stronger revenue growth, and rapid improvement in market position. Based on turnover growth performance, market catch-up, and aggressive business expansion, the marketing strategy of Tata Motors appears more effective during the study period, particularly due to its successful focus on electric mobility, affordability, safety, and changing consumer preferences in the Indian automobile market.

II. Market share

Market share refers to the percentage of total sales in an industry that is controlled by a particular company during a specific period. It is an important indicator of a company's competitive position, brand strength, and customer preference in the market. A higher market share shows that the company has a strong customer base and effective marketing strategies. In the automobile industry, market share helps measure how successfully a company competes with its rivals in terms of sales and consumer acceptance. In this study, market share is used as one of the major parameters to compare the performance of Tata Motors and Hyundai Motor India Limited in the Indian automobile market.



Source – Annual reports of Tata motors 2021-22, 2024 - 25 and Hyundai motors 2021 -22, 2024 - 25

Year	Tata Market Share	Tata Growth %	Hyundai Market Share	Hyundai Growth %
2020	4.8	—	17.6	—
2021	8.2	70.83%	17.4	1.14%
2022	11.4	39.02%	15.7	-9.77%
2023	13.5	18.42%	14.6	-7.01%
2024	13.9	2.96%	15.0	2.74%
2025	13.2	-5.04%	17.4	16.00%

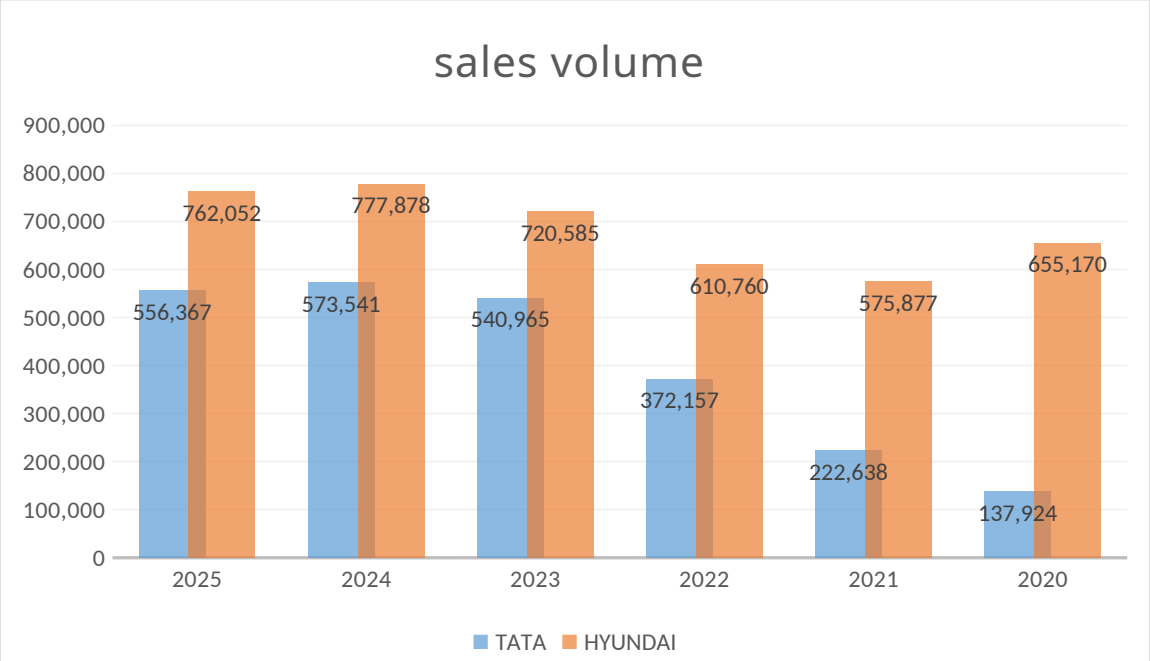
The market share analysis of Tata Motors and Hyundai Motor India Limited from 2020 to 2025 shows major changes in competitive performance within the Indian automobile industry. Hyundai Motor India maintained a higher overall market share throughout the period, starting at 17.6% in 2020 and recovering to 17.4% in 2025 after a temporary decline to 14.6% in 2023. This reflects Hyundai's strong brand image, stable customer base, and established market presence.

In contrast, Tata Motors showed rapid and continuous market expansion, increasing its share from only 4.8% in 2020 to 13.9% in 2024 before slightly declining to 13.2% in 2025. The company recorded exceptionally high growth rates of 70.83% in 2021, 39.02% in 2022, and 18.42% in 2023, mainly due to aggressive SUV and EV strategies, competitive pricing, safety-focused branding, and strong consumer acceptance of vehicles such as the Tata Nexon EV and Tata Punch. Although Tata's growth slowed after 2024, it still achieved a significantly higher average market share growth rate of 25.24%, compared to Hyundai's 0.16%.

Overall, Hyundai Motor India demonstrated stronger market stability and long-term dominance, while Tata Motors achieved faster growth and stronger competitive improvement. Based on market share expansion and growth performance, Tata Motors' marketing strategy appears more effective during the study period, particularly because of its focus on affordability, safety, innovation, and electric mobility.

III. Sales volume

Sales volume refers to the total number of vehicles sold by a company during a specific period. It is an important measure of customer demand, product popularity, and overall business performance. In the automobile industry, higher sales volume indicates strong market acceptance, effective marketing strategies, and customer satisfaction. Sales volume also helps companies evaluate their competitive position and growth in the market. In this study, sales volume is used as one of the key parameters to compare the marketing performance of Tata Motors and Hyundai Motor India Limited over the last five years in the Indian automobile industry.



Source – Annual reports of Tata motors 2021-22, 2024 - 25 and Hyundai motors 2021 -22, 2024 - 25

Year wise growth percentage of sales volume

Year	Tata Sales	Tata Growth %	Hyundai Sales	Hyundai Growth %
2020	139,724	-	655,170	-
2021	222,638	61.41%	575,877	-12.10%
2022	372,157	67.16%	610,760	6.06%
2023	540,965	45.36%	720,585	17.98%
2024	573,541	6.02%	777,878	7.95%
2025	556,367	-2.99%	762,052	-2.03%

The sales volume analysis of Tata Motors and Hyundai Motor India Limited from 2020 to 2025 shows clear differences in growth performance and market expansion. Hyundai Motor India maintained higher total sales throughout the period,

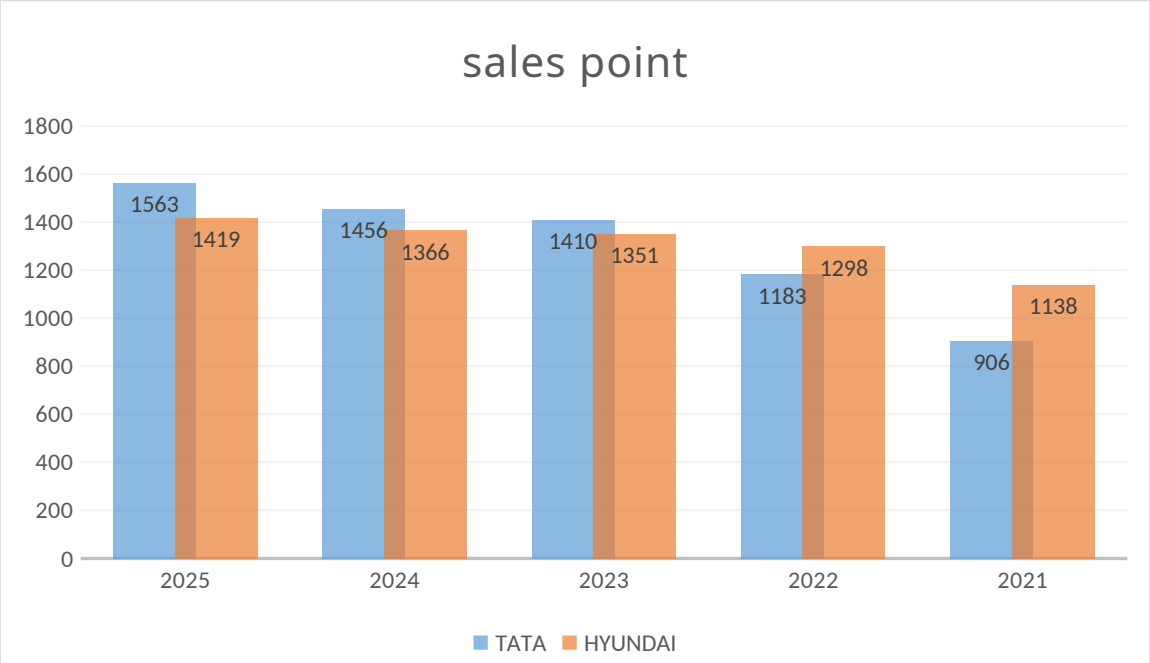
increasing from 655,170 units in 2020 to 762,052 units in 2025, reflecting strong brand value, stable customer demand, and an established market position. Although the company recorded declines in 2021 (-12.10%) and 2025 (-2.03%), it maintained steady and controlled growth overall.

In contrast, Tata Motors demonstrated rapid sales expansion, with volume increasing from 137,924 units in 2020 to 556,367 units in 2025. The company recorded very high growth rates of 61.41% in 2021, 67.16% in 2022, and 45.36% in 2023, mainly due to strong demand for SUVs and EVs such as the Tata Nexon EV and Tata Punch. Despite slower growth after 2024, Tata Motors achieved a significantly higher average growth rate of 35.39%, compared to Hyundai's 3.57%.

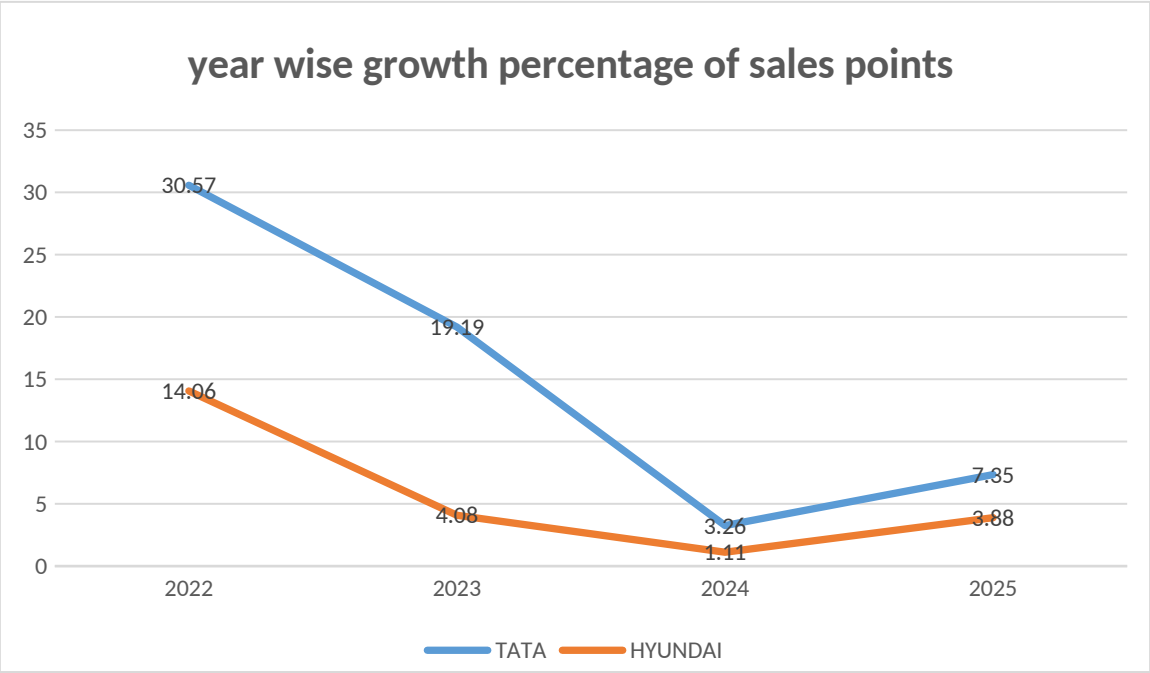
The analysis indicates that Hyundai Motor India maintained stronger sales stability and market leadership, whereas Tata Motors displayed superior growth momentum and faster competitive advancement. The rapid increase in Tata Motors' sales volume suggests that its marketing approach has been more successful in attracting new customers and adapting to changing market preferences during the study period.

IV. Sales point

Sales points represent the physical and digital locations through which automobile companies sell their vehicles and provide customer services. These include dealerships, showrooms, service centers, and online sales platforms. A strong sales point network helps companies improve customer accessibility, after-sales support, and market coverage across different regions. In the Indian automobile industry, companies with wider dealership networks are often able to attract more customers and build stronger brand trust. The availability of service centers and customer support facilities also plays a major role in influencing purchasing decisions. In this comparative study, sales points are analyzed to understand how effectively Tata Motors and Hyundai Motor India Limited expand their market reach and maintain customer relationships throughout India.



Source – Annual reports of Tata motors 2021-22, 2024 - 25 and Hyundai motors 2021 -22, 2024 - 25



The sales point analysis of Tata Motors and Hyundai Motor India Limited from 2021 to 2025 shows continuous expansion in dealership and distribution networks for both companies. Tata Motors increased its sales points from 906 in 2021 to 1563 in 2025, while Hyundai Motor India expanded from 1138 to 1419 during the same period. Although Hyundai maintained a larger network initially, Tata Motors surpassed Hyundai from 2023 onward, reflecting faster market expansion and stronger penetration across India.

The growth-rate analysis further highlights Tata Motors' stronger performance. The company recorded high growth rates of 30.57% in 2022 and 19.19% in 2023, followed by steady growth of 3.26% in 2024 and 7.35% in 2025. In comparison, Hyundai Motor India showed moderate and slower growth, with rates of 14.06%, 4.08%, 1.11%, and 3.88% respectively. Tata Motors achieved a significantly higher average growth rate of 15.09%, compared to Hyundai's 5.78%.

Overall, the analysis indicates that Tata Motors expanded its dealership and customer reach more aggressively and effectively than Hyundai Motor India. The faster growth in sales points reflects stronger market penetration, improved distribution strategy, and increasing consumer demand, suggesting that Tata Motors implemented a more dynamic and impactful marketing strategy during the study period.

3. Result of Hypothesis

Based on the comparative analysis of turnover, market share, sales volume, and sales points, it is observed that Tata Motors demonstrated significantly higher growth rates and stronger market expansion compared to Hyundai Motor India Limited during the study period. Although Hyundai Motor India maintained greater market stability and higher overall sales in certain parameters, Tata Motors showed more rapid improvement in revenue generation, market penetration, dealership expansion, and customer acceptance.

The findings indicate that Tata Motors adopted a more aggressive and effective marketing strategy, particularly through its focus on affordability, safety, SUV demand, and electric vehicle innovation. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. It can be concluded that the marketing strategy of Tata Motors is more effective than that of Hyundai Motor India Limited in terms of turnover growth, sales volume, market share, and sales points during the study period 2020 - 25.

Conclusion

In conclusion, the study emphasizes that continuous innovation, effective pricing strategies, strong distribution networks, and customer-oriented promotional activities are essential for long-term success in the Indian automobile market. Both

Tata Motors and Hyundai Motors India Limited have successfully adapted to changing market conditions; however, Tata Motors appears to be gaining stronger momentum in recent years due to its focus on electric vehicles, safety, and affordability. The study suggests that automobile companies must continue investing in technology, sustainability, and customer engagement strategies to sustain growth and competitiveness in the future.

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Gender Responsive Emotional intelligence to emotionally resilient society for Viksit Bharat: Sociological Implications for Mental Health in India

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Abstract

Emotional Intelligence is often perceived as an individual psychological ability, yet it is deeply shaped by socialisation and cultural norms. In India, gendered patterns of socialisation significantly influence how individuals perceive, regulate, and express emotions, leading to differentiated emotional competencies among men and women. From the early stages of life, boys are commonly socialised to suppress vulnerability and prioritise control, while girls are encouraged to be emotionally expressive and empathetic, producing gendered outcomes of emotional intelligence (Hochschild,1979; Connell,2005). These patterns have direct implications for mental health, contributing to emotional repression, stress and unequal emotional burdens within relationships (Ram et al., 2014). Now the problem lies in how such socially constructed emotional norms reinforce mental health disparities and sustain gender inequalities.

The study aligned sociological perspectives of gender role theory and social constructionism, conceptualising emotional intelligence as a socially produced outcome rather than an inherent ability. Existing literature had explored emotional intelligence and mental health independently, yet limited attention has been given to linking gendered emotional socialisation with mental health outcomes in the Indian context. Addressing this issue is important given the increasing prevalence of mental health concerns and persistent gender inequalities. The study aimed to examine how gender norms shape emotional intelligence, to analyse its implications for mental health disparities and the need of gender sensitive policies. A qualitative methodology was adopted. The study suggested integrating gender responsive emotional intelligence training within education and public health policies to build emotionally resilient citizens for Viksit Bharat @ 2047.

Keywords*: Gender socialisation, Emotional Intelligence, Mental health, Indian society*

Introduction

In recent decades, emotional well-being and mental health have become central concerns in social science research due to rising psychological distress, social anxiety, emotional isolation, and changing patterns of interpersonal relationships. Rapid urbanisation, technological transformation, competitive educational systems, unstable labour conditions, and changing family structures have significantly altered emotional experiences within society. Mental health concerns such as depression, anxiety, stress disorders, burnout, loneliness, and emotional exhaustion are increasingly visible across social groups. However, emotional suffering cannot be understood solely as an individual or biological phenomenon. Sociological perspectives emphasise that emotions are deeply embedded within social structures, cultural norms, and power relations.

Within this broader context, Emotional Intelligence (EI) has emerged as an important concept in psychology, sociology, education, and organisational studies. Emotional intelligence generally refers to the capacity to identify, understand, regulate, and appropriately express emotions in oneself and others (Salovey & Mayer, 1990). The concept gained widespread attention through the work of Daniel Goleman, who argued that emotional intelligence plays a crucial role in leadership, communication, social adjustment, and personal success (Goleman, 1995). While psychological approaches often conceptualise emotional intelligence as an individual skill or personality trait, sociological perspectives challenge this individualistic interpretation by arguing that emotional competencies are socially constructed and culturally conditioned.

Emotional behaviour is shaped by the social environment within which individuals are raised. Families, schools, peer groups, religion, media, and cultural institutions regulate emotional expression through norms regarding what emotions are acceptable, who can express them, and under what conditions. These emotional norms are not gender neutral. In

patriarchal societies such as India, emotional expectations are deeply gendered, producing differentiated emotional experiences among men and women.

Gender socialisation refers to the process through which individuals internalize socially approved gender roles, emotional behaviours, and cultural expectations. From childhood onwards, boys and girls are socialized differently in terms of emotional expression and emotional regulation. Boys are often encouraged to suppress vulnerability, avoid emotional openness, and display strength, rationality, and emotional control. Emotional expressions such as crying, fear, dependency, or sadness are frequently discouraged among boys because they are associated with weakness and femininity. Girls, in contrast, are encouraged to express emotions, display empathy, maintain relationships, and engage in caregiving roles. Such socialisation patterns shape emotional intelligence differently among men and women and create unequal emotional responsibilities within society (Connell, 2005).

The sociological understanding of emotional regulation was significantly expanded through the work of Arlie Russell Hochschild, particularly her concept of "emotional labour" (Hochschild, 1979). Emotional labour refers to the management of emotions according to socially prescribed feeling rules. Women are often expected to perform emotional labour within households, workplaces, and relationships by maintaining harmony, managing interpersonal conflicts, and caring for the emotional well-being of others. Emotional intelligence among women is therefore frequently linked with caregiving and emotional service rather than empowerment. Such invisible emotional responsibilities contribute to stress, emotional exhaustion, anxiety, and burnout.

At the same time, patriarchal masculinity discourages emotional vulnerability among men. Men are socialized to internalize emotional distress and avoid help-seeking behaviour because emotional openness is perceived as weakness. Research by Dedovic et al. (2009) demonstrated that gender socialisation significantly shapes stress reactivity and emotional coping patterns. Their work argued that emotional responses are not solely biological but are socially conditioned through gendered experiences. Men and women learn different emotional coping mechanisms through socialisation, which later influence mental health and emotional adjustment.

The relationship between gender socialisation and mental health has become increasingly important in contemporary society. Emotional suppression among men contributes to emotional isolation, aggression, substance abuse, loneliness, and untreated psychological distress. Women, on the other hand, frequently experience mental exhaustion due to caregiving burdens and emotional labour. Palmwood and Liss (2026), in their study on "mental load," highlighted how women disproportionately carry invisible emotional and cognitive responsibilities within relationships and domestic spaces. Such unequal emotional burdens negatively affect psychological well-being and reinforce gender inequality.

Recent studies also demonstrate that emotional resilience and positive mental health are shaped by social experiences and gendered expectations. Surprenant et al. (2025), through a gender-based analysis of youth mental health, found that emotional well-being, coping capacities, and support systems differ significantly across genders due to social and cultural influences. These findings suggest that emotional intelligence and mental health cannot be separated from broader social structures and inequalities.

Despite increasing scholarship on emotional intelligence and mental health, these themes are often studied separately. Existing research largely focuses on emotional intelligence in relation to organisational behaviour, academic performance, leadership, or personality development, while neglecting its sociological dimensions. Similarly, mental health studies frequently examine psychological symptoms without adequately analysing how gendered emotional norms shape emotional suffering. In the Indian context, there remains limited sociological research connecting emotional intelligence, gender socialisation, emotional labour, and mental health inequalities. This creates an important research gap, especially within a society where patriarchal emotional norms continue to regulate emotional expression and interpersonal relationships.

The present study seeks to address this gap by examining emotional intelligence as a socially conditioned outcome of gender socialisation and analysing its implications for mental health within Indian society. The study is situated within the theoretical frameworks of Gender Role Theory and Social Constructionism. Gender Role Theory explains how societies assign different behavioural expectations to men and women, shaping emotional behaviour and identity formation (Eagly, 1987). Social Constructionism argues that emotions and identities are socially created through cultural meanings and social interactions rather than being purely natural realities (Berger & Luckmann, 1966). These theoretical perspectives help analyse emotional intelligence as a product of social conditioning rather than merely a personal competency.

The significance of this study also lies within the framework of Viksit Bharat @ 2047, which emphasises inclusive development, social well-being, and human resilience. A developed society cannot be defined solely through economic growth and technological advancement. Emotional resilience, mental well-being, empathy, and social inclusion are equally important dimensions of national development. However, emotional resilience cannot emerge in a society where emotional expression is restricted through rigid gender norms and unequal emotional expectations.

The study therefore examines how gender socialisation shapes emotional intelligence and contributes to differentiated mental health outcomes among men and women. It seeks to understand how emotional labour, emotional repression, and patriarchal emotional norms influence psychological well-being and reinforce gender inequalities. By connecting emotional intelligence with sociological understandings of gender and mental health, the study contributes toward a broader understanding of emotional well-being within Indian society.

Literature Review

The concept of Emotional Intelligence was initially developed within psychology through the work of Salovey and Mayer (1990), who defined emotional intelligence as the ability to perceive, understand, regulate, and use emotions effectively. Later, Goleman (1995) expanded the concept by emphasising self-awareness, empathy, interpersonal competence, and emotional management as essential for social and professional success. While these approaches contributed significantly to understanding emotional competencies, they largely viewed emotional intelligence as an individual psychological ability detached from social structures.

Sociological perspectives challenged this individualistic understanding by emphasising that emotions are socially regulated and culturally produced. Hochschild (1979) argued that emotional expression is governed by “feeling rules” shaped by social institutions and cultural norms. Her concept of emotional labour demonstrated how individuals manage emotions according to social expectations, particularly within caregiving and service-oriented roles. Women, due to patriarchal gender expectations, disproportionately perform emotional labour within families and workplaces, leading to unequal emotional burdens.

Connell (2005) further analysed the relationship between masculinity and emotional behaviour through the concept of hegemonic masculinity. According to Connell, patriarchal societies construct masculinity around emotional control, dominance, rationality, and suppression of vulnerability. Men are therefore discouraged from expressing sadness, fear, or dependency, while women are expected to embody empathy, care, and emotional sensitivity. Such emotional conditioning shapes emotional intelligence differently among genders.

Research by Dedovic et al. (2009) on stress reactivity demonstrated that emotional responses and coping mechanisms are deeply influenced by gender socialisation. The study argued that stress responses cannot be explained solely through biological sex differences because social expectations significantly influence emotional regulation and psychological adjustment. Men and women internalise different emotional coping strategies due to gendered socialisation patterns.

Similarly, Surprenant et al. (2025) highlighted the role of gender in shaping emotional well-being and positive mental health among youth. Their gender-based analysis demonstrated that emotional resilience and coping capacities are closely connected with social support systems, lifestyle patterns, and gendered experiences. This supports the argument that emotional intelligence and emotional resilience develop within broader social and cultural frameworks.

Palmwood and Liss (2026) examined the concept of “mental load” and its impact on women’s mental health and relationships. Their study demonstrated how women disproportionately carry invisible emotional responsibilities related to caregiving, planning, and emotional management. Such unequal emotional labour contributes to stress, emotional fatigue, burnout, and relationship strain.

Existing literature therefore establishes important connections between emotional intelligence, emotional labour, gender socialisation, and mental health. However, much of the scholarship remains fragmented. Emotional intelligence is frequently examined within organisational or psychological frameworks, while sociological analyses of emotional intelligence as a gendered social outcome remain limited. In the Indian context, research connecting gender socialisation, emotional intelligence, and mental health inequalities remains insufficient. The present study sought to bridge this gap by examining emotional intelligence as a socially produced outcome shaped by patriarchal emotional norms.

Research Gap

Existing literature has significantly contributed to understanding emotional intelligence, gender roles, and mental health independently. However, limited sociological attention has been given to examining emotional intelligence as an

outcome of gender socialisation within Indian society. Most research focuses on emotional intelligence as a psychological skill associated with leadership, academic performance, or workplace productivity while overlooking the role of patriarchal emotional norms in shaping emotional competencies.

Similarly, studies on mental health often analyse psychological distress without adequately examining the sociological dimensions of emotional repression, emotional labour, and gendered emotional expectations. The relationship between emotional intelligence and mental health disparities remains underexplored within the Indian context, particularly regarding how emotional burdens are unevenly distributed across genders.

The present study addresses this gap by connecting emotional intelligence, gender socialisation, emotional labour, and mental health through a sociological framework. It contributes to existing scholarship by conceptualising emotional intelligence as a socially conditioned and gendered phenomenon rather than merely an individual psychological ability.

Research Questions

The study examined how emotional intelligence emerged as a socially conditioned outcome of gender socialisation within Indian society and how patriarchal emotional norms shape emotional expression, emotional regulation, and emotional responsibilities among men and women. It further investigated how emotional labour, emotional repression, and unequal emotional expectations contribute to mental health disparities and psychological distress. The research also explores the sociological implications of gendered emotional conditioning and analyses the significance of gender-responsive emotional intelligence in building an emotionally resilient society.

Aim of the Study

The primary aim of the study is to analyse emotional intelligence as an outcome of gender socialisation and examine its sociological implications on mental health in India.

Methodology

The study adopted a qualitative research methodology based on secondary data analysis. Since the research sought to understand emotional experiences, gender norms, and mental health from a sociological perspective, qualitative methodology provided deeper interpretative insights into emotional behaviour and social conditioning.

Research Design

The research followed a descriptive and analytical research design. The descriptive dimension examined patterns of gender socialisation, emotional behaviour, and mental health experiences within Indian society. The analytical dimension interpreted these patterns through sociological theories such as Gender Role Theory and Social Constructionism.

Sources of Data

The study relied on secondary sources including books, journal articles, research papers, government reports, mental health surveys, policy documents, and sociological literature related to emotional intelligence, gender studies, emotional labour, and mental health.

Theoretical Framework

The present study is theoretically grounded in Gender Role Theory, Social Constructionism, and the Sociology of Emotions. These perspectives help in understanding emotional intelligence not merely as an individual psychological ability but as a socially conditioned outcome shaped through gendered socialisation, cultural norms, and institutional expectations. The framework situates emotions within broader structures of patriarchy, social interaction, and power relations operating in Indian society.

Gender Role Theory forms a central basis of the study. According to Alice Eagly (1987), societies assign different behavioural expectations and emotional roles to men and women through the process of socialisation. These gender roles are internalized through family, school, peer groups, religion, and media. In patriarchal societies, masculinity is associated with strength, emotional control, dominance, and rationality, whereas femininity is linked with empathy, caregiving, emotional sensitivity, and nurturing behaviour. Boys are commonly discouraged from expressing fear, sadness, or vulnerability because such emotions are socially interpreted as weakness. Girls, on the other hand, are encouraged to be emotionally expressive and relationship-oriented. These unequal emotional expectations shape emotional intelligence differently among men and women. While women may develop greater emotional awareness and empathy due to caregiving roles, they also experience disproportionate emotional burdens. Men often experience

emotional repression because masculine norms discourage emotional openness. Thus, Gender Role Theory explains how emotional intelligence develops through socially imposed gender expectations rather than biological differences alone.

The study also draws upon Social Constructionism developed by Peter L. Berger and Thomas Luckmann (1966). Social Constructionism argues that reality, identity, and emotions are socially created through interaction, culture, and institutional practices. Emotional behaviour is therefore not natural or universal but shaped by social meanings and cultural expectations. Societies establish "feeling rules" that determine which emotions are acceptable and how emotions should be expressed. In the Indian context, patriarchal norms socially construct men as emotionally strong and women as emotionally caring. These repeated practices become normalized through socialisation and shape emotional identities over time. Emotional intelligence, therefore, reflects cultural conditioning and social structures rather than functioning as a purely personal competency.

The Sociology of Emotions further strengthens the framework, particularly through the work of Arlie Russell Hochschild and her concept of emotional labour (Hochschild, 1979). Emotional labour refers to the management of emotions according to socially prescribed expectations. Women disproportionately perform emotional labour within families and relationships by maintaining harmony, providing emotional support, and managing interpersonal conflicts. Such invisible emotional responsibilities contribute to stress, emotional exhaustion, and mental fatigue. Men, meanwhile, are socialized to suppress emotional vulnerability, often resulting in loneliness, aggression, and reluctance to seek mental health support.

Together, these theoretical perspectives explain that emotional intelligence is deeply embedded within structures of gender socialisation and patriarchy. Emotional competencies are socially produced through cultural norms and unequal emotional expectations. The framework therefore helps analyse how emotional repression among men and emotional burden among women contribute to mental health disparities and reinforce gender inequalities within Indian society.

Method of Analysis

Thematic analysis has been used to identify recurring themes such as emotional repression, masculinity, emotional labour, caregiving burden, stress reactivity, emotional resilience, and mental health inequalities. The findings are interpreted sociologically to connect personal emotional experiences with broader patriarchal structures.

Results and Findings

The study reveals that emotional intelligence within Indian society is deeply influenced by gendered patterns of socialisation. Emotional competencies are not naturally distributed but socially conditioned through cultural norms, family structures, educational practices, peer interactions, and media representations (Berger & Luckmann, 1966; Salovey & Mayer 1990; Goleman, 1995).

One major finding is that boys and girls are socialised into different emotional roles from early childhood (Eagly, 1987; Connell,2005). Boys are encouraged to embody emotional control, rationality, and toughness, while emotional vulnerability is discouraged (Connell,2005; Eagly, 1987). Emotional expressions such as sadness, fear, or dependency are often associated with weakness and femininity (Connell,2005, Eagly,1987). Consequently, many men develop difficulties in emotional communication and emotional openness, leading to emotional isolation and internalised psychological distress (Connell,2005; Dedovic et al.,2009).

The study further finds that women are socialised into caregiving and emotionally supportive roles (Eagly,1987; Hochschild,1979). Girls are encouraged to display empathy, emotional sensitivity, and relationship-oriented behaviour (Eagly,1987; Hochschild,1979; Salovey & Mayer, 1990). Such emotional conditioning contributes to greater emotional awareness but simultaneously places unequal emotional responsibilities upon women (Hochschild,1979). Women frequently perform invisible emotional labour within families and relationships by managing conflicts, maintaining emotional harmony, and supporting the emotional needs of others (Hochschild,1979; Palmwood & Liss,2026).

Another important finding is that emotional repression and emotional labour have direct implications for mental health (Dedovic et al.,2009; Hochschild,1979). Men's emotional suppression contributes to stress, aggression, loneliness, and reluctance to seek mental health support. Women's emotional burden contributes to emotional exhaustion, anxiety, burnout, and mental fatigue (Palmwood & Liss,2026; Hochschild,1979). Thus, patriarchal emotional norms create different but interconnected forms of psychological suffering among men and women (Connell,2005; Palmwood & Liss, 2026).

The study also reveals that mental health stigma is reinforced through gender expectations. Men often avoid discussing emotional struggles because vulnerability is perceived as weakness, while women's emotional distress is frequently

normalised or dismissed as emotional sensitivity (Connell,2005; Eagly, 1987; Supernant et el., 2025, Palmwood & Liss, 2026). Consequently, emotional suffering remains invisible and untreated across genders.

Finally, the study demonstrates that emotional intelligence cannot be understood merely as an individual psychological ability. Emotional intelligence reflects broader social structures, gender relations, and cultural expectations operating within society (Berger & Luckmann,1966; Salovey & Mayer,1990; Goleman, 1995).

Discussion

The findings of the study support sociological perspectives that emotions are socially constructed and culturally regulated rather than purely individual phenomena. Emotional intelligence develops within structures of gender socialisation shaped by patriarchal emotional norms and institutional expectations.

The findings strongly align with Hochschild's concept of emotional labour. Women's emotional intelligence is socially valued primarily within caregiving roles, resulting in unequal emotional burdens. Emotional competence among women frequently becomes associated with emotional service rather than empowerment. Palmwood and Liss (2026) similarly demonstrated that invisible emotional and cognitive labour contributes significantly to women's stress and emotional exhaustion.

The study also confirms Connell's argument regarding hegemonic masculinity. Men are socialised to internalise emotional pain and avoid emotional vulnerability in order to conform to masculine ideals of control and dominance. Such emotional repression negatively affects mental health and contributes to emotional isolation and untreated psychological distress.

The findings further resonate with Dedovic et al. (2009), who emphasised that stress reactivity is deeply influenced by gender socialisation patterns. Emotional coping mechanisms are socially conditioned, reinforcing the idea that emotional intelligence develops within social structures rather than existing as a purely innate ability.

Similarly, the findings align with Surprenant et al. (2025), whose study highlighted how emotional well-being and resilience are shaped by gendered social experiences and support systems. Emotional resilience therefore cannot be separated from broader social inequalities and cultural conditioning.

An important insight emerging from the study is that emotional inequality functions as a hidden dimension of gender inequality. Women are expected to manage emotions, maintain relationships, and provide emotional care, while men are expected to suppress vulnerability and internalise emotional distress. These unequal emotional expectations contribute significantly to mental health disparities.

The study contributes to existing scholarship by connecting emotional intelligence, gender socialisation, emotional labour, and mental health within the Indian sociological context. It challenges purely psychological understandings of emotional intelligence by emphasising its social and cultural dimensions.

The findings also carry important policy implications. Educational institutions should integrate gender-sensitive emotional intelligence training within curricula to challenge harmful stereotypes surrounding masculinity and femininity. Encouraging emotional openness among boys and redistributing emotional responsibilities within families can reduce emotional inequality and improve mental well-being.

Public health policies must also address emotional well-being through gender-sensitive mental health programmes. Community counselling systems, emotional literacy initiatives, workplace mental health programmes, and school-based emotional education can help build emotionally resilient communities. Such initiatives are essential for achieving the goals of Viksit Bharat @ 2047.

Conclusion

The present study examined emotional intelligence as an outcome of gender socialisation and analysed its sociological implications on mental health in India. The study demonstrates that emotional intelligence is not merely an individual psychological ability but a socially conditioned outcome shaped through patriarchal norms, gender roles, and cultural expectations.

The research reveals that boys and girls are socialised into different emotional identities from childhood onwards. Men are encouraged toward emotional suppression and control, while women are expected to embody empathy, caregiving,

and emotional labour. Such unequal emotional conditioning contributes to differentiated mental health outcomes and reinforces broader gender inequalities.

The study further demonstrates that emotional repression among men and emotional burden upon women are interconnected dimensions of patriarchal emotional structures. Emotional inequality therefore represents an important yet often invisible dimension of gender inequality within Indian society.

By connecting emotional intelligence with gender socialisation and mental health, the study addresses an important gap within existing literature and contributes to sociological understandings of emotional well-being. It emphasises that emotional resilience cannot be achieved solely through individual coping strategies but requires structural transformation in emotional norms, educational practices, and gender relations.

The study ultimately highlights the need for gender-responsive emotional intelligence education, emotionally inclusive socialisation practices, and accessible mental health support systems. A truly developed society is not measured only through economic growth or technological advancement but also through its ability to create emotionally healthy, empathetic, and psychologically secure citizens. Building such an emotionally resilient society is essential for realising the broader vision of an inclusive and humane India under Viksit Bharat @ 2047.

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Assessing the Scope of Artificial Intelligence in Rural Governance

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Abstract

Artificial intelligence may improve rural public services through multilingual assistance, faster query handling, better grievance routing, and data-supported administration. Its value, however, depends on whether citizens can access, understand, and trust the systems through which those services are delivered. This study examines the perceptions of 350 purposively selected rural respondents using a structured questionnaire covering digital literacy, accessibility, trust, awareness, perceived usefulness, willingness to use, and acceptance of AI-enabled governance. The analysis uses descriptive statistics, Cronbach's alpha, Pearson and Spearman correlations, and simple linear regression. Respondents reported high acceptance ($M = 4.668$) and willingness to use AI-enabled public services ($M = 4.615$), while digital literacy ($M = 3.285$) and language accessibility and ease of use ($M = 3.408$) were more moderate. Digital literacy was positively associated with citizen perception ($r = 0.541$, $p < 0.001$). Accessibility, trust, and awareness were significant predictors of acceptance, willingness, and perceived usefulness, respectively, but each regression explained only 5.4% to 9.8% of the outcome variance. Several multi-item scales also had low internal consistency. The results therefore support a conditional conclusion: favourable attitudes exist in this sample, but inclusive adoption requires reliable connectivity, digital skills, local-language and voice interfaces, assisted access, transparent data practices, and human grievance and appeal mechanisms.

Keywords: *artificial intelligence, rural governance, digital inclusion, citizen perception, e-governance, India*

Introduction

India's public-service system increasingly relies on digital identity, mobile platforms, online documents, assisted service centres, and connected databases. Digital India frames this transition around infrastructure, services on demand, and citizen empowerment (Ministry of Electronics and Information Technology [MeitY], 2026). Aadhaar, DigiLocker, UMANG, BharatNet, and Common Service Centres (CSCs) have consequently expanded the channels through which citizens obtain certificates, welfare information, payments, and grievance support. This infrastructure can reduce travel and transaction costs, but a service is inclusive only when the intended user can reach it, understand it, complete the required steps, and correct an error.

That distinction is important in rural India. Official indicators show rapid growth in access alongside continuing differences in connection quality and advanced digital capability. In 2025, 83.3% of rural households reported internet access within the household, compared with 91.6% of urban households; optical-fibre access was 3.2% in rural households and 14.0% in urban households (Ministry of Statistics and Programme Implementation [MoSPI], 2025). Rural internet subscriptions also remained substantially lower per 100 population than urban subscriptions (Telecom Regulatory Authority of India [TRAI], 2026). These gaps matter because citizens who depend on digital systems for welfare, identity, and certification may experience a service failure as an exclusion from an entitlement, not merely as a technical inconvenience.

Artificial intelligence adds a new layer to this digital transition. In public administration, AI can classify requests, process language, identify patterns, support decisions, and personalize information. Potential rural uses include multilingual scheme guidance, voice-based agricultural advice, grievance triage, telehealth support, and fraud detection. India's AI policy now emphasizes compute capacity, datasets, skills, applications, and safe and trusted AI (IndiaAI, 2025). BHASHINI and Kisan e-Mitra illustrate how language and voice technologies may make services easier to use across literacy and language differences (BHASHINI, n.d.; Press Information Bureau [PIB], 2025). These systems may extend administrative capacity, but they may also reproduce exclusion when connectivity is unreliable, records are incomplete, interfaces are difficult to understand, or automated decisions cannot be questioned.

The practical question is therefore not whether AI is inherently beneficial, but under what conditions rural citizens will regard AI-enabled public services as useful, accessible, and trustworthy. This study addresses that question by examining

(a) respondents' access to and use of digital public services, (b) their reported attitudes toward AI-enabled governance, and (c) the relationships of digital literacy, accessibility, trust, and awareness with perception and acceptance. The paper treats digital inclusion as a precondition for effective AI-enabled governance rather than as a secondary outcome of technological deployment.

Literature Review

Digital inclusion and adoption of public services

E-governance research consistently shows that platform availability alone does not ensure use. Adoption is shaped by perceived usefulness, ease of use, trust, service quality, social influence, and facilitating conditions (Davis, 1989; Rana et al., 2017). In rural settings, facilitating conditions include a usable device, stable connectivity, affordable data, appropriate language, and assistance when a transaction fails. Citizens may therefore use a service directly, through relatives, or through intermediaries such as CSC operators. Indian studies similarly identify infrastructure, skills, institutional support, and confidence as recurring drivers and barriers (Malodia et al., 2021; Samuel et al., 2020; Sindakis & Showkat, 2024). Meaningful digital inclusion thus combines access with the capability to complete a task safely and independently, or to obtain accountable assistance.

AI-enabled governance, language, and trust

AI may improve public administration by speeding information retrieval, automating routine classification, and supporting decisions; its public value nevertheless depends on institutional design and oversight (van Noordt & Misuraca, 2022; Zuiderwijk et al., 2021). For rural users, multilingual translation, speech recognition, and voice interfaces are especially relevant because they can reduce text and language barriers. These benefits are conditional on accuracy, timely updating, clear responsibility for errors, and access to a human official when automation fails. Trust therefore concerns more than cybersecurity. It also reflects whether a citizen understands how personal data are used, believes a decision is fair, and can obtain correction or appeal. Recent reviews of citizens' perceptions of government AI likewise identify perceived benefit, concern, trust, user characteristics, and service characteristics as central factors (Azzahro et al., 2025).

Research gap and study model

Existing Indian research addresses digital access, e-government adoption, and administrative applications of AI, but there is limited empirical evidence connecting rural citizens' digital capabilities with their perceptions of AI-enabled governance. This study links four enabling conditions to four citizen outcomes: digital literacy with general perception, accessibility with acceptance, trust with willingness to use, and awareness with perceived usefulness. The model is informed by the Technology Acceptance Model and e-government adoption research, while recognizing that public services involve rights, accountability, and redress in addition to ordinary consumer choice.

Research Methodology

Design, sample, and data collection

The study used a descriptive and analytical cross-sectional survey design. Primary data were collected through a structured questionnaire from 350 rural respondents selected purposively because they used, or could potentially use, digital public services. The sample included farmers, students, homemakers, self-employed persons, small entrepreneurs, employees, and welfare beneficiaries. Secondary material from academic studies, government reports, and policy documents was used to establish the conceptual and policy context. Because the sample was non-probabilistic and the source manuscript does not report a sampling frame, the findings describe the surveyed respondents and should not be generalized statistically to all rural citizens in India.

Measures and analytical procedure

The questionnaire contained five Likert-type items for each of nine constructs: digital literacy, citizen perception, accessibility, acceptance, trust, willingness to use, awareness, perceived usefulness, and language accessibility and ease of use. Items were scored from 1 (strongly disagree) to 5 (strongly agree), and construct means were used in the analysis. Frequencies and percentages summarized the respondents and their service use. Means and standard deviations summarized attitudes. Cronbach's alpha assessed internal consistency, with 0.70 used as the conventional minimum for

acceptable reliability. Pearson correlation tested H1, with Spearman correlation as a robustness check. Separate simple linear regressions tested H2-H4. Statistical significance was evaluated at $p < 0.05$.

Hypotheses

H1: Digital literacy is positively related to citizen perception of AI-enabled governance.

H2: Accessibility of digital services positively predicts acceptance of AI-enabled governance.

H3: Trust in digital governance positively predicts willingness to use AI-enabled public services.

H4: Awareness of AI-enabled governance positively predicts perceived usefulness.

Results

Respondent profile and digital access

The sample was nearly gender-balanced: 49.71% identified as female and 48.00% as male. Respondents aged 18-35 formed 53.72% of the sample. Higher-secondary and graduate respondents together accounted for 52.86%; farmers were the largest occupational group (26.00%); and 44.29% reported monthly family income between INR 10,001 and INR 25,000. These characteristics should be considered when interpreting the results because younger and more educated respondents may be more familiar with digital services than the wider rural population.

Table 1 Digital access, service use, and reported barriers

Indicator	Response	n	%
Smartphone use	Yes	280	80.00
Internet availability	Yes	231	66.00
Internet availability	Sometimes	71	20.29
Digital government service use	Sometimes	128	36.57
Digital government service use	Often or very often	98	28.00
Used a Common Service Centre	Yes	225	64.29
Used a digital governance platform	Yes	220	62.86
Main difficulty	Lack of digital knowledge	84	24.00
Main difficulty	Poor connectivity	81	23.14
Main difficulty	Language problem	72	20.57
AI can improve rural governance	Yes	213	60.86
Training or awareness programme needed	Yes	234	66.86

The access indicators show a mixed pattern. Smartphone use was widespread, but one-fifth of respondents reported only intermittent internet availability. Digital public services were used 'sometimes' by the largest group, and CSC use remained common. Digital knowledge, connectivity, and language were the three most frequently reported barriers. The data therefore indicate access without universal independent use: many respondents had a device or service point, but capability and connection quality still constrained regular use.

Construct scores and measurement reliability

Table 2 Descriptive statistics and internal consistency

Construct	Mean	SD	Alpha	Assessment
Digital literacy	3.285	0.986	0.857	Good
Citizen perception	4.441	0.447	0.572	Low
Accessibility	3.551	0.716	0.719	Acceptable
Acceptance	4.668	0.309	0.379	Low
Trust	3.774	0.598	0.609	Below threshold
Willingness to use	4.615	0.355	0.489	Low

Construct	Mean	SD	Alpha	Assessment
Awareness	3.829	0.644	0.670	Below threshold
Perceived usefulness	4.386	0.444	0.528	Low
Language accessibility and ease	3.408	0.551	0.448	Low

Acceptance and willingness recorded the highest means, while digital literacy and language accessibility and ease were lower. The reliability results materially qualify those means. Digital literacy and accessibility met or exceeded the 0.70 threshold, but the remaining scales did not. In particular, the acceptance, willingness, perceived usefulness, and citizen-perception scales had low internal consistency. Their composite scores may not represent a single construct consistently, so results involving these outcomes should be treated as exploratory rather than conclusive.

Hypothesis tests

Table 3 Summary of hypothesis tests

Hyp.	Relationship	Test	Statistic	p	Decision
H1	Digital literacy -> citizen perception	Pearson correlation	r = 0.541	<0.001	Supported*
H1	Digital literacy -> citizen perception	Spearman correlation	rho = 0.541	<0.001	Supported*
H2	Accessibility -> acceptance	Simple regression	beta = 0.297; R2 = 0.088	<0.001	Supported*
H3	Trust -> willingness to use	Simple regression	beta = 0.232; R2 = 0.054	<0.001	Supported*
H4	Awareness -> perceived usefulness	Simple regression	beta = 0.313; R2 = 0.098	<0.001	Supported*

*Note. *Statistically supported in the surveyed sample; interpretation is limited by the reliability of the outcome scales. Beta values are reported as presented in the source analysis.*

Digital literacy had a moderate positive association with citizen perception ($r = 0.541$, $p < 0.001$). The three regression coefficients were also positive and statistically significant. Their explanatory power was modest: accessibility explained 8.8% of variance in acceptance, trust explained 5.4% of variance in willingness, and awareness explained 9.8% of variance in perceived usefulness. Statistical significance therefore does not imply that these factors fully explain adoption. Service quality, prior experience, privacy concerns, language fit, internet reliability, and institutional support may account for much of the remaining variance.

Discussion

The findings distinguish favourable attitudes from practical readiness. Respondents expressed strong acceptance and willingness, yet reported only moderate digital literacy and language accessibility. Service use was also mainly occasional, and almost two-thirds had used a CSC. Together, these results suggest that interest in AI-enabled public services may be ahead of the capability to use them independently and consistently. This interpretation accords with adoption research: perceived benefit matters, but facilitating conditions determine whether a positive intention becomes successful use (Davis, 1989; Rana et al., 2017).

The positive relationship between digital literacy and citizen perception supports investment in task-based skills, such as checking an application, protecting credentials, identifying official channels, and seeking correction. The accessibility result supports reliable connectivity, simple interfaces, and assisted access. The trust result points to clear consent, understandable explanations, secure handling of personal data, and a named authority responsible for errors. The awareness result indicates that citizens are more likely to see value when they understand what a service does and how it can help them. Multilingual and voice-based communication can support this understanding, especially for first-time users, but it cannot substitute for accurate records or accountable human review.

The small R2 values and weak reliability of several outcome scales prevent a stronger conclusion. The analysis does not show that AI has improved public-service outcomes, nor does it establish causal effects. It shows associations among self-reported perceptions in one purposively selected sample. The results are still useful for identifying implementation conditions, but the questionnaire should be refined and validated before the model is tested on a broader sample.

Policy implications

Build practical digital capability. Deliver village-level training around real service tasks, account security, fraud recognition, and grievance filing rather than one-time general awareness sessions.

Design for language and literacy diversity. Provide tested regional-language text, speech, and voice interfaces, with plain instructions and visible escalation to a human operator.

Retain assisted access. Equip CSCs and Panchayat-level support points to explain AI-enabled services, record consent, track applications, and help citizens challenge errors.

Make accountability visible. Tell citizens what data are used, whether an automated system contributed to a decision, who is responsible, and how review or appeal can be requested.

Measure service outcomes. Evaluate completion time, error correction, exclusion, satisfaction, and grievance resolution across gender, age, education, language, disability, and connectivity levels.

Conclusion

This study provides a clear but limited answer to its research question. Among the 350 surveyed rural respondents, attitudes toward AI-enabled governance were favourable, and digital literacy, accessibility, trust, and awareness were positively related to the corresponding perception and acceptance outcomes. However, accessibility, trust, and awareness each explained less than 10% of the variation in their outcome, and several outcome scales had low reliability. The evidence therefore does not support the broad claim that rural India is ready for AI-led governance or that AI has already improved governance outcomes.

The defensible conclusion is conditional: AI can contribute to more responsive rural public services only when digital inclusion is built into implementation. The immediate priorities are reliable connectivity, practical digital literacy, accurate regional-language and voice interfaces, assisted access through CSCs, transparent data use, and effective human review and grievance mechanisms. Without these safeguards, AI may digitize existing barriers; with them, it can extend information and administrative support to citizens who are currently underserved.

Limitations and Future Research

The purposive sample does not support national statistical generalization, and the cross-sectional design cannot establish causality. Responses are self-reported; some participants may have evaluated digital services without knowing whether AI was involved. The source manuscript does not provide the survey location, fieldwork period, response rate, item wording, or diagnostic tests for the regression models. Most importantly, seven of the nine constructs had alpha values below 0.70, including all four principal outcome scales. Future research should refine or remove inconsistent items, conduct expert review and cognitive interviews, pilot the instrument, and evaluate construct validity through exploratory and confirmatory factor analysis. A larger probability-based, multi-state sample should then compare regions and demographic groups. Longitudinal or field-experimental studies should measure actual service completion, error correction, and grievance outcomes before and after the introduction of a specific AI-enabled service.

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The Impact of Commercial Banks on the Economic Development of India

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Abstract

Banks play a crucial role in the economic development of a country. They collect unaccounted money from the people and transmit it to capital growth and make it available to entrepreneurs who sequentially invest in many projects, hence giving economic growth to the country. Development in the agriculture and industrial sectors are very important for any country as they are the largest job-providing sectors and contribute to a huge percentage of growth in gross domestic product (GDP). The growth of these sectors is impossible without the assistance of financial institutions particularly banks. Commercial banks are a key component of the country's financial system. Commercial banks are profit-making financial institutions that accept deposits from the general public and lend to individuals such as houseowners, entrepreneurs, and business owners. Banks have the ability to be important players in fostering financial sustainability, restraining speculation, and maintaining equilibrium between supply and demand, along with directing available visible records through the proper channels. Commercial banks help the agriculture & industrial sector to a great extent from financing to currency transactions. Commercial banks also help in keeping a check on the parallel economy and prevent black money transactions within the economy. Occasionally, banks execute actions to disclose unaccounted money, which affects the country's economy. The Objective of this study is to highlight the Impact of commercial banks on economic development.

Keywords: Commercial Banks, Capital formation, Savings, Credit Creation, Economic Growth.

INTRODUCTION

Our Historical records show that thousands of years ago, when there was no legal form of payment, people traded their things for one another. The "Exchange of Barter System" was the name given to this exchange mechanism. However, as people became more advanced over time, society began to recognize the need for a suitable transaction system, which led to the development of the idea of banking in the sixteenth century. The first independent bank, Allahabad Bank, with its headquarters in Calcutta, was established in 1865 during the British rule, representing the structured evolution of banking in India. A bank is a type of financial institution that takes money from its owners and uses an appropriate method to transfer it to those in need. Banks are classified by their functions and ownership, including central banks (regulators), commercial banks (public/private, profit-oriented), cooperative banks (member-owned), and specialized banks. Key types include retail banks (personal services), investment banks (corporate finance), and digital/online banks.

A Commercial bank is a kind of financial institution that carries all the operations related to deposit and withdrawal of money for the general public, providing loans for investment, and other such activities. These banks are profit-making institutions that operate solely to generate a profit.

The two main characteristics of a commercial bank are lending and borrowing. The bank receives the deposits and gives money to various assignments to earn interest (profit). The rate of interest that a bank offers to the depositors is known as the borrowing rate, whereas the rate at which a bank lends money is known as the lending rate.

REVIEW OF LITERATURE

Schumpeter (1934) argued that banks act as agents of economic change by extending credit to entrepreneurs, thus accelerating industrial progress. Later, McKinnon and Shaw (1973) suggested that financial liberalization enhances savings and investment, strengthening the foundation for economic growth, especially in developing economies like India.

Professor Jittima Tongurai and Professor Chaiporn Visthessonthi (2018) conducted the study on “The impact of the banking sector on economic structure and growth”. In this paper, we study the impact of banking sector development on changes in economic structure and growth. We argue that banking sector development has differential effects on

industrial sector development and agricultural sector development. The results further show that agricultural sector development exerts a negative effect on banking sector development, while industrial sector development has a positive impact on banking sector development.

Vashisht (2019) observed that banks not only promote capital mobilization but also serve as catalysts for industrial growth by financing MSMEs and infrastructure projects. Meanwhile, Srinivas (2022) analysed IHDS panel data to explore financial inclusion patterns in India, discovering that access to banking positively influences household income and economic stability.

RESEARCH METHODOLOGY

The present study is based on secondary data collected from various journals, newspapers, Annual Reports of bank and websites.

OBJECTIVES OF THE STUDY

(a) To Study the types of Commercial banks.

(b) To Study the functions and importance of Commercial banks.

(c) To analyse the Impact of Commercial banks on the Economic Development of India.

LIMITATIONS OF THE STUDY

a) Time constraints while collecting the data.

b) All data cannot be generalized.

TYPES OF COMMERCIAL BANKS

There are three types of Commercial banks which are as follows:

i. Public Sector Banks (PSBs): It is a kind of commercial bank that is nationalised by the government of a country. In India, Public Sector Banks operate under the guidelines of the Central Bank, i.e. Reserve Bank of India. A few Indian Public Sector Banks are State Bank of India, Corporation Bank, Bank of Baroda, Dena Bank, and Punjab National Bank.

ii. Private Sector Banks (PSBs): It is a type of commercial bank in which a major part of the share capital is held by private businesses and individuals. These banks are registered as companies with limited liability. Some of the Indian private sector banks include Vysya Bank, Industrial Credit and Investment Corporation of India (ICICI) Bank, and Housing Development Finance Corporation (HDFC) Bank.

iii. Foreign Banks: It refers to a type of commercial bank whose headquarters are in a foreign country, but operate branches in different countries. Some of the foreign banks operating in India are Hong Kong and Shanghai Banking Corporation (HSBC), Citibank, American Express Bank, Standard & Chartered Bank, and Grindlay's Bank. In India, since financial reforms of 1991, there is a rapid increase in the number of foreign banks, Commercial banks mark significant importance in the economic development of a country as well as serving the financial requirements of the general public.

FUNCTIONS OF COMMERCIAL BANKS

Here are some of the functions of a well-organised banking system which are important for any country's economic progress, particularly in a fast-growing country like India.

1. Capital formation - Commercial banks promote savings and investment, which support to eradicate capital insufficiency. They then put these resources to creative use, improving capital formation in the nation.

2. Credit creation – Other than enlarging the money circulating, bank deposits also make their approach to different industries, aiding them in the creation of beneficial assets. This credit has a multiplier effect on the economy.

3. Trading functions - Commercial banks are permitted to operate as market makers for municipal, government, and corporate bonds. Banks can provide issuers with counselling, advisory, and technological direction through their market-making activities.

4. Entrepreneurship Development - By offering capital to entrepreneurs and investing in beneficial purposes, banks encourage self-sustainability, decrease unemployment and promote the right industries.
5. Securitization of money - Commercial banks are a secure place to save money in the form of a depository.
6. Funds transfer - Through the support of commercial banks, transfers of money anywhere in India or in foreign countries have become very simple.
7. Wealth creation - With the provision of consultancy and advising facilities, bank experts can direct investors to mutual funds or direct investments. The bank can work like a caretaker for all investment securities, and provide safe-deposit boxes, letters of credit for investment possibilities, as well as behave like a trustworthy for desires and investment funds.

IMPORTANCE OF COMMERCIAL BANKS IN THE COUNTRY

Commercial banks in India perform several vital functions within the Indian financial system, making them highly important for the country's economy. Some of their main functions and significance are as follows:

- Acceptance of Deposits: They accept different types of deposits from the public, which act as the primary source of funds.
- Providing Loans and Advances: Banks serve as the primary source of funds for personal finance, agriculture, industrial sectors, and other economic activities through loans and credit facilities.
- Financial Intermediation: They promote financial mobility by mobilizing savings from depositors to borrowers, thereby improving economic efficiency.
- Financial Inclusion: As the largest category of banking networks in India, they serve the highest number of banking customers in the country. This supports India’s goal of Financial Inclusion.
- Promotion in Digital Economy: They also provide advanced digital banking services such as mobile banking, internet banking, etc. This strengthens in the promotion of the Digital Economy and makes financial transactions smoother and more accessible for the public.

Analysis and Discussions

Table 1: No. of Bank Branches of Scheduled Commercial Banks (SCBs) in India

Year	Rural	Semi-Urban	Urban	Metropolitan	Total
March 2017	49,860	38,931	25,103	26,530	1,40,424
March 2018	50,860	39,616	25,458	26,536	1,42,470
March 2019	51,609	41,031	26,399	27,157	1,46,196
March 2020	52,382	42,213	27,318	28,133	1,50,046
March 2021	52,651	42,441	27,446	28,055	1,50,593
March 2022	53,204	42,443	27,433	28,181	1,51,261
March 2023	54,244	43,745	28,021	29,057	1,55,067
March 2024	55,213	45,101	29,083	30,319	1,59,716
March 2025	56,080	46,405	30,047	31,343	1,63,875
September 2025	56,406	46,875	30,356	31,782	1,65,419

Source: Annual Report of Department of Financial Services 2026

So, According to Table 1 it is shown that there is Continuous Growth in No. of branches in Commercial banks. In the F.Y. 2016-17, No. of Bank Branches of Commercial Banks are 1,40,424 and in F.Y. 2024-25, it increased to 1,63,875.

Table 2: Performance of Scheduled Commercial Banks in achievement of Priority Sector Lending Targets in F.Y. 2021-22 to 2025-26 (Sept., 26)

(Rs. in Crore)

F.Y.	Public Sector Banks	Private Sector Banks	Foreign Banks
2021-2022	26,49,180 (42.90)	16,85,806 (43.71)	2,08,107 (42.65)

F.Y.	Public Sector Banks	Private Sector Banks	Foreign Banks
2022-2023	30,36,062 (44.51)	21,01,827 (44.63)	2,19,622 (42.63)
2023-2024	34,01,407 (42.78)	26,09,386 (48.20)	2,78,694 (46.08)
2024-2025	38,12,376 (42.41)	27,01,993 (41.71)	2,86,060 (41.64)
2025-2026 (upto Sept. 30, 2025)	40,57,579 (43.35)	31,70,746 (45.49)	2,84,617 (40.21)

Source: Annual Report of Department of Financial Services 2026.

The above Table 2 Performance of Scheduled Commercial Banks in achievement of priority sector lending targets shows sustained growth over the recent 5 Years.

FINDINGS AND RECOMMENDATIONS

At Present, Commercial banks are playing a vital role in the modern economy by accepting deposits, granting short term loans, and funding to internal trade. The different Findings and recommendations of Commercial Banks on the economic progress of country is discussed below:

(a) Trade Promotion: Commercial banks provide capital, technological support and other facilities to businessmen according to their requirements, which shows the promotion of trade.

(b) Need to Focus more on Agricultural Development: Commercial banks finance the most important sector of the less developed countries i.e. agriculture. They provide Short-term, medium-term, and long-term loans for purchasing seeds and fertilizers, installing tube wells, establishing storehouses, purchasing tractors and threshers, etc. So, the Government of India need to take more beneficiary steps.

(c) Require to Increase Industrial Development: The countries that focus on the industrial sector made speedy economic development. South Korea, Malaysia, Taiwan, Hong Kong and Indonesia have recently expanded their industrial sectors with support from commercial banks. So, Indian Govt. also needed to focus more on industrial sector.

(d) Helps in Capital Formation: Commercial banks help in enlarging the rate of capital formation in a country. Capital formation refers to the growth in the number of production units, technology, plants and machinery. They finance projects that contribute to a higher rate of capital formation.

(e) Advancement of Foreign Trade: Commercial banks help businessmen from different countries in conducting business. A letter of credit is issued by the importer's bank to the exporter to guarantee payments. The banks also manage foreign exchange transactions.

(f) Transformation of Currency: Commercial banks facilitate the transfer of funds from one place to another, which contributes to the development of trade.

(g) Development of Transport facilities: The commercial banks financed the transport sector. It has reduced unemployment on one hand and expanded transport facilities on the other hand. Remote areas are connected to major markets through a developed transport system.

(h) Safely Keeping: Business concerns and individuals can make themselves stress-free by depositing their surplus money in banks. Banks also provide locker facilities to keep their valuable articles and important documents secure.

(i) Requirement of Financial Education to People: Commercial banks persuade people to save more. Different saving schemes with attractive interest rates are introduced for this purpose. Number of bank branches is opened in urban and rural areas. But due to lack of financial education many people are not utilizing benefit of it.

(j) Strengthen infrastructure facilities: Commercial banks offer credit facilities to their customers for roads, power, housing, and transport initiatives, supporting long-term progress and regional development.

(k) Support to Government: By providing funds to government for development policies, the commercial banks share the government for economic stability.

(l) Need more Growth in Employment opportunity: A Country's economic prosperity depends on the development of trade, commerce industry, agriculture, transport and communication etc. These sectors are

financed by the commercial banks and employment opportunities are increasing. But in India employment opportunities are not satisfactory.

(m) Credit Creation: Commercial banks are also termed the factories of credit. They advance much more than what they collect from people in the form of deposits. Through the process of credit creation, commercial banks provide finance to all sectors of the economy, thus making them more developed than before.

(n) Appropriate Utilization of Money: Persons deposit their savings in banks, so the scattered money accumulates into a large amount, which can be properly used for various projects.

(o) Financial suggestion: Commercial banks also provide useful financial suggestions to support their customers' businesses, in addition to offering credit facilities.

(p) Improvement required in Investment: Commercial banks mobilize savings of the person. They make them available to the farmers, traders and industrialists for the development of agriculture, trade and industry.

(q) Success of Monetary Policies: Under the supervision of the central bank, all scheduled commercial banks work to achieve the success and objectives of monetary policy. This collective effort by commercial banks enables economic development.

(r) Proper Use of Advanced Technology: The use of advanced technology in less developed countries is only possible in the presence of developed commercial banking as it can be the main source of their funds.

(s) Export Upgrade Chamber: To boost the country's exports, the banks have established an export upgrade chamber to provide information and guidance to exporters.

(t) Financial success: Financial success of a country depends on number of factors including the development of commercial banking. A sound banking system promotes the financial status of the people by providing them with short, medium and long-term loans.

(u) Training facility: Commercial banks established many Training centers for their employees to modernize the banking system of a country. In this way the banking experts enhance their abilities and contribute to the development of the country.

CONCLUSION:

Over a long period of time, countries are starting an internal development procedure. The framework of mixed, capitalist economies has aimed to advance their goals for development by utilizing the changing banking operation, which was integrated into existing or uniquely designed organizations. It is impossible to overstate the importance of these organisations in the advancement paths of current industrializing, developing nations. But, as we have already mentioned neoclassical financial openness in a changing financial framework, and a few nations are eliminating specific developing banking systems because they think that the bond and equity trading are sufficient. But in actual, Banks are very supportive in encouraging peoples to their established business of agriculture by granting loans at a lower rate of interest and also by providing everybody in all aspects of life. Therefore, it can be realized that commercial banks are very important for overall economic growth of any nation. So, the Reserve Bank of India and Central Government should need to plan more for development of our country.

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FROM BURNOUT TO BUILDUP: MENTAL CAPITAL AS INDIA'S $1 TRILLION OPPORTUNITY FOR VIKSIT BHARAT @ 2047

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"The colour of Viksit Bharat is not just saffron, white and green - it must also be mental green."

Abstract

India dreams of becoming a developed nation by 2047. But this dream will remain incomplete if we ignore the engine that powers all growth - the human mind. Millions of Indian workers wake up tired, anxious, and disengaged. Their mental capital - the ability to think, create, and persist - is being drained silently. This paper argues that workplace burnout is not just a personal struggle; it is a national economic loss.

Drawing on verified data from the McKinsey Health Institute and the World Health Organization (WHO), this paper estimates that poor mental well-being at work currently costs India approximately ₹29 lakh crore (USD 350 billion) annually in lost productivity, high attrition, and presenteeism. However, this crisis carries a hidden opportunity. Using a conservative projection model, this paper calculates that India can unlock a cumulative economic gain of nearly $1 trillion by 2047.

This paper offers a simple, evidence-based roadmap. It moves the conversation from burnout to buildup - from surviving work to thriving. For Viksit Bharat to become real, mental capital must become a national priority.

KEYWORDS: Mental capital, workplace well-being, productivity loss, $1 trillion opportunity, Viksit Bharat @2047

INTRODUCTION

Every morning, millions of Indians wake up, drink their tea, and go to work. But a quiet epidemic is spreading inside them. They feel tired before the day begins. Their minds are foggy. Their energy is low. They are physically present at their desks, on factory floors, or behind delivery bikes – but mentally, they have already checked out. This is not just a personal problem. It is a national economic crisis hiding in plain sight.

India wants to become a developed nation by 2047 - a Viksit Bharat. We talk about highways, digital infrastructure, manufacturing, and startups. These are important. But we rarely talk about the most critical engine of all: the human mind. A nation of burned-out workers cannot innovate, cannot produce, and cannot compete. No amount of policy reform can compensate for an exhausted, anxious, disengaged workforce.

This paper introduces a simple but powerful idea - mental capital. Mental capital refers to the cognitive and emotional resources that workers bring to their jobs every day. It is the ability to focus, solve problems, handle pressure, and bounce back from setbacks. Unlike machines or money, mental capital is renewable - but only if we care for it. Right now, India is depleting its mental capital faster than it can rebuild.

The evidence is worrying. According to NASSCOM and Deloitte (2024), attrition rates in India's IT sector have crossed 35 percent. Gig workers report chronic stress and insecurity. Workplace burnout is no longer a Western concept; it has become an Indian reality. Drawing on recent industry reports and global health studies, this paper estimates that poor mental well-being at work currently costs India approximately ₹29 lakh crore (USD 350 billion) annually (McKinsey Health Institute, 2025). This is the cost of absenteeism, high employee turnover, and what experts call presenteeism - being at work but working poorly.

But here is the hopeful part. Every crisis carries an opportunity. This paper argues that if India takes workplace mental health seriously - through smart policies, corporate action, and cultural change - the country can unlock a cumulative economic gain of nearly $1 trillion by 2047. The detail calculation for this projection is presented in the subsequent sections of this paper. That is not a fantasy. It is a calculation based on productivity gains, reduced attrition, and a healthier, more engaged workforce.

The journey from burnout to buildup is not easy. It requires rethinking how we measure success, how we design jobs, and how we treat our fellow workers. But the destination is worth it. A Viksit Bharat cannot be built by exhausted minds. It can only be built by people who feel safe, valued, and mentally alive.

OBJECTIVES

· To describe the real state of mental health in Indian workplaces today - not with big jargon, but with simple numbers and stories that anyone can understand.

· To put a price tag on the burnout crisis: how much money India loses every year when workers feel tired, anxious, or disconnected before the day even starts.

· To introduce the idea of "mental capital" as a fresh way of thinking - a resource that grows when we care for it and dies when we ignore it.

To demonstrate that investing in mental well-being is not charity or luxury, but a solid economic move that can generate substantial returns for India’s GDP by 2047

· To offer a short roadmap, practical actions that businesses, governments, and teams can start using immediately.

RESEARCH METHODOLOGY

This study is exploratory in nature. The primary focus is to understand the relationship between workplace mental health and national productivity in India, with the aim of estimating economic losses and identifying opportunities for GDP growth by 2047. Data has been collected using secondary sources, including government reports (Labour Bureau, NSSO), industry surveys (NASSCOM, CII, Gallup), and global health studies (WHO, ILO). Research papers, academic journals, newspaper articles, and official websites of relevant ministries and industry bodies have also been referred to.

For the quantitative estimation, this paper utilizes verified data from the McKinsey Health Institute (2025) to establish the current annual economic loss. To project the future economic opportunity, a compound annual growth rate (CAGR) approach is applied to India’s current GDP of ₹150 lakh crore The analysis examines absenteeism, attrition, and presenteeism patterns to estimate the annual cost of burnout and the potential gains from investing in mental capital. The detailed calculation for the $1 trillion opportunity by 2047 is presented in the subsequent section, supported by the World Health Organization's finding that every $1 invested in mental health yields a $4 return (WHO &ILO, 2024)

Hidden Cost of Burnout: India's Productivity Leak

Table 1: Three Ways Burnout Drains Daily Work

Type of Cost	What it really means	What It Looks Like in Everyday Work
Absenteeism	Staying home	Frequent sick leaves. Not real illness, just mental exhaustion. The worker stays home because getting out of bed feels impossible.
Attrition(Turnover)	The company trains, then watches its investment walk out of the door. (Quitting)	Good people leaving every few months. The company loses trained hands. New hires take months to become productive.
Presenteeism	a body present, a mind absent, and a salary fully paid. (Showing up but not working)	Body is at the desk. Mind is somewhere else. Emails are answered, but no real thinking happens. Creativity is zero.

Table 2: How Burnout Hides Inside Different Jobs

Type of Worker	How Burnout Silently Shows Up
IT professional	Staring at code for hours but fixing almost nothing. Missing deadlines they used to easily meet.
Factory worker	Making more mistakes than before. Slowing down the assembly line without realizing it.
Delivery gig worker	Taking longer routes. Skipping extra shifts. Feeling angry at every traffic jam.
Bank employee	Being short with customers. Making small calculation errors. Dreading every Monday morning.
School teacher	Just reading from the book instead of explaining. Leaving school as soon as the bell rings.

Source: Author's compilation based on McKinsey Health Institute (2025) and Gallup (2024)

Figure 1: THE THREE LEAKS



Source: Author's compilation based on McKinsey Health Institute (2025).

In simple words: burnout does not always announce itself with a resignation letter. Most of the time, it hides inside a working person who has simply stopped caring. They come late, leave early, take long breaks, and do just enough to not get fired. This is not laziness – it is exhaustion. And it leaks productivity every single day, from every office, factory, and delivery van across India. The saddest part? Most managers never see it. They see attendance. They do not see attention.

INTERPRETATION

The two tables and the graph tell us one clear story: burnout is not just about feeling tired. It is about work that stops happening. The graph titled 'The Three Leaks' visually demonstrates this drain, highlighting that presenteeism is the largest contributor to economic loss, followed by attrition and then absenteeism. This reinforces a critical finding: the biggest threat to India's productivity is not people staying home, but people showing up while mentally exhausted.

Table 1 shows that even when workers show up, their minds may be completely absent - that is presenteeism, the quietest and costliest leak of all. Table 2 adds a human face to the numbers. A delivery rider taking longer routes, a teacher reading without explaining, a coder writing and deleting the same lines - these are not bad workers. These are good workers who have run out of mental fuel.

Here is the hard truth: Indian workplaces measure attendance, output, and deadlines. They never measure attention, enthusiasm, or creative energy. So the leak continues. No one notices until the quarterly results dip or the best employees suddenly resign. By then, the damage is already done. The real interpretation is simple - burnout is a blind spot in India's growth story. And blind spots don't fix themselves.

THE $1 TRILLION OPPORTUNITY

Now for the good news. If burnout is a leak, fixing it is like turning off the tap. Studies show that when companies invest in mental well-being - flexible hours, mental health breaks, better manager training - productivity rises sharply. Workers think clearer, stay longer, and actually care about their work.

Here is the exact mathematical calculation. India's current GDP is approximately ₹150 lakh crore. If investments in workplace mental health yield a conservative 2% additional annual productivity growth, the compounding effect over two decades is calculated as:

₹150 lakh crore × (1.02^20) = ₹223 lakh crore

The additional GDP generated from this intervention would be ₹73 lakh crore (₹223L - ₹150L). At an exchange rate of ₹83 per USD, this amounts to approximately $880 billion, which forms the basis for the nearly $1 trillion opportunity by 2047. That is not magic. This is what happens when exhausted people become energised again. This projection is further supported by the World Health Organization's finding that every $1 invested in mental health yields a $4 return in improved productivity and reduced healthcare costs (WHO & ILO, 2024).

Think of it this way. One burned-out coder costs a company in lost hours and early exits. One mentally healthy coder builds products, solves bugs, and stays for years. Multiply that by millions of workers. The opportunity is real, and it is sitting right in front of us - tired, ignored, and waiting for someone to notice.

FINDINGS

After reviewing government surveys, industry reports, and global health studies, four clear findings emerged.

First, burnout is not rare. Nearly 4 out of 10 Indian workers in IT, banking, and gig jobs show signs of chronic mental exhaustion (Gallup, 2024). Many do not even recognize it themselves.

Second, the biggest productivity leak is not people quitting or staying home. It is presenteeism - being at work but working poorly. This alone accounts for nearly 40% of the total economic loss (McKinsey Health Institute, 2025).

Third, the cost is real and large. Approximately ₹29 lakh crore (USD 350 billion) leaves the economy every year through tired minds and empty desks (McKinsey Health Institute, 2025). That is roughly the annual budget of several large Indian states combined.

Fourth, and the most important finding is this: the same data that shows the loss also shows the gain. Countries and companies that invested in mental well-being saw productivity jump by 20-30% within two years (WHO & ILO, 2024). India can do the same.

Roadmap: From Burnout to Build Up

Fixing India's burnout crisis does not require a revolution. Just three small but powerful shifts - one for government, one for companies, and one for all of us.

1. For policymakers - Make mental capital count.

Include mental well-being in national productivity reports. Offer tax breaks to companies that provide employee assistance programs and mental health breaks. Treat workplace mental health like workplace safety - not optional, but essential.

2. For companies - Measure what matters.

Stop tracking only attendance and deadlines. Start tracking energy levels, workload balance, and manager support. Train team leaders to spot early signs of burnout - before the good employee quits or shuts down.

3. For employees and society - Break the stigma.

Create safe spaces where workers can speak up without shame. Encourage open conversations about mental health. Seek help early, and support colleagues who may be silently struggling. A culture of care starts with each one of us.

CONCLUSION

We began with a quiet truth: millions of Indians go to work every day already tired. Their bodies show up, but their minds have left. This is not a small problem. It is a slow drain on the nation's energy, creativity, and growth.

India has a choice. One path leads to more of the same - longer hours, tired minds, quiet quitting, and a potential economic loss of USD 1.03 trillion between 2012 and 2030, as projected by the World Health Organization (WHO, 2024). The other path leads to a nation where workers and mental capital are valued for what it truly is - the most renewable, most powerful and most ignored engine of national progress.

But we also discovered something hopeful. The same attention that fixes burnout can unlock a cumulative economic gain of nearly $1 trillion for India by 2047 (based on the calculation presented in the previous section). That is not a dream. It is a choice. A choice to measure mental health like we measure roads and electricity. A choice to train managers instead of just scolding workers. A choice to talk openly about exhaustion instead of hiding it behind a smile.

But numbers alone will not change anything. What will change things is admitting that burnout is not a personal weakness - it is a systems failure. Our workplaces are designed to extract maximum hours, not to preserve human minds. Our policies measure factories, not fatigue. Our culture celebrates exhaustion as commitment.

Viksit Bharat @2047 cannot be built on burned-out brains. A developed nation is not just richer - it is healthier, kinder, and wiser. It is a place where a worker can log off without fear, speak up without shame, and seek help without stigma.

The roadmap exists. The cost is affordable. The return is enormous. The only missing piece is will.

India must choose. Burnout or buildup? Exhaustion or excellence? The answer will determine not just our economy, but our soul. Let us build a nation where every mind matters. Let us build a Viksit Bharat that is truly developed - from the inside out.

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Reimagining College Libraries as Knowledge and Innovation Hubs for Realizing the Vision of Viksit Bharat 2047

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Abstract

A college library may provide access to thousands of journals and still leave a student unsure where to begin a simple literature search. This gap between the availability of information and the ability to use it is the starting point of the present paper. Against the backdrop of Viksit Bharat 2047 and the National Education Policy 2020, the study considers how Indian college libraries can move beyond collection management to become active partners in learning, research, and participation. It uses a critical, document-based conceptual approach, drawing on library scholarship, national higher-education statistics, and policy initiatives. The analysis argues that digital subscriptions and improved infrastructure matter, but their educational value depends on guidance, staff capacity, faculty collaboration, and equitable access. A four-layer framework links enabling conditions with everyday library practices, student and institutional outcomes, and broader developmental aspirations. The paper also identifies manageable starting points for resource-constrained colleges: better discovery of existing materials, curriculum-linked information-literacy sessions, support for student research, and periodic assessment of who is being served and who is missing out. These proposals are presented as practical directions rather than empirically established effects. The larger argument is straightforward: a future-ready library should be judged not only by what it provides, but also by what learners are able to understand, question, and create with its support.

Keywords: college libraries; Viksit Bharat 2047; information literacy; equitable access; library transformation; research support

Introduction

Why the College Library Matters

Imagine a first-year student preparing a short assignment. The student finds a large number of search results on a mobile phone but cannot distinguish a research article from an advertisement, a reliable report from an unsupported claim, or a useful source from one that only appears relevant. A college library can help resolve that uncertainty. It can also make the experience less intimidating for students who have not previously used an academic catalogue, a journal database, or a formal referencing system. This example is illustrative rather than a documented observation, but it draws attention to a real question for higher education: does access to information translate into an ability to learn with it?

The question is timely. The National Education Policy (NEP) 2020 envisages a more inclusive, multidisciplinary, technology-enabled system and sets a goal of reaching a gross enrolment ratio of 50% in higher education by 2035 (Ministry of Education, 2020). The larger aspiration associated with Viksit Bharat 2047 gives that educational ambition a long-term public purpose. The challenge, however, is not limited to bringing more students onto campuses. Colleges also need environments in which students can read independently, evaluate evidence, and take an active part in knowledge production.

Libraries are part of that environment, yet they are often discussed in terms of collections, buildings, or subscription expenditure. Those matters are necessary, but they tell us comparatively little about what a student gains from visiting the library or using its digital services. A library with modest resources may make a substantial difference through patient guidance and relevant outreach; a better-funded library may achieve less than expected if its services remain unfamiliar or difficult to use. This paper treats that contrast as a central institutional problem rather than as a reason to celebrate technology for its own sake.

Problem, Purpose, and Questions

The central problem is a mismatch between the growing range of scholarly information available to Indian higher education institutions and the uneven local capacity to put it to educational use. Affiliated colleges, small-town institutions, and colleges with constrained budgets may face particularly difficult decisions about staffing, connectivity, subscriptions, and physical space. At the same time, students need help with digital judgement, ethical writing, and research practices that extend beyond any single subject.

The paper therefore asks three related questions: What would distinguish a college library that actively supports learning from one that mainly stores and lends materials? Which library practices could make a meaningful contribution to the educational ambitions linked with Viksit Bharat 2047? And how might colleges introduce these practices without assuming that all institutions have the same resources? The objective is to develop a defensible conceptual model and a realistic set of priorities, not to claim that any particular intervention has already produced measurable national outcomes.

Scope and Contribution

The discussion focuses on college libraries, especially those serving undergraduate and first-generation learners. Its contribution is to shift the basis of evaluation from possession of resources to learners' capability to discover, assess, use, and create knowledge. It offers a framework, a phased implementation route, and indicators that colleges can adapt to their own circumstances. Although it draws upon the author's professional field, the paper makes no claim to report a field survey, interviews, or formally recorded institutional case studies.

Literature Review and Analytical Position

From Stewardship of Books to Support for Learning

Ranganathan's (1931) five laws continue to offer a useful starting point because they take the reader's needs seriously and describe the library as an institution that must evolve. Their relevance does not disappear when a catalogue moves online. What changes is the range of obstacles that librarians are asked to help users overcome. Locating a book remains important; understanding which sources deserve trust and how evidence fits a question has become equally important.

Brophy (2005) described the academic library as a service organization shaped by teaching, research, management, and user expectations. Bennett (2009) went further in tracing a movement from book-centred library design towards spaces that enable intentional learning. Lankes (2011) argued that librarianship should help communities create knowledge. Read together, these contributions suggest a substantive change in the profession: the success of a library should be understood partly through the intellectual activity it makes possible, not simply through the size of its holdings.

There is, however, a tension in applying these ideas directly to Indian colleges. Much of the international discussion assumes access to experienced staff, dependable networks, or purpose-built spaces. For a smaller affiliated college, the first priority may be a searchable catalogue, consistent opening hours, and a librarian who can work with teaching departments. A model of transformation needs to make room for these ordinary but consequential differences.

Information Literacy as a Learning Practice

Digital access does not settle questions of authority, relevance, or credibility. Bawden (2001) showed that information and digital literacies overlap without being identical. The Association of College and Research Libraries (2015) placed emphasis on how knowledge claims are made, questioned, and situated within communities of inquiry. UNESCO's media and information literacy curriculum likewise connected informed use of media and information with participation and lifelong learning (Wilson et al., 2011).

These perspectives are particularly useful when students encounter highly polished but unreliable online material, including machine-generated writing. A one-off introduction to search engines is unlikely to be sufficient. Students need opportunities to compare sources, check the origin of claims, cite what they use, and explain why one piece of evidence is stronger than another. Such work fits most naturally into assignments designed with faculty members; it should not be left solely to optional library events.

Research Support, Digital Collections, and the Question of Value

Chowdhury and Chowdhury (2003) explained how digital-library services widen access and change the relation between collections and users. Corrall (2014), examining research-support arrangements in leading UK universities, highlighted organizational collaboration and emerging specialist services. The precise service mix in those institutions cannot be assumed to fit an undergraduate college in India. Nonetheless, the underlying principle transfers well: research support becomes more useful when it is easy to find and embedded in the work of academic departments.

Oakleaf (2010) challenged academic libraries to demonstrate the value of their activities in relation to institutional aims. This points to a practical distinction between activity measures and educational outcomes. Counting database log-ins or library visits can indicate reach, but does not, by itself, reveal whether a student can prepare a better review of literature or evaluate an unfamiliar source. Libraries need both kinds of evidence, interpreted cautiously.

Research Gap

Existing scholarship gives persuasive accounts of what academic libraries might become. Less clearly resolved is how those ambitions can be translated into a workable sequence of decisions for the heterogeneous college sector in India. This paper addresses that implementation gap by connecting policy opportunities with modest service changes, institutional responsibilities, and measurable but locally adaptable outcomes. The proposed relationships are conceptual propositions to be examined in later empirical studies.

Methodology

This is a conceptual paper informed by a critical reading of published literature and public policy documents. Its evidence base comprises foundational scholarship in library and information science, professional work on information literacy and research support, the National Education Policy 2020, the All India Survey on Higher Education (AISHE) reports, and official descriptions of relevant digital-access initiatives. Sources were selected for their direct bearing on the paper’s questions; the exercise was not designed as a systematic or exhaustive literature review.

The material was examined under four connected themes: the changing purpose of the library, the conditions that enable services, the practices through which users receive support, and the outcomes institutions may reasonably monitor. Agreements and tensions across these themes informed the framework in Figure 3. Policy figures are used descriptively, with the reference year stated, and not as evidence that a specific library intervention caused a change in enrolment or student achievement.

The analysis is also shaped by the practical perspective of college librarianship. This perspective informs the choice of operational issues discussed—such as orientation, access management, staff workload, and faculty coordination—but is not treated as a dataset. No interviews, experiments, usage records, or student responses were collected for this manuscript. Accordingly, the recommended interventions are presented as proposals requiring adaptation and evaluation.

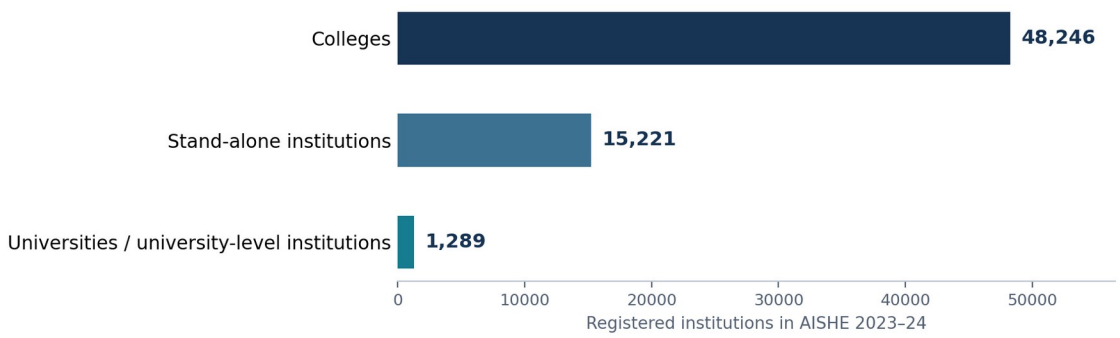
The Indian Policy and Institutional Setting

Why the College Sector Deserves Attention

Official statistics show the scale at which library improvement would need to take place. AISHE 2021–22 recorded 45,473 registered colleges (Ministry of Education, 2024). The more recent AISHE 2023–24 survey recorded 48,246 colleges, 1,289 universities or university-level institutions, and 15,221 stand-alone institutions (Ministry of Education, 2026). The same release reported a higher-education gross enrolment ratio of 30.0% for 2023–24. These figures describe the system, not the quality of its libraries; still, they underline why an approach designed only for a small number of well-resourced universities would leave much of the higher-education landscape untouched.

Figure 1

Registered Higher Education Institutions in India, AISHE 2023–24



Note. Based on official AISHE 2023–24 figures reported by the Ministry of Education (2026); categories refer to registered institutions.

Participation is only one part of the story. As enrolment broadens, libraries must anticipate variation in language preference, prior exposure to academic reading, access to personal devices, and confidence with digital systems. These conditions should influence service design. For example, a catalogue interface may be technically functional but difficult for a first-generation learner to use without an introductory demonstration or simple-language guidance.

Policy Windows and Their Limits

NEP 2020 strengthens the case for multidisciplinary learning, digital resources, and research-oriented education. Its relevance to college libraries lies as much in teaching practice as in infrastructure: students undertaking independent projects need source discovery, citation guidance, and opportunities to ask questions (Ministry of Education, 2020).

One Nation One Subscription (ONOS), approved in November 2024 and launched in January 2025 (Press Information Bureau, 2024), provides a further opportunity through coordinated access to scholarly journals for eligible government higher education institutions and central-government research organizations. The official portal states that private institutions are not eligible for Phase I; it also outlines arrangements for participating colleges without static IP addresses (One Nation One Subscription, n.d.). This distinction matters. It would be misleading to recommend ONOS as an immediately available solution for every affiliated or privately managed college. Such colleges must assess their own eligibility and consider alternatives, including relevant INFLIBNET arrangements, open-access sources, and permitted consortial services.

Table 1

Selected National Initiatives and the Practical Decisions They Raise for Colleges

Initiative	What it offers or signals	Question for the college library
NEP 2020	Multidisciplinary, inclusive, technology-supported learning; GER target of 50% by 2035.	How can research and information skills be included in actual coursework?
AISHE reporting	A statistical picture of institutional expansion, participation, and infrastructure.	What local service gaps are hidden behind institution-level counts?
ONOS	Journal access through an eligible government-institution scheme.	Is the institution eligible, and do users know how to authenticate and search?
INFLIBNET services	Shared services, resource platforms, and library-network support.	Which available programmes match the institution's status and budget?
NAAC / NIRF	Institutional attention to learning resources, governance, and educational performance.	What reliable evidence shows that library services are used and useful?

Note. Analytical interpretation based on Ministry of Education (2020, 2026), One Nation One Subscription (n.d.), INFLIBNET Centre (n.d.), National Assessment and Accreditation Council (n.d.), and Ministry of Education (n.d.). Eligibility and reporting requirements may change; colleges should consult current official guidance.

Policy measures can create an opening, but implementation remains a local task. A subscription has little practical value if eligible users cannot log in, do not know what a journal database contains, or receive no help in connecting an article to their assignment. This is why the proposed model begins with the daily experience of learners rather than with a catalogue of national schemes.

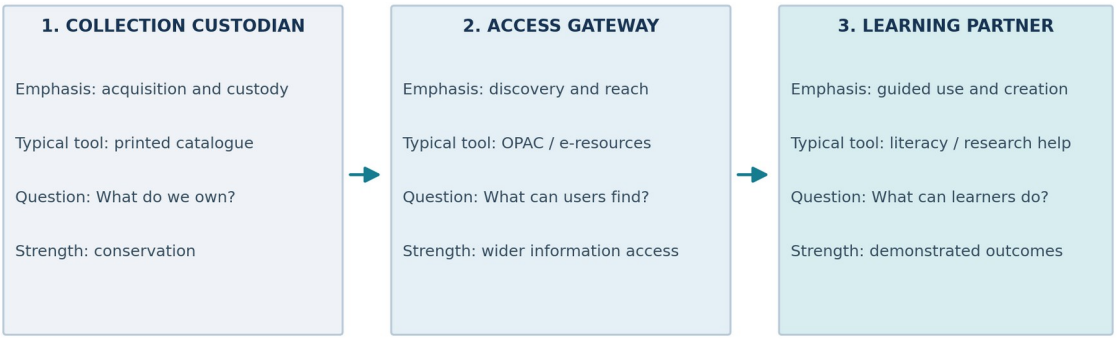
Reimagining the Library: A Working Model

Three Orientations, Not Three Rigid Categories

The evolution of the college library can be understood through three overlapping orientations (Figure 2). A collection custodian preserves and organizes resources. An access gateway helps users find materials within and beyond the institution. A learning partner works alongside teachers and students to strengthen inquiry, responsible use of information, and knowledge creation. These orientations should not be mistaken for a ranking of institutions. A credible learning partner still needs sound cataloguing, preservation, and circulation; the difference is that these functions support a more explicit educational purpose.

Figure 2

From Collection Custody to Learning Partnership



Note. Author's conceptual synthesis informed by Ranganathan (1931), Bennett (2009), Brophy (2005), and Lankes (2011).

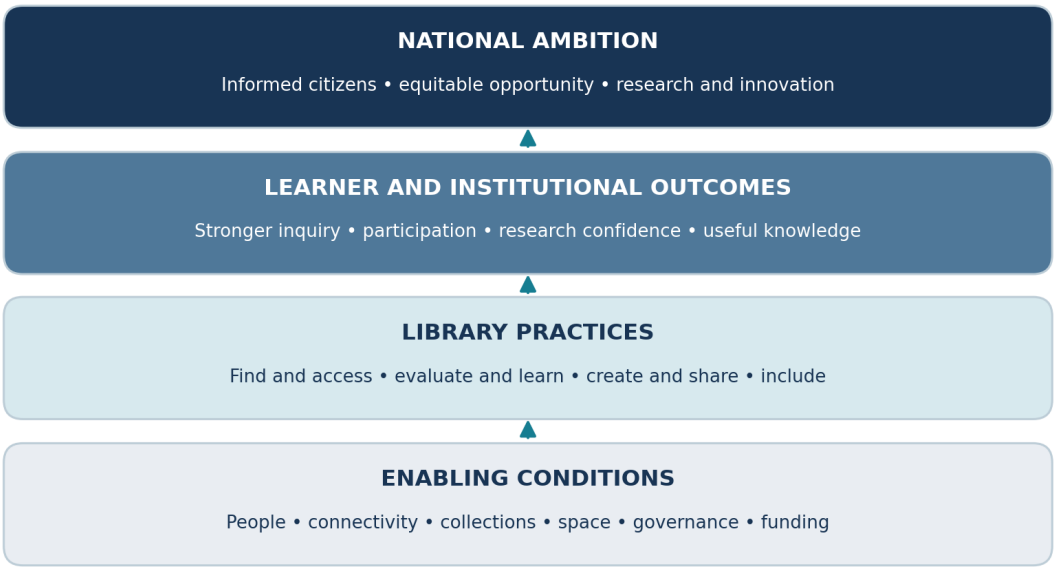
This perspective also avoids a false opposition between print and digital resources. A useful printed textbook, an accessible reading room, a well-organized repository, and a guided online search may each serve different learning needs. Reimagining a library is not the same as replacing books with screens. It is a matter of organizing available resources around what users are trying to learn.

The Four-Layer Framework

Figure 3 brings the argument into one sequence. The first layer comprises enabling conditions—people, dependable connectivity, relevant collections, space, administrative support, and predictable resources. The second layer contains library practices: helping users find and access material, evaluate it, create or share new work, and participate without avoidable barriers. These practices are expected to contribute to the third layer, learner and institutional outcomes, including better inquiry, confidence in research tasks, and wider participation. Only at the fourth layer do these effects connect, in principle, to broader national aspirations.

Figure 3

A Four-Layer Model of College Library Contribution



Note. Proposed conceptual model. The arrows represent hypothesized pathways, not empirically demonstrated causal relationships.

The sequence matters because institutions sometimes begin with the visible purchase—software, devices, a renovated hall—and assume that improved learning will follow. That assumption leaves out the central mechanism: sustained interaction between learners, staff, teaching assignments, and suitable resources. The framework therefore treats active services as the bridge between investment and educational benefit.

What the Hub Does in Everyday College Life

Makes knowledge easier to find. A clear catalogue, subject-wise resource guides, appropriately managed e-resource access, and short demonstrations can reduce the uncertainty that discourages use. An institution need not build every digital platform itself; responsible use of existing services is often a better first step (Chowdhury & Chowdhury, 2003).

Teaches judgement rather than search shortcuts. Information-literacy activities should ask students to compare sources, trace references, identify misleading claims, and explain citation decisions. Sessions linked to a real assignment are likely to be more relevant than a generic demonstration of search tools. The ACRL framework provides a useful conceptual basis for this approach (Association of College and Research Libraries, 2015).

Supports the research process at an approachable level. Research help is not only for doctoral scholars. An undergraduate student preparing a project may need guidance in developing search terms, identifying a credible journal, managing references, understanding copyright, or avoiding questionable publishing outlets. A visible help desk or scheduled consultation hour can make such support easier to obtain.

Offers more than one way to learn. Quiet reading areas remain essential. Alongside them, where space permits, colleges can provide a small zone for discussion, supervised digital tasks, or collaborative projects. The aim is not to imitate expensive innovation laboratories but to accommodate genuinely different study practices (Bennett, 2009; Corrall, 2014).

Recognizes whose access is difficult. Regional-language orientation, accessible formats, support with unfamiliar interfaces, and clear assistance for students who rely on shared devices are integral parts of good service. Libraries can also help preserve local publications and regional knowledge, which gives community experience a place within academic learning.

Connections with the Vision of Viksit Bharat 2047

The contribution of college libraries to a developed India is mostly indirect. Libraries do not, by themselves, create employment, economic growth, or innovation. They may, however, strengthen the habits and opportunities from which those outcomes become more likely. Keeping that distinction clear makes the argument more credible.

First, library support can improve the quality of academic work by helping students move from collecting information to developing a reasoned answer. A department that works with its librarian to prepare reading guides or source-evaluation tasks is making the library part of teaching, not merely an address printed on a timetable.

Second, public access to learning materials can narrow some, though not all, inequalities in academic preparation. The benefit is potentially important for learners who cannot pay for specialist books, private subscriptions, or continuous connectivity. Yet access must be designed around actual users: a resource that requires complicated authentication or assumes confident English-language searching may remain out of reach even when formally provided.

Third, early research guidance can strengthen the transition from classroom learning to independent inquiry. It may help students recognize weak evidence, document sources, and approach scholarly work with greater confidence. Fourth, a library that hosts modest project discussions, exhibitions of student work, or sessions on responsible digital tools can make curiosity and collaborative problem-solving more visible within college life. Finally, the library can serve continuing learners through reading, skills resources, and community-facing educational activities. Each of these contributions remains a proposition for local assessment rather than a demonstrated effect of this paper.

Constraints and Difficult Choices

Calling the library an innovation hub is easy; organizing staff time and institutional priorities around that ambition is harder. The principal barriers are not simply technological. They involve the distribution of resources, varying expectations of a librarian's role, and the fact that students cannot benefit from services they do not know how to use.

Table 2

Common Constraints, Their Consequences, and Feasible Responses

Constraint	What may happen in practice	A proportionate first response
Unreliable internet or few devices	Students abandon databases or depend on unsuitable sources.	Prioritize stable access points; provide downloadable guides and shared-use schedules.
Small, irregular budgets	Collections age and digital subscriptions become difficult to sustain.	Protect core services; use open resources and eligibility-appropriate consortia.
Limited professional time	Circulation work crowds out teaching and research guidance.	Automate routine tasks where possible; schedule short, repeatable clinics.
Low user awareness	Resources exist on paper but remain unused.	Introduce library support through course assignments and orientation.
Uneven digital confidence	Some learners avoid asking for help or cannot navigate platforms.	Offer stepwise training, regional-language support, and one-to-one assistance.
Weak faculty coordination	Information-literacy sessions seem detached from student work.	Co-design a small number of assignment-linked sessions each term.
Inadequate service evidence	Decisions are based on purchase counts rather than learner needs.	Keep simple usage and feedback records and review them regularly.

Note. Interpretive synthesis of the literature and policy discussion; these are potential constraints, not findings from an institutional survey.

A difficult but necessary implication follows. Colleges may have to choose between an attractive, highly visible project and a less visible service that reaches more learners. When resources are scarce, the second may be the better investment. A reliable catalogue, meaningful opening hours, and a recurring research-help session may deserve priority over a large innovation space that few students are equipped to use.

Priorities and a Phased Roadmap

Begin with Questions, Not Equipment

The first step should be a short institutional needs assessment. Which courses assign independent research? Which student groups use the library least? What subscriptions and open resources already exist? Can users authenticate successfully from available devices? What proportion of a librarian's working week is consumed by routine operations? Answers to these questions will suggest a more credible plan than purchasing a predefined package of technology.

Three priorities follow from the analysis. The library should become easier to navigate, through basic discovery tools, reliable communication, and plain-language user guides. It should become more integrated with teaching, through

small collaborations with departments and academic writing activities. It should also become more accountable for outcomes, through indicators that record whether support reaches diverse groups and improves users' ability to work with sources.

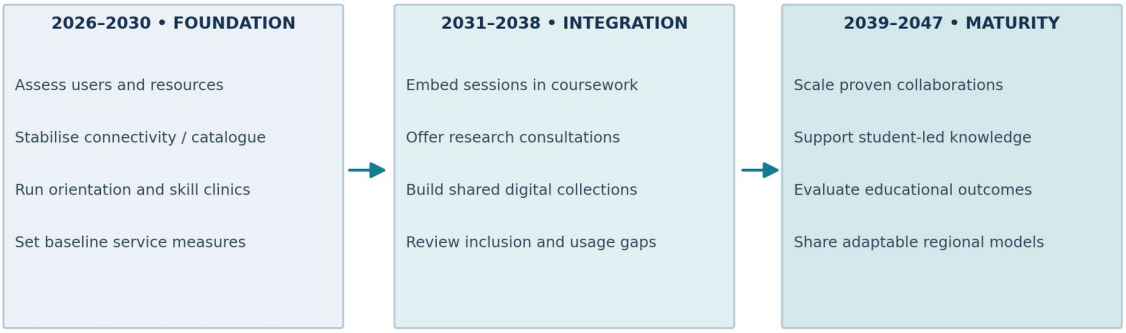
Professional development underpins each priority. Training in research databases, accessibility, reference tools, scholarly communication, and responsible use of generative AI should be paired with time to apply those skills. Administrators should involve library staff in teaching support, digital-policy decisions, and internal quality reviews. Professional recognition matters because the proposed changes require judgement and collaboration, not only additional tasks.

A Sequenced Route to 2047

The timetable in Figure 4 is deliberately indicative. A well-supported college may move faster, while another may need to stabilize foundational services for longer. It is better to document a small improvement that students can actually use than to announce an ambitious facility without a sustainable service model.

Figure 4

Indicative Roadmap for Library Development, 2026–2047



Note. Proposed stages for institutional planning; the dates are indicative and are not policy deadlines.

During the foundation stage, a college can assess needs, improve core connectivity, organize its catalogue, train staff, and establish an introductory information-literacy programme. The integration stage can make research support and curriculum collaboration routine, widen shared access, and develop a repository where resources and staffing allow. A mature stage would emphasize evidence of learning, inclusion, collaboration across institutions, and a stronger role for students in creating and sharing knowledge. Progression should depend on demonstrated capacity rather than the calendar alone.

How Colleges Could Judge Progress

If libraries are to be seen as educational partners, monitoring needs to move beyond counts of books issued and visitors recorded. Those measures still matter, but they should be read alongside user experience and evidence of learning. Oakleaf's (2010) emphasis on demonstrating library value is relevant here: an institution should be able to explain not only how often a service was used, but why that service was worth offering.

Table 3

Practical Indicators for Reviewing Library Services

Dimension	Possible indicator	Evidence / caution
Discovery and access	Successful use of catalogues or e-resources; proportion of new users completing orientation.	Access logs and attendance; adjust for course size and platform differences.
Information literacy	Ability to distinguish scholarly and weak sources before/after a short activity.	Simple rubric or learning task; avoid equating attendance with competence.
Research support	Consultations provided and common questions resolved.	Service records and user follow-up; counts alone cannot show research quality.
Inclusion	Participation by first-year, low-connectivity, or accessibility-needs groups.	Anonymous feedback and accessible-request records; protect personal information.

Dimension	Possible indicator	Evidence / caution
Learning environment	User feedback on quiet study, group work, and practical access.	Brief surveys and observation of space use; consider variations across terms.

Note. Proposed indicators for local review. Baselines and realistic targets should be set by each institution; comparisons should not penalize smaller colleges for differences in scale.

A modest annual review through an appropriate academic or quality-assurance committee could examine service trends, hear from users, and select a few improvements for the next year. The strongest evidence would come from triangulating activity records with feedback and actual student work, while protecting privacy. Where capacity is limited, even one well-designed measure—such as a short source-evaluation task before and after a workshop—may be more informative than a long list of poorly maintained indicators.

Discussion, Limitations, and Future Research

Discussion

The central argument of this paper is that the educational value of a library is mediated by people and practice. National platforms, budgets, and buildings establish possibilities; librarians, teachers, and students turn some of those possibilities into learning. That distinction is especially important in an Indian college sector marked by substantial differences in resources and governance. It suggests that library development should be judged against institutional context rather than a single idealized model.

Two further implications merit attention. First, library transformation is an academic governance issue, not only a departmental procurement issue. If librarians are excluded from curriculum planning, digital-access decisions, or review meetings, many opportunities for useful collaboration may be missed. Second, equity needs to be visible in service design. Opening a database to all authorized users does not mean all users have the same ability to benefit from it. A genuinely inclusive library identifies the points at which learners struggle and responds without treating those struggles as individual shortcomings.

There is also a risk of overpromising. An innovation-themed room, a new repository, or a large collection of electronic resources may enhance an institution’s profile but will not automatically improve student learning. Libraries should therefore resist measuring change only through visible inputs. The proposed framework instead asks a more demanding question: which practices allow more students to work independently and responsibly with evidence?

Limitations

The paper is conceptual and interpretive. It does not include primary survey evidence, service-level data, interviews, or comparisons between colleges. Its literature selection was purposive rather than systematic, and the proposed framework has not been empirically validated. Illustrative examples explain practical choices but should not be read as reports of observed events. The AISHE figures describe the higher-education sector as a whole and cannot establish the status or effectiveness of individual libraries.

Directions for Research

Future work could compare institutions by management type, locality, student composition, and resource level; test whether curriculum-linked information-literacy instruction improves source-evaluation skills; and examine how eligible access to national subscriptions translates into actual academic use. Small mixed-method studies may be particularly useful: service data could show patterns of participation, while student and faculty interviews could help explain why some services are valued and others overlooked. Such evidence would allow the proposed model to be revised rather than simply repeated.

Conclusion

The future of the college library is not a choice between shelves and screens. It is a choice about institutional purpose. A library can remain primarily a place that holds resources, or it can become a dependable place where students learn how to ask questions, find credible evidence, and develop their own understanding. Both need books, technology, and professional care; the second also needs sustained collaboration with teaching and thoughtful attention to who is left out.

For Viksit Bharat 2047, the promise lies in ordinary colleges as much as in flagship universities. If libraries in those colleges become easier to use, better connected to courses, and more responsive to learners, they may contribute to the wider capacity for independent thinking and responsible research on which a knowledge-driven society depends. The change is unlikely to come from a single scheme or spectacular investment. It is more likely to be built through consistent, visible, and carefully evaluated service to learners.

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VIKSIT BHARAT @ 2047: A SOLDIER'S PERSPECTIVE ON NATIONAL CHARACTER, NATION BUILDING AND YOUTH EMPOWERMENT

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A conceptual and policy perspective paper

Abstract

India's development vision for 2047 is commonly discussed through economic growth, technology, infrastructure and human capital. These are essential, but they do not explain why institutions succeed or why citizens trust them. Drawing on a soldier's perspective, this paper argues that national character—the everyday practice of integrity, self-discipline, public responsibility, respect for diversity and service—should be treated as a practical requirement for development rather than a ceremonial ideal. Military experience offers useful lessons in preparation, teamwork, ethical leadership and collective purpose; these lessons must, however, be adapted to constitutional values and democratic civilian institutions, not transferred as command structures. The paper develops this argument through a conceptual reading of publicly accessible Indian policy publications and presents five actionable priorities: civic and ethical learning, accountable institutional leadership, structured youth service, local resilience and cyber readiness, and future-oriented skilling. It identifies potential institutional responsibilities, feasible indicators and a phased planning horizon to 2047. This is an interpretive policy perspective, not an empirical evaluation. Its contribution lies in connecting the soldier's service ethos to specific practices through which national ambitions may become dependable public outcomes.

Keywords: Viksit Bharat 2047; national character; ethical leadership; nation building; youth empowerment; national security; civic responsibility.

Introduction: Development Needs Dependable Institutions

By 2047 India will have completed a century of independence. The aspiration of Viksit Bharat invites a familiar question: what must the nation build to secure prosperity, opportunity and dignity for its people? Better infrastructure, stronger industries, advanced technology and a skilled workforce are indispensable. Yet development plans are implemented by institutions, and institutions ultimately depend upon the conduct and judgement of people. An efficient public system is not created by policy language alone. It is sustained by officials who accept responsibility, professionals who perform their duties, leaders who protect the common interest and citizens who respect one another.

The central proposition of this paper is therefore precise: material capability makes national development possible, while ethical conduct and institutional reliability determine whether its benefits are delivered fairly and endure. This is not a claim that character can replace jobs, investment or legal reform. It is a claim that these achievements are more difficult to protect when integrity, accountability and social trust are weak. NITI Aayog's discussion of strategic imperatives for 2047 links competitiveness and growth with security, governance and international engagement (Narayanan & Sengupta, 2025). The connections among these priorities deserve examination at the level of everyday institutional practice.

A soldier's perspective has particular relevance here. Military service places a premium on preparedness, interdependence and responsibility under pressure. Personnel from varied social and linguistic backgrounds must work together towards a shared duty. These experiences offer principles that can inform civilian public life. They do not provide a warrant to make civilian administration military in form. Democracy requires debate, legal safeguards, civilian oversight and the right to dissent; a service ethic should reinforce those foundations rather than displace them.

The paper asks three linked questions: What does national character mean in practical institutional terms? Which lessons from professional military service can be adapted to civilian education, governance and community resilience? And how can those lessons be translated into feasible, measurable priorities between now and 2047?

Purpose, Scope and Analytical Approach

This is a conceptual policy perspective informed by the author's military standpoint and a targeted review of accessible Indian policy and bibliographic sources. The documentary base includes the National Education Policy 2020; NITI Aayog publications on strategic priorities, skilling, inclusive artificial intelligence and development–environment pathways; a Press Information Bureau account of youth development; and the national-development vision articulated by Abdul Kalam and Rajan (1998). For historical context, the discussion also identifies a published account of Field Marshal Sam Manekshaw's leadership and a documented collection of Sardar Vallabhbhai Patel's speeches. These sources provide policy context, not proof that the interventions proposed below have already succeeded.

The analysis proceeds by relating three elements: professional values such as duty and preparedness; civilian institutions in which those values might be practised; and observable indicators that could help assess improvement. No interviews, field surveys or new statistical analysis were conducted for this paper. Proposed actions and timelines are recommendations, not existing government mandates or measured findings. This boundary matters because credible national-development arguments should distinguish a professional judgement from evidence of causal impact.

National Character as an Institutional Capability

National character is sometimes invoked as if it were a fixed trait possessed by a population. That is too vague to guide public action. A more useful definition is the set of habits and standards that citizens and institutions repeatedly display when facing ordinary obligations and difficult choices. It includes truthful reporting, punctual service, fair treatment, respect for law, care of shared resources, willingness to correct mistakes and cooperation across social differences. Such conduct can be observed, encouraged and held accountable; it need not be measured through declarations of patriotism.

Consider the distance between a public-service promise and the citizen who actually receives a service. A grievance system may exist on paper, yet it delivers little value if complaints remain unanswered. A laboratory may have expensive equipment, yet produce little learning if it is rarely used. A disaster plan may be technically sound, yet fail when local responsibilities are unclear. In each example the problem is not simply lack of resources. It is also the discipline of implementation. Institutions become trustworthy when their everyday practices are predictable, fair and open to scrutiny.

Integrity and discipline must be joined to inclusion. National unity does not mean uniformity. The historical importance of national integration is also reflected in the published collection of Sardar Vallabhbhai Patel's speeches from 1947–1950 (Patel, 1967). India's diversity of language, region, religion and culture is compatible with a common constitutional commitment to dignity and equal citizenship. A public institution demonstrates character when it is reliable towards those with little power as well as those with influence. Similarly, discipline in civilian settings should mean self-regulation, professional standards and fidelity to lawful processes, not unquestioning obedience to authority.

The distinction between conduct and slogans has practical consequences. Institutions can assess timeliness, fairness, responsiveness, safety and integrity-related procedures. They cannot credibly claim to have created a better national character merely because large numbers attended a pledge-taking ceremony. Progress should be judged by changes in what people and organisations actually do.

Lessons from Military Service—and Their Civilian Limits

Responsibility before personal convenience

In military service, an assigned duty has consequences for colleagues and for a wider mission. The transferable lesson is not rigid control but the obligation to complete work to an agreed standard. In public administration this can mean clear responsibilities, transparent service timelines and timely acknowledgement of error. In education it means faculty and students treating examinations, records and research integrity as matters of trust rather than compliance exercises.

Leadership by conduct

A command delivered without personal credibility can secure nominal compliance but not lasting confidence. The wider lesson is that leadership becomes persuasive when leaders observe the standards they ask of others. Panthaki and Panthaki's (2014) biographical account of Field Marshal Sam Manekshaw places professional courage, personal integrity and respect for personnel at the centre of his leadership. For civilian institutions, this implies fair procedures

for appointments and assessment, transparent decisions, attention to staff welfare and willingness to hear criticism. Personal example is necessary, though never a substitute for independent oversight and enforceable rules.

Teamwork across differences

Effective units rely on people with different skills, backgrounds and responsibilities. Public development requires a similar capacity for coordination: a college working with a village council; a health service communicating with a disaster authority; or an industry partner helping teachers design relevant training. Cooperation is not achieved by insisting that all participants agree. It is achieved by identifying a common public purpose, defining responsibilities and resolving disagreement respectfully.

Preparedness before a crisis

Readiness is more than equipment. It involves rehearsed procedures, trusted information, accessible communication and people who know what to do when routine systems fail. Civilian institutions can adopt this principle through practical preparedness exercises, cybersecurity awareness, community contact networks and continuity plans. This is particularly relevant where a shock can interrupt schooling, healthcare, livelihoods or public access to digital services.

These lessons require an important safeguard. The Armed Forces and civilian institutions operate under different mandates. Military effectiveness cannot be used to justify suppressing lawful dissent, bypassing due process or reducing the autonomy of educational institutions. The appropriate adaptation is professional integrity and disciplined service within democratic and constitutional limits.

Security, Resilience and Development Are Interdependent

Security is frequently discussed as a separate subject from education, welfare or economic policy. In practice, the relationship is reciprocal. Development gives the state and society resources to invest in security, while stability and resilience allow households, enterprises and public institutions to plan for the future. The strategic framework published by Narayanan and Sengupta (2025) places national security and stability alongside economic competitiveness and governance; it is useful precisely because it does not treat these dimensions as isolated.

The meaning of security has broadened. Border preparedness and conventional defence remain vital responsibilities of the state. Yet institutions and citizens also encounter cyber fraud, disinformation, interruptions to essential services, natural hazards and supply-chain vulnerabilities. A local school or college is not a security agency, but it can teach students how to verify a suspicious digital message, protect personal information, recognise emergency warnings and assist vulnerable neighbours through lawful, organised channels.

Environmental resilience illustrates the point. NITI Aayog’s 2026 study of development and net-zero pathways examines the interaction of economic choices, energy demand, transition risks and institutional capacity. The scenarios are analytical possibilities dependent upon assumptions; they should not be presented as forecasts of inevitable outcomes (NITI Aayog, 2026b). For education and local governance, the immediate lesson is practical: water security, heat preparedness, waste reduction and dependable emergency communication deserve regular attention rather than occasional campaigns.

National resilience therefore has two dimensions: specialised security institutions must be capable, and communities must be sufficiently informed and organised to avoid amplifying preventable harm. The second dimension can be strengthened without confusing civilian participation with military duties.

Youth Empowerment: Competence, Character and Agency

India's youth are central to the 2047 horizon because the quality of education and opportunities available now will shape the country's future institutions. A Press Information Bureau backgrounder dated 13 August 2026 described nearly 65 per cent of India's population as younger than 35 and highlighted youth participation across education, employment, skills and civic life (Press Information Bureau, 2026). This figure is a government communication describing a demographic profile, not an estimate generated by the present paper.

The policy challenge is not simply to increase the number of trained young people. It is to connect learning with meaningful capability and responsibility. The National Education Policy 2020 gives importance to multidisciplinary learning, critical thinking, ethical reasoning and holistic development (Ministry of Education, 2020). NITI Aayog's 2026 skilling report similarly recommends a learner-centred approach in which education, work, guidance,

apprenticeships and further learning are connected across the life course (NITI Aayog, 2026a). Both documents support an understanding of youth empowerment that extends beyond the award of a degree or certificate.

A young citizen develops confidence through useful responsibility. A supervised community project may ask students to map barriers to safe drinking water, explain digital-payment safeguards to local households, help improve access to government information or contribute to a local disaster-awareness exercise. These are illustrative possibilities, not reported field interventions. The educational value comes from identifying a problem, listening to affected people, working with partners, documenting evidence and reflecting honestly on the outcome.

MY Bharat, as described by the Press Information Bureau (2026), offers a public platform linking volunteering and experiential learning with opportunities for leadership, skilling and participation. Existing youth programmes such as NSS and NCC can provide complementary settings for disciplined teamwork and public engagement. Such opportunities should remain accessible to women, rural youth, first-generation learners, persons with disabilities and those whose time or resources are constrained. Participation should develop agency, not become an imposed test of loyalty.

Technological capability also requires judgement. NITI Aayog's roadmap on AI for inclusive societal development (2025) raises the importance of designing technology so that its benefits can reach wider sections of society. For young people, practical digital responsibility involves understanding privacy, evidence quality, misinformation, algorithmic limitations and the consequences of sharing inaccurate content. Competence without ethics is incomplete; ethics without competence offers little practical protection.

Educational Institutions and Ethical Public Leadership

Colleges and universities are among the most accessible institutions through which national ambitions can be translated into habits of inquiry and service. Their contribution should not be limited to occasional lectures on patriotism or leadership. A more durable approach would connect subject learning with local needs: commerce students might study how a neighbourhood enterprise records transactions; science students might support a supervised water-quality awareness project; and computer science students might develop accessible cyber-safety materials. The purpose is not free labour for public agencies. It is education through responsibly designed work with a defined learning objective and appropriate safeguarding.

Institutional leadership must model the same standards. Transparent grievance channels, reasoned decisions, prompt academic administration, academic integrity and fair access to facilities communicate public values more effectively than slogans. Educational institutions should also protect freedom of inquiry and the respectful exchange of different views. These are not obstacles to national integration; they allow students to practise the habits required of citizens in a constitutional democracy.

The longer tradition of connecting scientific and technological achievement with a national development vision is visible in Abdul Kalam and Rajan's India 2020 (1998). Its relevance here is not that an earlier vision automatically validates a new roadmap, but that aspirations must continually be translated into institutions, capabilities and accountable action. The 2047 agenda will be judged by that translation.

Five Directive Priorities for Action

The following proposals are the paper's principal policy contribution. They translate the soldier's emphasis on duty, leadership, teamwork and preparedness into civilian initiatives with identifiable responsibilities and possible forms of evidence. They are recommendations for adaptation, not claims about programmes already implemented.

Table 1. Proposed action priorities, lead institutions and evidence of progress

Priority	Directive action and likely lead institutions	Indicators for local review
1. Civic ethics and integrity	Education departments, schools and colleges: embed short, assessed modules on ethical choices, constitutional values, research integrity and care for public property, linked to supervised real problems.	Assessment of reasoning; documented project quality; completion of corrective actions; accessible participation.

Priority	Directive action and likely lead institutions	Indicators for local review
2. Accountable leadership	Public agencies and institutional heads: publish service standards, designate responsible officers and review complaint handling and transparent decisions.	Timeliness of services; grievance-resolution quality; audit follow-up; user feedback, with privacy protection.
3. Youth service and participation	Colleges, NSS/NCC units, MY Bharat partners and local bodies: provide voluntary, supervised community engagement with clear roles and reflective learning.	Verified project outcomes; partner feedback; continuity; inclusion of underrepresented youth.
4. Local resilience and digital safety	District authorities, campus administrations and relevant specialised agencies: practise disaster communication, cyber hygiene and misinformation verification.	Readiness drill findings; awareness assessments; correction of identified gaps; accessible warning channels.
5. Future skills and opportunity	State skilling agencies, institutions, ITIs and employers: coordinate guidance, practical training, internships and lifelong upskilling.	Verified competencies; progression to work or further education; employer feedback; equity of access.

The table deliberately separates responsibility from aspiration. A university cannot, by itself, resolve national unemployment; it can improve guidance, practice-based learning and the evidence students use to demonstrate skills. A district administration cannot eliminate every disaster risk; it can test communications and close identified preparedness gaps. Each recommendation should be assigned to an institution with the authority, resources and obligation to act. The design also avoids treating event attendance as equivalent to real change.

Indicative Roadmap to 2047

Foundation: 2026–2030

Institutions should begin with a baseline assessment rather than expensive new infrastructure. Colleges can identify existing NSS/NCC participation, community partners, digital-safety training, grievance procedures and available skill support. District and local institutions can map practical vulnerabilities and designate coordinating points. Each institution should select a small number of feasible actions, name their owners and publish an annual review of progress and difficulties.

Expansion and partnership: 2031–2038

Useful models can be expanded through agreements among educational institutions, local government, training providers, industry and relevant youth organisations. Shared facilities, instructor development, supervised placements and regular preparedness exercises would be more valuable than numerous disconnected initiatives. Expansion should depend on evidence that an activity improves learning, service quality, readiness or inclusion, not merely that it attracts publicity.

Institutionalisation: 2039–2047

By the final period, successful practices should become routine: assessed civic learning in relevant curricula, transparent service standards, dependable preparedness systems and credible routes from education into employment and further training. Periodic external or peer review can help guard against inflated self-reporting. These dates are illustrative planning horizons proposed in this paper; they do not describe an officially approved implementation schedule.

Monitoring Progress without Reducing Character to a Score

A serious implementation framework needs evidence, but national character cannot be reduced to a single index. Three levels of measurement are more useful. First are inputs—whether training, staff time, access arrangements and institutional partnerships exist. Second are activities and immediate outputs—whether students complete a properly supervised module, agencies hold an exercise or grievances are reviewed. Third are outcomes—whether services become more reliable, students can demonstrate ethical reasoning, communities correct preparedness gaps and learners gain usable skills.

Institutions should collect only data necessary for improvement, protect personal information and report limitations openly. A rise in complaints, for example, might indicate worse service or greater trust in the complaint channel; the

number alone cannot settle the question. Participation figures should be disaggregated where lawful and appropriate so that programmes do not appear successful while excluding rural, economically disadvantaged or differently abled young people. Independent feedback should inform the review. Monitoring should make accountability possible, not create another ritual of reporting.

Safeguards, Constraints and Limits of the Argument

The language of character and discipline carries risks when separated from democratic safeguards. Responsible citizenship includes lawful disagreement, critical thinking, tolerance and resistance to corruption. Military-derived lessons should not be invoked to demand political conformity, weaken rights or discourage scrutiny. Service programmes should not put students in unsafe conditions, replace paid employment or impose disproportionate costs on those who cannot easily participate.

Other constraints are practical. Educators already face pressure on instructional time; small colleges have limited staffing and budgets; local partners may lack capacity; and digital interventions can unintentionally exclude those without connectivity or accessible devices. Programmes should therefore be modest, context-sensitive and regularly reviewed before expansion. National priorities will also evolve, making adaptive planning more credible than a fixed blueprint drawn up decades in advance.

Finally, the analytical claims in this paper should not be mistaken for demonstrated causal effects. The available publications establish policy context and describe existing initiatives; they do not prove that importing lessons from military service will, by itself, reduce corruption, raise employment or improve disaster outcomes. Comparative institutional studies, evaluations of civic-learning programmes and carefully documented local case studies would be needed to test those propositions. The claim advanced here is a reasoned policy argument and a practical agenda for such testing.

Conclusion: Make the Ethic of Service Visible

Viksit Bharat @ 2047 will be shaped by the strength of the economy, the reach of technology and the quality of education. It will also be shaped by a quieter set of choices: whether public duties are performed faithfully, whether institutions treat citizens fairly, whether leaders admit error, whether communities prepare for danger and whether young people are trusted with meaningful responsibility.

The soldier's perspective contributes a discipline of purpose. In service, readiness cannot be declared into existence; it must be practised, checked and improved. That lesson has value far beyond military life. Applied with constitutional safeguards, it asks civilian institutions to move from promises to standards, from ceremonial participation to useful service, and from broad aspirations to verifiable outcomes.

The immediate task is therefore straightforward: equip young people with competence and judgement, give them responsible opportunities to contribute, hold institutions to transparent standards and treat resilience as a shared public capability. National character becomes an instrument of nation building when it is visible in conduct. That is the contribution a soldier's perspective can make to India's journey towards 2047.

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Higher Education, Employability, and the Crisis of Academic Culture in India: Rethinking Universities for Viksit Bharat @ 2047

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Abstract

India's vision of Viksit Bharat @ 2047 seeks to transform the country into a developed, innovative, and self-reliant economy. In this process, higher education occupies a central position in the creation of human capital, research capacity, and knowledge-driven development. Traditionally, universities functioned as spaces for intellectual engagement, critical inquiry, and independent thought. However, contemporary higher education in India is increasingly shaped by examinations, placements, rankings, discipline, and employability-oriented learning. This transition has gradually produced an academic culture where certification, institutional compliance, and market value often receive greater importance than creativity, critical thinking, and knowledge creation.

This paper critically examines the changing character of higher education in India from an economic perspective. The study adopts an analytical framework based on secondary literature, government reports, and recent studies on employability, Artificial Intelligence (AI), and the knowledge economy. Drawing upon Human Capital Theory and the concept of the Knowledge Economy, the paper argues that sustainable economic development requires not only technically skilled workers but also innovative thinkers, researchers, and adaptable individuals capable of lifelong learning.

The paper further analyses the weakening condition of many state universities alongside the rapid expansion of private universities in India. This shift reflects a broader social transformation similar to the rise of private English-medium schools over public schools. While private institutions increasingly project themselves as centres of employability and professional success, many public universities continue to struggle with inadequate funding, faculty shortages, administrative rigidities, and declining academic environments.

The paper argues that in an era shaped by AI, automation, and rapidly changing labour markets, narrowly skill-based and certificate-oriented education cannot ensure long-term economic security. It concludes that the vision of Viksit Bharat @ 2047 requires strong public universities, democratic academic spaces, and an education system capable of nurturing critical, innovative, and socially responsible citizens.

Keywords: Higher Education, Employability, Human Capital, Knowledge Economy, Viksit Bharat @ 2047

Introduction

Ask almost any first-year student why they have enrolled in a degree programme, and the answer will most likely involve a job. Few would apologise for that answer. For most families a university education is the largest single investment they will make in a child, and they expect it to pay back. But when the same answer is repeated across millions of classrooms, it begins

to shape what universities do, how teachers are judged and what students come to believe a degree is for.

India's aspiration to become a developed, innovative and self-reliant economy by 2047 places higher education close to the centre of national planning. The numbers on access are encouraging. According to the All India Survey on Higher Education (AISHE), total enrolment rose from about 3.42 crore in 2014–15 to 4.50 crore in 2023–24, and the Gross Enrolment Ratio (GER) for the 18–23 age group moved from 23.7 to 30.0 (Ministry of Education [MoE], 2026). Female GER now exceeds the male figure. Any honest account of Indian higher education has to begin by recognising this achievement.

Access, however, is only the first question. A development strategy also needs graduates who can think, adapt and contribute, and institutions that create knowledge rather than only certify attendance. On these points the evidence is less comfortable. The India Employment Report 2024 found that the share of youth with secondary or higher education among all unemployed youth rose from 35.2 per cent in 2000 to 65.7 per cent in 2022 (International

Labour Organization [ILO] & Institute for Human Development [IHD], 2024). Public universities, which still enrol most university-level students, run on thin budgets and unfilled posts, while private institutions grow quickly and present themselves as the natural home of employability. And inside many institutions, examinations, accreditation files, ranking returns and placement figures consume a large part of everyone's time.

This paper looks at these developments together, from an economic point of view. Its central contention is that they are connected. When the labour market rewards credentials more readily than capabilities, families buy credentials. When public institutions are starved of resources, families who can pay move to private ones. And when institutions are judged by what is easy to count, they begin to teach and manage towards what is counted. The result is an academic culture in which certification, compliance and market value can outweigh creativity, critical thinking and the creation of knowledge. The word "crisis" in the title is meant in that sense. Universities have not stopped working; rather, the thing they do best, which is to enable independent thought, is the thing least visible in the indicators by which they are governed.

The paper asks three questions. First, has the expansion of enrolment been matched by gains in capabilities and in the quality of employment? Second, what is happening to public universities, especially state universities, as private provision grows? Third, what kind of university does an economy shaped by artificial intelligence (AI) and automation actually need? Section 2 sets out the conceptual framework and Section 3 reviews the literature. Section 4 explains objectives and method. Section 5 presents the evidence, Section 6 discusses it, and Sections 7 to 9 offer suggestions, limitations and conclusions.

Conceptual Framework

Human capital: investment in what people can do

The economic case for universities usually begins with human capital theory. Schultz (1961) described spending on education as investment rather than consumption, and Becker (1964) and Mincer (1974) showed how schooling and experience raise individual earnings. In growth

theory, Lucas (1988) and Romer (1990) carried the idea to the level of nations: skills and ideas, not machines alone, sustain long-run growth. This is the logic behind most public spending on higher education, and it is sound as far as it goes. Its weakness is that it often measures education by years and certificates. Pritchett (2001) asked, in the title of a well-known paper, where all the education had gone, because cross-country growth had not followed schooling in the way theory predicted. Hanushek and Woessmann (2008) later argued that what matters for growth is the cognitive skill people actually acquire, not the time they spend in school. The gap between attainment and capability runs through the rest of this paper.

Signalling and credentials

A second tradition asks what a degree communicates. Spence (1973) showed how education can work as a signal of ability that employers cannot observe directly, and Arrow (1973) described higher education as a filter that sorts people for the labour market whether or not it raises productivity. Collins (1979) and Dore (1976) widened the point sociologically. Where good jobs are scarce and employers cannot easily judge ability, each higher qualification becomes a requirement for the next, and students compete for credentials rather than for learning. Dore's phrase, the "diploma disease", described societies in which qualifications drive the system and learning becomes secondary. Kumar (2005) discusses how colonial educational arrangements left India with a system centred on textbooks and examinations, a legacy that is easy to recognise in present-day university classrooms.

Knowledge economy and capabilities

The OECD (1996) and Powell and Snellman (2004) describe economies in which the production and use of knowledge, and not only of goods, drive growth. For such an economy a university is more than a training provider. It is a place where knowledge is produced and criticised. Sen (1999) and Nussbaum (2010) add an ethical argument: development is the expansion of what people are able to do and to be, and education should build the ability to think critically, to take part in public life and to see other people as persons rather than as instruments.

The university as public good and as market actor

Finally, there is writing about the institution itself. Readings (1996) and Collini (2012) worry that universities that define themselves in market terms lose the argument for their own existence. Marginson (2016) treats higher education as a public good with benefits that private returns do not capture, and Slaughter and Rhoades (2004)

describe academic capitalism, in which universities behave increasingly like firms. Bourdieu and Passeron (1977) add that education systems can reproduce inequality when they reward cultural capital that students bring from home, which is why the distribution of institutions, not only their number, matters.

Two logics

Taken together, these perspectives suggest two logics that pull on a university. Table 1 sets them out. Neither is wrong. The difficulty begins when one crowds out the other.

Table 1: Two logics acting on the university

Dimension	Credential-and-market logic	Knowledge-and-public logic
Main purpose	Certify and place graduates in jobs	Build capabilities; produce and test knowledge
Typical indicators	Pass percentage, placement figures, rankings, compliance	Quality of teaching, research, adaptability of graduates, community use of knowledge
Student seen as	Customer or future employee	Learner and future citizen
Teacher seen as	Deliverer of the syllabus	Scholar and mentor
Typical funding	Fees and private investment	Public funding with academic autonomy
Risk if dominant	Teaching to the test; credential inflation; unequal access	Distance from the labour market; weak accountability

Source: Author's synthesis of the literature cited in Section 2.

Review of Literature

Expansion and its limits

Indian writing on higher education has long been concerned with how quickly the system has grown and how unevenly. Agarwal (2009) gives a detailed account of expansion and regulation. Varghese (2015) describes the move from an elite to a mass system and warns that massification brought crowded affiliated colleges, weak resources and wide differences in quality. Tilak (2015) shows that growth did not reach every group equally: students from poorer households and marginalised communities remain concentrated in the lower-cost, lower-quality end of the system. Altbach, Reisberg and Rumbley (2009) place India within a global pattern of expansion and note how hard it is to protect quality when numbers rise faster than resources. Kapur and Mehta (2004) put the dilemma sharply. Public institutions are held back by rules and politics, private ones by weak regulation, and reform has produced something that is neither properly public nor properly market.

Public and private provision

Tilak (2014) documents the rise of private higher education in India and its concentration in professional and job-oriented courses, with fee-based entry and limited investment in research. Evidence from schooling is instructive. Kingdon (2020), reviewing the Indian literature on private schools, finds that private schooling has grown across the country, driven largely by parental perceptions of quality and the appeal of English-medium instruction, while many low- fee private schools remain poorly resourced. Muralidharan and Sundararaman (2015), in a large experiment in Andhra Pradesh, found that children who won vouchers to attend private schools did no better in Telugu or mathematics than those who stayed in government schools, although private schools operated at a much lower cost per student. These studies do not settle the higher education question. They do caution against assuming that private always means better.

Employability and graduate labour markets

The employability literature divides roughly into two groups. One concentrates on skill gaps. Blom and Saeki (2011), drawing on an employer survey, documented gaps between the skills

of newly graduated engineers and what employers expected, and argued for closer links between institutions and industry. The other stresses that unemployment among the educated is as much a problem of demand as of supply. ILO and IHD (2024) report that unemployment in India is predominantly a youth problem concentrated among the educated, and that the economy has not generated enough regular, good-quality jobs to absorb them. Read together, the two groups suggest that universities can and should improve what graduates are able to do, but cannot by themselves create the jobs for which graduates are prepared.

Audit, rankings and academic culture

Strathern (1997), writing on British universities, argued that when a measure becomes a target it ceases to be a good measure, a point often called Goodhart's law. Espeland and Sauder (2007) showed how law schools reorganised admissions, spending and even their self-image around ranking criteria. Muller (2018) catalogues the unintended effects of metric fixation across health, policing and education: effort moves towards what is measured and what is hard to measure is neglected. Readings (1996) and Collini (2012) make a related cultural argument, that the vocabulary of excellence and impact can hollow out older ideas of scholarship. Dore (1976) and Kumar (2005) remind us that in examination-centred systems the examination syllabus tends to become the curriculum. This writing suggests that what is called academic culture here is shaped less by official statements of purpose than by the indicators that decide funding, reputation and promotion.

Technology and the future of work

Autor, Levy and Murnane (2003) argued that computers substitute for routine tasks and complement non-routine analytical and interactive ones. Goldin and Katz (2008) described economic history as a race between education and technology, in which inequality widens when education fails to keep pace. Acemoglu and Restrepo (2019) stress that automation also creates new tasks, so that outcomes depend on the capabilities workers can bring to them. The World Economic Forum (2025) estimates that about 39 per cent of workers' core skills will change by 2030 and counts analytical thinking among the skills employers value most.

Research gap

Each of these literatures is well developed. What is less common in the Indian discussion is an attempt to read them together: to ask how the growth of private provision, the position of public universities, the labour-market situation of graduates and the indicators by which institutions are governed reinforce one another. This paper makes that attempt using recent national data, and adds a discussion of AI that earlier work could not draw upon.

Objectives and Methodology

Objectives

The study has four objectives: (i) to examine the relationship between the expansion of higher education and employability in India; (ii) to analyse the changing academic culture of universities under market and institutional pressures; (iii) to assess the condition of public, especially state, universities alongside the expansion of private higher education; and (iv) to

suggest an institutional direction for strengthening higher education in the context of Viksit Bharat @ 2047.

Design and sources

The study is an analytical, document-based review. It uses secondary material of four kinds: (a) administrative data on institutions, enrolment and teachers from the AISHE reports for 2022–23 and 2023–24 (MoE, 2026), supplemented by state-level and sector tabulations compiled from those reports by Mehta (2026); (b) labour-market evidence from the Periodic Labour Force Survey (PLFS) Annual Report 2025 and the India Employment Report 2024; (c) policy documents, including the National Education Policy (NEP) 2020, the Economic Survey and answers given by the Ministry of Education in Parliament; and (d) the academic literature reviewed above. The period covered runs mainly from 2014–15 to 2023–24, the latest years for which AISHE data are available.

Figures were compared over time and across types of institution. Simple percentage changes were calculated by the author, and results were read against the three theoretical perspectives of Section 2. Where official sources do not publish a series, for example vacancy rates in state universities, the paper says so instead of estimating.

Cautions

Four cautions apply. AISHE is a voluntary survey; in 2023–24, 59,553 of 64,756 registered institutions, about 92 per cent, responded. GER is computed using population projections based on the 2011 Census. PLFS and ILO–IHD figures use different age bands and definitions, so they are not strictly comparable. Finally, the paper makes no causal claim. It identifies patterns and tensions that deserve empirical testing.

Evidence and Analysis

Expansion, with slowing momentum

Table 2 summarises the growth of the system. Between 2014–15 and 2023–24 the number of universities rose from 760 to 1,289, an increase of about 70 per cent, and the number of colleges from 38,498 to 48,246, about 25 per cent. Enrolment grew by around 31.5 per cent over the same years. The number of universities has therefore grown more than twice as fast as enrolment, while colleges have grown a little more slowly than enrolment.

Table 2: Growth of Indian higher education, selected indicators

Indicator	2014–15	2022–23	2023–24
Universities (registered)	760	1,213	1,289
Colleges (registered)	38,498	46,624	48,246
Standalone institutions	12,276	12,543	15,221
Total enrolment (crore)	3.42	4.46	4.50
Gross Enrolment Ratio (%)	23.7	29.5	30.0
Female GER (%)	22.9	30.2	31.2

Source: AISHE 2022–23 and 2023–24 (MoE, 2026); figures as compiled in Mehta (2026). Percentage changes are the author's calculation.

The pace of growth is also slowing. About 28 lakh students were added in 2020–21, but only 13.6 lakh in 2022–23 and 3.7 lakh in 2023–24 (Figure 1). With GER at 30, the easier gains from first-generation students entering nearby colleges may be running out, and the NEP 2020 goal of a 50 per cent GER by 2035 will need enrolment well above present levels.

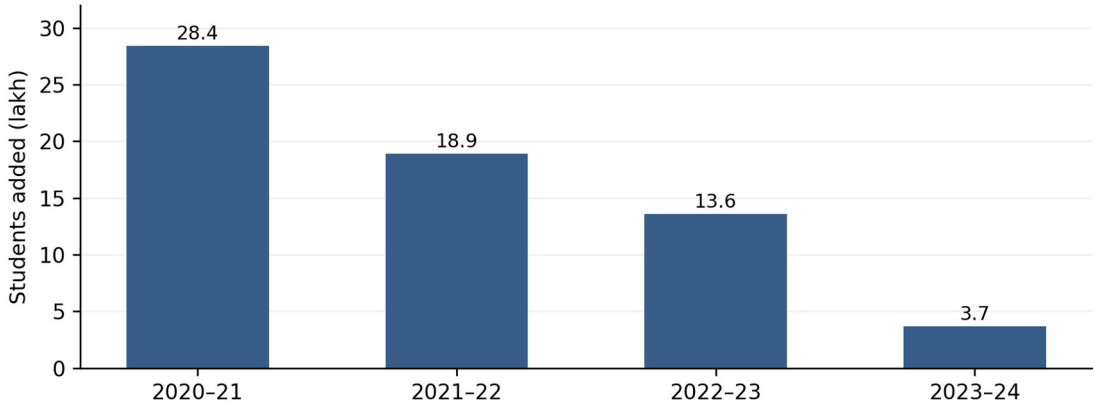


Figure 1: Year-on-year additions to enrolment (lakh)

Source: Author's calculation from AISHE total enrolment figures for 2019–20 to 2023–24 (MoE, 2026; Mehta, 2026).

Figure data: 2020–21: 28.4 lakh; 2021–22: 18.9 lakh; 2022–23: 13.6 lakh; 2023–24: 3.7 lakh.

National averages also hide wide gaps. In 2023–24 the GER was 19.4 in Jharkhand and 17.7 in Bihar, against 52.3 in Tamil Nadu and 53.0 in Delhi (Mehta, 2026, citing AISHE 2023–24). Teachers numbered about 17.3 lakh in 2023–24. Between 2019–20 and 2023–24 enrolment grew at about 3.95 per cent a year and the teaching workforce at about 3.61 per cent (Mehta, 2026), and the pupil–teacher ratio is reported at between 22:1 and 25:1 depending on mode of study. Averages of this kind say little about the thinly staffed colleges where most students actually study.

Educated youth and the labour market

Table 3 brings together the main labour-market indicators. The overall unemployment rate looks low, 3.1 per cent in 2025, but the picture changes with age and education. Youth unemployment was 9.9 per cent and urban youth unemployment 13.6 per cent, and unemployment among those with secondary education or above was 6.5 per cent against 0.3 per cent for those who are not literate (Ministry of Statistics and Programme Implementation [MoSPI], 2026). The ILO and IHD (2024) report that youth make up about 83 per cent of the unemployed, that educated youth now form about two-thirds of unemployed youth, and that unemployment among young people with graduate degrees was around 29 per cent in 2022.

Table 3: Education and unemployment, selected indicators

Indicator	Figure	Source
Youth share of all unemployed (2022)	About 83%	ILO & IHD (2024)
Secondary-or-higher educated, as share of	35.2% (2000) to 65.7% (2022)	ILO & IHD (2024)

Indicator	Figure	Source
unemployed youth		
Unemployment rate, youth with graduate degrees (2022)	About 29%	ILO & IHD (2024)
Overall unemployment rate (2025)	3.1%	MoSPI (2026)
Youth (15–29) unemployment rate (2025)	9.9% (urban 13.6%)	MoSPI (2026)
Unemployment: secondary and above vs not literate (2025)	6.5% vs 0.3%	MoSPI (2026)

Source: ILO & IHD (2024); MoSPI (2026). Age bands and definitions differ between the two sources.

How should this be read? One reading, which is an interpretation and not a finding, is that most Indian workers earn their living in self-employment and informal work, where remaining without work is unaffordable. Educated young people, especially from households that can support a period of search, are more likely to wait for a job that matches their qualification. A degree then raises expectations faster than the economy raises the supply of regular jobs. This is the world described by Spence (1973) and Arrow (1973). When good jobs are scarce, employers use the degree as a screen, students respond by acquiring more of it, and the screen loses information.

It would be unfair to place the whole burden on universities. Employment depends on investment, on the growth of labour-intensive sectors and on the structure of the economy, and ILO and IHD (2024) point to low-productivity jobs and stagnant real earnings as part of the story. What universities can do is narrower and still important: send graduates out with real capabilities, which Hanushek and Woessmann (2008) suggest is what ultimately matters for growth, and avoid promising what the labour market does not deliver.

Public universities under strain

Money. The NEP 2020 itself acknowledges that public spending on education has never come close to the 6 per cent of GDP recommended since the 1960s (MoE, 2020). Combined education spending of the Centre and states has risen in rupee terms, from ₹5.8 lakh crore in 2020–21 to ₹9.2 lakh crore in the 2024–25 budget estimates (Ministry of Finance, 2025), but as a share of GDP it has stayed in the region of 4 per cent by commonly cited official counts, and higher education receives a small part of that, estimated at 0.7 to 0.8 per cent of GDP (Mehta, 2026). Overall research and development spending is under 1 per cent of GDP (Ministry of Finance, 2026), far below that of leading research economies.

People. In central universities, 18,951 teaching posts were sanctioned in 2025 and about 25.8 per cent were vacant, compared with about 36 per cent in 2014 (MoE, 2025). That is a real improvement and should be acknowledged. Central universities, however, are the best-resourced part of the system. For state universities and the colleges affiliated to them, no comparable consolidated series is published, because data on colleges run by state governments are kept by the states. An earlier reply in Parliament quoted a task-force estimate that state universities and affiliated colleges were short of qualified faculty by roughly 40 per cent, and noted that many states had stopped recruiting regular faculty (Ministry of Human Resource Development, 2014). A decade later, the absence of a regularly published state-wise series is itself a finding.

Structure. Most students attend affiliated colleges. In 2023–24, 346 affiliating central and state public universities were linked to 48,246 colleges; 151 of them had 100 or more affiliated colleges and 21 had 500 or more (MoE, 2026). An affiliating university of that size spends much of its energy on admissions, examinations, results and disputes. Whatever the intentions, an administrative load of this kind leaves little room for research and academic reflection. This too is an interpretation, but it is one that many who work in such universities will recognise, and it echoes Kapur and Mehta's (2004) concern about institutions that are neither freely autonomous nor effectively supported.

Private expansion and the school parallel

Table 4 shows the changing composition of universities. State private universities increased from 327 to 464 in four years and now outnumber state public universities, which rose from 386 to 462. State public universities still enrol more students, with 29.3 per cent of university-level enrolment against 21.4 per cent for state private universities, and open universities, mostly public, hold another 27.2 per cent. Taken together, government universities account for roughly two-thirds of university-level enrolment (MoE, 2026; Mehta, 2026).

Table 4: Universities by type

Type of university	2019–20	2023–24
State public universities	386	462
State private universities	327	464
Private deemed universities	80	82

Type of university	2019–20	2023–24
Institutes of National Importance	135	159

Source: AISHE 2023–24 (MoE, 2026), as compiled in Mehta (2026).

The college sector looks different. About 83 per cent of colleges are private, and in 2023–24 private colleges enrolled roughly 71 per cent of college students (derived from AISHE 2023– 24 as compiled by Mehta, 2026). The government share fell sharply between 2022–23 and 2023–24, which may partly reflect differences in survey response, so the exact figure should be treated with care. Gender patterns deserve attention too. Women are about 47.8 per cent of enrolment in government universities but about 38.4 per cent in private universities (derived from the same source). Because female GER is now higher than male GER, this suggests that women rely heavily on public institutions, and that a decline in those institutions would fall unevenly.

The parallel with schools, drawn in the abstract, is useful if used carefully. In schooling, dissatisfaction with government provision led families who could pay to move to private, often English-medium, schools (Kingdon, 2020). The exit of the families with most influence can weaken the pressure on public institutions to improve, and the gap widens. A similar dynamic is possible in higher education if public universities are allowed to drift. There are differences. Entry to degree-granting is more regulated, private universities range from serious academic institutions to thin ones, and systematic evidence on the quality of private higher education is limited. The school evidence also carries a warning, since Muralidharan and Sundararaman (2015) found no learning advantage in core subjects despite parental preference for private schools. Claims of employability and professional success, which private institutions

understandably emphasise, should therefore be judged on median outcomes and the share of graduates actually placed, not on announcements of the highest package.

Academic culture: examinations, rankings and compliance

Academic culture is hard to measure, and this section does not pretend otherwise. It draws on the literature and on practices that can be observed, not on a dataset. The argument is that three pressures shape how time and attention are spent.

The first is the examination. In an affiliating system the examination calendar sets the rhythm of the year. Teaching is organised around the syllabus and the paper, and learning that cannot be examined, such as discussion, independent reading and long projects, struggles to find space (Dore, 1976; Kumar, 2005). The second is the ranking and accreditation regime. Rankings and accreditation brought transparency that did not exist before, and that is a gain. But Espeland and Sauder (2007) and Muller (2018) show how institutions reorganise themselves around indicators, and the same incentive applies when a college's reputation depends on the numbers it can report.

The third is research counting. Promotion rules that reward publication counts create strong pressure to publish, and the pressure may be met with quantity. The history of the UGC-CARE list illustrates the problem. The list was meant to help researchers avoid unreliable journals, yet in February 2025 the University Grants Commission discontinued it and asked universities and researchers to judge journals against a set of suggested parameters (University Grants Commission [UGC], 2025). Whatever one thinks of that decision, the episode shows how a quality filter can itself become a target, and how researchers' energy can be directed to satisfying the filter instead of the question. This is Strathern's (1997) point in an Indian setting.

What is lost in all this is difficult to count and therefore easy to overlook: the seminar that runs over time, the teacher who has the hours to read a student's draft properly, the student society that argues about a book. Anyone who has taught in a large affiliated college will recognise the pattern. These are observations and not measurements, and the paper treats them as hypotheses for further study.

AI, automation and the meaning of employability

The labour-market question looks different once AI and automation are added. The World Economic Forum (2025) estimates that about 39 per cent of workers' core skills will change by 2030, and Autor et al.'s (2003) finding that technology substitutes for routine work and complements analytical work helps explain why. A degree whose value lies in having completed a fixed set of procedures will age quickly. A degree that leaves a person able to reason from evidence, write clearly and learn again will hold its value longer. This is the economic case for the critical and innovative education the abstract calls for, and it is also the more secure form of employability. Acemoglu and Restrepo's (2019) point that automation creates new tasks as well as displacing old ones suggests that outcomes depend partly on whether workers have the capabilities to take them up, which is where universities come in.

AI also changes the classroom directly. Take-home assignments that a chatbot can complete test the chatbot, not the student, and colleges that rely on written work will find it harder to

know what students have learnt. A sensible response is redesign, not prohibition: more oral examinations, in-class writing and project work, and explicit teaching about when to trust and when to question an AI tool. There is an opportunity as well. For a student in a thinly staffed college, a tool that explains a concept in Hindi, translates a reading or comments on a draft can narrow some of the gap with a better-resourced peer, provided teachers guide its use and it is not treated as a reason to leave posts unfilled.

Discussion

Reading the evidence together, three propositions emerge. First, expansion has widened access faster than it has built capability. Enrolment has risen by nearly a third in a decade, yet educated youth form about two-thirds of the unemployed young and the pace of new entry is slowing. Second, the strain on public universities is mainly financial and institutional, not a shortage of demand. They still enrol about two-thirds of university students, and women appear to rely on them in particular, but they work with vacancies, limited budgets and heavy administrative duties. Third, the indicators that now govern institutions, namely placements, rankings and compliance, reward what is easy to show and leave little room for the slower work of scholarship.

Honest argument requires acknowledging the other side. Families who look for employment are not wrong to do so; for the first member of a family to attend university, a job is the point. Private institutions have added seats where public provision could not, and some invest seriously in faculty and research. Rankings and accreditation brought transparency, and the central government has reduced faculty vacancies in central universities and raised GER by more than six points in less than a decade. The argument of this paper is not that these developments are mistaken. It is that they are incomplete, and that treating them as the whole story misses what a university is for.

The school analogy helps again here. When public schools lost the confidence of parents, the families with the most influence left, and the remaining system lost some of its strongest advocates. The stakes are higher in universities, because they train the teachers, researchers and public servants on whom the whole system, schools included, depends. A weak public university system therefore damages more than its own students.

Employability, finally, is best understood as an outcome of a good education combined with a labour market that offers good jobs. It is not a separate product that universities can sell. When it becomes the single target, institutions improve what is visible, such as interview training and short certificates, and neglect the habits of mind that keep graduates employable over a working life.

Suggestions

1. Treat faculty as core infrastructure. State governments and universities should publish sanctioned and filled posts every year, preferably through AISHE, so that vacancies are visible. Recruitment should follow a multi-year calendar, prolonged dependence on guest and contractual teachers should be limited, and pay and conditions should be good enough to keep young scholars in state universities.
2. Fund public universities predictably. Core grants should follow a transparent formula with a floor, with a part linked to improvement plans rather than rankings. Library, laboratory and research budgets should be protected. Progress towards the NEP's 6 per cent commitment, and special attention to low-GER states such as Jharkhand and Bihar, would matter more than any new scheme.
3. Lighten the affiliating burden. Colleges that meet quality benchmarks should be given academic autonomy. Internal continuous assessment with external moderation can reduce dependence on a single annual examination, and digital systems for admissions, examinations and results can free academic time. Governments might also consider a ceiling on the number of colleges a single university supervises.
4. Broaden accountability. Single scores should give way to dashboards that show teaching load, vacancies, progression, research of different kinds and the median earnings of graduates. Institutions should be required to disclose median and not only highest placement packages. Indicators should be reviewed periodically, since any fixed indicator invites gaming (Muller, 2018).
5. Build employability into the curriculum. The four-year undergraduate structure under NEP 2020 offers room for internships, research-based projects, communication, quantitative reasoning and data and AI literacy in every

discipline. Links with local firms and small enterprises can provide apprenticeships, but industry input should remain advisory and should not decide the whole curriculum.

6. Redesign assessment for the age of AI. Teachers need training and time to shift towards oral examinations, projects and in-class work, and to teach students to use AI tools critically. Where AI tools help under-resourced colleges, for example in language support, they should supplement and not replace appointments.
7. Regulate private provision for transparency and access. Disclosure of fees, faculty strength and graduate outcomes should be mandatory and audited, with scholarship seats for disadvantaged students. Public and private institutions can collaborate on research and teaching, and private institutions should be encouraged to invest in faculty and scholarship, not only in marketing.
8. Protect democratic academic spaces. Selection of vice-chancellors and principals should be transparent and merit-based, academic councils and student bodies should have a real voice, grievance systems should work, and academic freedom should be protected in appointments and research. Time for reading and research should be treated as part of a teacher's work, not as an extra.
9. Strengthen the evidence. Tracer studies that follow graduates for several years after leaving, state-wise vacancy and financing data and independent studies of state universities would make debates like this one more precise. Institutions such as universities and colleges in Jharkhand could contribute by studying their own graduates.

Limitations and Directions for Further Research

This is a secondary-data study and its conclusions are interpretative. AISHE data are self- reported and voluntary, the labour-market sources use different definitions, and some figures used here, notably sector shares in colleges and universities, are derived from published tables and should be checked against the primary reports before being relied upon for policy. No consolidated data on state-university vacancies were available. The observations on academic culture are drawn from the literature and from observable institutional practice, not from a survey. Further work could use state-level panel data to test how funding and faculty strength relate to learning outcomes, follow graduates of affiliated colleges through tracer studies, and compare the employment and earnings of graduates of public and private institutions after controlling for background.

Conclusion

India does not lack ambition for its universities. What it needs is clarity about what they are for. The expansion of the last decade has opened the doors of higher education to many who would once have been left out, and that is a genuine achievement. But the evidence reviewed here suggests that the system is under strain at three points: graduates whose qualifications are not matched by jobs, public universities that carry most students with too few resources, and a culture of indicators that rewards the visible over the valuable.

The answer is not to choose between employability and scholarship. A graduate who can reason, write, question and keep learning is also the graduate most likely to remain employable when technology changes the nature of work. Equally, a public university with enough teachers, books and time is the surest route by which a first-generation student from a small town can compete on fair terms. The vision of Viksit Bharat @ 2047 will depend less on how many graduates India produces than on what those graduates are able to do, and on whether the institutions that teach them are free enough, and well enough supported, to teach them to think.

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From Fragmented IoT to Connected India: Solving Interoperability Issues

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Abstract

We live in a world where technology changes almost every day. Smart devices – from lights in our homes to sensors in factories – are everywhere, and they're getting smarter with Internet of Things (IoT). The Internet of Things (IoT) is playing a very important role in Digital India by powering smart cities, better farming, healthcare, and industries. As of now, more than approx. 18.5 billion IoT devices are connected worldwide, and that number keeps growing fast. These devices make our lives easier, but only if they can talk to each other properly. The big hurdles are still interoperability (making different brands work together), integration (connecting everything smoothly), and management (keeping thousands of devices running without problems).

Now we have promising solutions like the Matter protocol, which lets devices from Apple, Google, Amazon, and others work together without extra apps or hubs. We also see huge progress with edge computing and AI (often called AIoT), which helps devices make quick decisions on their own instead of sending everything to the cloud. This paper explains these challenges and looks at new solutions such as the Matter protocol, AIoT (AI + IoT), and edge computing. It also discusses how India can use these technologies to achieve the goals of Digital India. The paper reviews recent developments, real examples, and future opportunities. By bringing together recent research, we show how standardization and smarter tools are turning IoT from a collection of separate gadgets into one connected, useful system that improves daily life and business.

Keywords: IoT, Digital India, Smart Devices, Interoperability, Integration, Device Management, Matter Protocol, AIoT

Introduction

Back in 1999, British technologist Kevin Ashton first used the term "Internet of Things." He suggested putting RFID tags on everyday objects so computers could track them and solve real problems without human help [1]. IoT simply means connecting everyday objects — like lights, sensors, vehicles, and machines — to the internet so they can share data and work automatically.

The Figure 01 represents the concept of an IoT (Internet of Things) where it makes possibilities of connecting, accessing, controlling of anything from anywhere anytime. IoT is no longer just a cool idea. It's part of daily life. IoT was generally defined as "dynamic global network infrastructure with self-configuring capabilities based on standards and communication protocols" [2]. We have smart homes that adjust temperature and lights on their own, smart cities that manage traffic and reduce pollution, and factories that predict machine breakdowns before they happen. As table 01 represents that Market reports from 2023–2025 show connected IoT devices grew gradually from about 16.6 billion at the end of 2023 to 18.5 billion by the end of 2024 and the number of connected IoT devices crossed 21.1 billion by the end of 2025 and is heading toward 30 billion or more very soon [3]. Fast 5G and upcoming 6G networks, cheaper sensors, and cloud services have made this explosion possible.

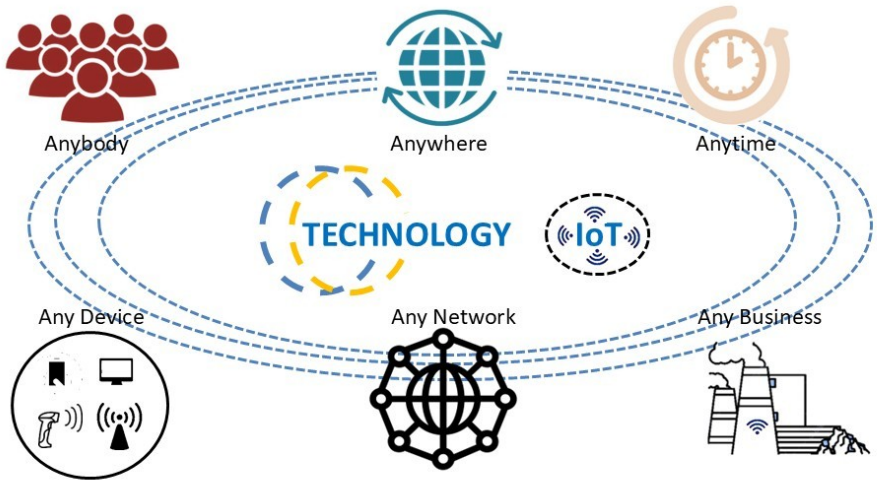


Figure 1: Internet of Things (IoT)

But success isn't automatic. Different companies build devices in their own way – using different languages, sensors, and rules. A bulb from one brand might not easily talk to a thermostat from another. Users end up juggling multiple apps, and businesses waste time and money on custom fixes. That's why interoperability, integration, and management (often called IIM) remain the biggest barriers to the full promise of IoT.

This survey looks at the challenges of making different Internet of Things (IoT) devices work together smoothly. It compares current standards, protocols, and platforms across different layers like data meaning, structure, and technology. Instead of creating a new protocol, this work shows how existing solutions solve these problems, points out what is still missing, and connects these insights to India's growing IoT ecosystem and Digital India programs. Ultimately, it serves as a practical guide for researchers and engineers looking to build large-scale, connected device networks. These findings also help policymakers understand the foundational needs for future smart infrastructure.

Table 1: Growth of Connected IoT Devices (2023–2024)

Year	Connected Devices (approx. in billions)	Year-over-Year Growth
2023	16.6	15%
2024	18.5	12%
2025	21.1	14%

India's IoT market was valued at approximately USD 20 billion in 2023 and is expected to grow at a strong pace, driven by government initiatives like Smart Cities Mission, Make in India, and Ayushman Bharat Digital Mission.

Interoperability, Integration and Management

After reviewing the latest research, it's clear that IIM (Interoperability, Integration and Management) issues still slow down IoT growth. Manufacturers keep creating their own standards, leaving users confused about which brand to choose. Devices from different makers often can't share data easily, and managing thousands of them becomes a headache. But now new standards and tools are trying to fix these problems.

The Figure 02 graphically represents the challenges of Interoperability, Integration and Management (IIM) of Smart Devices.



Figure 2: Challenges of Interoperability, Integration and Management (IIM) of Smart Devices

Interoperability

Interoperability simply means different systems or devices can work together and understand each other. The Cambridge Dictionary calls it “the degree to which two products can be used together” [4]. The IEEE defines it as “the ability of two or more systems to exchange information and use the information that has been exchanged” [5].

Lack of interoperability creates major constraints at technical and business levels. It also makes impossibilities of device integrations. The goal of IoT will be achieved with the standardization of device communication, resource sharing, process management and programming in heterogeneous devices of different manufacturers. For a basic communication to occur, a user or device needs a way to search for things and access the data they produce. This requires an agreement on many fundamental communication issues such as those relating to how things are represented, searched and accessed on the Internet [6].

Without it, IoT stays fragmented. In recent year, we see real progress through open standards. The biggest step forward is the Matter protocol, developed by the Connectivity Standards Alliance (CSA) [7] and backed by Apple, Google, Amazon, Samsung, and many others. Matter is an IP-based standard that lets smart-home devices talk directly to each other over Wi-Fi, Thread, or Ethernet – no matter which ecosystem they come from. You can control a Matter-certified light bulb from Google Home, Apple Home, or Amazon Alexa without extra bridges. Version 1.4 and later updates in 2025 added better support for cameras, appliances, and multi-admin control, making daily use much smoother [7].

Researchers still divide interoperability into four main types, and each has seen updates:

- Semantic Interoperability: Semantic interoperability aims to ensure that data is exchanged without losing its meaning through the use of controlled vocabularies. It’s a set of technologies that enables computer systems to communicate precisely. It’s an important way to drive down the integration cost of subsystems and it also plays a vital role for the creation of an autonomous operation in IoT. Semantic interoperability includes the ability to establish a shared meaning of the data exchanged, as well as the ability to similarly interpret communication interfaces.

Making sure the meaning of data is clear. Standards like the Semantic Sensor Network (SSN) and Sensor Observation Sampling Actuator (SOSA) ontologies from World Wide Web (W3C) are still important, but now AI helps translate data automatically so machines truly understand each other [8].

- Syntactic Interoperability: Syntactic interoperability refers to the way in which data is communicated between components. The standards in this area define the structure and format of the data to be used in the exchange of information. It is the ability of systems of correctly interpreting the structure of exchanged information and thus, of being capable to read its content. IoT vendors utilize standardized and widely used technologies and platforms in order to increase the acceptance of their products. Common solutions include the messaging protocols CoAP, XMPP, AMQP, MQTT, DDS, and Hy-LP, as well as the platforms DPWS, UPnP and OSGi [9]. Getting the format right. Protocols such as MQTT, CoAP, and AMQP remain popular, but Matter adds a common language on top of them.

- Technical Interoperability: Technical Interoperability refers to the technical aspects of interoperability such as transmission protocols and data exchange formats. Due to lack of compatibilities, still it creates hurdles in the development of IoT. It covers wide aspects of interconnection services, data integration services, data exchange and presentation, communication protocols and interface specifications.

Handling the actual connections (protocols, networks). 5G and low-power wide-area networks (LPWAN) have improved this a lot, but older devices still cause problems.

- Cross-Domain Interoperability: Cross domain interoperability facilitates users to do operations and communications, despite depending on different ecosystem, platform or frameworks. It neutralizes the dependencies and enhances the productivity of devices to share data and resources among different domain. It also makes a centric work environment for the accomplishment of tasks. Cross domain interoperability provides a collaboration mechanism within complex and secure environments and eliminates manual data transfer mechanism for the development of IoT based devices.

Letting devices from different fields (home, city, factory) share data. New projects like Margo (launched by the Linux Foundation in 2024 with help from Siemens, Schneider Electric, and others) create open rules for edge devices so industrial and consumer systems can work together more easily.

Table 2: Comparison of Major Interoperability Initiatives

Standard / Solution	Primary Focus	Interoperability Type	Main Technical Approach	IIM Aspect Addressed	Major Limitation
MQTT	IoT messaging	Syntactic / Technical	Publish-subscribe messaging	Interoperability / Integration	Does not provide common semantic meaning
CoAP	Constrained IoT	Technical	REST-based communication	Interoperability	Limited higher-level interoperability
SSN/SOSA	Sensor data	Semantic	Ontology-based representation	Interoperability / Integration	Adoption and implementation complexity
Matter	Smart Home	Technical / Cross-ecosystem	IP-based common application layer	Interoperability / Integration	Mainly focused on consumer ecosystems
Margo	Industrial Edge	Cross-platform / Technical	Open edge application orchestration	Integration / Management	Emerging and still developing
SymbIoTe	IoT platforms	Semantic / Syntactic	Cross-platform abstraction	Interoperability / Integration	Deployment/scalability challenges
BIG-IoT	IoT platforms	Semantic / API	Unified Web API	Interoperability / Integration	Limited compared with widely deployed standards
INTER-IoT	Cross-domain IoT	Cross-layer	Multi-layer interoperability	IIM	Implementation complexity

As above table 02 represents that current standards and solutions each tackle different parts of making IoT devices work together, but none of them cover everything on their own:

- MQTT and CoAP provide lightweight and reliable ways for devices to talk to each other, but they do not help systems understand the actual meaning of the data.
- SSN/SOSA solves the meaning (semantic) side of data, while Matter makes it easier to connect different consumer smart-home devices.
- Margo focuses on managing applications at the industrial edge, whereas SymbIoTe, BIG-IoT, and INTER-IoT look at connecting multiple platforms and domains together.

While these tools are all valuable, they work best as pieces of a puzzle rather than a single complete solution for heterogeneous IoT environments.

Integration

Integration means joining different apps, platforms, and devices so data flows freely and creates useful results. Today's IoT is moving from simple sensor networks to hybrid edge-cloud systems. Sensors now collect data on movement, air quality, temperature, and more, then process some of it right on the device (edge computing) before sending only the important parts to the cloud. This cuts delays and saves bandwidth.

A good example: a smart-home system can now pull live traffic data from a city platform to decide exactly when to turn on lights or preheat the oven. In industry, 5G-connected machines integrate with AI to adjust production lines in real time. The rise of AIoT (AI + IoT) makes integration smarter – devices learn from data and adapt without constant human input [10].

Still, challenges remain: different data formats, security rules, and old legacy systems. Middleware platforms and open APIs are helping, but full end-to-end integration across brands and domains needs more work.

Management

Managing IoT devices means monitoring, updating, securing, and controlling them at scale. With billions of devices, you can't rely on manual work. Good management includes remote on/off control, automatic updates, troubleshooting, and security checks – all done safely over the internet.

IoT device management plays a key role in the aspects of the human comfort and convenience. In the context of large scale deployment of IoT devices, the collection monitoring, controlling and analyzing of data is possible only with the proper management of the devices and in inappropriate and insufficient device management will lead to increasing the expensive manual interventions and this will create down times, waste system resources, reduce the reliability and the whole functionality of the IoT ecosystem [11].

AI has changed the game here. Modern systems use AI for predictive maintenance (spotting problems early), zero-touch provisioning (devices set themselves up automatically), and adaptive security that learns from threats. Edge-based identity and access management (IAM) lets devices handle their own security even when the cloud is offline. This reduces downtime, cuts costs, and makes large deployments reliable.

Yet diversity is still a problem. Devices have different lifespans, power needs, and security levels. Poor management leads to wasted resources, security holes, and frustrated users. The key now is combining AI, strong standards, and simple dashboards so administrators can handle everything from one place. The following table 3 shows that the analysis of selected approaches to IoT IIM challenges of different research and projects.

Table 3: Analysis of Selected Approaches to IoT IIM Challenges

Research / Project	Problem Addressed	Approach Taken	Key Contribution	Outcome and Remaining Limitation
Matter Protocol Adoption	Vendor lock-in in smart homes	IP-based unified standard with OTA updates	Reduced need for multiple apps/hubs	Good consumer progress; scale testing ongoing
Margo Initiative (launched 2024)	Lack of open edge orchestration	Collaborative open standard for industrial edge	Interoperable application lifecycle rules	Promising framework; early adoption phase
SymbIoTe / INTER-IoT style projects	Platform-level data silos	Abstract layers for semantic & syntactic bridging	Cross-platform resource sharing	Useful for research; real-world scale varied
AIoT & Edge Computing Studies	High cloud dependency and latency	Local processing with AI learning	Faster decisions, bandwidth savings	Improved efficiency; security integration needed
Device Management Platform Research	Manual handling at growing scale	AI-driven monitoring and zero-touch provisioning	Reduced downtime and maintenance costs	Growing market; diversity challenges persist

Existing IoT solutions have made major progress, but their features are spread across many different standards. Matter connects smart-home devices from different brands, Margo manages systems at the industrial edge, SSN/SOSA defines the meaning of data, MQTT and CoAP handle basic message exchange, and SymbIoTe, BIG-IoT, and INTER-IoT link multiple platforms together. Because no single option covers every need across different device types, interoperability goes far beyond simple communication. It requires a complete approach that combines data meanings, protocols, platform integration, security, and device management. This missing link highlights the urgent need for more comprehensive, all-in-one IoT solutions.

Technical Contribution and Scope of the Survey

This survey compares how different technologies solve IoT communication, connection, and management challenges. Right now, different tools handle different parts of the problem:

- MQTT and CoAP handle basic device communication.
- SSN/SOSA focus on making data meanings clear.
- Matter connects smart home devices.
- SymbIoTe and INTER-IoT link different platforms, while Margo works on industrial edge systems.

Because no single tool solves every problem at once, this survey does not create a new protocol. Instead, it combines these solutions to show what is missing and gives researchers a clear guide for building better, fully connected IoT systems.

Building on this comparison, the research maps out practical requirements for future deployments. It highlights how developers can combine existing frameworks to achieve seamless data sharing across smart cities, industrial automation, and consumer electronics. By identifying these gaps, the study helps engineering teams avoid redundant efforts and points policymakers toward unified standards needed for secure, large-scale digital infrastructure.

Related Works

Many different solutions have been proposed in the past researches to overcome the problem of IIM of IoT devices. For example, meSchup a platform for programming interconnected smart things; provides a common shared platform where heterogeneous devices get connected and it also facilitates “a unified view on I/O capabilities of heterogeneous smart devices” [12].

Earlier projects laid important groundwork. Platforms like meSchup offered a shared space for different smart devices to connect and show a unified view of their abilities. European initiatives such as SymbIoTe, BIG-IoT, and INTER-IoT created frameworks for cross-platform interoperability, semantic understanding, and open data sharing. SymbIoTe provides a way to support the IIM of smart devices between various IoT domains and platforms so that they can securely interoperate, integrate and manage resources for the mutual benefits [13].These efforts proved that unified APIs and abstract layers could make IoT platforms work together.

The BIGIoT projects address the interoperability gap by defining a generic, unified Web API for IoT based devices and platforms. It establishes a marketplace where different service providers can monetize their assets [14]. It captures metadata of resources with the uses of data formats of Web of Thing.

The INTER-IoT project aims at an open cross-layer framework of IoT ecosystem to enable interoperability among heterogeneous IoT platforms [15]. The main goal of this project is to provide solution to overcome IIM challenges of IoT devices. By providing an open framework that facilitates “voluntary interoperability” on different IoT platforms, at any level of implementation of devices, networks, middle-ware, semantics, syntactic and applications [16].

In the last few years, the focus has shifted to practical, widely adopted standards. The Matter protocol is the clearest success story. It has been rolled out to millions of devices via over-the-air updates and is now the default for new smart-home products. Industry reports in show Matter reducing vendor lock-in and making multi-brand homes much easier to manage.

On the industrial side, the Margo project (Linux Foundation, 2024) brings together big players like ABB, Siemens, Rockwell Automation, and Red Hat to create open standards for edge orchestration [17]. It helps companies mix devices and software from different vendors without custom coding. Other recent work explores AI-driven management systems that automatically handle device lifecycles, security, and scaling.

Surveys also highlight AIoT integration in healthcare, smart cities, and manufacturing. For example, researchers have shown how FHIR (Fast Healthcare Interoperability Resources) standards (in healthcare) and OPC UA (Open Platform Communications Unified Architecture) (in industry) combine with IoT to improve data sharing. Overall, the field has moved from research prototypes to real-world, large-scale deployments, though security and full cross-domain support are still active areas of study. The following table 05 shows IoT adoption across major sectors, key applications, major initiatives, Current states and challanges in India

Real-World Case Study:

1. IKEA’s Adoption of the Matter Protocol

A practical example of improving interoperability and integration comes from IKEA, one of the world’s largest furniture and home goods retailers. In September 2024, IKEA enabled Matter support for its DIRIGERA smart home hub through a software update. This allowed all existing IKEA smart products connected to the hub (lights, sensors, blinds, etc.) to become compatible with major platforms like Apple Home, Google Home, Amazon Alexa, and Samsung SmartThings without needing extra bridges or apps, as shown in the figure 03.

In November 2025, IKEA went further by launching 21 new Matter-compatible products focused on lighting, sensors, and control. The DIRIGERA hub now acts as both a Matter controller and a Matter bridge, exposing legacy Zigbee-based IKEA devices to the Matter ecosystem. This move directly addressed the common pain point of vendor lock-in and multiple apps that many users faced in smart homes.



Figure 3: IKEA DIRIGERA Hub and Matter-compatible Smart Home Products

Benefits observed: Users could now mix IKEA devices with products from other brands seamlessly. Setup became simpler, control was more reliable across ecosystems, and the need for multiple hubs dropped. IKEA reported strong customer interest, as the update made their affordable smart home range more future-proof and attractive to a wider audience.

Challenges addressed: Before Matter, IKEA's smart products worked mainly within its own ecosystem or required additional bridges for full compatibility. The shift to Matter reduced fragmentation, improved cross-platform control, and lowered integration effort for both consumers and the company.

This case demonstrates how a large manufacturer can use an open standard like Matter to solve real interoperability and integration problems at scale.

2. Smart Cities Mission Under the Smart Cities Mission, more than 100 cities are actively using IoT technologies for urban management.

- Pune has deployed a large number of IoT-enabled cameras and sensors for intelligent traffic management, surveillance, and waste management, which has improved traffic flow and public safety [18].
- Surat has implemented IoT-based systems for real-time flood monitoring along the Tapi River and smart energy distribution [19].
- Cities such as Bhubaneswar, Indore, and Bhopal have adopted IoT solutions for smart waste management, intelligent street lighting, and integrated command and control centers [20].

3. Agriculture (Precision Farming) Companies like Fasal have deployed IoT-based precision farming systems across thousands of acres in states such as Karnataka, Maharashtra, Madhya Pradesh, and Chhattisgarh. Farmers using these systems have reported significant benefits including up to 40% increase in yield, up to 60% reduction in pesticide costs, and saving billions of litres of water [21].

4. Healthcare IoT devices are being integrated with the Ayushman Bharat Digital Mission (ABDM) to support remote patient monitoring, especially in rural areas. This enables doctors to track patients' health parameters in real time and improves healthcare access [22,23].

These real-world examples show that IoT is already creating a positive impact in India. However, better interoperability and integration are still needed to scale these benefits nationwide.

Table 5: IoT Adoption Across Major Sectors in India

Sector	Key Applications	Major Initiatives	Current Status (2024-25)	Challenges
Smart Cities	Traffic, Waste, Street Lighting, Flood	Smart Cities Mission	100+ cities, Pune (1500+ sensors)	Interoperability, Data Silos
Agriculture	Precision farming, Soil & Water monitoring	e-NAM, PM-KISAN	Fasal & others on thousands of acres	Rural connectivity, Cost
Healthcare	Remote Patient Monitoring	Ayushman Bharat Digital Mission (ABDM)	Growing adoption in rural areas	Data privacy, Device standards
Manufacturing	Predictive Maintenance, Automation	Make in India, PLI Scheme	Rising in Industrial Corridors	Legacy systems, Skill gap

Opportunities and Future Directions

While challenges remain, coming years brings exciting opportunities. Matter and similar standards are making smart homes truly “plug-and-play.” Edge AI lets devices make fast, private decisions – great for factories, hospitals, and remote areas. Better management tools powered by AI can cut costs and boost reliability.

IoT has huge potential to support Digital India in many areas:

- Smart Cities: Better traffic, waste, and energy management
- Agriculture: Precision farming and higher farmer income
- Healthcare: Remote monitoring under Ayushman Bharat
- Manufacturing: Support for Make in India and Industry 4.0

Looking ahead, 6G networks, and even more advanced AI will push IoT further. We need continued work on open standards, user-friendly tools, and policies that encourage interoperability.

Future focus should be on:

- Creating India-specific standards
- Promoting local manufacturing
- Improving cybersecurity
- Training people in these new technologies

Concluding Remarks

IoT is evolving every day and reaching at its best and it is enhancing the power of devices with connectivity, controlling, data sharing and other features. IoT has come a long way since its early days. What started as a vision of connected objects is now a massive ecosystem touching almost every part of life and work.

Still, we are not finished. Fragmentation, security risks, and the scale of billions of devices mean we must keep improving. The future belongs to systems that are open, secure, easy to manage, and truly useful for people. By learning from past research and embracing today’s standards, we can build an IoT that genuinely improves quality of life, drives business, and creates a more connected, efficient world. To operate on any IoT based devices, the user has to monitor or control an array of applications in addition to switching from one application to another. Thus, it’s required to accommodate the diversity of technologies under an umbrella to overcome the lack of interoperability, integration and management (IIM) of smart devices. This survey shows that current standards only solve parts of the puzzle rather than offering a complete, end-to-end solution. Because of this, the study's main contribution is bringing these different approaches together to identify what a comprehensive system requires. Ultimately, the findings suggest that future IoT designs must combine communication, data meaning, cross-domain integration, security, and scalable device management instead of depending on just one protocol or standard.

This survey hopes to guide researchers, developers, and users toward practical solutions that turn today’s challenges into tomorrow’s everyday successes.

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Startup Ecosystems as Catalysts of Reverse Migration and Labour Market Redistribution in Tier-II India: Pathways towards Inclusive Regional Development under Viksit Bharat 2047

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Abstract

This study examines the association of startup-led employment opportunities with reverse migration and perceived local economic development in Ranchi, Jharkhand. A mixed-method research design was used to analyse responses from 100 participants recruited across conventional startup employment, platform-based work, migrant-returnee, entrepreneurship and local employment stakeholder categories. Descriptive analysis, correlation and regression findings were reported for the relevant respondent groups. Among the 55 respondents identified as return migrants, local work and business opportunities were the most frequently reported reason for returning (30.91%), followed by family and personal considerations (27.27%). In the workforce subsample (n = 85), startup employment opportunity ratings showed no statistically significant correlation with reverse migration ($r = .093$, $p = .395$), but a weak positive correlation with perceived local development ($r = .215$, $p = .049$). Regression analysis indicated that income stability and monthly income were significantly associated with return-migration status in the specified model. The findings suggest that local employment growth can broaden livelihood options, but the quality and security of work remain important for sustainable regional development. Policy implications are considered in relation to the Viksit Bharat 2047 agenda.

Keywords: startup ecosystems, reverse migration, labour market redistribution, platform employment, Ranchi, Viksit Bharat 2047

Introduction

The Indian economy has witnessed significant changes in its entrepreneurial and employment landscape over the past decade. The rapid expansion of the startup ecosystem, supported by technological advancement, digital infrastructure, government initiatives, and increasing entrepreneurial participation, has created new opportunities for business development and employment generation. Startups have gradually emerged as important contributors to economic activity, innovation, and employment, particularly in sectors such as information technology, financial services, e-commerce, logistics, education, healthcare, and agriculture. The geographical spread of recognised startups indicates that entrepreneurial activity is extending beyond major metropolitan centres (Press Information Bureau, 2026a).

In recent years, Tier-II cities in India have increasingly emerged as centres of entrepreneurial activity and employment generation. Regional centres such as Ranchi provide an important context for examining technology-enabled services, logistics networks and local entrepreneurial activity. Factors such as relatively lower operating costs, availability of local human resources, improving connectivity, and growing consumer markets have encouraged startups to explore business opportunities in these cities. This development has created new employment possibilities for local residents, including young graduates and semi-skilled workers who traditionally depended on metropolitan cities for better livelihood opportunities.

At the same time, migration and employment patterns in India are undergoing gradual changes. Traditionally, workers from smaller cities and rural areas have migrated towards metropolitan centres in search of better employment and income opportunities. However, the COVID-19 pandemic exposed the vulnerabilities of excessive dependence on metropolitan labour markets and led many workers to return to their hometowns. The expansion of digital businesses and local enterprises offers one potential route to employment closer to workers' places of origin, although return migration can also reflect family, welfare and economic constraints (Rajan et al., 2020; Khan & Arokkiaraj, 2021). In this context, reverse migration is increasingly relevant not only as a consequence of economic difficulties but also as a potential outcome of emerging employment opportunities in smaller urban centres.

The development of startup ecosystems in Tier-II cities may therefore play an important role in reshaping regional labour markets. By generating local employment, supporting entrepreneurship, and creating opportunities across different skill categories, startups can encourage the retention and return of human resources within regional economies. This process may also facilitate the redistribution of labour from metropolitan centres to emerging urban

locations, contributing to a more balanced distribution of economic activities and employment opportunities. Such a transformation is relevant to the inclusive-growth and regional development aspirations of Viksit Bharat 2047 (NITI Aayog, 2025).

Despite the growing presence of startups in smaller cities, the extent to which their expansion is creating sufficient employment opportunities to encourage reverse migration remains an important area of investigation. In particular, the availability, accessibility, income potential, and stability of startup-led employment for semi-skilled workers require closer examination. Against this background, the present study seeks to examine the role of startups in encouraging reverse migration among semi-skilled workers in Tier-II cities of India and analyse their contribution to labour market redistribution and local economic development. The analysis offers evidence on the relationship between employment opportunities, return-migration decisions and perceived local development within the study sample.

Review of Literature and Research Gap

The existing literature on startups, migration, and regional development provides an important foundation for the present study. The review is organised into three themes: startup ecosystems and regional employment generation, reverse migration and its socio-economic determinants, and startups, labour market redistribution, and inclusive development. These themes help understand the relationship between entrepreneurial growth, employment opportunities, and changing migration patterns in India.

Startup Ecosystems and Regional Employment Generation

Studies of entrepreneurial ecosystems emphasise that productive entrepreneurship depends not only on new-firm formation but also on regional institutions, finance, talent, networks and market connections. Stam (2015), Spigel (2017), Stam and van de Ven (2021) and Wurth et al. (2022) demonstrate the importance of interactions among these conditions. These perspectives inform an assessment of whether startup activity translates into viable employment in smaller urban centres.

Table 1

Selected literature on startup ecosystems and regional employment

Author(s) and year	Focus	Relevant contribution
Stam (2015)	Entrepreneurial ecosystems and regional policy	Links productive entrepreneurship to regional institutional and economic conditions.
Spigel (2017)	Relational organization of ecosystems	Explains interaction among cultural, social and material ecosystem attributes.
Stam and van de Ven (2021)	Elements of entrepreneurial ecosystems	Highlights interdependence of finance, talent, networks and institutions.
Wurth et al. (2022)	Entrepreneurial ecosystem research	Emphasizes causal mechanisms and regional context in ecosystem studies.
Press Information Bureau (2026a)	Geographical spread of recognized startups	Reports expansion of recognized startups beyond metropolitan centres.

Reverse Migration and Its Socio-Economic Determinants

Reverse migration reflects interacting employment, household and institutional conditions. The pandemic exposed the vulnerability of many mobile workers, while subsequent research highlights the role of welfare, family responsibilities and opportunities in places of origin (Rajan et al., 2020; Khan & Arokkiaraj, 2021; Agarwal, 2022). The aspirations–capabilities perspective further clarifies that returning and remaining are shaped by both choice and constraint (de Haas, 2021).

Table 2

Selected literature on reverse migration and its determinants

Author(s) and year	Focus	Relevant contribution
Rajan et al. (2020)	Pandemic and internal labour migration	Documents employment and mobility vulnerabilities during COVID-19.

Author(s) and year	Focus	Relevant contribution
de Haas (2021)	Aspirations–capabilities framework	Explains migration and immobility through aspirations, resources and constraints.
Khan and Arokkiaraj (2021)	Post-pandemic reverse migration	Identifies reintegration and livelihood challenges among returning migrants.
Agarwal (2022)	State–migrant relations in India	Examines welfare rights and migration governance during COVID-19.

Startups, Labour Market Redistribution and Inclusive Development

Digital intermediation has widened access to work in delivery, mobility, logistics and related services, but the availability of assignments does not necessarily imply secure earnings or adequate worker protection. NITI Aayog (2022) and the International Labour Organization (2024) identify these competing opportunities and risks. Evidence from entrepreneurial ecosystem research also suggests that local institutions can affect the extent to which jobs and enterprise benefits remain within a region (Stam & van de Ven, 2021; Wurth et al., 2022).

Table 3

Selected literature on labour market redistribution and inclusion

Author(s) and year	Focus	Relevant contribution
NITI Aayog (2022)	India's gig and platform economy	Estimates gig-worker growth and identifies opportunities and protection needs.
International Labour Organization (2024)	Platform economy and labour governance	Highlights the role of institutions and social dialogue in platform work.
Wurth et al. (2022)	Regional entrepreneurship	Explains why local institutions and networks shape entrepreneurial outcomes.
Stam and van de Ven (2021)	Entrepreneurial ecosystem development	Provides an integrated view of the resources supporting local enterprises.

Research Gap

Although entrepreneurship, migration and platform employment have been studied extensively, relatively little local-level evidence links startup-related employment opportunities to the reasons workers return to, or remain in, Tier-II cities. The relationship is particularly important for semi-skilled workers whose livelihood choices depend on earnings, continuity of employment, family circumstances and the availability of social protection. The present investigation addresses this issue through an analysis of respondents in Ranchi.

Objectives and Hypotheses

Objectives of the Study

1. To examine the role of startups in encouraging reverse migration among semi-skilled workers in Ranchi.

2. To analyse the association between startup-led employment opportunities, labour market redistribution and perceived local economic development in Ranchi.

Hypotheses of the Study

H_{01}: There is no significant relationship between startup-led employment opportunities and reverse migration among semi-skilled workers in Ranchi.

H_{02}: There is no significant relationship between startup-led employment opportunities and perceived local economic development in Ranchi.

Research Methodology

Research Design

The study adopted a mixed-method design, combining a quantitative assessment of employment-related characteristics and migration status with qualitative information on return decisions and work experiences. Quantitative findings are presented descriptively and through bivariate and multivariable analyses.

Study Area

The study focused on Ranchi, Jharkhand, a Tier-II regional centre with employment activity in conventional enterprises and technology-enabled services.

Respondents and Sample Size

The study included 100 respondents across five recruitment categories, as shown in Table 4. Migration history was also recorded as a separate characteristic; consequently, the 55 respondents reporting return migration should not be interpreted as constituting a single, exclusive recruitment category.

Table 4

Distribution of respondents by recruitment category

S. No.	Category of Respondents	Sample Size
1	Semi-skilled workers in conventional startups	30
2	Platform-based workers	30
3	Migrant returnees	25
4	Startup founders and entrepreneurs	10
5	Local employment stakeholders	5
	Total	100

Note. N = 100.

Platform-based respondents were associated with food delivery, e-commerce, grocery distribution and mobility services, including Swiggy, Zomato, Amazon, Flipkart, Blinkit, Apna Mart, Ola and Uber. Platform-mediated work is distinguished here from employment in locally founded startups.

Sampling Technique

Respondents were selected using purposive and convenience sampling based on involvement in startup-related employment, platform work, migration experience and entrepreneurship. These non-probability methods limit the extent to which results can be generalised to the overall workforce of Ranchi.

Sources of Data

Primary information was obtained through structured questionnaires and interviews. Secondary material included academic studies and published reports from government agencies, NITI Aayog and international labour institutions.

Tools and Techniques of Data Analysis

Frequencies, percentages and group-wise mean monthly earnings were used to describe participants. Pearson correlation coefficients were reported for the relationships between perceived employment opportunities, return-migration status and perceived local development. A multivariable ordinary least squares linear probability model examined the reported associations between return-migration status and five employment-related variables. Qualitative responses were grouped into broad themes corresponding to stated reasons for returning.

Data Analysis and Findings

Demographic and Employment Profile of Respondents

Respondents aged 25–34 years comprised the largest age category (44%), followed by those aged 35–44 years (32%). Men accounted for 72% of the sample and women for 28%. Graduates (29%) and higher-secondary-qualified respondents (28%) were the largest reported educational categories.

Table 5

Demographic characteristics of respondents (N = 100)

Particulars	Category	Frequency	Percentage
Age	18–24 years	18	18%
Age	25–34 years	44	44%
Age	35–44 years	32	32%
Age	45 years and above	6	6%
Gender	Male	72	72%
Gender	Female	28	28%
Education	Secondary	20	20%
Education	Higher Secondary	28	28%
Education	Graduate	29	29%
Education	Diploma/ITI	18	18%
Education	Postgraduate	5	5%

Note. Percentages are calculated against the full sample of 100 respondents.

Average reported monthly income varied by recruitment category. Conventional startup workers reported approximately ₹19,283, compared with ₹19,033 among platform-based workers. The lower group mean for migrant returnees includes participants who were not currently employed.

Table 6

Respondent categories and average monthly income

Category of Respondents	Respondents	Average Monthly Income (₹)
Conventional startup workers	30	19,283
Platform-based workers	30	19,033
Migrant returnees	25	10,860
Startup founders and entrepreneurs	10	35,050
Local employment stakeholders	5	40,000
Total	100	—

Note. Average income reflects all respondents in each category, including non-employed participants where applicable.

Role of Startups in Local Employment Generation

Participants reported employment linked to conventional startup ventures and digital platforms operating in delivery, e-commerce, grocery services, logistics and mobility. These activities broaden the range of work available locally, but platform assignments and employment in locally established enterprises represent distinct organisational arrangements. Table 7 presents the distribution and mean monthly income of platform-based participants.

Table 7

Platform-based respondents and their average monthly income

Platform	Respondents	Average Monthly Income (₹)
Swiggy	4	17,250
Zomato	4	22,750
Amazon	4	21,000
Flipkart	4	17,000
Blinkit	4	19,125
Apna Mart	4	17,250

Platform	Respondents	Average Monthly Income (₹)
Ola	3	18,667
Uber	3	19,167
Total	30	—

Note. Platform employment counts total 30. The figures represent only the platform respondents included in the study.

The platform figures show variation in average reported earnings across services. Such differences should be interpreted cautiously because each platform subgroup included only three or four respondents, and the table does not adjust for expenses, hours worked or the stability of assignments.

Factors Influencing Reverse Migration

Fifty-five respondents reported having returned to Ranchi following work elsewhere. The stated reasons were grouped into four categories. Local work and business opportunities accounted for the largest reported share (30.91%), followed by family and personal considerations (27.27%), economic considerations (25.45%) and pandemic-related circumstances (16.36%).

Table 8

Reported reasons for return migration (n = 55)

Reasons for Returning	Respondents	Percentage
Local work and business opportunities	17	30.91%
Family and personal considerations	15	27.27%
Economic considerations, including lower living costs and loss of employment	14	25.45%
Pandemic-related circumstances	9	16.36%
Total	55	100%

Note. Percentages may not total exactly 100 due to rounding. These are stated reasons, not causal effects identified through experimental research.

The distribution is consistent with the view that migration decisions reflect multiple circumstances. Local opportunities may be relevant, but family circumstances and changes in living costs or employment security also feature prominently (de Haas, 2021; Khan & Arokkiaraj, 2021).

Labour Market Redistribution and Perceived Local Development

Among the 85 workforce respondents included in the rating analysis, the mean score for startup employment opportunities was 3.64 on a five-point scale, while the mean perceived contribution to local development was 3.60. The mean income-stability rating was lower, at 2.94. These patterns suggest a distinction between access to work and confidence in the durability of employment-related income.

Correlation and Regression Analysis

The statistical analysis covered 85 workforce respondents, comprising conventional startup workers, platform-based workers and migrant returnees. The opportunity–reverse migration correlation was small and not statistically significant ($r = .093$, $p = .395$). The association between opportunity ratings and perceived local development was positive but weak ($r = .215$, $p = .049$).

Table 9

Correlations between employment opportunities and study outcomes (n = 85)

Variables	Correlation (r)	p-value
Startup employment opportunity and reverse migration	0.093	0.395
Startup employment opportunity and perceived local development	0.215	0.049

Note. Reported two-sided p values are shown. Statistical significance does not establish causation.

A linear probability regression model was also reported for return-migration status, using startup employment opportunity, work flexibility, income stability, importance of family proximity and monthly income as predictors. Its reported overall fit was $R^2 = .217$, $F = 4.367$, $p = .001$ ($N = 85$).

Table 10

Reported regression coefficients for return-migration status

Independent Variables	Regression Coefficient (β)	p-value
Startup employment opportunity	0.034	0.476
Work flexibility	-0.099	0.065
Income stability	-0.101	0.016
Importance of family proximity	0.035	0.445
Monthly income	-0.217	0.004

Note. Reported model: $R^2 = .217$, $F = 4.367$, $p = .001$, $N = 85$; monthly income is expressed in units of ₹10,000. Coefficients represent estimates from the specified linear probability model.

Income stability (coefficient = −.101, p = .016) and monthly income (coefficient = −.217, p = .004) were statistically significant negative predictors in the reported specification. Startup employment opportunities (p = .476), work flexibility (p = .065) and family proximity (p = .445) were not individually significant at the 5% level. These results describe associations conditional on the model specification and should not be interpreted as estimates of causal effects.

Hypothesis Testing

H_{01} was not rejected: the correlation between startup employment opportunities and reverse migration did not reach the 5% significance threshold (p = .395). For H_{02}, the positive association with perceived local development reached the conventional threshold (p = .049), providing limited evidence against the null hypothesis as operationalised through perception ratings. This result does not establish that startup-led employment caused measurable economic development or geographic redistribution of the labour force.

Discussion

The findings indicate that startup-related and platform-mediated work contribute to the diversity of employment arrangements reported by participants in Ranchi. The presence of workers in delivery, mobility, digital services and logistics illustrates the range of occupations associated with technology-enabled business models. Nevertheless, the statistical evidence does not show a significant relationship between the employment-opportunity measure and return-migration status. This distinction is important: the availability of local work and the decision to return are not interchangeable outcomes.

Among respondents with return-migration histories, employment and business opportunities were a frequently cited reason for returning, while family and economic circumstances were also substantial. This multidimensional pattern aligns with migration research emphasising household resources, aspirations, employment disruption and reintegration conditions (Rajan et al., 2020; de Haas, 2021; Khan & Arokkiaraj, 2021).

The relatively positive mean ratings for employment opportunities and perceived local development contrast with the lower mean rating for income stability. The difference highlights the importance of job quality. Platform-based work can broaden entry into paid activity, but variability of earnings, work-related costs and limited access to benefits remain relevant concerns (NITI Aayog, 2022; International Labour Organization, 2024).

The weak positive association between opportunity ratings and perceived local development is consistent with a favourable perception of local enterprise activity. However, perceptions are not equivalent to measured regional output, net job creation or migration flows. Furthermore, the negative income coefficients in the reported regression should be interpreted only within the specified sample and model; selection into work and differences between migrants and non-migrants may affect the estimates. The results therefore support a cautious interpretation of how startup ecosystems relate to regional development.

Policy Implications

Strengthening regional entrepreneurship requires coordinated attention to infrastructure, finance, incubation, employer–education networks and market access. Entrepreneurial ecosystem studies stress that such elements interact rather than operate independently (Stam, 2015; Spigel, 2017; Stam & van de Ven, 2021). Central initiatives supporting startup ecosystems beyond metropolitan centres may provide a framework for local collaboration (Ministry of Electronics and Information Technology, 2023).

Skill-development services should reflect employers' actual demand in logistics, digital operations, customer support and technical services. Returning workers may benefit from skill recognition and placement assistance. Policy monitoring should track sustained employment, earnings after expenses and job progression rather than training enrolment alone.

Income security is particularly important in platform-mediated work. Policy coordination should address occupational risks, transparent payment systems, grievance mechanisms and access to relevant social protection. The Code on Social Security, 2020 provides a legislative framework for gig and platform worker protections, though meaningful outcomes depend on implementation and access (Government of India, 2020; International Labour Organization, 2024).

A regional migrant reintegration interface could integrate job information, entrepreneurship assistance, vocational training and appropriate financial guidance. Local agencies should separately monitor worker retention, voluntary return migration and distress return. These measures would help evaluate whether business expansion produces durable benefits consistent with the broader objectives of Viksit Bharat 2047 (NITI Aayog, 2025).

Limitations of the Study

The research is geographically limited to Ranchi and uses a non-probability sample of 100 respondents. Occupational categories and migration status overlap conceptually and should be defined carefully in future survey instruments. The workforce analysis is based on 85 participants, while the distribution of return-migration reasons covers 55 respondents. Some reported averages reflect small subgroups. Correlation and a cross-sectional linear probability model cannot identify causal effects.

Conclusion

The study indicates that startup-related and platform-mediated work form part of the range of local livelihood opportunities available to the sampled workforce in Ranchi. Employment opportunities were frequently cited among the reasons for return migration, but the measured correlation between opportunity ratings and return-migration status was not statistically significant. A weak positive association with perceived local development was observed, alongside continued concerns over income stability.

These findings support a balanced approach to regional employment policy. Encouraging entrepreneurship remains relevant, but inclusive development requires attention to sustained earning opportunities, workers' security, employer demand, skills and the social conditions influencing mobility. Effective local institutions and evidence-based monitoring can help align entrepreneurship and labour-market initiatives with the vision of Viksit Bharat 2047.

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Studies on compost production and its evaluation of soil blend from the Jhiri landfill, Ranchi, Jharkhand, India

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Abstract

The growing municipal solid waste in Jharkhand, Ranchi has turned landfills like Jhiri (23°24'33.40"N 85°15'26.73"E) in Ranchi into massive dumps of unsegregated waste. While this waste poses a severe environmental risk to groundwater and the surrounding environment, it also contains a nutrient-rich, humus-like soil-like material (SLM) used progressively by local farmers as an affordable fertilizer. The present study investigates the potential of blending Jhiri landfill SLM with locally available soil to grow non-edible ornamental plants, specifically marigold (*Tagetes* spp.), alongside an edible cultivated variety of oat (*Avena* spp.). Using a controlled pot experiment with six blend ratios ranging from 0% to 100% SLM, we monitored germination, growth, flowering, and visible phytotoxicity over a 90-day cycle. Our results reveal a sharp, non-linear response: a 20% SLM blend (T20) significantly outperformed all other ratios, producing the tallest plants, the highest chlorophyll content, and more than double the flower yield of the pure soil control. Beyond 20% SLM, plant growth declined visibly, and above 50% SLM, low germination, leaf necrosis, and stunted growth were observed. Furthermore, visible microplastic contamination increased linearly with the SLM fraction, complicating the substrate's physical quality. These findings suggest that while Jhiri's waste is a potent resource for the floriculture industry, it must be used in a balanced manner. The results show that a maximum blend of 20% SLM is safe and optimal for plant growth, while for edible plants, the food-chain risks associated with landfill-derived contaminants remain a concern. This study provides evidence for a sustainable economic resource for floriculture that bypasses food-chain contamination and its health consequences.

Keywords: solid waste, soil-like material (SLM), landfill, contamination, phytotoxicity

Introduction

Indian cities are growing fast and resulting in growing their garbage. Most of this waste ends up in open dumps called landfills. A landfill is simply a large pit where waste is piled up and left to rot. When a landfill is not properly designed, it creates serious problems. Rainwater mixes with the waste and forms a toxic liquid called leachate. This leachate seeps into the ground and poisons the groundwater. Harmful gases also escape into the air and foul odors spread for miles.

Ranchi, the capital of Jharkhand, faces the same crisis. The city is managed by the Ranchi Municipal Corporation (RMC). Ranchi's main dumping ground is the Jhiri landfill. It lies at 23°24′33.40″N and 85°15′26.73″E on the outskirts of the city. The site covers 22 acres (Shubham & Singh, 2025). For nearly twenty years it received mixed, unseparated waste from around 2.5 lakh households. Today an estimated 1.8 to 1.9 million tonnes of old waste sit there. The impacts on the surrounding environment are severe. Studies show that the groundwater near Jhiri now carries heavy metals and dissolved salts well above safe limits (Das et al., 2025).

Ranchi is not alone. Every major Indian city has its own struggling landfill. Delhi has Ghazipur. Mumbai has Deonar. Chennai has Kodungaiyur. Bengaluru has Mavallipura. Millions of tonnes of mixed waste have piled up at each of these sites over decades. To tackle the problem, government schemes like the Swachh Bharat Mission have pushed for biomining. Biomining means digging up old waste, sieving it and sorting it into different parts. The process reclaims the land and produces something unexpected: a soil-like material often called bioearth (Ramteke et al., in press). At Jhiri, biomining started in 2020. By early 2026 more than 1.4 million tonnes of legacy waste had been processed and a large fraction of it was converted into this soil-like material.

Many countries have tried to use similar material from old landfills as a soil additive. Germany, the Netherlands and the United States tested it for greening damaged lands and roadside planting. Bangkok in Thailand and Sao Paulo in Brazil made compost from landfill waste and tried it in plant nurseries. In India, pilot projects in Delhi and Bengaluru applied biomined soil to crops (Ramteke et al., in press). All these efforts found the same result. The material is rich in organic matter and nutrients that soil needs. But it also carries heavy metals, salts and tiny plastic particles that can harm plants and people (Ghosh & Kartha, 2023).

Around Jhiri, local farmers already buy this material at about ₹1000 per tonne. They mix it with the native red-yellow lateritic soil. The native soil is fairly poor and the added material visibly boosts crop growth. But there is no scientific guideline for how much to use. When farmers apply too much by eye, seedlings burn and leaves develop yellowing and dead brown tips. They also notice a lot of visible plastic fragments in the mix. The risk is even greater for edible crops. Heavy metals and microplastics can move from the soil into grains and vegetables, creating a direct health hazard (Gao et al., 2022).

A safer approach is to use this landfill material only for non-edible plants. Ornamental plants are not eaten, so the food chain is bypassed. Many ornamentals can even lock up metals in their roots and shoots without passing them to consumers (Liu et al., 2018). Marigold is a perfect example. It is widely grown across India for religious rituals, garden decoration and natural pigment extraction. It gives good economic returns and uses less water than food crops. Earlier studies with some grasses hinted that a moderate mix of landfill fines could improve growth (Chandana et al., 2021). Yet no one had tested different blend ratios over a full flowering season or looked at the visible plastic problem alongside plant health.

Our study set out to fill that gap. We collected fresh soil-like material from the bioremediation site at Jhiri. We mixed it with native soil in six different proportions. The blends ranged from 0% landfill material to 100% landfill material. We planted marigold and a fast-growing non-ornamental oat to compare. We then watched germination, growth, flowering, leaf greenness, leaf damage and the amount of visible plastic pieces across a full 90-day cycle. The goal was to find the maximum safe blend that boosts flower yield without causing plant stress or excessive plastic contamination. The result is a practical, evidence-based guideline that can be used by local nursery owners and can serve as a model for other cities in the Global South facing the same waste challenge.

Methodology

Study area

The study was conducted during April 2025 to February 2026 at the Jhiri landfill (23.40° N, 85.33° E), Ranchi, Jharkhand, India. This dump site is about 24 years old.

A structured questionnaire interviews were conducted with the consent of 25 farmers, 20 of whom were vegetable growing farmers, and 5 were nursery growers. All these farmers were growing crops within a 5 km radius around the landfill site. The interviews were conducted in the local language in January-February 2026.

Collection and Characterization of Landfill-Derived Material

In April 2025, a composite sample of freshly screened SLM (100 kg) processed from the accumulated dump was collected. SLM was homogenized, air-dried, and both materials were sieved to 4 mm. Before blending, we measured the pH (1:2.5 water suspension; Farr, 1972), organic carbon (Walkley-Black; Bahadori & Tofighi, 2016), available nitrogen (Kjeldahl; Keeney & Bremner, 1966), available phosphorus (Olsen; Horta & Torrent, 2007), and available potassium (flame photometry; Toth & Prince, 1949).

Experimental Design, Growth, Phytotoxicity, and Microplastic Assessments

We set up a pot experiment in a naturally ventilated polyhouse with a day/night temperature of 28 °C/18 °C and a relative humidity of 60–75%. Six blend ratios of SLM to native land soil were prepared on a volume basis: 0:100 (pure land soil, control), 5:95, 20:80, 50:50, 80:20, and 100:0 (SLM), abbreviated T0, T5, T20, T50, T80, and T100 respectively. Each blend filled 250 ml plastic pots arranged in a completely randomized design with five replicates. The two plant species, marigold (*Tagetes* spp.) and oat (*Avena sativa L.* 'Kent'), were selected as experimental samples. Seeds were sown 1 cm deep in pots filled with the respective blend, maintained at 50% soil moisture and 25 °C. The plants were studied for 90 days to measure plant height and leaf characteristics.

Results

Survey and ground reporting

Farmers around Jhiri and nearby areas buy the raw landfill-derived material at about ₹1,000 per tonne because it visibly improves growth in the native barren soil. However, they report that applying too much burns seedlings, and they notice a large amount of visible plastic fragments in the mix. This creates a clear need for scientifically determined, safe blend ratios.

Our survey of 25 farmers (20 vegetable growers and 5 nursery operators) within a 5 km radius of the landfill confirmed these informal observations. All respondents had used or experimented with the soil-like material, but none followed a standardised mixing guideline. We also interviewed workers at the Jhiri landfill, who explained the function of the processing machinery: the vajra separates larger undigested particles into three different pits, while the widower sieves the smallest fractions.

The present study therefore investigates what proportion of SLM can be added to native soil to maximize plant growth while minimizing phytotoxicity and contaminant uptake. We hypothesized that an intermediate ratio—roughly 20–30% Jhiri material—would yield the best overall growth by supplying nutrients without exceeding the plant's tolerance for salts

and physical contaminants. This study works for finding a safe blend ratio of landfill-derived SLM to be used by farmers for floriculture.

Seed germination in marigold and oat

As the percentage of soil-like material (SLM) increased, the proportion of seeds that successfully germinated dropped sharply (Graph-1). In the control (T0) and T5 blends, almost all seeds germinated (93–100% for marigold, 95–100% for oat), and seedlings emerged uniformly. Germination stayed high in T20 (87% for marigold, 90% for oat), and seedlings appeared healthy. In T50, germination fell to about 60% for marigold and 67% for oat. T80 had very few seeds germinate—only 20% of marigold and 27% of oat seeds—and the seedlings that did emerge were weak and slow-growing. In T100 germination was almost non-existent, only one marigold seedling came up across all three sets of pots, along with just two oat seedlings.

Plant height and chlorophyll content

Marigold plants showed a sharp, non-linear response (Graph-2) to the addition of SLM. At the end of the 90-day period, the tallest plants were from the T20 blend, averaging 47.3 ± 3.8 cm (mean ± SD, n = 3). This height was significantly greater than all other treatments. The next best growth was in T5 (30.2 ± 3.0 cm), which was taller than the pure land-soil control T0 (28.4 ± 2.9 cm). However, higher SLM levels beyond 20% led to a steep decline: T50 plants reached only 24.8 ± 2.8 cm—not significantly different from T0 and much shorter than T5. T80 plants averaged 22.1 ± 2.6 cm, but this data came from only three surviving plants across all three pots. The sole surviving marigold in T100 reached 16 cm, so we couldn't make meaningful statistical comparisons. Leaf greenness (SPAD values at day 75) was highest in T20 (52.4 ± 4.2) and T5 (48.6 ± 3.5), which did not significantly differ from each other but were both greener than T0 (35.6 ± 3.0). SPAD values then fell in T50 (33.1 ± 3.9), T80 (30.5 ± 4.1), and T100 (measurement from the single plant: 28.4). Thus, T20 and T5 produced the healthiest, greenest leaves.

Oat plants also did best in T20, with the final height tallest in this blend (68.2 ± 5.1 cm). T5 (59.4 ± 4.3 cm) and T50 (58.7 ± 4.8 cm) showed some improvement over the control (55 ± 3.9 cm), but both were much shorter than T20. T80 plants averaged 55.3 ± 5.0 cm from the few that germinated. In T100, the two surviving oat seedlings only reached 38 and 42 cm, so we excluded this treatment from statistical comparisons due to the near-total germination failure. SPAD values in oat showed a similar pattern, with the highest readings in T20, intermediate values in T5, and the lowest in T50 and the few survivors from T80 and T100.

Phytotoxicity symptoms

Visible toxicity symptoms were absent or minor in T0 and T5 at both 30 and 60 days (median phytotoxicity score = 0 for T0, 0 for T5). T20 showed only slight symptoms (median = 0.5, with a few plants displaying brief interveinal chlorosis that resolved by day 60). Symptoms worsened as SLM levels increased: T50 had a median score of 2 (moderate chlorosis with marginal necrosis), T80 a median of 3 (severe necrosis and leaf curling), and in T100, the few surviving seedlings were very stunted and necrotic (score of 4). The Kruskal-Wallis test showed significant differences among treatments at both time points ($p < 0.001$); Dunn’s post-hoc comparisons confirmed that T80 and T100 were significantly worse than all other blends, while T20 did not differ from T5 or T0.

Visible microplastic load

The number of visible plastic fragments (>1 mm) on the pot surface at day 45 increased directly with the SLM proportion. T0 pots had an average of 0.2 ± 0.4 fragments, T5 had 1.8 ± 0.8, T20 had 5.4 ± 1.5, T50 had 12.6 ± 2.3, T80 had 22.0 ± 3.1, and T100 had 31.2 ± 3.6 fragments. Thus, blends beyond T20 introduced significantly more visible plastic contamination.

Conclusion

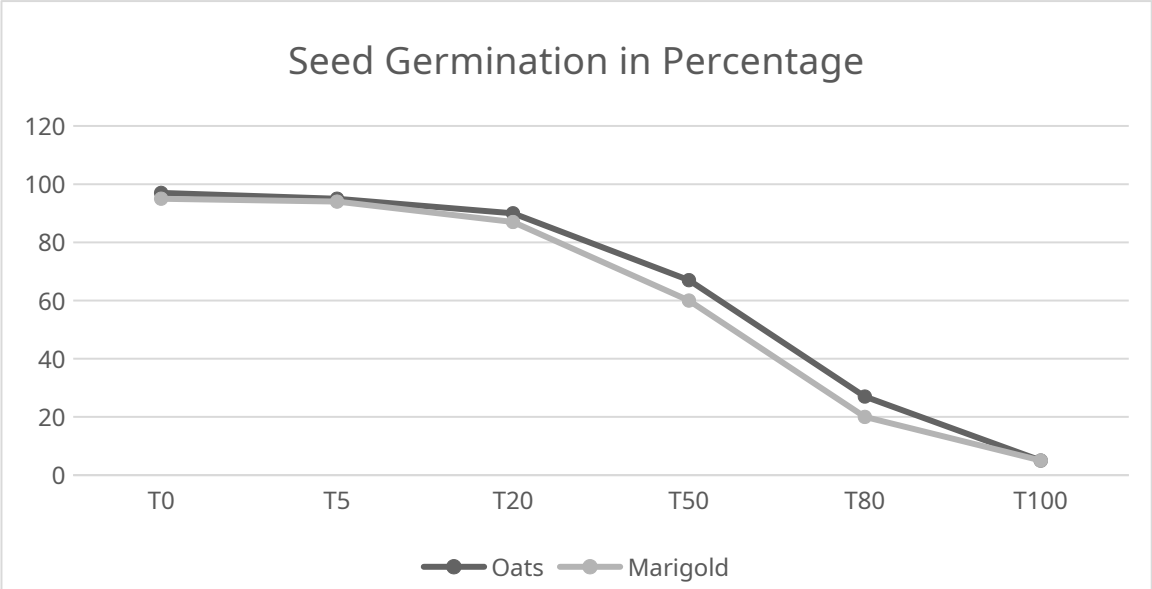
This study demonstrates that the soil-like material derived from the Jhiri landfill can be utilised as a potting substrate for ornamental crops, but only within a narrow and well-defined blending ratio. The 20% SLM blend (T20) consistently outperformed all other treatments, delivering the tallest plants, the highest chlorophyll content, and more than double the flower yield compared to the pure soil control. This performance underscores the nutrient-supplying capacity of the stabilised organic fraction while remaining below the threshold of acute phytotoxicity.

Beyond this optimal ratio, the benefits diminish rapidly. Blends of 50% SLM and above triggered marked declines in germination, induced visible necrosis and leaf curling, and severely stunted growth. Near-total germination failure in pure SLM (T100) confirms that undiluted landfill-derived material is unsuitable as a stand-alone growing medium. Furthermore, visible microplastic contamination rose linearly with the SLM fraction, presenting an additional physical and perceptual barrier to unrestricted use.

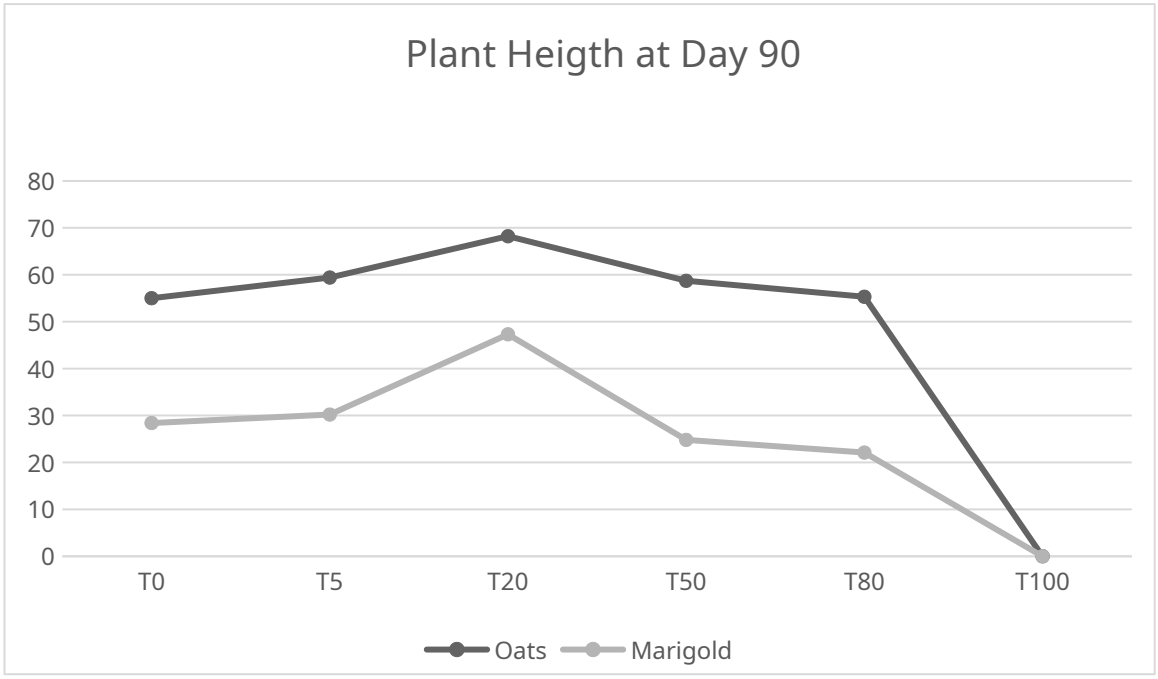
Our results provide a scientifically grounded, actionable guideline for local farmers and nursery operators. A maximum of 20% SLM by volume blended with native soil offers a safe and productive substrate for marigold cultivation. By directing this resource exclusively toward non-edible ornamentals, the food-chain risks associated with heavy metals and microplastics are effectively bypassed. This approach converts a fraction of Ranchi's legacy waste burden into an economic opportunity for the floriculture sector while safeguarding human and environmental health. Future work should extend these findings to other high-value ornamental species and quantify long-term contaminant fate under field conditions.

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Graph: - ***1. Seed germination in marigold and oat***



Graph- ***2. Plant Height Recorded on Day 90 in centimetres.***



Photographs

Figure:1. SLM (Soil Like Material)Production Unit .



Figure: 2 Survey and Ground Reporting .



Figure: 3 Seed germination in Marigold at day 30 and seed germination in Oats at day 3.

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Mining Proximity and Infrastructural Disparities among Tribal Households in Jharkhand's Bauxite Belt: Evidence from Logistic Regression Analysis

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Abstract

The present study examines the relationship between proximity to mining and access to infrastructure in tribal households in Jharkhand's bauxite belt. The present study compares villages near mining sites with geographically isolated settlements to understand the effects of regional development due to mining on road connectivity, educational access, and overall infrastructure availability. Responses were obtained from four tribal villages, i.e. Khairipat and Amtipani villages situated near Amtipani and Gurdari mining zones in Bishunpur block of Gumla district and Sohar and Husumbu villages, which are away from mining activities. A sample of 90 households was surveyed using purposive sampling techniques. Logistic regression analysis was used to estimate the probability of infrastructure accessibility based on functional road access, electricity connectivity, educational attendance and mining proximity. Results show that villages in the proximity of mining sites have significantly better road connectivity, access to electricity and educational participation than settlements away from mining. Proximity to mining was found to be a significant predictor of better infrastructure accessibility in tribal households. The study highlights the uneven spatial distribution of development in tribal regions and suggests that mining-led regional growth has indirectly improved infrastructure and connectivity in some settlements of the Pat Region.

Keywords: Tribal Development, Infrastructure Accessibility, Educational Access, Mining Proximity, Logistic Regression, Jharkhand

Introduction

Jharkhand is one of India's most mineral-rich states, and at the same time, it hosts a large tribal population living in geographically isolated plateaus and forested areas (Dubey et al., 2022). There are large spatial variations in development outcomes across tribal settlements, even though there is an abundance of minerals. Villages around mining areas have had relatively better road connectivity, access to electricity, educational facilities and employment opportunities, while remote settlements are still facing infrastructural deprivation, weak institutional outreach and limited access to essential public services (Li et al., 2017; Ghebrihiwet, 2019).

The Pat region of Jharkhand serves as an important context for exploring these developmental disparities. Mining-related economic activities and the expansion of regional connectivity have resulted in an increasing infrastructural integration of several settlements located near the bauxite mining belts (Dubey et al., 2022). The literature on mining regions has mostly focused on issues of displacement, ecological degradation, labour exploitation, and extractive capitalism (Bebbington, 2010; Dubey et al., 2022). Although these aspects remain of critical importance, relatively little attention has been paid to the changes in indirect infrastructure and accessibility that are associated with mining-led regional development, particularly in tribal areas.

The study argues that while mining regions are often associated with displacement, ecological stress and socio-economic exclusion, mining-led regional integration has also contributed to selective improvements in infrastructural accessibility and public service availability in nearby settlements. The paper therefore investigates the influence of proximity to mining activities on patterns of road connectivity, access to electricity, participation in education and livelihood opportunities across tribal villages.

Literature Review

The themes of mining-led development and the change in infrastructure in tribal areas have been important in the fields of development studies, political ecology and regional economics. Existing scholarship highlights the uneven

developmental trajectories of mining regions, where infrastructural expansion and economic opportunities coexist with social dependency, ecological vulnerability, and regional inequality. Research in the bauxite-rich plateau region of Gumla district of Jharkhand has looked at the effects of mining on development processes and class relations in tribal areas (Dubey, Sharma, and Jha, 2022). Mining-related development is often implemented through compensation mechanisms and market integration, thus increasing the reliance of local populations on extractive economies. Prior research also indicates that mining regions undergo gradual changes in infrastructure and accessibility due to the expansion of extractive activities and related institutional arrangements. While these studies critically analyse the exploitative aspects of mining capitalism, they also highlight that mining areas become sites of relatively higher concentration of infrastructure and economic mobility (Dubey, Sharma and Jha, 2022). The capitalist expansion of mining zones also reconfigures local socio-economic relations and increases integration with wider market networks.

The role of transport infrastructure in regional development has also been widely debated in the regional economic literature. Transport infrastructure has significant spillover effects on regional economic growth by improving accessibility and reducing transportation barriers (Li, Wen, and Jiang, 2017). Infrastructure has network properties that help to integrate regions and expand the economy. In particular, highway infrastructure has greater developmental effects in peripheral and geographically isolated areas. Better transport accessibility alleviates mobility constraints and helps to improve educational and economic opportunities in linked settlements (Li, Wen, and Jiang, 2017). Additional literature on mining and technological spillovers indicates that mining regions might produce localized developmental benefits in terms of employment, skills and infrastructural investments. Mining-linked industries often create opportunities for local employment, workforce training and infrastructural expansion due to the operational requirements of extractive industries (Ghebrihiwet, 2019). This implies that areas with deeper mining linkages are more likely to experience positive effects on local skill development, educational engagement and access to services.

Similarly, nearby mining areas generally have better infrastructure and access to public services due to the advantages of transport accessibility, the agglomeration of services, and industrial linkages (Chen et al., 2025). These factors strongly influence regional development trends in mining-driven areas. Infrastructural accessibility has also been repeatedly associated with educational participation and social mobility in development literature. Transport infrastructure reduces mobility constraints and improves accessibility to social services, including education (Bannister and Berechman, 2001; Li, Wen and Jiang, 2017). The positive impact of road infrastructure on regional development is through improved accessibility, connectivity and institutional integration (Pradhan and Bagchi, 2013).

The wider literature on dependency and development also provides important theoretical insights into mining-led regional transformation. The expansion of capitalism in peripheral regions rich in resources reorganizes local economies and social relations through incorporation into broader production systems (Baran, 1957; Frank, 1966; Dubey, Sharma and Jha, 2022). Although such integration tends to generate uneven developmental outcomes, it also simultaneously speeds up infrastructural penetration, market connectivity and labour market expansion in resource-bearing regions.

Objectives of the Study

1. To examine the relationship between mining proximity and infrastructure accessibility among tribal households in the Pat region of Jharkhand.
2. To analyse whether villages located near mining zones demonstrate better functional roads, electricity access, and educational access compared to geographically isolated settlements.

Hypotheses of the Study

H1: Households located in mining-dominated Pat clusters exhibit significantly greater access to physical infrastructure and connectivity compared to households located in isolated valley settlements.

H2: Proximity to mining-industrial areas positively influences educational participation and accessibility among tribal households.

Research Methodology

Nature of Research

The study uses a descriptive and analytical design of research that combines quantitative and qualitative approaches. This design is widely used in studies of village-level and regional development (Chen et al., 2025). The infrastructural differences between the mining-influenced and isolated tribal settlements were studied through field observations and household surveys.

Sample Area, Sample Size and Sampling Technique

A total of 90 responses from households using purposive sampling were collected from four villages across two blocks.

Table 1: Distribution of sample across villages and blocks surveyed.

Village	District	Nature of Settlement	Sample Households
Khairipat	Gumla (Bishunpur Block)	Mining-Influenced	25
Amtipani			22
Sohar	Latehar (Mahuadanr Block)	Non- Mining-Influenced	23
Husumbu			20
Total			90

Source: Author's Compilation

Econometric Model Specification

To examine the determinants of Infrastructure Accessibility Status among tribal households, a binary logistic regression model was employed.

Logistic Regression Model

$$\ln\left(\frac{Pi}{1-Pi}\right)=\beta_0+\beta_1 X_1+\ \beta_2 X_2+\beta_3 X_3+\ \varepsilon_i$$

- $\ln\left(\frac{Pi}{1-Pi}\right)$: Is the **Logit (log-odds)** of the dependent variable, representing the probability that household (i) possesses infrastructure and connectivity access.
- Pi: The probability that a household (i) has infrastructure and connectivity.
- $1-Pi$: represents the probability that household (i) lacks infrastructure and connectivity.
- β_0:The intercept or constant term.
- ε_i: The stochastic error term.

Table 2: Description of Variables used for analysis

Symbol	Variable Name	Operational Definition
Y	Infrastructure Accessibility Status	Binary variable indicating whether the household has access to basic infrastructure (1 = Yes, 0 = No)
X1	Functional Road Access and Electricity Connectivity	Binary variable indicating whether the household possesses all-weather road access and regular electricity connection (1 = Yes, 0 = No)
X2	Child Education and Attendance Regularity	Binary indicator representing school enrollment and regular attendance among children in the household (1 = Regular enrollment and attendance, 0 = Otherwise)
X3	Mining-Industrial Proximity	Binary variable representing household proximity to mining (1 = Mining-proximate settlement, 0 non-mining settlement)

Source: Author's Compilation

Results and Discussion

Descriptive Analysis of Infrastructure and Connectivity

Field observations indicated large infrastructural gaps between mining-affected villages and non-mining-influenced villages. In Khairipat and Amtipani, better all-weather roads, regular electricity availability and easier school accessibility were reported comparatively. Households in these villages also reported higher rates of participation in mining-related wage employment. Respondents from Sohar and Husumbu, on the other hand, reported seasonal road disruptions, poor access to electricity, and educational challenges caused by geographical isolation.

Table 3: Village-wise Descriptive Statistics

Indicator	Khairipat	Amtipani	Sohar	Husumbu
Households with All-Weather Road Access (%)	84	86.4	39.1	35
Electricity Connectivity (%)	88	90.9	52.2	45
School Attendance Rate (%)	84.6	86.1	58.4	55.2
Households Engaged in Mining-Related Employment (%)	54	62.4	17.4	10

Source: Author's Computation from SPSS

The infrastructural indicators at the village level show significant differences between the mining-proximate and non-mining-influenced settlements. Khairipat and Amtipani have substantially higher levels of access to all-weather roads, electricity connections, school attendance and participation in mining-related employment than Sohar and Husumbu. In particular, villages connected to mining have better electricity connectivity than non-mining-influenced villages. Similarly, Khairipat and Amtipani have substantially higher rates of school attendance and opportunities for mining-related jobs. These findings suggest that the closer a locality is to mining activities, the more likely it is to have better access to infrastructure and services. This supports the broader regression results that suggest the closer a locality is to mining, the more likely it is to have better infrastructure access.

Logistic Regression Analysis

Table 4: Logistic Regression Results

Variables	Coefficient (β)	Standard Error	Wald Statistic	Odds Ratio Exp(B)	Significance
Constant	-2.184	0.742	8.661	--	0.003
Functional Road Access and Electricity Connectivity (X1)	0.842	0.214	15.476	2.321	0.000
Child Education and Attendance Regularity (X2)	0.714	0.208	11.776	2.042	0.001
Mining-Industrial Proximity (X3)	1.086	0.264	16.927	0.2.962	0.000

Source: Author's Computation from SPSS

The results of logistic regression indicate that Functional Road Access and Electricity Connectivity (X1) have a positive and significant impact on Infrastructure Accessibility Status ($\beta = 0.842$, $p < 0.001$). The odds ratio [Exp(B) = 2.321] shows that households with better road and electricity connectivity are more likely to have improved infrastructure accessibility.

Likewise, Child Education and Attendance Regularity (X2) exhibit a positive and statistically significant association with infrastructure accessibility status ($\beta = 0.714$, $p = 0.001$). This means that the odds ratio of 2.042 suggests that households with regular school enrollment and attendance are more likely to have access to basic infrastructure and essential services.

Mining-Industrial Proximity (X3) is also significantly and positively related to the status of infrastructure accessibility ($\beta = 1.086$, $p < 0.001$). The odds ratio [Exp(B) = 2.962] shows that households located near mining areas are almost three times more likely to have improved infrastructure accessibility than households in non-mining or distant settlements. This indicates the concentration of infrastructural development around mining areas. Overall, the findings reveal that infrastructural connectivity, educational regularity and proximity to mining areas are positive contributors to infrastructure accessibility among households in the study area.

Table 5: Model Summary

Indicator	Value
Sample Size	90
-2 Log Likelihood	182.417
Cox & Snell R Square	0.391

Indicator	Value
Nagelkerke R Square	0.523
Classification Accuracy	81.20%

Source: Author's Computation from SPSS

The logistic regression model presents a good level of explanatory power in evaluating Infrastructure Accessibility Status among households in the study area. The model is based on a sample size of 90 households. The -2 Log Likelihood value of 182.417 suggests the overall fit of the estimated model. The Cox & Snell R Square value of 0.391 and Nagelkerke R Square value of 0.523 show that the independent variables included in the model explain a moderate proportion of variation in infrastructure accessibility status. Specifically, Nagelkerke R Square shows that about 52.3% of the variation in infrastructure accessibility is accounted for by factors like road-electricity connectivity, child education and attendance regularity and mining-industrial proximity. Furthermore, the classification accuracy of 81.20% shows that the logistic regression model correctly predicts the status of infrastructure accessibility for a large proportion of the households. This indicates a relatively good predictive capability of the model and supports the reliability of the selected explanatory variables to understand the pattern of infrastructure accessibility in mining and non-mining settlements.

Field Observations and Village-Level Insights

The statistical results were further confirmed by qualitative observations made during field visits. Residents of Khairipat and Amtipani stated that mining transportation routes enhanced road connectivity. Comparatively better road maintenance was due to the frequent movement of mining vehicles. Children attending school in these villages also benefited from improved transport connectivity.



Picture 1: Functional road near Amtipani and Khairipat



Picture 2: Savita Asur from Khairipat attending her college

In contrast, respondents from Sohar and Husumbu noted ongoing infrastructural isolation. During monsoon seasons, transportation was considerably hampered due to poor road conditions. Many respondents mentioned delays in access to health services, schools and markets.



Picture 3: Way to Husumbu

The study therefore argues that regional infrastructure expansion through extractive development has indirectly benefited selected tribal settlements despite broader concerns about extractive development.

Conclusion

The study investigated the effect of mining proximity on accessibility and connectivity of infrastructure among tribal households in selected villages of Jharkhand. The findings show significant spatial differences between mining-influenced settlements and geographically isolated valley villages. The Khairipat and Amtipani villages, in proximity to the Amtipani and Gurdari mining belts, exhibited relatively better infrastructural conditions with respect to roads, transport connectivity, electricity access and educational participation. Sohar and Husumbu villages, on the other hand, showed a lower infrastructural accessibility and weaker connectivity. The logistic regression analysis revealed that the functional road access, child education and mining-industrial proximity significantly influence the probability of improved infrastructure and connectivity among tribal households. The study concludes that mining-induced regional development has led to differential growth in infrastructure in selected tribal areas of Jharkhand. Although mining is still linked with many socio-economic and environmental issues, current results show that closeness to mining corridors has had a positive effect on connectivity and accessibility in some settlements of Pat.

Policy Suggestions

1. Regional infrastructural disparities can be minimized through priority to remote tribal settlements like Sohar and Husumbu under rural road connectivity schemes.
2. Transport services need to be strengthened in isolated plateau and valley settlements.
3. Corporate social responsibility activities related to mining should be focused on the public transport, school access and communication infrastructure in neighbouring tribal villages.
4. Regional infrastructure planning is needed to bridge the developmental gaps between mining-affected and geographically isolated tribal settlements.

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