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Human Resource Development
Institute of Telangana
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Smt. Santhi Kumari, IAS(Retd.)
Vice Chairperson & Director General
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From the VC & Director General's Desk

It gives me great pleasure to present this special issue of *Samriddhi*, brought out to commemorate the National Seminar on "Economic Growth, Sustainable Development and Public Policy," scheduled for 30 and 31 October 2026 at Dr. MCR HRD Institute of Telangana. Published during the Institute's Golden Jubilee year, this issue reflects our commitment to evidence-based research and informed policy dialogue.

This issue brings together research and perspectives across eleven themes: economic growth and global competitiveness; sustainable development and environmental governance; public policy and governance; innovation, technology and digital transformation; social development and human capital; public finance and institutional development; inclusive growth and social sector governance; rural and urban governance and infrastructure; Mission Karmayogi and capacity building; leadership and change management in government; and ethical governance in public administration. The contributions address contemporary policy challenges and emerging opportunities, with insights relevant to Telangana and the wider national context.

I congratulate all the authors for their valuable contributions and appreciate the editorial team for its dedicated efforts in bringing out this special issue of *Samriddhi*. I hope the articles will enrich policy discussions and strengthen the connection between knowledge and practice in advancing inclusive and accountable governance.

Smt. Santhi Kumari, IAS(Retd.)

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MSME and Entrepreneurship Development in the context of Globalization and Emerging Economies.

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Micro, Small and Medium Enterprises (MSME s) and entrepreneurship have emerged as important drivers of economic transformation, employment generation, innovation, and inclusive development, particularly in emerging economies. In the context of globalization, MSME s are increasingly exposed to new markets, advanced technologies, international competition, changing consumer preferences, and global value chains. These developments create significant growth opportunities while simultaneously presenting challenges related to limited finance, technological capability, managerial competence, infrastructure, market access, and regulatory compliance. This paper examines the role of MSMEs and entrepreneurship development in strengthening the competitiveness and resilience of emerging economies under rapidly changing global conditions. It highlights how entrepreneurial orientation, innovation, digitization, skill development, institutional support, and access to finance can enhance the capacity of MSME s to participate effectively in domestic and international markets. The study also discusses the importance of supportive government policies, entrepreneurship ecosystems, financial institutions, incubation facilities, and public–private collaboration in encouraging sustainable enterprise development. Particular attention is given to the ability of MSME s to generate employment, promote regional development, support local innovation, and contribute to economic diversification. The paper argues that emerging economies can gain greater benefits from globalization when MSME development is integrated with entrepreneurship promotion, technological adoption, sustainable business practices, and improved market connectivity. Strengthening these dimensions can help create competitive, innovative, resilient, and inclusive entrepreneurial ecosystems capable of contributing to long-term economic and social development.

Keywords: MSMEs, Entrepreneurship Development, Globalisation, Emerging Economies, Innovation, Digitalisation, Economic Development, Competitiveness, Employment Generation, Sustainable Entrepreneurship.

1 Introduction

Globalisation changes the opportunities available to small enterprises and the conditions under which they compete. International customers, imported technologies and cross-border production networks can extend the economic possibilities of a local business. The same connections can expose that business to unfamiliar standards, concentrated buying power and disruptions originating far beyond its domestic market. Understanding MSME development therefore requires attention to the terms of international engagement and to the capabilities that allow enterprises to respond.

The economic significance of small firms is well established, although widely cited estimates use different definitions and populations. The World Bank describes small and medium enterprises as accounting for approximately 90 per cent of businesses and more than half of global employment (World Bank, n.d.). These figures concern SMEs as defined in that source and should not be treated as a harmonised estimate for every national MSME category. The International Labour Organization's analysis of surveys from 99 countries also demonstrates the importance of self-employment and small economic units while identifying persistent problems of informality and employment quality (ILO, 2019). Enterprise prevalence alone consequently provides an incomplete measure of development.

This paper asks: under what conditions does global economic integration support productive, inclusive and resilient entrepreneurship among MSMEs in emerging economies? The question links business strategy to development policy. An enterprise may increase turnover without improving its operating surplus; an export cluster may expand without raising workers' real earnings; and digital participation may increase customer access while reducing commercial autonomy. Each outcome requires a different explanation and a different policy response.

The paper advances three objectives. It first clarifies the channels connecting globalisation with enterprise development. It then constructs a framework explaining the roles of capabilities, institutions and commercial governance. Finally, it derives propositions and policy recommendations that can guide empirical research and programme design. The contribution is integrative: it connects bodies of scholarship that illuminate different stages between receiving a market opportunity and achieving a durable developmental gain.

2 Scope and review approach

This is a conceptual review based on purposively selected academic and institutional sources. It does not report fieldwork, estimate causal effects or conduct a statistical meta-analysis. The academic selection covers foundational contributions on firm resources, learning, entrepreneurial opportunities, institutions and value chain governance, together with research on digital entrepreneurship and small-firm business practices. Institutional material covers employment, trade, finance, enterprise networks and environmental aspects of digitalisation.

Sources were located through targeted web searches using combinations of MSME or SME, entrepreneurship, global value chains, business practices, finance and digitalisation. Publication details and substantive claims were checked against publisher pages, author or university records, and official institutional publications. Selection emphasised direct relevance to the mechanisms examined and identifiable authorship. The reference set draws principally on works published between 1990 and 2024, supplemented by an undated World Bank overview. This is a selective synthesis, rather than an exhaustive account of scholarship available in 2026. Where full texts were unavailable, interpretation was confined to accessible abstracts or official summaries.

The analysis groups the selected contributions around market entry, organisational learning, resource constraints, governance and developmental outcomes. This thematic organisation supports conceptual inference but cannot establish the frequency or magnitude of particular effects. The review does not claim a preregistered search protocol, comprehensive database coverage or formal quality scoring. Its propositions identify relationships for subsequent testing.

MSMEs are treated as heterogeneous enterprises that fall within national definitions based on employment, turnover, investment or combinations of these criteria. No common numerical threshold is imposed across countries. Emerging economies are discussed as a broad analytical context characterised by economic transformation and uneven enterprise conditions, rather than as a single, homogeneous country group. Informal businesses, established small manufacturers and internationally oriented medium enterprises should therefore be distinguished in applying the argument.

3 Conceptual foundations and literature review

Entrepreneurship and enterprise development

Shane and Venkataraman (2000) place the relationship between opportunities and the individuals who discover, evaluate and exploit them at the centre of entrepreneurship research. This perspective helps separate entrepreneurship from the administrative act of business registration. For the present analysis, entrepreneurship development includes improvements in opportunity assessment, resource mobilisation and the organisation of commercially viable activity. It may occur within an existing firm as well as through the establishment of a new venture.

Development is defined here more broadly than numerical enterprise growth. It includes productive capability, the ability to withstand disruption and the capacity to generate satisfactory livelihoods. These dimensions can move in different directions. A household enterprise may choose stable local income over expansion, while a specialist supplier may pursue rapid growth through international contracts. Both require analysis on terms appropriate to their objectives, resources and exposure to risk.

Firm resources and organisational adaptation

Barney (1991) explains sustained competitive advantage through the characteristics of firm resources, including their value, rarity and difficulty of imitation or substitution. Applied to MSMEs, this perspective directs attention to specialised knowledge, trusted relationships and organisational routines, rather than enterprise size alone. It also raises a distributional question: an enterprise can possess a valuable capability yet receive a limited return if its customers control market access.

Teece, Pisano and Shuen (1997) extend the analysis towards the processes through which firms integrate and reconfigure competencies in changing environments. Their framework provides a basis for examining adaptation when customer requirements, technologies or supply arrangements change. In this paper, dynamic capability means the capacity to revise how resources are organised; it is distinct from the routine ability to produce an existing product reliably. This distinction matters because international engagement may require both consistent execution and changes to established methods.

Learning and business practices

Cohen and Levinthal (1990) identify absorptive capacity as the ability to recognise the value of external information, assimilate it and apply it commercially. Access to international knowledge is therefore insufficient if an enterprise lacks the prior knowledge and internal processes required to use it. For a small supplier, learning may depend on technical staff, production records and the opportunity to discuss defects with customers.

McKenzie and Woodruff (2017) provide empirical evidence linking business practices to small-firm performance in developing countries. Their analysis associates stronger practices with outcomes including sales, profits and productivity; panel evidence also links better practices with subsequent survival and sales growth. These relationships support attention to managerial capability, but they should not be converted into a universal causal estimate of the benefits of training. The policy implication developed here is to assess whether assistance changes actual business routines, rather than recording attendance alone.

Institutions and commercial governance

North (1990) explains how institutions structure incentives and shape economic performance. This approach brings contract reliability, administrative predictability and informal norms into the analysis of enterprise decisions. A firm's willingness to invest depends partly on whether it can reasonably expect to receive payment and retain the returns from investment. Institutional quality therefore influences which opportunities appear commercially credible.

Gereffi, Humphrey and Sturgeon (2005) explain global value chain governance through transaction complexity, the codifiability of information and supplier capabilities. Their distinction among market, modular, relational, captive and hierarchical arrangements helps explain differences in coordination and power. For the present framework, participation in an international chain and autonomy within that chain are separate variables. The opportunity to supply a buyer does not, by itself, establish that the supplier can negotiate favourable conditions or move into more valuable activities.

Trade networks and digital entrepreneurship

The World Trade Organization (2016) identifies disproportionate trade barriers facing SMEs and considers how more coherent policy can improve participation. The World Bank (2020) similarly presents global value chains as a potential route to development, conditional on complementary reforms and predictable international cooperation. These accounts support a

conditional understanding of internationalisation: the availability of trade opportunities must be considered together with firms' ability to use them.

OECD (2023) emphasises the networks through which SMEs obtain knowledge, skills and access to production relationships. Its evidence is useful for identifying mechanisms, although conclusions drawn from OECD settings require scrutiny before transfer to lower-capacity institutional contexts. Nambisan (2017) adds that digital technologies alter entrepreneurial processes and the location of entrepreneurial agency. Together, these perspectives suggest that enterprise outcomes depend partly on resources and decisions outside the legal boundaries of the individual firm.

The analytical problem addressed

The reviewed approaches explain different elements of enterprise development. Resource and learning theories concentrate on what firms can do; institutional analysis examines the conditions surrounding their decisions; and value chain governance clarifies the relationships through which activity is coordinated. The analytical problem addressed here is how these elements jointly determine whether market participation produces benefits that enterprises and workers can retain. This is a focused conceptual contribution, not a claim that earlier scholarship has ignored their interaction.

4 Globalisation and the development of MSMEs

Market access and the economics of participation

An MSME can engage internationally through direct exports, subcontracting, services supplied remotely, imported inputs or domestic sales to internationally connected firms. These routes involve different demands. A direct exporter may need to manage documentation and overseas customer acquisition, whereas a subcontractor may rely on an intermediary for those functions. Evaluation should therefore identify the route of engagement before interpreting its effects.

The WTO's account of SME trade barriers provides the basis for examining fixed entry costs such as obtaining market information and meeting standards (WTO, 2016). The present paper reasons that commercial readiness should be assessed at the level of the proposed transaction. A larger order can become unviable when certification expenditure, rejected shipments, delivery charges and payment delays are included. Revenue growth is consequently an inadequate stand-alone indicator of successful internationalisation.

Consider an illustrative small food processor receiving its first overseas enquiry. The enquiry establishes potential demand, but profitability also depends on packaging, testing, spoilage allowances and the time between production and payment. It demonstrates why export assistance should connect customer access with costing and production planning.

Learning and productive upgrading

The World Bank (2020) argues that value chain participation can support productivity and development when appropriate conditions are present. Building on this conditional account, the paper distinguishes exposure to new requirements from the internal learning needed to meet them. A demanding customer may provide useful feedback, but the supplier must diagnose problems, allocate staff time and finance corrective changes.

The proposed mechanism is cumulative. Firms that record failures can identify recurring causes; firms that train workers can implement corrections; and firms that retain knowledge can apply those improvements to subsequent orders. Where these steps are absent, repeated international transactions may increase workload without deepening capability. Future research should therefore measure changes in routines and technical competence alongside export participation.

Digital participation and commercial dependence

Digital entrepreneurship research challenges the assumption that entrepreneurial activity occurs entirely within a clearly bounded organisation (Nambisan, 2017). Applying this insight to MSMEs, the paper argues that a platform-mediated business should be analysed together with the rules of the platform on which it depends. The proposed analytical questions concern who controls visibility, access to customers and commercially useful transaction data.

Digital participation should consequently be distinguished from effective digital capability. Opening an online account is an observable act, but it does not demonstrate accurate inventory management, profitable customer acquisition or reliable fulfilment. A useful evaluation would examine net contribution per order, repeat purchases, failed deliveries and the proportion of revenue dependent on one channel. These are proposed assessment measures, rather than findings from the reviewed studies.

Environmental effects also require attention. UNCTAD (2024) examines the material and environmental consequences of digitalisation, including resource use and electronic waste. Digital business activity should therefore not automatically be classified as environmentally

benign. For MSMEs, the relevant assessment would consider equipment replacement, packaging and delivery arrangements as well as any reductions in travel or material use.

Finance and the timing of growth

The IFC's 2017 assessment estimated a US$5.2 trillion financing gap for formal MSMEs in developing economies (IFC, 2017). This is a historical estimate with a specified population, not a current figure for all formal and informal enterprises. Its relevance here is to establish the scale of financing constraints documented in that assessment, rather than to estimate conditions in any particular country today.

The conceptual implication is that financing needs should be matched to the timing and purpose of investment. Machinery, market testing and working capital involve different repayment horizons. International orders may require expenditure before revenues arrive, while process improvements may generate returns gradually. A programme that increases loan availability without examining cash flow could expand financial exposure without resolving the underlying business constraint. Conversely, viable enterprises may be unable to accept profitable orders when funds cannot be obtained at the required stage.

Distribution and employment quality

The ILO's treatment of small economic units highlights the importance of informal employment, gender disparities and job quality (ILO, 2019). This establishes a reason to examine who receives the benefits of enterprise growth. The present framework therefore separates owner income, retained business surplus and worker outcomes. Their relationship is an empirical question rather than an assumed consequence of higher sales.

For policy evaluation, inclusion should mean more than counting participants from under-represented groups. Relevant questions concern control over business decisions, access to remunerative customers and changes in income security. A programme may increase the number of women selling products while leaving purchasing decisions and profits under someone else's control. Evaluation should be designed to detect such differences without presuming that they occur in every setting.

5 An integrated conceptual framework

The framework proposed in this paper distinguishes three stages: access to commercially relevant opportunities, conversion of those opportunities into productive capability, and retention of the resulting benefits. Global engagement supplies potential customers,

information and competitive pressures. Enterprise routines determine how the firm responds. Financial conditions, institutions and the governance of commercial relationships influence which responses are feasible and how benefits are distributed.

The stages are analytically distinct but may interact over time. Retained profits can finance learning, and improved capabilities can strengthen bargaining positions. Conversely, dependence on a single buyer may limit funds available for adaptation. These feedback relationships imply that a one-time survey cannot fully explain the process. The framework is intended as a guide to research design and policy diagnosis, not as an empirically established causal model.

Proposition one on learning

P1. International engagement is more likely to support subsequent enterprise upgrading when firms develop routines that translate external information into operational changes.

This proposition applies the learning mechanism discussed by Cohen and Levinthal (1990) to the paper's specific setting. It predicts a mediating role for organisational learning between engagement and upgrading. Researchers should distinguish pre-existing capability from learning acquired after engagement, because more capable firms may already be more likely to enter international markets.

Proposition two on finance and institutions

P2. The relationship between learning-based capability improvements and enterprise growth is stronger when firms can obtain appropriate finance and rely on predictable commercial institutions.

This is a proposed complementarity, rather than an estimate derived from existing data. A technically feasible improvement may not be implemented without funds; investment may also be deferred if payment is uncertain. Testing should examine whether finance and institutional conditions modify the relationship between capability development and outcomes, while allowing for sector and firm-size differences.

Proposition three on digital dependence

P3. Digital market participation is more likely to improve retained enterprise income when firms possess operational digital skills and maintain access to more than one viable sales channel.

The proposition separates the number of online transactions from the financial benefits retained by the enterprise. It would be weakened if concentration consistently produced higher net returns without increasing vulnerability, or if the cost of maintaining multiple channels exceeded their benefits. Channel diversity should therefore be assessed economically, rather than assumed to be desirable at any cost.

Proposition four on collective services

P4. Shared access to commercially relevant testing, logistics and technical services reduces the disadvantage associated with small scale, provided that service quality and access arrangements are reliable.

The proposed mechanism is the distribution of indivisible costs across multiple users. A shared facility can also fail through low utilisation, inconvenient location or weak maintenance. Empirical assessment should compare actual use and changes in delivered costs, rather than treating the establishment of a facility as evidence of enterprise improvement.

Proposition five on developmental outcomes

P5. Enterprise sales growth is more likely to produce inclusive developmental outcomes when commercial arrangements permit investment in productive capacity and employment conditions.

This proposition directs attention to retained margins, worker remuneration and decision-making authority. It allows for the possibility that sales growth and inclusion diverge. Testing would require information from workers as well as owners and should distinguish paid employment from unpaid household labour. No proposition in this section has been tested within the present paper.

6 Policy and managerial implications

The following recommendations are deductions from the conceptual synthesis. Their effectiveness will depend on local diagnosis and evaluation; they are not presented as uniformly successful interventions.

Match assistance to enterprise conditions

Public support should distinguish livelihood-oriented micro enterprises, firms consolidating domestic markets and enterprises preparing for international expansion. A livelihood business may benefit most from reliable local trading conditions and basic bookkeeping. An export-oriented manufacturer may require technical certification or supplier qualification. Using one

programme for both can impose costs without addressing either enterprise's principal constraint.

Eligibility and progression should be based on the problem being addressed. Where assistance involves substantial public expenditure, programme managers should document the expected change in enterprise behaviour and the reason commercial providers cannot adequately supply the service. This would make it easier to identify when support should be revised, withdrawn or extended.

Connect finance with operational diagnosis

Financial assistance should begin with analysis of the enterprise's cash cycle and the intended use of funds. Advisory support can help separate weak margins, delayed payment and investment needs, which require different responses. Any public risk-sharing arrangement should specify which financing constraint it addresses and how additional economic activity will be assessed.

Evaluation should consider repayment performance alongside enterprise survival, productive investment and retained income. A larger lending portfolio is not sufficient evidence of better development outcomes. Equally, a programme serving financially excluded enterprises should not be judged only by criteria that favour already established borrowers. The evaluation design must reflect the programme s stated purpose.

Build learning into commercial relationships

Enterprise support organizations should link training to identifiable operational problems. For example, a technical mentor could help a firm reduce rejection rates and then assess whether improvements persist after the assistance ends. Management education institutions can contribute supervised diagnostic projects, provided businesses receive useful outputs and commercially sensitive information is protected.

Lead firms and purchasing organizations should be encouraged to provide clear specifications, timely feedback and realistic implementation periods. Where suppliers are expected to make dedicated investments, both parties should clarify responsibility for changes and cancellation. These recommendations follow from the paper's attention to the conditions under which learning can be financed and sustained.

Provide shared services with accountable management

Common testing facilities, technical extension and consolidated logistics are potential responses to scale disadvantages. Their design should begin with verified demand, expected utilization and maintenance arrangements. A facility that is affordable to access but unable to provide dependable results may add delay rather than reduce costs.

Universities, industry associations and specialist providers can contribute expertise, but participation should be tied to service standards. Programme evaluation should report waiting times, repeat use, delivered costs and improvements in the problems the service was intended to address. Such measures would allow public authorities to distinguish a useful common resource from an underused asset.

Integrate inclusion and environmental performance

Support for under-represented entrepreneurs should examine practical barriers such as time availability, access to information and control over financial resources. Programme design should be informed by the intended participants rather than relying only on intermediaries. Outcomes should include retained earnings and effective business control, with results dis aggregated where appropriate and collected with informed consent.

Environmental support should similarly focus on measurable operational changes. Enterprises could receive help assessing energy use, avoidable waste and the commercial case for cleaner processes. Targets should account for differences among sectors and enterprise capacities. Expensive reporting obligations without technical assistance may divert resources from the improvements they are intended to encourage.

7 Relevance to India and Telangana

The framework offers a way to formulate research and programme questions for India and Telangana without assuming uniform conditions across enterprises. This section proposes an application; it does not present state-level findings. A district or cluster study could begin by distinguishing enterprise size, formality, ownership, sector and type of market engagement. It should also establish whether the main constraint concerns demand, production, finance or the reliability of commercial relationships.

For example, a proposed study could compare locally oriented micro enterprises with small suppliers serving larger national or international buyers. Owners could be interviewed about payment cycles, customer concentration and changes in business routines. Worker

interviews and selected records could provide additional evidence on earnings, working conditions and operational performance. Any sampling frame would need to account for enterprises absent from formal registration lists.

Management departments and local enterprise organizations could pilot diagnostic assistance in a defined cluster, with clear entry criteria and baseline measures. The objective would be to establish whether assistance changes specific practices and outcomes. No claim about the effectiveness of a Telangana programme is made here; the application requires original data and an appropriate comparison design.

8 Limitations and future research

The paper's principal limitation is its selective evidence base. It integrates influential theories and institutional analyses but does not establish the overall balance of findings across all relevant studies. Accessible summaries sometimes restrict the detail available for assessing research methods. Publication and selection bias may favour formal, visible or internationally connected enterprises over informal businesses that remain outside major datasets.

The breadth of the emerging-economy category also limits direct generalization. Institutional conditions, sector characteristics and household arrangements differ substantially. A framework that explains export manufacturing may require adaptation for local services or home-based production. Empirical work should identify these boundaries before combining enterprise groups.

Longitudinal research could distinguish selection into international engagement from changes occurring afterwards. A panel should measure initial capabilities, commercial relationships and subsequent outcomes, while tracking closures to reduce survivor ship bias. Where feasible, phased programme introduction or credible comparison groups could strengthen causal assessment. A single cross-sectional structural equation model could examine associations, but would not establish the causal ordering proposed here.

Future studies should combine financial and non-financial measures. Sales per worker, retained operating surplus, customer concentration, payment delays and survival would illuminate enterprise outcomes. Real earnings, job stability and access to protection would address worker outcomes. Qualitative interviews could explain why similar enterprises respond differently to comparable opportunities. These measures should be adapted to accounting capacity and sector characteristics rather than imposed mechanically.

9 Conclusion

Globalisation creates potential routes through which MSMEs can access customers, knowledge and productive relationships. Whether those routes support entrepreneurship development depends on the ability to convert opportunities into capability and to retain a sufficient share of the resulting benefits. The paper's framework explains this process through the interaction of organisational learning, financial conditions, institutions and commercial governance.

The practical implication is that enterprise development policy should assess more than entry, registration or export participation. It should examine whether businesses improve their operations, sustain viable margins and contribute to better livelihoods. The five propositions provide a basis for testing these relationships, including situations in which market participation expands without corresponding developmental gains. Further empirical research is required to establish their magnitude, causal ordering and relevance across different emerging-economy settings.

References

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120. https://doi.org/10.1177/014920639101700108

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35(1), 128–152. https://doi.org/10.2307/2393553

Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. Review of International Political Economy, 12(1), 78–104. https://doi.org/10.1080/09692290500049805

International Finance Corporation. (2017). MSME finance gap: Assessment of the shortfalls and opportunities in financing micro, small, and medium enterprises in emerging markets. https://documents1.worldbank.org/curated/en/653831510568517947/pdf/121264-WP-PUBLIC-MSMEReportFINAL.pdf

International Labour Organization. (2019). Small matters: Global evidence on the contribution to employment by the self-employed, micro-enterprises and SMEs. https://www.ilo.org/publications/small-matters-global-evidence-contribution-employment-self-employed-micro

McKenzie, D., & Woodruff, C. (2017). Business practices in small firms in developing countries. Management Science, 63(9), 2967–2981. https://doi.org/10.1287/mnsc.2016.2492

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. Entrepreneurship Theory and Practice, 41(6), 1029–1055. https://doi.org/10.1111/etap.12254

North, D. C. (1990). Institutions, institutional change and economic performance. Cambridge University Press. https://doi.org/10.1017/CBO9780511808678

Organisation for Economic Co-operation and Development. (2023). OECD SME and entrepreneurship outlook 2023. OECD Publishing. https://doi.org/10.1787/342b8564-en

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. Academy of Management Review, 25(1), 217–226. https://doi.org/10.5465/amr.2000.2791611

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

United Nations Conference on Trade and Development. (2024). Digital economy report 2024: Shaping an environmentally sustainable and inclusive digital future. United Nations. https://unctad.org/publication/digital-economy-report-2024

World Bank. (2020). World development report 2020: Trading for development in the age of global value chains. https://www.worldbank.org/en/publication/wdr2020

World Bank. (n.d.). SMEs finance. Retrieved October 2, 2026, from https://www.worldbank.org/ext/en/topic/competitiveness/small-and-medium-enterprises-smes-finance

World Trade Organization. (2016). World trade report 2016: Levelling the trading field for SMEs. https://www.wto.org/english/res_e/publications_e/wtr16_e.htm

Micro, Small and Medium Enterprises (MSMEs) Development, Employment Generation and Regional Disparities in Telangana: A District-Level Analysis

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Micro, Small and Medium Enterprises (MSMEs) are important sources of entrepreneurship, employment and local economic activity, but their distribution across regions can be highly uneven. This study examines the spatial concentration of registered MSMEs and MSME-associated employment across the 33 districts of Telangana and assesses their relationship with district economic scale. The analysis uses official district-level data on Udyam registrations, Gross District Domestic Product (GDDP) and employment associated with Udyam registrations. The results show considerable spatial concentration, the Gini coefficient of MSME registrations is about 0.47, the coefficient of variation is 1.18, and the three largest districts account for about 40.1 percent of registered MSMEs. A log-log cross-sectional model reports a strong positive association between GDDP and MSME registrations ($\beta = 0.977$; $p < 0.001$; $R^2 = 0.848$). The corresponding association between GDDP and reported MSME employment is also positive ($\gamma = 1.262$; $p < 0.001$; $R^2 = 0.616$). The findings indicate that MSME activity is closely linked to the geography of economic activity. However, the estimates are descriptive associations rather than causal effects because the analysis is cross-sectional and the underlying administrative series have different reference dates. The study therefore supports district-sensitive MSME policies that combine infrastructure, finance, skills, market access and enterprise scaling with locally appropriate cluster development.

Keywords: MSMEs; employment generation; regional disparities; Telangana; district economy; spatial concentration; Udyam registration; GDDP; inclusive growth; agglomeration.
JEL Classification: L26; L52; J21; R11; R12; R58

1. Introduction

Regional disparities remain an important concern in development policy because aggregate growth can conceal substantial differences in productive opportunities across locations. The

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spatial organisation of economic activity affects employment, investment, productivity, human-capital accumulation and access to markets. Regional economics has long recognised that firms do not choose locations independently of other firms and economic institutions. Market size, transport costs, labour availability, supplier networks and knowledge spillovers can create cumulative advantages for particular locations (Krugman, 1991; Fujita et al., 1999).

The Indian evidence also points to the importance of location. Lall et al. (2004) show that market access, localisation and urbanisation economies can influence industrial productivity, while Mitra (2000) finds evidence of urbanisation economies in Indian industries. Tripathi (2013) further reports that agglomeration and urban economic growth are closely related in Indian cities. These findings are relevant for MSMEs because small firms often depend strongly on local business networks, access to finance, infrastructure, labour markets and customers.

Telangana provides a useful setting for examining these issues. The state combines a large metropolitan economic centre around Hyderabad and adjoining districts with districts that differ substantially in economic structure, market access and industrial development. Official district GDDP estimates for 2022–23 illustrate this variation. Rangareddy recorded GDDP of Rs. 2,83,419 crore, Hyderabad Rs. 2,28,623 crore and Medchal-Malkajgiri Rs. 88,867 crores, whereas Mulugu recorded Rs. 6,914 crores (Government of Telangana, 2024b). Such differences raise an empirical question does MSME activity follow the geography of economic scale, or is it relatively dispersed across districts?

The Telangana Socio-Economic Outlook 2024 reports 9,21,883 Udyam-registered MSMEs as of 12 June 2024. Services accounted for 79.3 percent of these registrations, while manufacturing accounted for 20.7 percent. Micro enterprises represented 96.8 percent of the registered total (Government of Telangana, 2024a). These figures demonstrate the numerical importance of micro enterprises and the increasing relevance of services within the registered MSME sector.

Employment provides a complementary measure. A Government of India parliamentary statement reports district-wise employment associated with Udyam registrations from the beginning of the Udyam portal in July 2020 through 22 March 2023, with a Telangana total of 26,38,699 persons (Government of India, Rajya Sabha, 2023). The employment ranking is not identical to the district ranking based on 2024 MSME registrations. This difference is

analytically useful because the number of enterprises alone does not reveal the scale of employment associated with them.

The policy context has also evolved. The Telangana MSME Policy 2024 places emphasis on employment, entrepreneurship, technology adoption, competitiveness, inclusive growth and enterprise development (Government of Telangana, 2024c). The RAMP programme has additionally emphasised institutional coordination and strengthening of the MSME ecosystem (Government of Telangana, RAMP, 2026). These policy directions make district-level evidence particularly relevant for deciding whether interventions should focus on enterprise creation, scaling, infrastructure, finance, skills or market integration.

Against this background, the present study examines three related issues the spatial distribution of registered MSMEs, the distribution of MSME-associated employment, and the relationship between district economic scale and MSME activity. The paper does not assume that concentration is automatically undesirable. Agglomeration can generate productivity and market-access benefits, but excessive spatial concentration may also leave weaker districts with limited enterprise ecosystems. The policy challenge is therefore to balance productive agglomeration with broader access to entrepreneurial opportunities.

2. Review of Literature and Research Gap

2.1 Agglomeration and regional economic concentration

The theoretical basis for spatial concentration is closely associated with increasing returns and agglomeration economies. Krugman (1991) explains how increasing returns, transport costs and market interactions can generate geographical concentration. Fujita et al. (1999) formalise the interaction between market size, transport costs and the location of economic activity. These approaches suggest that firms may benefit from locating near markets and other firms because proximity reduces transaction costs and facilitates access to specialised inputs and services.

Marshall's concept of industrial districts similarly emphasises specialised labour, supplier networks and knowledge spillovers. In empirical work on India, Lall et al. (2004) distinguish market-access effects, intra-industry localisation economies and inter-industry urbanisation economies. Their results indicate that infrastructure and market access can be particularly important for productivity. Mitra (2000) also finds that urbanisation and industrial spread are related to productivity growth in several Indian industries. Tripathi (2013) shows

that agglomeration is associated with urban economic growth in India. Together, this literature provides a theoretical basis for expecting MSME concentration to be related to district economic scale.

2.2 MSMEs, finance and regional development

MSME performance is also shaped by institutional constraints. Access to formal finance is one of the most persistent concerns for smaller enterprises. Vidyarani and Maheshkumar (2022), using Indian enterprise data, identify significant regional differences in access to formal credit and argue for region-specific programmes. This is important for district-level policy because uniform financial interventions may not address the different constraints faced by metropolitan, intermediate and less-developed districts.

Indian MSME research also highlights constraints relating to technology, infrastructure, market access and enterprise capabilities. These constraints can interact with spatial concentration. A district with a developed business ecosystem may offer firms better access to banks, skilled workers, suppliers and customers, while a district with a weaker ecosystem may face higher costs of establishing and expanding an enterprise. Consequently, regional disparities in MSMEs can reflect both market-based agglomeration and differences in the local institutional environment.

2.3 Research gap

Existing evidence provides substantial information on the contribution and constraints of MSMEs, but state-level totals can conceal important differences among districts. For Telangana, district-level evidence that simultaneously examines enterprise concentration, MSME-associated employment and the relationship with district economic scale remains limited. The present study addresses this gap by combining concentration measures with a parsimonious cross-sectional regression framework. Its contribution is primarily empirical, it establishes a district-level baseline against which future research can examine population, urbanisation, credit, infrastructure, human capital and spatial dependence.

3. Objectives and Research Hypotheses

1. To measure the spatial distribution and concentration of registered MSMEs across the districts of Telangana.
2. To examine the district-level distribution of employment associated with Udyam-registered MSMEs.

3. To estimate the association between district economic size and MSME registration/employment concentration.

The empirical hypotheses are:

H1: Registered MSMEs are spatially concentrated across Telangana's districts.

H2: District economic size is positively associated with registered MSMEs.

H3: District economic size is positively associated with MSME-associated employment.

4. Conceptual and Analytical Framework

The analysis combines agglomeration economics with a simple regional production framework. Let M_i represent registered MSMEs in district i and Y_i represent district economic output. MSME formation may depend on market size, infrastructure, finance, labour availability, institutions, industrial linkages and entrepreneurial capability. District GDDP is used here as a summary indicator of the scale of the local economic system rather than as an exogenous policy variable.

The baseline log-log specification is given by:

$$\boldsymbol{ln(M_i) = \alpha + \beta ln(Y_i) + \varepsilon_i}$$

where M_i denotes the number of registered MSMEs and Y_i denotes district GDDP.

The coefficient β is interpreted as an elasticity-type cross-sectional association. A coefficient close to one implies that MSME registrations vary approximately proportionately with district economic scale. The second model is:

$$\boldsymbol{ln\,(E_i) \;=\; \alpha \;+\; \gamma\, ln\,(Y_i) \;+\; u_i}$$

where E_i is reported employment associated with Udyam registrations. The log specification reduces the influence of very large districts and permits comparison across districts with different economic scales. Since the models contain only one explanatory variable, the coefficients are not interpreted as causal effects.

5. Data and Methodology

5.1 Data sources

The principal MSME dataset is Annexure 43 of the Telangana Socio-Economic Outlook 2024, which reports district-wise Udyam registrations as of 12 June 2024 (Government of Telangana, 2024a). District GDDP is taken from the Directorate of Economics and Statistics and refers to

2022–23 estimates at current prices (Government of Telangana, 2024b). Employment data are taken from a Government of India Rajya Sabha response reporting district-wise employment associated with Udyam registrations through 22 March 2023 (Government of India, Rajya Sabha, 2023).

The reference periods are intentionally kept separate. The paper does not treat the 2024 enterprise count and 2023 employment series as contemporaneous observations. The employment series is therefore used to describe the spatial distribution of reported MSME-associated employment rather than to calculate a current employment-per-enterprise ratio.

5.2 Measures of spatial concentration

Three complementary measures are used. The coefficient of variation measures dispersion relative to the mean. The Gini coefficient summarises inequality in the distribution of registered MSMEs across districts. Concentration ratios identify the share of total registrations accounted for by the three, five and ten largest districts (CR3, CR5 and CR10). These measures provide a simple way to assess whether registrations are broadly distributed or concentrated in a limited number of districts.

5.3 Econometric estimation

Two OLS log-log models are estimated for the 33 districts. Heteroskedasticity-robust HC1 standard errors are used. Spearman rank correlations are also reported because the relationship may be influenced by non-normal distributions and large metropolitan observations. The models are treated as baseline descriptive specifications. Potential omitted variables include population, urbanisation, bank credit, infrastructure, industrial land, human capital, electricity availability, sectoral structure and government support. Their omission limits causal interpretation.

6. Empirical Results

6.1 Structure of registered MSMEs

Telangana recorded 9,21,883 Udyam-registered MSMEs as of 12 June 2024. Of these, 1,90,669 were manufacturing enterprises and 7,31,214 were service enterprises. Micro enterprises accounted for 8,92,147 registrations, followed by 26,708 small and 3,028 medium enterprises (Government of Telangana, 2024a). Thus, the registered sector is dominated numerically by micro enterprises, while services constitute the largest broad activity category.

Category	Number	Share
Total MSMEs	9,21,883	100.0%
Manufacturing	1,90,669	20.7%
Services	7,31,214	79.3%
Micro	8,92,147	96.8%
Small	26,708	2.9%
Medium	3,028	0.3%

Source: *Government of Telangana (2024a), Telangana Socio-Economic Outlook 2024, Annexure 43 (Udyam registrations as of 12 June 2024).*

6.2 Spatial concentration of MSMEs

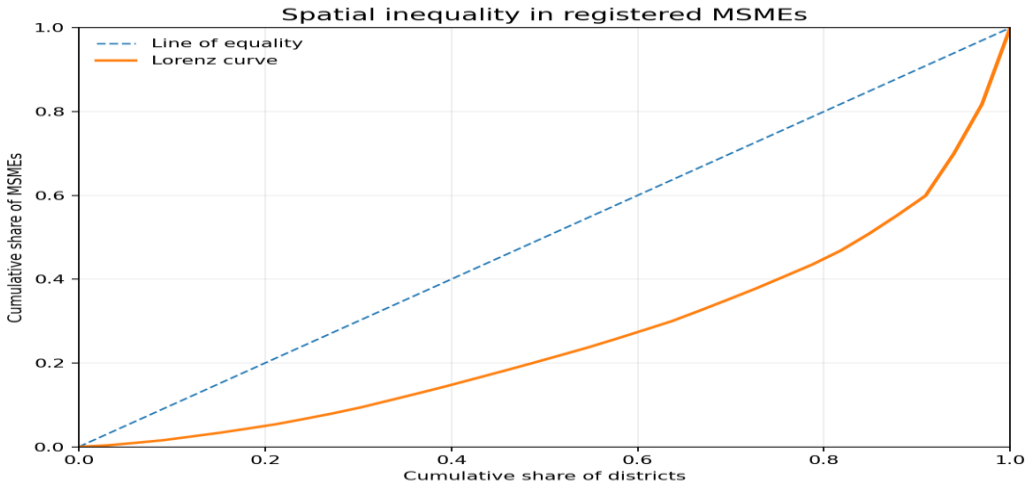
The district distribution shows substantial concentration. Hyderabad recorded 1,68,077 registered MSMEs, followed by Rangareddy with 1,09,164 and Medchal-Malkajgiri with 92,235. Together, the three districts accounted for approximately 40.1 percent of the state total. The five largest districts accounted for about 49.1 percent, while the ten largest accounted for approximately 64.9 percent.

Rank	District	MSMEs
1	Hyderabad	168,077
2	Rangareddy	109,164
3	Medchal-Malkajgiri	92,235
4	Nalgonda	42,988
5	Nizamabad	40,599
6	Karimnagar	36,969
7	Khammam	30,494
8	Hanumakonda	26,514
9	Sangareddy	26,299
10	Suryapet	24,706

Source: *Government of Telangana (2024a), Telangana Socio-Economic Outlook 2024, Annexure 43 (district-wise Udyam registrations as of 12 June 2024).*

The coefficient of variation was approximately 1.18 and the Gini coefficient approximately 0.47. These indicators point to considerable inequality in the geographical distribution of registered MSMEs. The result provides evidence in support of H1. The concentration is also consistent with the agglomeration literature, which suggests that market access, infrastructure, labour pools and business networks can reinforce enterprise location in economically dense areas (Krugman, 1991; Lall et al., 2004).

Figure 1. Lorenz curve for the distribution of registered MSMEs across Telangana's districts.



Source: *Author's calculation from Government of Telangana (2024a), Annexure 43.*

6.3 Spatial distribution of MSME-associated employment

The Government of India employment series reports 26,38,699 persons associated with Udyam registrations through 22 March 2023. The largest reported employment figures were Mahabubnagar (4,56,019), Rangareddy (4,25,737), Hyderabad (3,32,711), Medchal-Malkajgiri (2,36,030) and Suryapet (1,93,027). These five districts together represented approximately 62.3 percent of the reported employment (Government of India, Rajya Sabha, 2023).

The employment ranking differs from the ranking based on the 2024 number of registered enterprises. This is an important distinction. Enterprise count measures the number of registered units, whereas employment reflects the accumulated employment reported through the registration system. Differences may therefore arise from enterprise size, sector composition, registration timing and the cumulative nature of the employment measure. H2 is supported descriptively by the concentration pattern, although the employment series should not be treated as a contemporaneous outcome of the 2024 enterprise distribution.

7. Econometric Results

7.1 MSME registrations and GDDP

The log-log OLS model produces an estimated coefficient of 0.977 on log GDDP. The HC1 robust standard error is 0.097 and the robust p-value is below 0.001. The model R^2 is 0.848. The Spearman rank correlation is 0.886 ($p < 0.001$). The evidence therefore indicates a strong positive cross-sectional association between district economic scale and registered MSMEs.

Variable	Coefficient	Robust SE	p-value
Constant	-0.075	0.975	0.9389
ln(GDDP)	0.977	0.097	<0.001

***Source**: Author's calculations based on district-wise MSME and GDDP data from Government of Telangana (2024a, 2024b).*

Observations = 33; $R^2 = 0.848$; Spearman $\rho = 0.886$ ($p < 0.001$).

7.2 MSME-associated employment and GDDP

The employment model gives a coefficient of 1.262 on log GDDP, with a robust standard error of 0.137 and a robust p-value below 0.001. The R^2 is 0.616, while the Spearman rank correlation is 0.793 ($p < 0.001$). The positive association supports H3. However, the coefficient should be read carefully because employment is measured cumulatively through March 2023, whereas GDDP refers to 2022–23.

Variable	Coefficient	Robust SE	p-value
Constant	-2.323	1.401	0.1073
ln(GDDP)	1.262	0.137	<0.001

***Source**: Author's calculations based on district-wise employment reported through the Udyam Registration Portal in Government of India, Rajya Sabha (2023), and district GDDP data from Government of Telangana (2024b).*

Observations = 33; $R^2 = 0.616$; Spearman $\rho = 0.793$ ($p < 0.001$).

7.3 Interpretation

The two models point to a common spatial pattern districts with larger economic systems tend to contain more registered MSMEs and higher reported MSME-associated employment. The result is compatible with agglomeration mechanisms identified in the regional economics literature, including market access, labour-market pooling and business linkages (Mitra, 2000; Lall et al., 2004). At the same time, the evidence cannot establish that higher GDDP causes MSME growth. The relationship may operate in both directions, while common factors such as population, urbanisation, infrastructure and public investment may influence both variables.

The employment coefficient above one is particularly noteworthy as a descriptive result, but it should not be interpreted as an employment multiplier. The employment series and enterprise series are not measured over identical periods and the model does not include controls for enterprise size or sector. A stronger claim would require a harmonised panel and a richer identification strategy.

8. Discussion

The findings suggest that Telangana's MSME geography is closely connected with its wider economic geography. The concentration of enterprises around Hyderabad, Rangareddy and Medchal-Malkajgiri is consistent with the expectation that firms value access to markets, infrastructure, skilled labour and business services. This pattern does not necessarily imply policy failure. Agglomeration can generate genuine productivity benefits, and attempts to disperse firms without considering local comparative advantage may reduce efficiency (Krugman, 1991; Lall et al., 2004).

The policy issue is therefore one of opportunity and capability rather than simple geographical equalisation. Districts with weak enterprise ecosystems may face cumulative disadvantages: a small market reduces incentives for suppliers and services, limited business networks raise transaction costs, and weak financial access can constrain enterprise formation and scaling. The literature on regional credit access reinforces the importance of location-specific financial conditions (Vidyarani & Maheshkumar, 2022).

The dominance of micro enterprises also has implications for employment policy. A large number of registrations does not automatically translate into large-scale employment or high productivity. Policy evaluation should therefore move beyond registration counts and monitor enterprise survival, graduation from micro to small and medium categories, turnover, productivity, wages, exports, investment and employment. Such measures would provide a clearer picture of whether formalisation is accompanied by sustained economic upgrading.

9. Policy Implications

Adopt district-sensitive MSME strategies. District plans should reflect differences in enterprise density, sector composition, infrastructure, market access and employment potential rather than applying identical interventions everywhere.

Strengthen business ecosystems outside the metropolitan core. Industrial estates, common facility centres, logistics, testing facilities, digital connectivity and reliable utilities can reduce location-specific operating costs.

Support enterprise graduation. Because micro enterprises dominate registrations, policy should track and facilitate movement from micro to small and from small to medium enterprises through technology, quality certification, managerial training and market development.

Improve access to institutional finance. District-level credit facilitation, credit guarantees, receivables finance and financial-literacy support can help address financing constraints, particularly for smaller firms.

Align skills with district industrial demand. Skill development programmes should be linked to local sector profiles so that training improves labour-market matching and enterprise productivity.

Develop locally viable clusters. Districts can build clusters around agro-processing, food processing, textiles, engineering, tourism-linked activities and other sectors consistent with local resources and market opportunities.

Use employment and productivity as core policy indicators. Registration should be treated as an administrative input, while employment, enterprise survival, investment, turnover and productivity should be used to assess economic outcomes.

Improve district-level data integration. Udyam, Udyam Assist, industrial approvals, District Industries Centre records and relevant finance and employment information should be progressively integrated, subject to data-protection safeguards.

10. Limitations

Udyam registration data capture registered/formalised enterprises and do not represent the entire informal enterprise universe.

The MSME and employment datasets have different reference periods; therefore, the paper does not calculate a contemporaneous employment-per-enterprise ratio.

GDDP is treated as a measure of district economic scale, not as an exogenous explanatory treatment.

The regression models contain only one explanatory variable and cannot eliminate omitted-variable bias or reverse causality.

Changes in district boundaries and administrative classifications can complicate comparisons across years.

11. Conclusion

This study provides a district-level assessment of MSME concentration, MSME-associated employment and the relationship between economic scale and enterprise activity in Telangana. The evidence shows substantial spatial concentration. The Gini coefficient of about 0.47,

coefficient of variation of 1.18 and CR3 of 40.1 percent indicate that registered MSMEs are not evenly distributed across the state's 33 districts.

The econometric results reinforce this descriptive finding. District GDDP is strongly and positively associated with registered MSMEs and with reported MSME-associated employment. The results are consistent with the regional economics literature on agglomeration and market access, but they do not establish causality. The principal implication is that MSME policy should recognise the economic logic of agglomeration while addressing avoidable barriers that restrict enterprise development in districts with weaker ecosystems.

A future research stage should develop a district-year panel incorporating population, urbanisation, bank credit, infrastructure, human capital, industrial land, sector composition and scheme utilisation. Spatial methods such as Moran's I and spatial regression could also test whether neighbouring districts influence enterprise outcomes. Such extensions would provide a stronger basis for explaining regional disparities and evaluating the effectiveness of place-based MSME interventions.

References

Fujita, M., Krugman, P., & Venables, A. J. (1999). The spatial economy: Cities, regions and international trade. MIT Press.

Government of India, Ministry of Micro, Small and Medium Enterprises. (2025). Annual report 2024–25. Government of India.

Government of India, Rajya Sabha. (2023, March 27). Unstarred Question No. 2994: Formal and informal employment under MSMEs in Telangana. Government of India.

Government of Telangana. (2024a). Socio-Economic Outlook 2024. Directorate of Economics and Statistics.

Government of Telangana. (2024b). Telangana Economy: P.E. 2023–24. Directorate of Economics and Statistics.

Government of Telangana. (2024c). Telangana MSME Policy 2024. Industries and Commerce Department.

Government of Telangana, RAMP. (2026). RAMP Telangana: MSME growth portal and ecosystem interventions. Department of Industries.

Krugman, P. (1991). Increasing returns and economic geography. Journal of Political Economy, 99(3), 483–499.

Lall, S. V., Shalizi, Z., & Deichmann, U. (2004). Agglomeration economies and productivity in Indian industry. Journal of Development Economics, 73(2), 643–673. https://doi.org/10.1016/j.jdeveco.2003.04.006

Mitra, A. (2000). Total factor productivity growth and urbanization economies: A case of Indian industries. Review of Urban & Regional Development Studies, 12(2), 97–108. https://doi.org/10.1111/1467-940X.00023

Tripathi, S. (2013). Do large agglomerations lead to economic growth? Evidence from urban India. Review of Urban & Regional Development Studies, 25(3), 176–200. https://doi.org/10.1111/rurd.12014

Vidyarani, K., & Maheshkumar, T. (2022). Determinants of access to formal credit for the micro, small and medium enterprises in India: An inter-regional analysis. SEDME (Small Enterprises Development, Management & Extension Journal), 49(3), 311–330. https://doi.org/10.1177/09708464221106273

Appendix A. District-Level Dataset Used in the Analysis

MSMEs refer to Udyam registrations as of 12 June 2024; GDDP refers to 2022–23 current-price estimates; employment refers to persons reported under the Udyam Registration Portal through 22 March 2023.

District	MSMEs (2024)	GDDP 2022–23 (Rs. crore)	Employment (to Mar. 2023)
Hyderabad	168,077	228,623	332,711
Rangareddy	109,164	283,419	425,737
Medchal-Malkajgiri	92,235	88,867	236,030
Nalgonda	42,988	50,616	115,531
Nizamabad	40,599	36,536	57,645
Karimnagar	36,969	26,603	83,961
Khammam	30,494	40,803	61,876
Hanumakonda	26,514	23,869	47,628
Sangareddy	26,299	60,401	40,076
Suryapet	24,706	30,003	193,027
Mahabubnagar	24,220	28,960	456,019
Siddipet	23,419	28,030	22,121
Jagtial	19,858	21,217	20,021
Mancherial	19,545	21,395	13,855
Warangal	18,976	18,887	34,139
Yadadri Bhuvanagiri	17,514	24,611	16,707
Nirmal	17,331	16,956	12,805
Kamareddy	16,876	22,053	22,262
Adilabad	16,617	17,190	33,091
Peddapalli	16,447	22,353	22,157
Bhadradri Kothagudem	15,684	34,215	35,955
Medak	15,318	23,558	29,506
Vikarabad	15,184	19,840	40,167
Rajanna Sircilla	13,278	12,778	10,444
Nagarkurnool	12,059	21,277	118,946
Mahabubabad	11,628	18,172	82,786
Jangaon	9,599	13,593	11,129
Wanaparthy	9,321	14,151	22,624
Jogulamba Gadwal	8,208	14,219	11,158

District	MSMEs (2024)	GDDP 2022–23 (Rs. crore)	Employment (to Mar. 2023)
Kumuram Bheem	8,135	11,136	4,928
Jayashankar	5,906	13,809	13,431
Narayanpet	5,504	12,980	6,875
Mulugu	3,211	6,914	3,351

Source: *District-level MSME data from Government of Telangana (2024a), district GDDP data from Government of Telangana (2024b), and employment data from Government of India, Rajya Sabha (2023).*

Appendix B. Model Specification for Replication

Model 1: $\ln(\text{MSMEs}_i) = \alpha + \beta \ln(\text{GDDP}_i) + \varepsilon_i$

Model 2: $\ln(\text{Employment}_i) = \alpha + \gamma \ln(\text{GDDP}_i) + u_i$

Estimation: OLS across 33 districts with heteroskedasticity-robust HC1 standard errors; Spearman rank correlation is used as a non-parametric robustness check. The coefficients are interpreted as cross-sectional associations, not causal effects.

Beyond the Bin: Rethinking Municipal Solid Waste Management through Environmental Governance and Social Perspective

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Municipal solid waste management (MSWM) is often understood primarily in terms of what happens after waste enters the municipal system, with comparatively less attention being given to the social and institutional processes that determine what becomes waste in the first place. This paper adopts a "Beyond the Bin" perspective to examine MSWM as a broader environmental governance challenge shaped by household consumption, social behavior, institutional arrangements and citizen participation. It argues that addressing waste only through collection and disposal overlooks the conditions that contribute to its generation and the social and institutional relationships through which waste is managed. The paper looks at the different dimensions of MSWM, including household consumption practices, awareness related to MSW governance, household solid waste-management practices, and the social aspects of MSWM. A descriptive, cross-sectional research design with a mixed-method approach was adopted, drawing on a primary survey of 100 respondents from Telangana selected through convenience sampling. The primary survey brings out the motives and drivers underlying certain behavioral practices among citizens and provides insights into emerging patterns and challenges of MSWM at the grassroots level. The responses indicate that waste-related practices are influenced not only by individual choices but also by the social and institutional context in which those choices are made. The findings therefore highlight the relevance of environmental governance, participation, accountability, coordination, and shared responsibility in understanding MSWM. The "Beyond the Bin" perspective connects the processes through which waste is generated with the social and institutional processes

through which it is governed, drawing attention to waste prevention, sustainable consumption and citizen participation alongside conventional waste-management practices. The paper thus seeks to place MSWM within a broader environmental governance and social framework, emphasizing that addressing waste requires attention not only to its management after generation but also to the conditions that shape its generation.

Keywords: Municipal Solid Waste Management; Environmental Governance; Sustainable Consumption; Social Perspective; Citizen Participation; Waste Governance.

1.Introduction

"Environmental problems are everyone's fault but nobody's problem."

In today's world, environmental problems are becoming an everyday event. But these problems have not received attention to what it requires, and this becomes an issue when a problem does not get an acknowledgement then there will least effort toward it. And this is the case with most environmental problems. According to the United Nations Environment Programme (UNEP), the world is facing Triple planetary crises comprising climate change, nature and biodiversity loss, pollution and waste. Solid Waste Management (SWM) has traditionally been approached as a municipal service concerned primarily with the collection, transportation, processing, and disposal of waste. However, the scale and complexity of contemporary waste generation challenge this conventional understanding. Urbanization, alteration of consumption patterns, and an increase in the use of packaged and disposable products have stressed waste management from being a simple sanitation problem to a major environmental and institutional problem with socio-economic repercussions. Globally, municipal solid waste generation is projected to increase substantially in the coming decades, placing greater pressure on land, resources, and urban infrastructure. This situation is more challenging in India, especially because of rapid urbanization and varied capacity of municipalities to process waste and engage citizens. Though the Solid Waste Management Rules (SWM) 2016 placed responsibilities of source segregation, collection, processing and scientific disposal of solid waste, challenges like mixed waste, inadequate source segregation, dependency on landfills, and limited resource recovery show that significant gap exists between policy and its implementation. Current practices on SWM are largely downstream-focused. They deal with what happens after waste is generated at the household or community level. However, this approach fails to investigate what precedes waste disposal. Waste is not created at the bin; it is generated through a wider system of resource extraction, production, packaging, distribution, consumption, and disposal. Consequently, addressing waste only after it has been generated limits the capacity of

public institutions to address its structural causes. This entails moving from "waste management" to "waste governance." Environmental governance provides a more comprehensive framework and acknowledges that responsibility for waste management involves several factors such as governments, municipalities, producers, consumers, service providers, civil society and informal waste workers. Thus, effective waste governance requires adequate administrative structures and capacity as well as coordination of institutional accountability and participation across waste lifestyles.

At the same time, the concept of sustainable consumption challenges the assumption that increasing waste is an unavoidable consequence of economic development. It shifts attention towards reducing unnecessary consumption, encouraging reuse and repair, improving product durability, and questioning patterns of excessive material use. This complements the circular economy, which seeks to move away from the linear “take-make-use-dispose” model towards systems in which products and materials remain in use for as long as possible through prevention, reuse, repair, refurbishment and recycling. However, existing approaches reveal an important limitation. The circular economy is often reduced to recycling, while environmental governance is usually examined in isolation from consumption and resource recovery. Similarly, waste policies may place considerable emphasis on citizen segregation while giving comparatively less attention to the upstream role of producers, product design and consumption systems. The contribution of informal waste workers to material recovery also remains insufficiently integrated into formal governance structures.

2. Conceptual framework

The environmental issues are certain challenges that cause disorder in the natural environment, and it needs to be governed to maintain the order. The historical aspect of environmental governance is related to various developments in policy instruments and paradigm shifts. The need to govern environment felt necessary with arising disorders in society such as rising level of carbon CO2 in atmosphere, global warming, climate change, natural imbalance and all these are consequence of human activities as quoted by Lipschutz - “Environmental problems has become more social than a biological one." Under traditional public administration environmental problems govern with command-and-control principles which are status quo in nature and poorly suited for modern complex environmental problems. During the 1980s the doctrine of the New Public Administration brought market principle to the governance of environment like carbon trading and clean development mechanisms and various policy commitments for instance, Stockholm conference

1972, Earth summits, Kyoto protocol, Paris agreement, sustainable development etc. In present era the governing environmental issues are challenged by. Firstly, low politic where environmental issues are given least priority by people who are in power. Secondly, Devolved fragmentation, environmental issues are left with local governments without strong financial backbone. Thirdly, Disjointed incrementalism where environmental policies Adjusted step by step rather than making it rational and comprehensive. (Evans and Thomas,2024) Municipal solid waste is becoming a major environmental issue in the modern world. The need for and importance of solid waste management can be understood from the fact that historically, poor waste management has led to various governance, health, and environmental consequences. For instance, 1994's Surat, India plague outbreak, Ghana, Acra's Seasonal flooding in 2011 and love canal industrial hazard affecting large number of people in USA. (Wilson et al., 2015)This highlights that a sound waste management system can prevent the consequences of the environment, human health, and society. (Chandrappa & Das 2012)

Waste management demands a new way of thinking. There is a need for shifting paradigms in terms of managing waste. Because in present context waste generation is largely dictated by consumption patterns and household income. There is an increasing trend of non-food items. (Widyaningsih et al. 2015) Rather than relying on conventional methods such as landfill and incineration, which is going out of fashion. There is a need for focusing on emerging ideas such as zero waste, sustainable consumption, Sustainable production and recycling, life cycle assessment, organic composting etc. this emphasis that there is urgent need to act upon these ideas. For instance, recycling above 80 percent only can slow down the depletion of natural resources. (Steffan lehmann 2010). Rising income, changing lifestyle pattern, and increased consumption has led to a huge generation of waste which is around 2.56 billion metric tons in 2022 and expected to increase 3.86 billion metric tons by 2050 in a business-as-usual scenario. This shows the urgency of the issue. The environmental impact of municipal solid waste is that in global methane assessment, solid waste is the third largest global source of methane which is around 20 percent. If we look at waste from a resource perspective, then it will have large benefits, for instance upstream employment such as Research, Redesign, Remanufacturing, and Recyclability. etc. With this municipal solid waste has become a very part of environmental governance and society. (what a waste 3.0, 2026) The impact of waste on health is huge; diarrheal diseases caused an estimated 1.2 million deaths globally in 2021,Open burning and unsafe waste treatment can release pollutants such as PM2.5, PM10, arsenic, benzene, cadmium, lead, mercury and dioxin-like substances, which may affect respiratory, cardiovascular, reproductive, neurological and immune systems.(WHO, 2025)

Environmentally, solidwaste disposal contributes approximately 3-4% of annual global anthropogenic greenhouse gas emissions.(Monni et al. 2006) and this is also causing air pollution, water contamination etc. This shows that municipal solid waste management is a cross-cutting issue which is affecting health, climate change, sustainable production and consumption etc. it needs holistic approach to address. Economically, in terms of management of waste, cost of inaction is becoming more than the cost of action. For instance, in proper waste management cost of action is US$ 5-7 per capita per year, but cost of inaction is US$ 20-50. This reflects the urgent need to act upon proper waste management across the globe. Proper waste management can benefit society in many ways, for instance McKinsey in report Row 3 above quotes that the waste sector will create around 9-25 million green jobs in future. Food waste management costs around 750 billion USD. Proper management can save the economy. (Wilson et al., 2015) There is a need to have innovation in three categories. Firstly, technological innovation with less ecological footprint. Second, at institutional level, i.e. using market and non-market-based techniques. Third, nurturing less materialistic values in society and promoting sustainable lifestyles. (Steffan lehmann 2010)

3. Objectives

1. To examine household solid waste management practices, with a focus on segregation, disposal, recycling, and interaction with waste-collection services.
2. To assess sustainable consumption practices among households, particularly in relation to waste reduction, reuse, repair, and avoidance of single-use products.
3. To examine citizens' perceptions of environmental governance in SWM, focusing on service delivery, accountability, enforcement, and citizen participation.
4. To identify key behavioral, social, and institutional factors influencing sustainable SWM and examine their implications for effective waste governance.

4. Methodology

4.1 Research Design

The present study adopts a descriptive, cross-sectional research design to examine household solid waste management (SWM) practices and explore how environmental governance and social factors shape sustainable waste-management behavior. The descriptive component helps the study understand existing household-level practices and perceptions, while the cross-sectional design allows data to be collected from respondents at a particular point in time. A mixed-method approach is used, incorporating both quantitative and qualitative elements. Primary data is collected through a structured online questionnaire administered using Google Forms. The questionnaire consists mainly of close-ended questions, including multiple-choice items and statements measured on a five-point Likert scale. A small number of open-ended questions are also included, allowing respondents to describe their views, experiences, and perceptions in greater detail.

4.2 Study Area

The study is conducted in Telangana, with respondents drawn from different locations across the state. Telangana offers a relevant context for examining household solid waste management in view of its rapid urbanization, changing consumption patterns, and the increasing demands placed on municipal waste-management systems. The study does not seek to evaluate the administrative or operational performance of any particular municipality. Instead, it focuses on household-level waste-management practices and public perceptions related to SWM, environmental governance, and associated social dimensions.

4.3 Participants and Sample Size

The study comprises a total sample of 100 respondents residing in Telangana. An effort is made to include respondents from different demographic and socio-economic backgrounds. The questionnaire collects information on characteristics such as age, gender, educational qualification, occupation, household income, household size, and type of residence. These variables are considered to examine whether waste-management practices and perceptions differ across demographic and socioeconomic groups. The individual respondent constitutes the unit of analysis, although several questions specifically address practices and decision-making at the household level. The study therefore examines individual responses in relation to household waste-management behavior, perceptions, and participation.

4.4 Sampling Technique

The study employs convenience sampling which is considered appropriate for the present exploratory study given the available time and resources, as well as the objective of obtaining preliminary empirical insights into household waste-management practices and perceptions. At the same time, the limitations of this sampling approach are recognized. Since the study is based on a non-probability sample of 100 respondents, the findings cannot be treated as statistically representative of the entire population of Telangana. The results are therefore interpreted primarily in relation to the respondents included in the study. Rather than making population-wide generalizations, the analysis focuses on identifying patterns, perceptions, and associations within the surveyed sample.

4.5 Data Sources

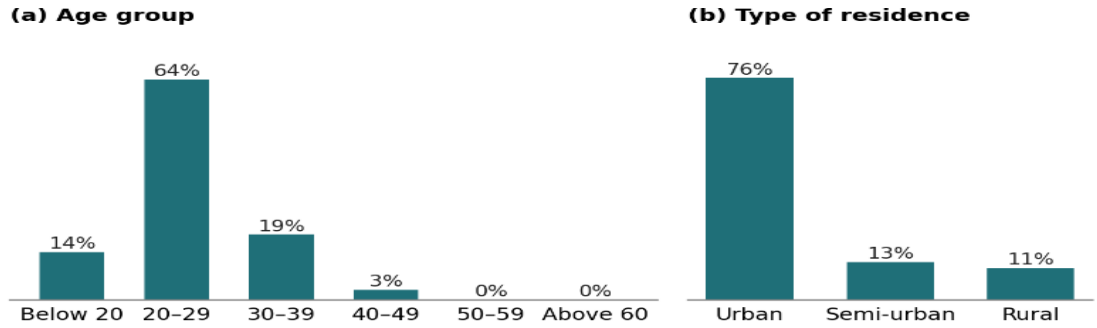
The study draws on both primary and secondary sources of data to develop a broader understanding of the research problem. Primary data is collected through a structured questionnaire administered using Google Forms. The questionnaire is organized around five broad dimensions: (i)

demographic characteristics, (ii) household solid waste management practices, (iii) sustainable consumption, (iv) environmental governance, and (v) the social dimensions of waste management. The use of close-ended, Likert-scale, and limited openended questions allows the study to capture measurable patterns while also giving respondents some scope to express their individual perspectives. Secondary data is obtained from relevant scholarly literature, government reports, policy documents, legislative and regulatory frameworks, institutional publications and credible national and international sources dealing with municipal solid waste management, environmental governance, sustainable consumption and the social dimensions of waste management. The literature review and conceptual framework provide the basis for understanding the relationship between solid waste management, environmental governance, sustainable consumption, and social participation. These conceptual linkages guide the empirical investigation and inform both the design of the questionnaire and the subsequent analysis of the primary data.

5. Data Analysis

5.1 Demographic profile

The demographic profile of the respondent shows that most of the respondent falls between the age category of 20-29 years. And majority of them are urban residents that is 76%. And rest of them from semi urban (13%), rural (11%) areas. so, this broadly reflects an urban picture. Figure 1. Age distribution and type of residence of respondents.

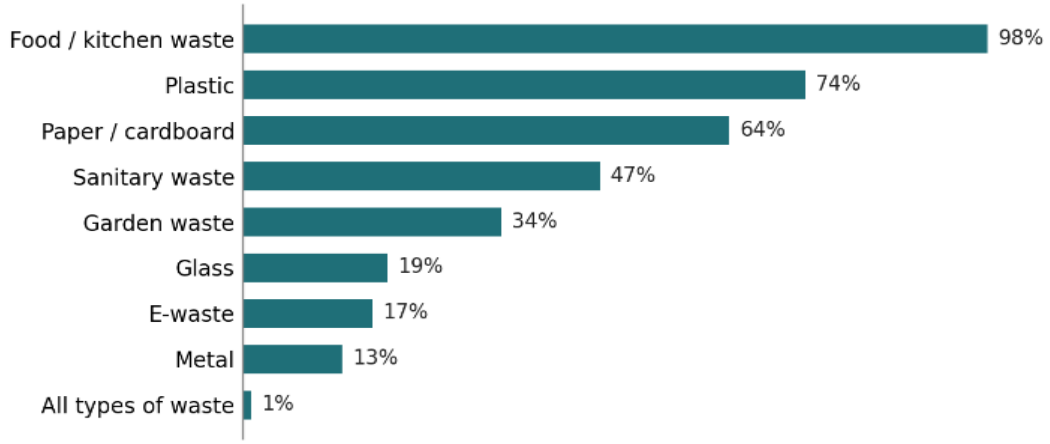


Source: Primary survey data.

5.2 Household Waste Generation and Segregation Practices

Figure.2 shows different category of waste generated on households. The food and kitchen (98%) waste is dominant followed by plastic (74%), paper or cardboard (64%), sanitary waste (47%), garden waste (34%), glass (19%), E waste (17%), and metal (13%).

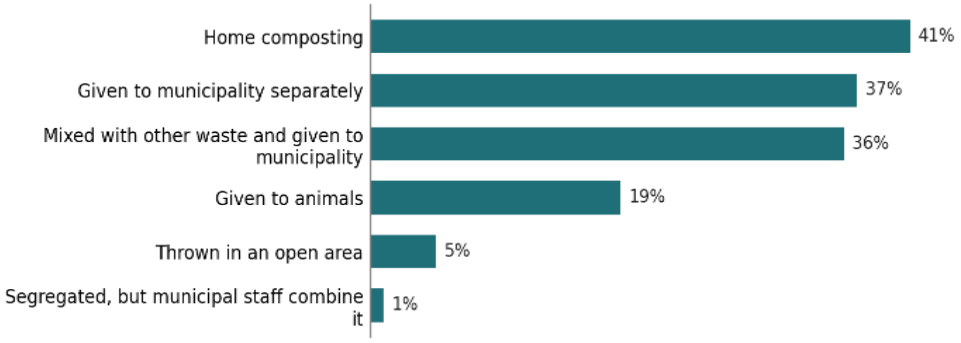
Figure 2. Types of waste generated by households.



Source: Primary survey data. Multiple responses allowed; percentages may exceed 100%.

Figure 3. Management of kitchen waste

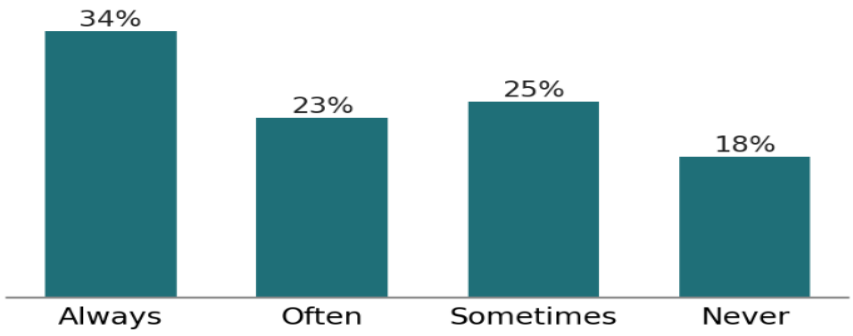
Figure 3 shows that major part of kitchen waste treated by home composting (41%) followed by 37% is given to municipality separately. 36% of kitchen waste is mixed with other waste and given to municipality, followed by 19% is given to animal. 5% throw it at open area. And 1% believe that they segregate it but municipal staff combine it anyhow.



Source: primary data.

Figure 4. Frequency of household waste segregation

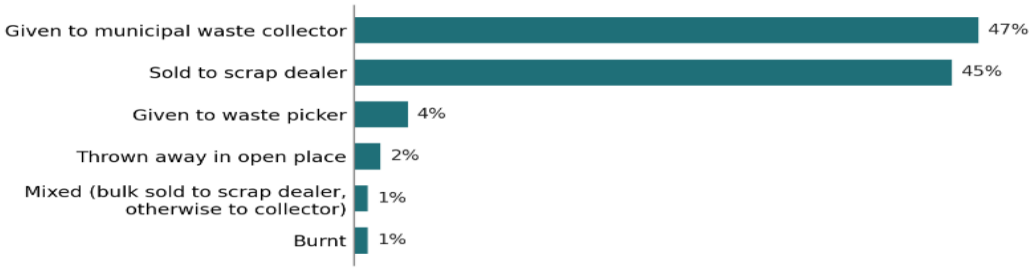
Figure 4 shows that 34% respondents always practice waste segregate at source, while 34% practices it often followed by 25% sometimes. And 18% of the respondent never practiced waste segregation at source



Source: Primary survey data.

Figure 5. Destination of recyclable waste.

Figure 5 shows that 47% of respondents hand over recyclable waste to municipal waste collectors, while 45% sell it to scrap dealers. Only 4% give it to waste pickers, whereas 2% dispose of it in open spaces and 1% each follow mixed disposal practices or burn the waste. These findings indicate that recyclable waste is largely channelled through municipal collection systems and informal scrap markets, highlighting the role of both formal and informal actors in household waste recycling.

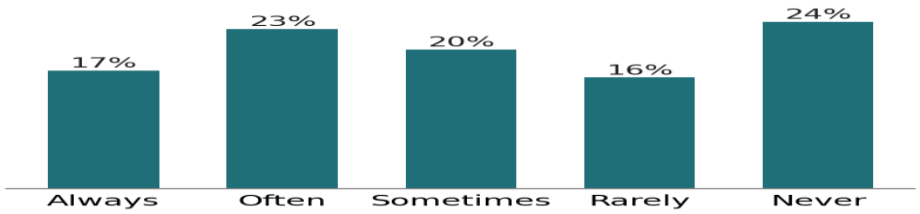


Source: Primary survey data.

5.3 Municipal Service and Barriers to Segregation

Figure 6. Whether the waste collector collects segregated waste separately.

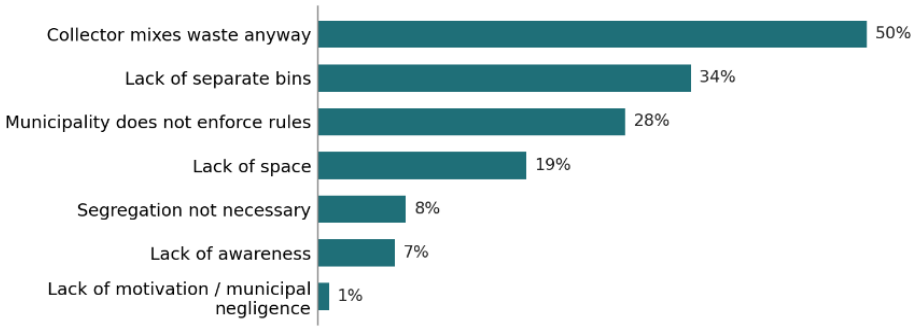
The findings indicate that separate collection of segregated household waste is inconsistent. While 23% of respondents reported that waste collectors often collect segregated waste separately and 17% stated that this always happens, 20% reported that it happens only sometimes. Furthermore, 16% indicated that separate collection rarely occurs, while 24% stated that it never occurs. These findings suggest a gap between household-level waste segregation and municipal collection practices. The lack of consistent separate collection may discourage households from maintaining segregation at source.



Source: Primary survey data.

Figure 7. Major reasons for not segregating household waste.

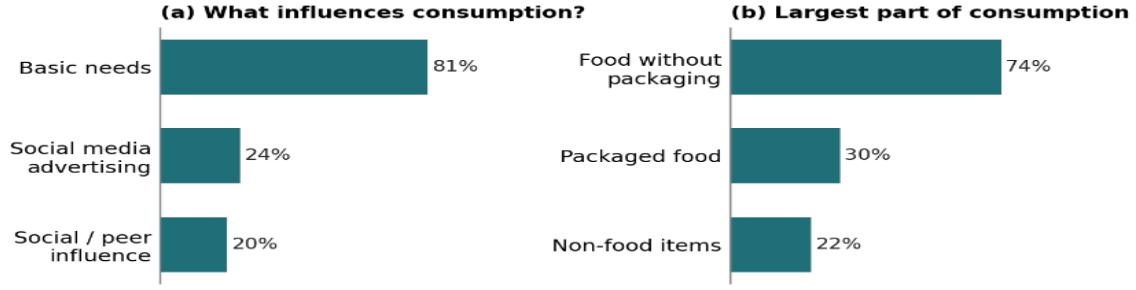
The most frequently reported reason for not segregating household waste was the perception that waste collectors mix waste anyway, cited by 50% of respondents. This was followed by the lack of separate bins (34%) and inadequate municipal enforcement of rules (28%). Additionally, 19% identified a lack of space as a barrier. Relatively fewer respondents cited the belief that segregation was unnecessary (8%), lack of awareness (7%), and lack of motivation or municipal negligence (1%). Overall, the findings indicate that barriers to segregation are primarily associated with collection practices, infrastructure, and administrative enforcement rather than a lack of public awareness alone.



Source: Primary survey data. Multiple responses allowed; percentages may exceed 100%.

5.4 Consumption Patterns and Everyday Practices

Figure 8. Influences on consumption and the largest category of consumption.

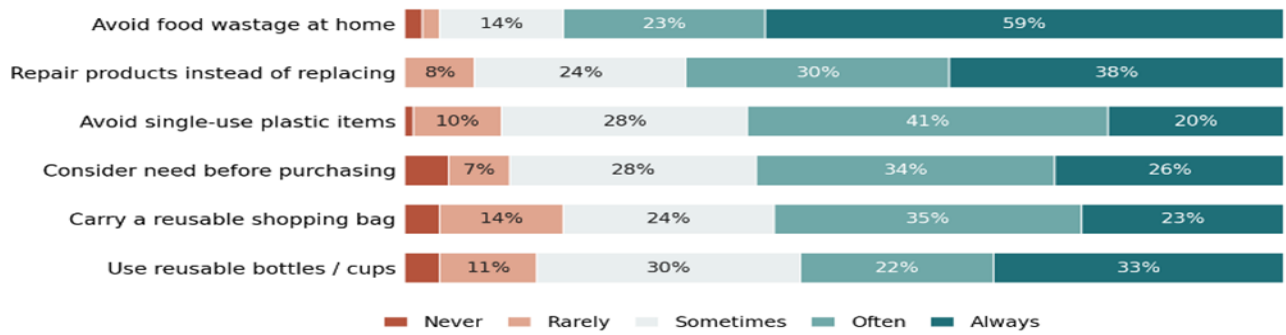


The findings show that basic needs were the primary influence on consumption, reported by 81% of respondents. Social media advertising (24%) and social or peer influence (20%) were also identified as factors affecting consumption decisions. Regarding the largest category of consumption, food without packaging was reported by 74% of respondents, followed by packaged food (30%) and non-food items (22%). These results suggest that consumption is largely need-oriented, although social influences also play a role. The relatively high share of food consumed without packaging may provide an opportunity to promote sustainable consumption practices, while packaged food consumption highlights the need to consider packaging waste. Multiple responses were permitted for this figure.

Source: Primary survey data. Multiple responses allowed; percentages may exceed 100%.

Figure 9. Frequency of waste-reducing consumption behaviours (sorted by share responding "Often" or "Always").

The findings reveal variations in the adoption of waste-reducing practices among respondents. Avoiding food waste at home was the most frequently reported behaviour, with 82% indicating that they practised it often or always. Repairing products instead of replacing them followed at 68%. In comparison, 61% reported often or always avoiding single-use plastic items, while 60% considered the need for a product before purchasing it. Carrying reusable shopping bags was reported often or always by 58% of respondents, while 55% frequently used reusable bottles or cups. These results indicate stronger adoption of food-waste prevention and product repair than of some reusable alternatives. The findings suggest scope for encouraging consistent waste-reduction practices in everyday consumption.

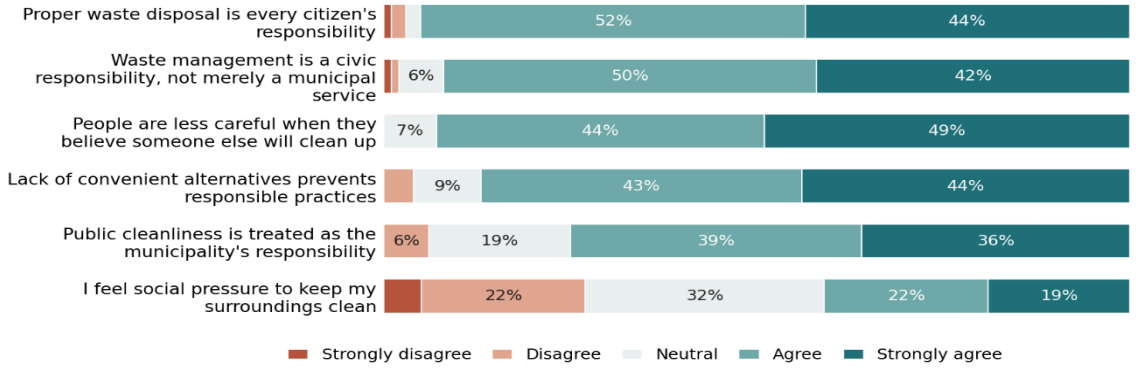


Source: Primary survey data. Rows are normalised to 100%; labels below 6% are not shown.

5.4 Civic Responsibility and Social Attitudes

Figure 10. Level of agreement with statements on civic responsibility and social influence. The findings demonstrate a strong sense of civic responsibility towards waste management. A combined

96% of respondents agreed or strongly agreed that proper waste disposal is every citizen's responsibility, while 92% supported the view that waste management is a civic responsibility rather than merely a municipal service. Similarly, 93% agreed or strongly agreed that people tend to be



less careful when they expect someone else to clean up. In addition, 87% believed that a lack of convenient alternatives prevents responsible practices. However, responses concerning social pressure to keep surroundings clean were more varied, with 41% agreeing or strongly agreeing, 32% remaining neutral, and 27% disagreeing or strongly disagreeing. Overall, the findings suggest that respondents recognise their civic responsibilities, but translating these attitudes into consistent practices may depend on municipal facilities, convenient alternatives, and social influences.

Source: Primary survey data. Rows are normalised to 100%; labels below 6% are not shown.

6. Findings

6.1 Household Waste Management Practices

The findings show that household waste management varies with awareness, collection arrangements, and individual participation. Most respondents (76%) belonged to urban areas, while 13% were from semi-urban and 11% from rural areas. Although 49% were very or somewhat familiar with municipal solid waste management, 35% had only heard of it, suggesting differences in the depth of awareness. In terms of municipal collection, 53% reported alternate-day collection and 23% received daily services. Segregation practices varied considerably. While 34% consistently segregated waste and 23% did so often, 18% never practised segregation. Food and kitchen waste emerged as the most common household waste (98%), followed by paper and cardboard (74%) and metal (64%).

6.2 Waste Disposal and Recycling Practices

The responses reflect a combination of municipal collection and household-level waste recovery. Around 41% practised home composting, while 37% handed kitchen waste separately to municipal

collectors. However, 36% reported that kitchen waste was mixed with other waste before collection.For recyclable materials, 47% depended on municipal collectors, while 45% sold them to scrap dealers. This highlights the role of both municipal services and informal recycling channels in household waste recovery.

6.3 Sustainable Consumption Practices

Respondents showed a propensity towards sustainable consumption regarding food waste, product repair and replacement, and reduction of disposable products. Around 82% of respondents reported that they consistently tried to avoid food waste, while 61% reported that they consistently tried to avoid single-use plastics. About 68% of respondents said that they would consider the necessity of a product before purchasing and would prefer repairing a product rather than replacing it.Although a few select reported that they use reusable shopping bags and bottles, these responses indicate that sustainable choices are not integrated into the daily lives of all the respondents.

6.4 Environmental Governance and Citizen Responsibility

The responses reflect a sense of civic responsibility toward waste management. About 96% of respondents believed that the proper disposal of waste is the responsibility of every citizen, and 92% of respondents believed that waste management is a civic responsibility rather than a municipal service.However, 87% of respondents also believed that the absence of easier alternatives made it hard to practice environmental responsibility. Also, 75% of respondents believed that it is the primary responsibility of the municipality to keep public areas clean. These respondents believed that it is the responsibility of the individual to practice environmental governance within the limits of the framework and capacity of municipal environmental governance.

7. Discussion

The results demonstrate that municipal solid waste management is more than the usual concerns with collection and disposal. It includes household consumption and behavioral choices, institutional arrangements, and the nature of citizen–municipality interactions. Household-level composting and recycling illustrates the importance of decentralized waste recovery. However, the absence of uniformity in segregating waste, coupled with the irregular collection by municipal workers underscores a vital citizen-participation and institutional-responsiveness nexus. While a large portion (57%) of the respondents indicated that they segregate waste either always or often, only a little over 40% indicated that municipal workers consistently respected waste segregation. This shows that household participation is highly reliant on the dependability of municipal service

delivery. The adoption of sustainable consumption practices, particularly food-waste avoidance, product repair, and reduced reliance on single-use plastics indicate that behavioral changes are critical in influencing households to modify their practices in addressing waste at source. At the same time, the influence of basic needs, advertising, and social factors indicates that consumption decisions are shaped by considerations extending beyond individual environmental awareness. One major aspect of the study is the recognition of waste management as a shared civic responsibility. However, dependence on municipal authorities and the constraints arising from lack of alternatives point toward the need to move beyond an exclusively service-oriented approach. Citizen participation must be complemented by accessible infrastructure, consistent collection mechanisms, and institutional accountability.The study takes a 'Beyond the Bin' approach to waste management, particularly regarding the role of local municipalities, the integration of best practices on sustainable consumption and household waste management, as well as the emphasis on social responsibility and responsive institutions. Effective waste governance consequently requires a shift from a predominantly collection-centered framework towards a more integrated and participatory approach to environmental management.

8. Conclusion

Municipal solid waste management cannot be understood merely as a question of collecting, transporting, and disposing of waste. The findings of this study demonstrate that waste management is closely connected with household consumption patterns, everyday behavioural choices, social practices, municipal service delivery, and citizen-institution relationships. The “Beyond the Bin” perspective therefore shifts attention from what happens after waste is generated to the social and institutional conditions that shape its generation, management, and recovery.

The findings indicate that respondents demonstrate a considerable degree of awareness and willingness to adopt sustainable practices, particularly in relation to avoiding food waste, reducing single-use plastics, repairing products, and participating in waste segregation and recycling. At the same time, inconsistencies in segregation and the dependence on municipal collection systems reveal that individual responsibility alone cannot ensure effective waste management. The gap between citizens’ willingness to participate and the availability and reliability of supporting services highlights the importance of institutional responsiveness. The study also reinforces the idea that effective waste governance requires shared responsibility. Citizens have an important role in responsible consumption, segregation, reduction, reuse, and recycling, while municipalities must provide accessible infrastructure, reliable collection, effective enforcement, and accountable

service delivery. Informal recovery mechanisms and community participation also need greater recognition within waste-management systems.

Overall, the study argues for a shift from a predominantly collection-centred approach towards an integrated model of environmental governance that addresses waste prevention, sustainable consumption, resource recovery, citizen participation, and institutional accountability together. Moving "beyond the bin" therefore requires not only better waste-management systems but also changes in consumption practices, institutional arrangements, and relationships between citizens and public institutions. Such an approach can contribute to more sustainable, participatory, and responsive municipal solid waste governance.

References

Wilson, D. C., Rodic, L., Modak, P., Soos, R., Carpintero, A., Velis, C. A., Iyer, M., & Simonett, O. (2015). *Global waste management outlook*. United Nations Environment Programme & International Solid Waste Association.

Widyaningsih, N. L., Tjiptoherijanto, P., Widanarko, S., & Seda, F. S. S. E. (2015). Linkage model between sustainable consumption and household waste management. *Procedia Environmental Sciences, 28*, 195–203. https://doi.org/10.1016/j.proenv.2015.07.026

Chandrappa, R., & Das, D. B. (2012). *Solid waste management: Principles and practice.* Springer.

Monni, S., Pipatti, R., Lehtilä, A., Savolainen, I., & Syri, S. (2006). *Global climate change mitigation scenarios for solid waste management* (VTT Publications No. 603). VTT Technical Research Centre of Finland.

Cook, E., Ionkova, K., Bhada-Tata, P., Yadav, S., & van Woerden, F. (2026). *What a waste 3.0: Global snapshot of solid waste management toward circularity until 2050*. World Bank.

Steffen Lehmann (2011) "Resource Recovery and Materials Flow in the City: Zero Waste and Sustainable Consumption as Paradigms in Urban Development, "Sustainable Development Law & Policy: Vol. 11: Iss. . 1, Article 13.

Evans, J., & Thomas, C. (2024). *Environmental governance* (2nd ed.). Routledge. https://doi.org/10.4324/9781003334699

Ministry of Environment, Forest and Climate Change. (2026). *Solid Waste Management Rules, 2026* (S.O. 388(E)). Government of India.

Central Pollution Control Board. (2024). *Annual report 2023–24 on implementation of Solid Waste Management Rules, 2016*. Ministry of Environment, Forest and Climate Change, Government of India.

Khan, A., Mishra, S., & Singh, P. (2025). *Tailoring solid waste management in India: Learnings from cities with a million-plus population*. Council on Energy, Environment and Water.

Maity, S. K. (2018). Importance of municipal solid waste management. *International Journal of Advanced Engineering Research and Science, 5*(5), 361–363.

Mandpe, A., Paliya, S., Gedam, V. V., Patel, S., Tyagi, L., & Kumar, S. (2023). Circular economy approach for sustainable solid waste management: A developing economy perspective. *Waste Management & Research, 41*(3), 499–511.

Godfrey, L. (Ed.). (2021). *Waste management practices in developing countries.* MDPI.

Palm, J., & Bocken, N. (Eds.). (2021). *Achieving the circular economy: Exploring the role of local governments, business and civic society in an urban context.* MDPI.

Fidelis, R., Guerreiro, E. D. R., Horst, D. J., Ramos, G. M., de Oliveira, B. R., & Junior, P. P. de A. (2023). Municipal solid waste management with recyclable potential in developing countries: Current scenario and future perspectives. *Waste Management & Research*, 1–21.

Pernebayev, Z., & Aitimbetova, A. (2026). Environmental impacts of municipal solid waste disposal in urban areas: A systematic review of contamination pathways, assessment methods, and mitigation strategies. *Sustainability, 18*(8), 3900.

Srivastava, V., Ismail, S. A., Singh, P., & Singh, R. P. (2015). Urban solid waste management in the developing world with emphasis on India: Challenges and opportunities. *Reviews in Environmental Science and Biotechnology, 14*(2), 317–337.

Tracking Telangana's Progress on SDGs 6, 7, 13 and 15: A Trend Analysis, 2019-2024

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The Sustainable Development Goals (SDGs) provide an important framework for assessing environmental sustainability at the national and sub-national levels. The current study focuses on the performance of Telangana in four SDG indicators, SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 15 (Life on Land) for the period 2019-2024. The study adopts descriptive and analytical research design and secondary data is collected from SDG India Index reports of NITI Aayog and other sectoral sources. The Telangana progress was assessed and compared with the national average and selected peer states using the following methods: Trend analysis, Benchmarking, Gap analysis, Rank analysis, Z-score analysis, and Sectoral validation. The results indicate that Telangana has made considerable strides in SDG 7 with a perfect score of 100, and has consistently scored higher than the national average in SDG 6 and SDG 15. SDG 13, however, was the least successful goal, with the highest gap from the goal, low scores and a drop in state ranking. Groundwater stress and lack of climate resilience are identified as the main weaknesses, whereas the availability of renewable energy and forest conservation are identified as the main strengths on a sectoral basis. The study finds that the environmental sustainability performance of Telangana is not uniform, with good progress in energy and land management but not so good in climate action. The proposed Climate-Energy-Resource (CER) Governance Model provides a policy package that can be used to stimulate a balanced and sustainable environmental development and to speed up the achievement of the SDG 2030 targets.

Keywords: Sustainable Development Goals (SDGs), Environmental Sustainability, Telangana, Climate-Energy-Resource (CER) Governance, SDG India Index

1. Introduction

The Sustainable Development Goals (SDGs), adopted by all United Nations member states in 2015, set out a shared agenda to be achieved by 2030. Within India, NITI Aayog is the nodal institution for SDG monitoring, and its SDG India Index ranks every State and Union Territory

on a 0-100 scale, where a higher score means a state is closer to the national targets. The Index was first launched in 2018 and has since been updated in 2019-20, 2020-21 and 2023-24. In the latest edition, India's overall score rose to 71 from 66, and SDG 13 (Climate Action) recorded the sharpest improvement, climbing from 54 in 2020-21 to 67 in 2023-24.

Four goals sit at the centre of environmental sustainability: SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action) and SDG 15 (Life on Land). They are closely connected. Water, energy and land resources depend on one another, and climate change affects all three. Telangana, formed in 2014, is a semi-arid state that depends heavily on groundwater and tanks, is expanding renewable energy, and has launched large programmes on water supply, tank restoration and afforestation. It is therefore a useful case for asking whether policy effort shows up in measured SDG progress.

This paper presents the performance of Telangana on SDGs 6, 7, 13 and 15 in the SDG India Index editions from 2019-20 to 2023-24. It compares the state to the national average and to other peer states, and utilizes simple statistical tools and publicly available secondary data.

The SDGs on clean water and sanitation, affordable and clean energy, climate action and life on land are closely linked, but progress on these goals is often measured individually, which makes it hard to see the impact of all goals on sustainable development. The SDG performance of India is usually reported in terms of national aggregates and state rankings, but there is limited goal-specific analysis of the performance at the state level, which is a gap in evidence for state-level policy making. The SDG India Index 2023-24 broadened its scope and identified some major national gains, especially in climate action, but the contribution and gains that Telangana has made or received is yet to be explored in detail. The performance of Telangana in comparison to the top states and the national average can be useful to identify strengths and weaknesses and policy priorities for the state before the 2030 SDG target. Moreover, the study relies on publicly available data and a straightforward analytical method that can be replicated by researchers, students and government agencies to track future progress and inform evidence-based decision-making.

2. Review of Literature

The literature review reveals that SDG monitoring is gaining significance in India. Sharma and Tripathi (2022) noted that India's SDG performance has been improving continuously and highlighted the importance of having effective measurement frameworks. Parekh and Lal

(2024) measured the distance of states from SDG targets and made projections, but they did not account for the changes over time and restricted their analysis to the previous versions of the SDG Index. Baig et al. (2025) examined SDGs 6 and 13 at the South Asian level and identified challenges in water access, climate monitoring, and resource management, without addressing state-level variations in India. The Economic Survey 2021-22 highlighted improvements in state SDG performance and the increasing number of Front Runner states, but provided only descriptive insights. The CESS Telangana SDG Report documented Telangana's efforts across environmental goals; however, it lacked a comparative analysis of the state's performance over multiple SDG Index editions. Collectively, the reviewed studies provide useful insights into SDG performance but offer limited evidence on the longitudinal and comparative assessment of Telangana's progress in SDGs 6, 7, 13, and 15.

3. Research Gap

The review of literature reveals several important gaps in the existing body of knowledge. First, most index-based studies focus on national-level or inter-state comparisons and are generally confined to earlier editions of the SDG India Index, particularly up to 2020-21, leaving the latest 2023-24 edition largely unexplored. Second, studies examining environmental SDGs, especially SDG 6 (Clean Water and Sanitation) and SDG 13 (Climate Action), are predominantly conducted at the South Asian or regional level and provide limited insight into the performance of individual Indian states. Third, the available literature on Telangana is largely descriptive in nature and lacks a systematic benchmarking of the state's performance against national averages and comparable peer states across different time periods. Finally, SDGs 6, 7, 13, and 15 are seldom analysed collectively for a single state despite their strong interdependence and combined significance for environmental sustainability. To address these gaps, the present study examines Telangana's progress across these four environmental goals using three editions of the SDG India Index (2019-20, 2020-21, and 2023-24) and benchmarks its performance against India and selected peer states, thereby providing a comprehensive and longitudinal assessment of the state's environmental sustainability trajectory.

4. Research Questions

1. How have Telangana's scores on SDGs 6, 7, 13 and 15 changed between 2019-20 and 2023-24?

2. How does Telangana's performance compare with the national average and with peer states on each goal?
3. Which of the four goals show the strongest and weakest progress, and what do sector-level indicators suggest about the reasons?

5. Objectives

The following are the objectives of the study:

1. To analyse the trend in Telangana's goal-wise scores on SDGs 6, 7, 13 and 15 from 2019-20 to 2023-24.
2. To benchmark Telangana against the all-India score and selected peer states.
3. To identify the environmental SDGs where Telangana faces the largest gap from the target and analyse the underlying sectoral factors responsible for the gap.
4. To suggest policy priorities for Telangana based on the findings.

6. Hypothesis:

H1: Telangana has performed better than the national average in SDGs 6, 7, and 15 during the study period.

H2: SDG 13 exhibits the largest performance gap among the selected environmental SDGs.

7. Research Methodology

The study is descriptive and analytical, secondary data. It covers the period 2019-2024 and examines three editions of the SDG India Index (2019-20, 2020-21, and 2023-24). The data has been extracted from SDG India Index reports and SDG India dashboard published by NITI Aayog, along with data from other sources such as CGWB, CEA, MNRE, ISFR, Telangana Government reports, CESS publications and Economic Survey.

The focus state was Telangana and comparator states were India, Andhra Pradesh, Karnataka, Tamil Nadu, Kerala and Maharashtra. Data analysis was done in MS Excel with descriptive statistics, percentage change analysis, absolute change analysis, gap analysis, rank analysis, Z-scores, CAGR and trend analysis. Trends and comparisons were illustrated using line and bar charts.

The study has a number of limitations, such as only three editions of the SDG Index, indicator changes across editions, and composite index scores. Thus, sectoral data were used for validation and the results show associations rather than causation.

8. Data Analysis and Interpretation

Table – 8.1 - Telangana vs India (SDG 6,7,13,15)

Goal	Telangana 2019-20	India 2019-20	Telangana 2020-21	India 2020-21	Telangana 2023-24	India 2023-24
SDG 6 Water	84	88	96	83	90	89
SDG 7 Energy	93	70	100	92	100	96
SDG 13 Climate	66	60	43	54	59	67
SDG 15 Land	88	66	81	66	82	75

Data source: NITI Aayog SDG India Index editions 2019-20, 2020-21, 2023-24.

Interpretation: The comparison indicates that Telangana outperformed the national average in SDGs 7 and 15 across all editions and maintained a strong lead in renewable energy and land-related indicators. Telangana's SDG 6 score improved significantly from 84 in 2019-20 to 90 in 2023-24, remaining close to the national average. However, SDG 13 recorded a decline from 66 to 59 during the study period, while India improved from 60 to 67, highlighting climate action as the weakest area of performance for Telangana.

Table 8.2: Trend Analysis - Telangana (2019-20 to 2023-24)

Goal	Absolute Change (2023-24 minus 2019-20)	% Change	CAGR of Score	Interpretation
SDG 6 Water	90-84 = +6	+7.14%	Growth then decline 96→90 = -6.25% in last period	Positive overall but decline in latest edition - indicates saturation or indicator change
SDG 7 Energy	100-93 = +7	+7.52%	Achieved ceiling (100) in 2020-21 and maintained	Strongest progress, Achiever category - stable at 100 for 2 editions
SDG 13 Climate	59-66 = -7	-10.6%	Volatile: 66→43 (-34.8%) then 43→59 (+37.2%)	Weakest progress, U-shaped trend - Shows climate vulnerability, not policy stability
SDG 15 Land	82-88 = -6	-6.81%	Decline then stable 81→82 (+1.23%)	Stable but below 2019 level - Afforestation effect plateaued

Interpretation: The trend analysis reveals uneven progress across the four environmental goals. SDG 7 demonstrated the strongest performance by achieving the maximum score of 100

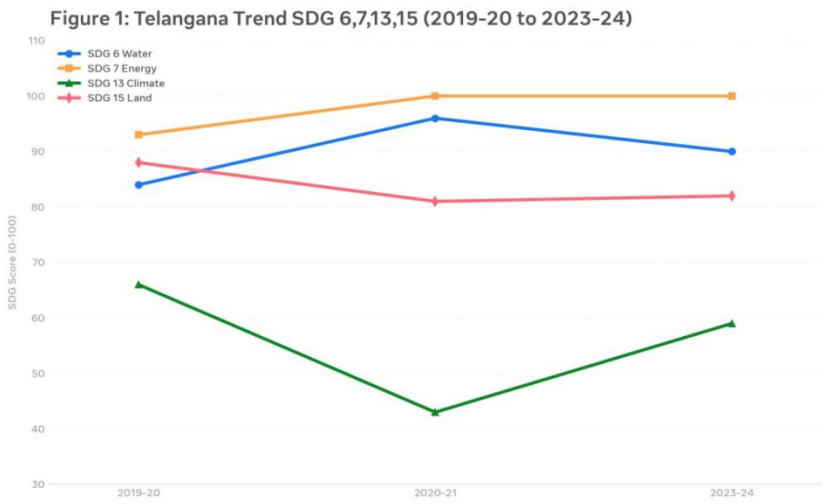
and sustaining it over two consecutive editions. SDG 6 showed overall improvement despite a slight decline in the latest edition. SDG 15 remained relatively stable but failed to regain its earlier peak level, while SDG 13 exhibited considerable fluctuations and an overall decline, indicating the need for stronger climate resilience and adaptation measures.

Table – 8.3 - Descriptive Statistics and Z-Score Analysis of All States (2023-24)

Goal	Mean of All States	Min	Max	SD	Telangana Z-score = (Tel - Mean)/SD
SDG 6 Water	85.2	68	96	7.1	(90-85.2)/7.1 = +0.68 (Above typical state)
SDG 7 Energy	92.4	70	100	8.3	(100-92.4)/8.3 = +0.91 (High performer)
SDG 13 Climate	64.5	42	81	9.2	(59-64.5)/9.2 = -0.60 (Below typical state)
SDG 15 Land	71.3	45	93	11.5	(82-71.3)/11.5 = +0.93 (High performer)

Interpretation: The Z-score analysis shows that Telangana performed above the average state in SDGs 6, 7 and 15, reflecting its strong standing in water management, renewable energy and land conservation. The highest positive Z-scores were observed for SDGs 7 and 15, confirming Telangana's position as a high-performing state in these areas. Conversely, the negative Z-score for SDG 13 indicates that Telangana's climate action performance remains below the national state average and requires priority attention.

Figure 8.1: Trend Line – Telangana



Interpretation:

The figure highlights contrasting trends across the four environmental SDGs. SDG 7 showed the strongest performance, reaching and maintaining the maximum score of 100, reflecting

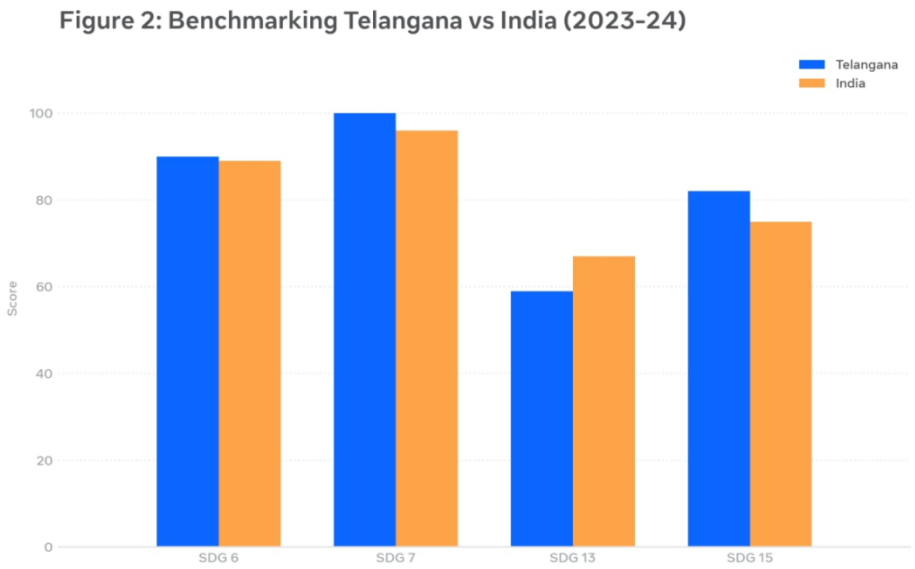
sustained success in energy access and renewable energy initiatives. SDG 6 improved considerably during the study period despite a slight decline in the latest edition, while SDG 15 remained largely stable with modest variations. In contrast, SDG 13 exhibited the most volatile trend, declining sharply in 2020-21 before partially recovering in 2023-24, indicating relatively weaker and less consistent climate action outcomes. Moreover, while India's SDG 13 score improved from 54 to 67, Telangana's score increased only from 43 to 59, highlighting a persistent gap in climate resilience and the need for stronger climate governance measures.

Table 8.4: Gap Analysis - Telangana vs National Average (2023-24)

Goal	Telangana - India	Distance from 100 (100 - Telangana)	Status
SDG 6	90-89 = +1	10	At par with national
SDG 7	100-96 = +4	0	Above national, Target Achieved
SDG 13	59-67 = -8	41	Below national, Widest gap to target
SDG 15	82-75 = +7	18	Above national

Interpretation: The gap analysis indicates that Telangana has either matched or exceeded the national average in SDGs 6, 7 and 15. The state achieved the SDG 7 target with a perfect score, indicating complete achievement according to the SDG Index framework. However, SDG 13 shows an 8-point deficit compared to the national average and a 41-point gap from the ideal score of 100, making climate action the most critical area for policy intervention.

Figure 8.2. Benchmarking



Interpretation: The benchmarking chart clearly demonstrates Telangana's comparative strengths in SDGs 7 and 15 and its slight advantage in SDG 6. The only area where Telangana

falls below the national average is SDG 13, confirming that climate action remains a significant developmental challenge despite satisfactory performance in the other environmental sustainability goals.

Table 8.5: Rank Analysis - Telangana Among 28 States

Goal	Rank 2019-20	Rank 2020-21	Rank 2023-24	Change in Rank
SDG 6	8th	4th	7th	Improved then slipped -3
SDG 7	9th	1st (15 states at 100)	1st (shared)	Achieved top rank
SDG 13	7th	7th	19th	Major deterioration
SDG 15	3rd	3rd	7th	Stable in Top 10

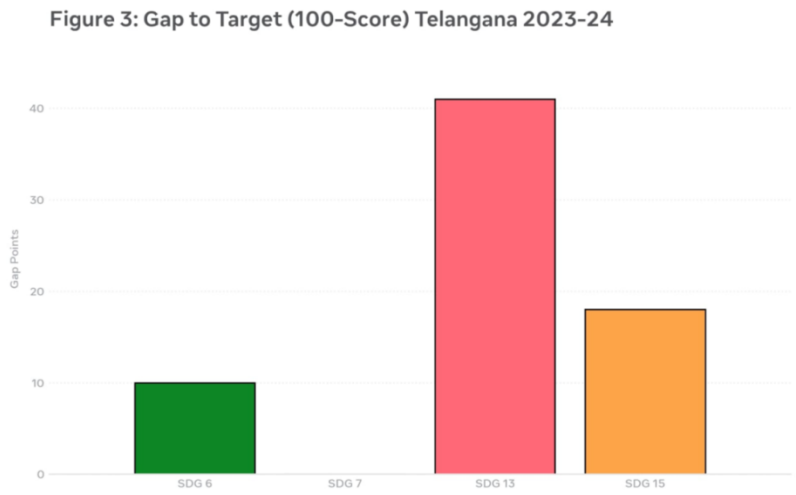
Interpretation: The ranking analysis reveals substantial progress in SDG 7, where Telangana moved from 9th position to joint 1st rank among states. In SDG 6, the state improved initially but slipped slightly in the latest edition. The most notable decline occurred in SDG 13, where Telangana's rank fell from 7th to 19th, indicating a significant deterioration in comparative performance. Although Telangana's rank in SDG 15 declined, it remained within the top ten states, reflecting sustained strength in land-related sustainability indicators.

Table 8.6: Peer State Benchmarking (2023-24 Edition)

State	SDG 6	SDG 7	SDG 13	SDG 15	Composite
Kerala	85	100	70	93	79
Karnataka	86	100	65	75	72
Tamil Nadu	87	100	61	63	78
Maharashtra	90	98	64	70	70
Andhra Pradesh	88	96	62	65	72
Telangana	90	100	59	82	74
India Average	89	96	67	75	71

Interpretation: Among the selected peer states, Telangana emerged as one of the strongest performers in SDGs 7 and 15, equalling the highest energy score and recording the second-highest land score after Kerala. Its performance in SDG 6 was also competitive and on par with Maharashtra. However, Telangana recorded the lowest climate action score among the peer states, suggesting that climate governance and resilience measures have not advanced at the same pace as achievements in water, energy and land management.

Figure 8.3 - Gap to Target



Interpretation: The figure highlights the distance between Telangana's current performance and the ideal SDG target score of 100. SDG 7 has already achieved the target, while SDG 6 remains close to attainment. SDG 15 requires moderate improvement, whereas SDG 13 exhibits the largest gap of 41 points, clearly identifying climate action as the state's foremost environmental sustainability challenge.

Table 8.7: Sector Data CAGR Validation

Sector Indicator	2019	2024	CAGR	Supports Index Score?
Renewable Capacity Telangana	3,621 MW (2019)	5,865 MW (2024)	10.12%	Yes - supports SDG 7 = 100, growth rate matches score
Forest Cover Telangana (ISFR)	20,582 sq km (2019)	21,214 sq km (2021)	1.5%	Yes - slow growth explains SDG 15 stable at 82, not rising
Groundwater Over-exploited Units	26% blocks (2017)	35% (2022)	Worsening	Explains SDG 6 decline 96→90 and SDG 13 low - WMO 2025 reports persistent deficits 2022-2025
Hyderabad AQI >100 days	89 days (2019)	127 days (2023)	+9.2% worsening	Explains SDG 13 low - air quality not in Index directly but disaster linked

Interpretation: The sector-level indicators largely support the SDG Index findings. Rapid growth in renewable energy capacity validates Telangana's perfect SDG 7 score, while modest growth in forest cover is consistent with the stable SDG 15 performance. Increasing groundwater stress supports the recent decline in SDG 6 scores, and deteriorating environmental indicators associated with climate resilience help explain Telangana's relatively weak SDG 13 performance. These results demonstrate the usefulness of combining index scores with sectoral evidence to assess sustainability outcomes.

Indicator-Level Challenges Behind SDG Gaps:

The indicator-level assessment reveals that groundwater stress and inadequate climate resilience are the primary constraints affecting Telangana's environmental sustainability performance, while renewable energy expansion remains the state's strongest area of achievement.

Table - 8.8. - Indicator-Level Challenges Behind SDG Gaps

SDG	Weak Indicator	Evidence
SDG 6	Groundwater stress	Over-exploited blocks increased from 26% to 35%
SDG 7	No major gap	Score reached 100
SDG 13	Disaster preparedness	Major contributor to low climate score
SDG 15	Slow increase in forest cover	CAGR only 1.5%

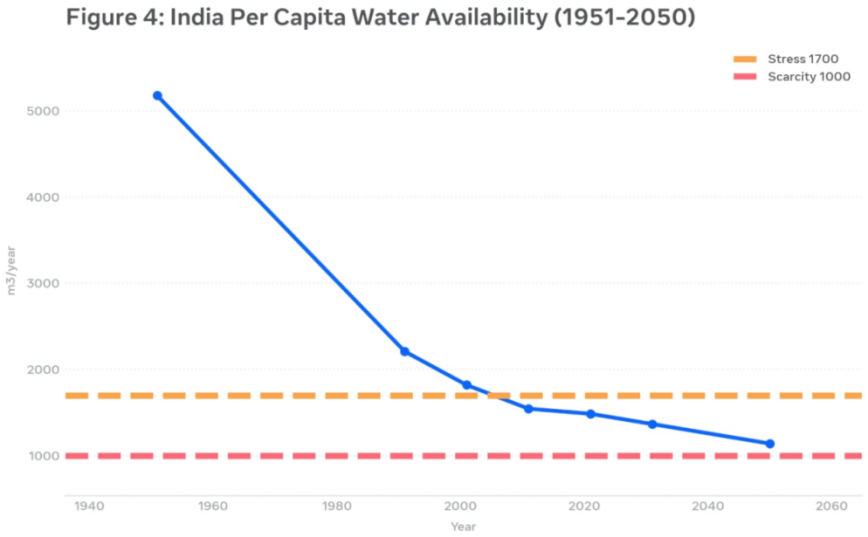
Interpretation: The indicator-level analysis helps explain the reasons behind Telangana's varying performance across the four environmental SDGs. While SDG 7 (Affordable and Clean Energy) has already achieved the target score and shows no major implementation gap, SDG 6 (Clean Water and Sanitation) faces challenges arising from increasing groundwater stress, reflected in the rise of over-exploited groundwater blocks. Similarly, SDG 13 (Climate Action) remains the weakest-performing goal due to shortcomings in climate resilience and disaster preparedness indicators, which have constrained the state's overall climate score. Although SDG 15 (Life on Land) continues to perform well, the relatively slow growth in forest cover indicates that future improvements may require greater emphasis on ecosystem quality and biodiversity conservation. Overall, the table demonstrates that Telangana's environmental sustainability gaps are driven not only by goal-level performance but also by specific sectoral challenges, particularly in groundwater management and climate resilience, which require targeted policy interventions.

Table 8.9: Policy Matrix from Gap Analysis

Priority	Goal	GAP	Suggested Action (From CER Model)
P1 - Critical	SDG 13	41 points, Z-score -0.60, Rank 19th	Establish City CER Cell in GHMC, improve disaster preparedness from 19.20 to 80, Link KUSUM solar pumps with micro-irrigation mandate
P2 - Maintain	SDG 7	0 gap	Maintain 100, shift focus to RE storage + Green Hydrogen with water assessment
P3 - Sustain	SDG 15	18 gap, Z-score +0.93	Haritha Haram 2.0 - increase quality not just area, prevent 29,000 ha diversion trend
P4 - Recover	SDG 6	10 gap, declining trend	Focus on groundwater - Tank restoration data shows 35% blocks over-exploited, implement Water Credit

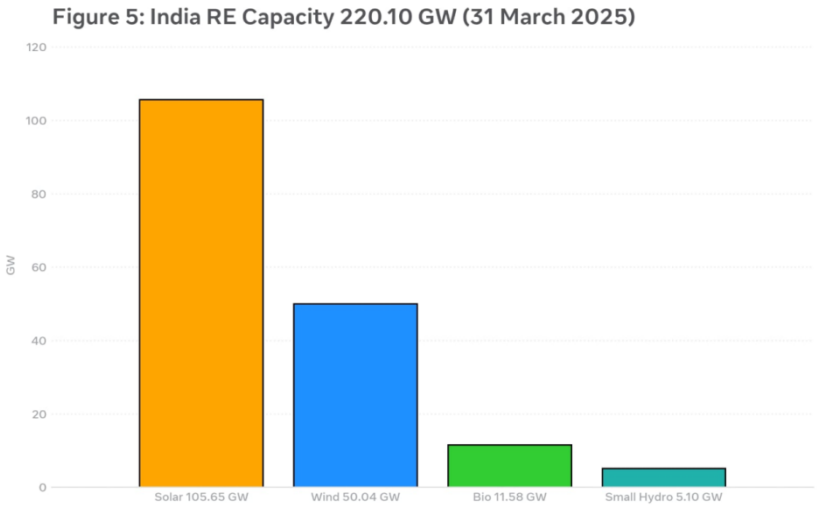
Interpretation: The policy matrix identifies SDG 13 (Climate Action) as the highest priority area due to its large performance gap, low ranking, and below-average score, indicating the need for stronger climate resilience and disaster preparedness measures. SDG 7 (Affordable and Clean Energy) has achieved the target score and therefore requires policy efforts to focus on sustaining gains through renewable energy storage and green energy initiatives. SDG 15 (Life on Land) demonstrates strong performance but still requires continued efforts in forest and biodiversity conservation to bridge the remaining gap. SDG 6 (Clean Water and Sanitation), although performing above the national average, shows signs of decline, highlighting the importance of groundwater conservation and sustainable water resource management. Overall, the matrix suggests prioritising climate action while maintaining achievements in energy, land, and water management for balanced environmental sustainability.

Figure 8.4 - Water Security



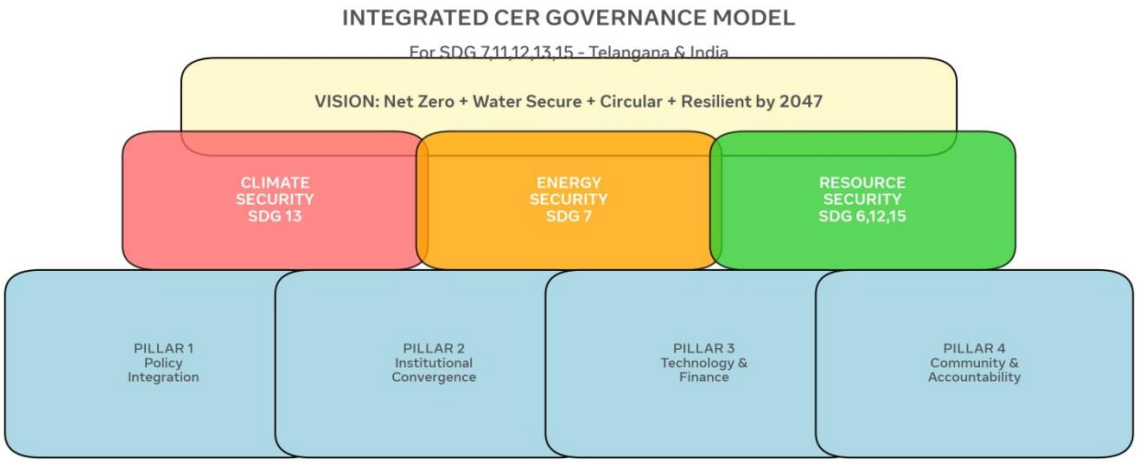
Interpretation: The figure shows a continuous decline in India's per capita water availability from over 5,000 m^3 in 1951 to nearly 1,100 m^3 by 2050. The trend crosses the water stress threshold and moves close to the water scarcity level, indicating growing pressure on water resources. For Telangana, which is heavily dependent on groundwater, this highlights the importance of sustainable water management, groundwater recharge, and conservation measures to maintain SDG 6 performance.

Figure 8.5 - Energy Security



Interpretation: The figure illustrates that solar energy constitutes the largest share of India's renewable energy capacity, followed by wind, bio-energy, and small hydro power. The rapid expansion of renewable energy capacity supports India's progress towards clean energy goals and validates Telangana's achievement of a perfect SDG 7 score. The findings suggest that future efforts should focus on energy storage, grid integration, and green hydrogen technologies to sustain long-term energy security.

Figure 8.6 - Integrated CER Model



Interpretation: The Integrated Climate-Energy-Resource (CER) Governance Model highlights the interdependency of climate security (SDG 13), energy security (SDG 7) and resource security (SDGs 6 and 15) and calls for a coordinated policy approach. The four pillars of sustainable development proposed in the model are: Policy integration, Institutional

convergence, Technology and finance support, and Community participation. It offers a strategic blueprint for Telangana to enhance energy, water, and land management and build climate resilience.

Major Findings

- Telangana has met and maintained a perfect score for SDG 7.
- Telangana continued to be better than the national average in SDGs 6 and 15.
- SDG 13 had the lowest score, the largest target gap (41 points) and the lowest ranking.
- Water scarcity became one of the major issues for SDG 6.
- Telangana did well in energy and land management when compared to other states, but was weak in climate action.
- The CER Governance Model offers a holistic approach to environmental sustainability.

Overall Discussion Statement:

Progress is asymmetric in the analysis based on absolute change, gap analysis, Z-score and rank analysis. Telangana shows Achiever status in SDG 7 (Z=+0.91) and Front Runner in SDG 15 (Z=+0.93), but Performer in SDG 13 (Z=-0.60). The SDG 13 in India improved from 54 to 67 (+24%) nationally while Telangana improved from 43 to 59 (+37%) but still 8 points below national average. This is a confirmation that energy and land successes have not led to climate resilience, and thus a need for integrated Climate-Energy-Resource governance as stated in the objectives.

Policy Implications

- Climate resilience should receive the highest policy priority.
- Groundwater management must complement water supply initiatives.
- Renewable energy leadership should be strengthened through storage and green hydrogen development.
- Afforestation programmes should focus on forest quality and biodiversity enhancement.
- Integrated CER governance should be institutionalised at the state and urban levels.

Conclusion:

This study analyzed the progress of the SDG India Index and the supporting sectoral indicators of SDGs 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 13 (Climate Action)

and 15 (Life on Land) for the period 2019-2024 for the state of Telangana. The analysis shows that Telangana has made significant strides in environmental sustainability, with the highest score of 100 in SDG 7, Renewable and clean energy, reflecting its high performance in renewable energy and energy access. The state also did well in SDG 15, consistently outperforming the national average and ranking among the top states in land and forest indicators. SDG 6 has improved overall, but there is increasing concern about groundwater depletion and water stress, as evidenced by recent declines.

SDG 13 (Climate Action) was the lowest performing area, however. Though it has recovered in the latest edition, Telangana still lagged behind the national average and saw a substantial drop in state ranking. The need for climate resilience and disaster preparedness was consistently identified as a significant challenge across all gap analysis, z-score analysis and benchmarking results. The sectoral validation also showed that there has been no corresponding improvement in renewable energy and forest cover with respect to climate adaptation and resilience measures.

The study finds that the progress made in environmental sustainability in Telangana has been uneven, with good results in energy and land use, but weaker results in climate action. The state needs to build on its strengths in clean energy and ecosystem conservation, while strengthening its focus on climate resilience, sustainable groundwater management and integrated resource governance to ensure balanced progress towards the 2030 SDG targets. The proposed Integrated Climate-Energy-Resource (CER) Governance Model provides a holistic approach to policy coordination between water, energy, climate and land sectors, which would help to achieve more sustainable and resilient development in Telangana.

Thus, the success of energy and land management alone is not enough to ensure environmental sustainability as a whole, as Telangana has shown. To achieve balanced progress towards the 2030 SDG targets, integrated governance is needed that can tackle climate resilience, water security, renewable energy expansion and ecosystem conservation.

References

- Baig, F., Kassem, A., Akhter, M. Z., Kabeer, S., Faiz, M. A., Baig, M. F., & Sherif, M. (2025). Synergies and struggles: Water security and climate action in South Asia's quest for SDG 6 and SDG 13. *Gondwana Research, 148*, 393-414. https://doi.org/10.1016/j.gr.2025.07.022
- Centre for Economic and Social Studies (CESS). *Sustainable Development Goals in Telangana.* Hyderabad: CESS. *(Verify year and editor details.)*

- Government of India, Ministry of Finance. (2022). *Economic Survey 2021-22*, chapter on Sustainable Development and Climate Change. New Delhi.
- NITI Aayog. *SDG India Index and Dashboard* (editions 2019-20, 2020-21 and 2023-24). New Delhi: NITI Aayog.
- Parekh, P., & Lal, B. (2024). Assessing progress made by Indian states and UTs for the attainment of Sustainable Development Goals. In *Modeling Economic Growth in Contemporary India*. Emerald Publishing.
- Sharma, S., & Tripathi, U. (2022). India's march forward: Progress on the Index for the Sustainable Development Goals. In *Handbook of Research on Building Greener Economics and Adopting Digital Tools in the Era of Climate Change*. IGI Global. https://doi.org/10.4018/978-1-6684-4610-2.ch010

Responsible Trekking and Environmental Sustainability in the Western Ghats: Ecological Sensitivity and Policy Perspectives

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The Western Ghats are an ecologically important region of India, known for their rich biodiversity, forests, water resources and diverse landscapes. The region also attracts visitors for trekking and other nature-based activities. Although trekking provides opportunities to experience nature, recreational activities in ecologically sensitive areas may create environmental pressures related to waste generation, plastic pollution, trail damage, wildlife disturbance and overcrowding. Responsible trekking is therefore essential for balancing recreational activities with environmental protection.

This study examined responsible trekking and environmental sustainability in selected trekking destinations of the Western Ghats of Karnataka. It assessed environmental awareness among trekkers, responsible trekking practices, compliance with existing guidelines, reported environmental pressures and perceptions of management effectiveness. A descriptive and analytical research design was adopted, and primary data were collected from 123 respondents through a structured questionnaire. The data were analyzed using descriptive statistics, Cronbach's alpha and Spearman's rank correlation.

The findings indicated relatively high mean scores for environmental awareness (3.94), responsible trekking behaviour (3.91) and guideline compliance (3.82). Overcrowding was the most frequently reported environmental pressure (41.5%), followed by noise (17.1%). A significant positive relationship was found between environmental awareness and responsible trekking behaviour ($\rho = 0.678$, $p < .001$). However, the relationship between guideline compliance and perceived management effectiveness was not statistically significant ($\rho = 0.130$, $p = .152$).

The study also considered the relevance of the High-Level Working Group report on the Western Ghats as a broader policy reference for ecological protection, sustainable development, environmental monitoring and community participation. The findings highlight

the importance of strengthening environmental awareness, consistently implementing existing trekking guidelines, improving visitor monitoring and encouraging responsible visitor behaviour. The study contributes to discussions on sustainable development, environmental governance and biodiversity protection in ecologically sensitive regions.

Keywords: Western Ghats, responsible trekking, environmental sustainability, ecological sensitivity, visitor management, environmental governance.

1. Introduction

The Western Ghats are one of the ecologically significant regions of India, extending across six states, including Karnataka. The region is known for its rich biodiversity, forests, water resources and diverse natural landscapes. It plays an important role in maintaining the ecological balance of peninsular India. Its natural beauty and ecological importance have also made it a popular destination for trekking and other nature-based recreational activities.

Trekking provides visitors with opportunities to experience natural landscapes and develop an appreciation for environmental conservation. However, recreational activities in ecologically sensitive areas may create environmental pressures through waste generation, plastic litter, damage to vegetation, disturbance to wildlife and movement outside designated trails. These concerns highlight the importance of responsible trekking in balancing recreational use with environmental protection.

Responsible trekking involves practices that minimize harm to the natural environment, including proper waste disposal, reducing unnecessary plastic use, following designated trails, protecting vegetation and wildlife, and complying with trekking guidelines. Environmental awareness can encourage such practices, but awareness does not always translate into responsible behaviour. Examining the relationship between environmental awareness, trekking practices and compliance is therefore important for understanding visitor behaviour and identifying areas where environmental management can be strengthened.

Karnataka has established trekking-management measures through Forest Department guidelines and Standard Operating Procedures. These measures provide a framework for regulating trekking activities and addressing visitor safety and environmental protection. The relevant concern is therefore not merely the existence of regulations, but also whether trekkers understand and follow the applicable guidelines and whether their implementation and monitoring can be strengthened to support biodiversity conservation.

The issue also has wider implications for public policy and environmental governance. The High-Level Working Group on the Western Ghats, chaired by Dr. K. Kasturirangan, examined the need to balance ecological protection with sustainable development. Its report provides a broader policy reference for considering ecological sensitivity, environmental monitoring, sustainable tourism and local community participation. Although the report was not specifically designed to regulate individual trekking behaviour, its broader principles are relevant to discussions on responsible tourism and environmental management in the Western Ghats.

Against this background, the present study examines the relationship between environmental awareness, responsible trekking behaviour, compliance with existing guidelines and perceived management effectiveness in selected trekking destinations of the Western Ghats in Karnataka. It also considers visitor-reported environmental pressures, including overcrowding, noise, waste, disturbance to wildlife and damage to natural features. By examining these aspects together, the study seeks to identify areas where visitor awareness, implementation of existing guidelines and trekking-management practices may be improved.

The study is limited to visitor-related aspects of environmental sustainability at selected trekking destinations. It does not assess the overall ecological condition of the Western Ghats or evaluate the entire trekking-policy framework of Karnataka. Instead, it focuses on trekker responses and perceptions to develop evidence-based recommendations for responsible trekking, effective visitor management and biodiversity protection.

2. Statement of the Problem

The Western Ghats of Karnataka attract visitors for trekking and other nature-based recreational activities. Although existing Forest Department guidelines and Standard Operating Procedures provide a framework for managing trekking activities, effective environmental protection also depends on visitor awareness, compliance with applicable guidelines and consistent monitoring.

Trekking-related environmental pressures may include plastic waste, improper waste disposal, excessive noise, overcrowding, movement into restricted or sensitive areas, damage to vegetation and disturbance to wildlife. Other irresponsible practices, such as scratching trees, removing natural objects and ignoring instructions provided by guides, may also affect the

natural environment. The extent to which these concerns occur at individual destinations requires appropriate evidence and assessment.

The central problem addressed by this study is the relationship between trekkers' environmental awareness, their responsible trekking behaviour and their compliance with existing guidelines. It also examines how trekkers perceive the effectiveness of current management measures. Understanding these aspects is important because awareness and compliance alone may not provide a complete picture of visitor management or the environmental pressures reported at trekking destinations.

Therefore, the study investigates these issues in selected trekking destinations of the Karnataka Western Ghats using responses from trekkers. The findings are intended to identify areas where environmental awareness, implementation of existing guidelines, visitor monitoring and management practices may be strengthened to support responsible trekking and biodiversity conservation.

3. Scope of the Study

The study focuses on responsible trekking and environmental sustainability in selected trekking destinations of the Western Ghats in Karnataka. It examines visitor-related aspects of environmental protection based on responses collected from 123 trekkers.

The study covers the following areas:

1. Environmental awareness: Trekkers' understanding of environmental protection and the ecological consequences of visitor activities.
2. Responsible trekking behaviour: Practices relating to waste disposal, plastic use, designated trails and protection of natural features and wildlife.
3. Environmental pressures: Respondents' reports of overcrowding, noise, waste and other visitor-related environmental concerns.
4. Guideline compliance: Trekkers' reported compliance with existing trekking guidelines and instructions.
5. Perceived management effectiveness: Respondents' perceptions of the effectiveness of trekking-management measures.

The study also considers relevant government guidelines, academic literature and the High-Level Working Group report on the Western Ghats to develop policy recommendations for improving visitor awareness, monitoring and environmental management.

The scope is limited to the responses of the selected participants and the secondary sources examined. It does not assess the overall ecological condition of the Western Ghats, directly measure environmental damage or evaluate the entire trekking-management framework of Karnataka. The findings are intended to provide insights into responsible trekking practices and identify areas where existing management measures may be strengthened.

4. Objectives of the Study

1. To assess the level of environmental awareness among trekkers visiting selected trekking destinations in the Western Ghats of Karnataka.
2. To examine self-reported responsible trekking practices and compliance-related behaviour among trekkers.
3. To identify the major forms of environmental pressure associated with visitor activities, including waste, plastic use, noise, overcrowding, disturbance to wildlife and damage to natural features.
4. To examine the perceived effectiveness and implementation of existing trekking guidelines and management measures.
5. To suggest evidence-based measures for strengthening trekking management and biodiversity protection in the Western Ghats of Karnataka.

5. Research Methodology

The study adopted a **quantitative, descriptive and analytical research design** to examine environmental awareness, responsible trekking practices and compliance-related behaviour among trekkers visiting selected trekking destinations in the Western Ghats of Karnataka. Primary data were collected from **123** respondents through a structured questionnaire containing multiple-choice and rating-scale questions. The questionnaire covered environmental awareness, responsible trekking practices, environmental pressures, compliance with existing trekking guidelines and perceptions of management effectiveness. **Purposive sampling** was used to select respondents with trekking experience in the selected destinations. Secondary data were obtained from **Karnataka Forest Department guidelines** and **Standard Operating Procedures (SOPs), the High-Level Working Group report on the Western Ghats,** government publications, academic studies and other credible sources. The collected

data were analyzed using descriptive statistics, Cronbach's alpha and Spearman's rank correlation to examine response patterns, assess the internal consistency of selected measures and investigate relationships between key variables. The findings were used to develop evidence-based policy suggestions for sustainable trekking management and biodiversity protection.

6. Review of Literature

Sustainable Tourism and Environmental Sustainability

Nature-based tourism has received considerable attention because it provides opportunities for people to experience natural environments while also creating a need to protect ecological resources. **Ardoin et al. (2015),** through a review of research on nature-based tourism, examined environmental knowledge, attitudes, intentions and behaviour among visitors. The review indicated that although environmental awareness has received considerable attention, relatively fewer studies have directly examined actual behavioural change among visitors. This highlights the importance of examining how environmental understanding is reflected in visitor practices.

Li et al. (2024), in a systematic review of 331 publications on sustainable tourist behaviour, identified pro-environmental behaviour, responsible behaviour and sustainable consumption as important areas of sustainable tourism research. The review also highlighted the continuing need to understand the relationship between environmental intentions and actual behaviour. This is relevant to trekking destinations where environmental sustainability depends not only on visitor awareness but also on responsible practices while using natural areas.

Environmental Awareness and Responsible Visitor Behaviour

Environmental awareness is an important factor in understanding responsible behaviour among visitors to natural areas. **Sharma and Gupta (2020),** in their study of nature-based tourists in an Indian national park, examined environmental awareness, personal norms and pro-environmental behaviour. Their findings indicated that awareness of environmental consequences and a sense of responsibility were associated with environmentally responsible behaviour.

Esfandiar et al. (2022), through a systematic review of 88 empirical studies on pro-environmental behaviour in protected areas, examined different forms of visitor behaviour, including littering and staying on designated trails. The review highlighted the importance of

examining specific environmental behaviour rather than considering pro-environmental behaviour as a single general activity. It also identified the need for greater attention to actual behaviour rather than relying only on behavioural intentions.

Maidullah et al. (2024) examined pro-environmental behaviour among national park visitors in India by considering recreation involvement, environmental activism and place attachment. The study provides evidence that visitors' engagement with natural areas and their environmental involvement are relevant to understanding responsible behaviour in protected areas.

Visitor Behaviour and Environmental Pressure

Visitor behaviour can influence the environmental conditions of recreational and protected areas. Research has examined activities such as littering, inappropriate movement and other forms of visitor-related environmental impact. **Esfandiar et al. (2022)** highlighted the importance of specific behaviour such as littering and trail-related behaviour when assessing pro-environmental practices in protected areas.

Gross et al. (2023), through a systematic review of tourists' valuation of nature in protected areas, examined how visitors relate to and value natural environments. The review demonstrates the importance of understanding visitors' relationship with nature when considering environmental protection.

Wang and Yin (2026) examined the gap between tourists' pro-environmental intentions and actual behaviour in nature-based destinations. Their study draws attention to the fact that positive environmental intentions do not necessarily result in responsible actions. This distinction is important in trekking environments, where visitors may express concern for nature but their actual practices may differ.

These studies are relevant to the present research because responsible trekking involves practical behaviour such as appropriate waste management, following designated trails, avoiding unnecessary disturbance and respecting natural features and wildlife.

Visitor Management, Monitoring and Policy Implementation

Visitor management is an important component of environmental protection in areas experiencing recreational use. **Salerno et al. (2013),** in their study of tourism and carrying capacity in the Mount Everest region, considered environmental, social, spatial and temporal dimensions of tourism pressure. Their study demonstrates that managing tourism pressure

requires consideration of the characteristics and conditions of the destination rather than relying only on visitor numbers.

Pásková et al. (2021) examined carrying capacity and visitor management from a systems perspective. Their work emphasized the importance of understanding visitor numbers, patterns of use and the wider destination context while developing visitor-management approaches.

Pickering et al. (2018), through a review of visitor monitoring and management research in recreational and protected areas, highlighted the importance of monitoring visitor use and environmental conditions for supporting management decisions. These studies indicate that environmental guidelines and visitor regulations need to be supported by monitoring and effective implementation.

For trekking destinations, this literature provides a basis for examining whether visitors understand existing guidelines, whether responsible practices are followed and where implementation and monitoring can be strengthened.

Western Ghats and Sustainable Tourism Governance

The Western Ghats provide an important context for examining the relationship between tourism and environmental protection because of their ecological significance. The High-Level Working Group report on the Western Ghats emphasized ecological protection along with sustainable development and recognized the importance of sustainable tourism, environmental monitoring and local community participation. The report provides a broader policy framework for considering tourism and ecological protection in the Western Ghats.

However, the policy framework does not specifically examine the behaviour of individual trekkers or the extent to which trekkers understand and follow trekking guidelines. This creates scope for examining the visitor-level dimension of environmental sustainability.

Research on tourism in the Western Ghats has also considered the relationship between tourism development, environmental management, biodiversity conservation and community participation. Such studies indicate that tourism in ecologically sensitive areas needs to be considered together with environmental protection and appropriate management practices.

7. Research Gap

The reviewed literature shows that sustainable tourism research has given considerable attention to environmental awareness, pro-environmental behaviour, visitor impacts and

protected-area management. Previous studies have examined issues such as littering, trail behaviour, environmental responsibility, visitor pressure, carrying capacity and monitoring. However, there remains scope to examine these dimensions together within the specific context of trekking destinations, particularly the relationship between environmental awareness, responsible trekking practices, compliance with existing guidelines and perceived management effectiveness.

The literature also highlights the importance of understanding the relationship between environmental awareness and actual behaviour. Although environmental awareness may encourage responsible practices, awareness alone does not necessarily ensure consistent compliance with environmental guidelines. Examining this relationship in trekking destinations is important because visitor activities take place in natural environments that may be ecologically sensitive.

In the context of the Western Ghats, existing policy literature provides a broader framework for ecological protection, sustainable tourism, environmental monitoring and community participation. However, further visitor-level evidence can help clarify how trekkers understand and report compliance with existing trekking guidelines and how they perceive the effectiveness of current management measures.

Therefore, the present study addresses this research gap by examining environmental awareness, self-reported responsible trekking behaviour, reported environmental pressures, guideline compliance and perceived management effectiveness in selected trekking destinations of the Karnataka Western Ghats. By analyzing these dimensions together, the study seeks to identify opportunities for improving visitor awareness, strengthening the implementation of existing guidelines and supporting evidence-based trekking management and biodiversity conservation.

8. Hypotheses

Hypothesis 1: Environmental Awareness and Responsible Trekking Behaviour

H_{01} (Null Hypothesis):

There is no significant relationship between environmental awareness and responsible trekking behaviour among trekkers visiting selected trekking destinations in the Western Ghats of Karnataka.

H_{11} (Alternative Hypothesis):

There is a significant relationship between environmental awareness and responsible trekking behaviour among trekkers visiting selected trekking destinations in the Western Ghats of Karnataka.

Hypothesis 2: Compliance with Existing Guidelines and Perceived Effectiveness of Trekking Management

H_{02} (Null Hypothesis):

There is no significant relationship between trekkers' compliance with existing trekking guidelines and their perception of the effectiveness of trekking management measures.

H_{12} (Alternative Hypothesis):

There is a significant relationship between trekkers' compliance with existing trekking guidelines and their perception of the effectiveness of trekking management measures.

9. Operational Definitions

1. **Environmental Awareness:**

The level of understanding among trekkers regarding the ecological sensitivity of the Western Ghats and the environmental consequences of activities such as littering, plastic use, noise, vegetation damage and disturbance to wildlife.

1. **Responsible Trekking Behaviour:**

The extent to which trekkers follow environmentally responsible practices while trekking, including proper waste management, staying on designated trails, avoiding damage to natural features and respecting wildlife and environmental instructions.

1. **Trekking Guidelines:**

The environmental, safety and visitor-management instructions applicable to trekkers at the selected trekking destinations, including instructions relating to designated routes, waste, restricted areas, visitor conduct and guide directions.

1. **Compliance:**

   The extent to which trekkers follow and adhere to the existing trekking guidelines and instructions provided by the Forest Department, guides and trekking-management authorities.

2. **Environmental Pressure:**

The visitor-related pressure placed on the natural environment through activities such as waste generation, plastic pollution, excessive noise, overcrowding, disturbance to wildlife, movement outside designated routes and damage to vegetation or natural features.

1. **Perceived Management Effectiveness:**

The extent to which trekkers perceive existing trekking rules, monitoring, guide instructions, visitor management and other management measures as effective in promoting responsible behaviour and protecting the environment.

1. **Visitor Management:**

The measures used to regulate and manage visitor activities at trekking destinations, including visitor control, route management, monitoring, guidance, compliance and environmental protection measures.

1. **Ecological Sensitivity:**

The vulnerability of natural areas to disturbance or environmental damage resulting from visitor activities, particularly in relation to vegetation, wildlife, water resources, trails and other natural features.

1. **Selected Trekking Destinations:**

The trekking locations in the Western Ghats of Karnataka included within the geographical scope of the present study.

These operational definitions provide a common basis for measuring the variables used in the questionnaire and for interpreting the results of the study.

10. Plan of Analysis

Data collected from **123** respondents were coded and organized for analysis. Descriptive statistics, including frequency, percentage, mean and standard deviation, were used to summarise the respondents' profiles and key study variables. Cronbach's alpha was used to assess the internal consistency of the multi-item scales, wherever appropriate.

Spearman's rank correlation analysis was used to examine the relationship between environmental awareness and responsible trekking behaviour, and between compliance with existing trekking guidelines and perceived effectiveness of trekking management measures. Statistical significance was assessed at the 5% level. The findings were presented through concise tables and selected graphs. The results were interpreted in relation to the study objectives to identify patterns in environmental awareness, responsible trekking behaviour,

reported environmental pressures, guideline compliance and perceived management effectiveness. The findings were subsequently used to develop practical recommendations for strengthening trekking management, environmental sustainability and biodiversity protection.

Table 1: Respondent profile and Major Environmental pressure (N=123)

Variable	Category	Frequency	Percentage
Age	Below 20 years	8	6.5%
Age	20–29 years	54	43.9%
Age	30–39 years	34	27.6%
Age	40–49 years	17	13.8%
Age	50 years and above	10	8.1%
Trekking frequency	Once	18	14.6%
Trekking frequency	2–3 times	39	31.7%
Trekking frequency	4–5 times	29	23.6%
Trekking frequency	More than 5 times	37	30.1%
Guideline information	Social media/internet	44	35.8%
Guideline information	Trekking guide/organiser	30	24.4%
Guideline information	Forest Department/official source	25	20.3%
Guideline information	Usually do not check	14	11.4%
Guideline information	Friends/family	10	8.1%
Environmental pressure	Overcrowding	51	41.5%
Environmental pressure	Noise	21	17.1%
Environmental pressure	Plastic/waste	16	13.0%
Environmental pressure	Vegetation/natural-feature damage	13	10.6%
Environmental pressure	Off-route movement	11	8.9%
Environmental pressure	Wildlife disturbance	11	8.9%

Interpretation: Most respondents were aged 20–29 years (43.9%), and 53.7% had undertaken trekking at least four times. Social media/internet was the most common source of guideline information (35.8%). Overcrowding was the leading environmental pressure reported by respondents (41.5%), followed by noise (17.1%).

Analysis: Table 2. Descriptive Statistics of Study Constructs (N = 123)

Table 2. Reported environmental pressures. (N = 123)

Construct	Items	N	Mean	SD
Environmental awareness	Q4–Q7	123	3.94	0.75
Responsible trekking behaviour	Q8–Q11	123	3.91	0.74
Reported environmental pressures	Q12–Q14	123	3.64	0.66
Guideline compliance	Q16–Q18	123	3.82	0.91
Management effectiveness (perceived)	Q19–Q20	123	2.33	0.97

Interpretation: Environmental awareness (M = 3.94), responsible trekking behaviour (M = 3.91) and guideline compliance (M = 3.82) recorded relatively high mean scores. Reported environmental pressures also scored 3.64, suggesting that respondents reported encountering such pressures during trekking. Perceived management effectiveness was lower (M = 2.33), indicating less favorable assessments of existing management measures.

Analysis: Cronbach's Alpha

Table 3: Reliability Analysis

Scale	Items	No. of items	N	Cronbach's alpha
Environmental awareness	Q4-Q7	4	123	0.616
Responsible trekking behaviou	Q8-Q11	4	123	0.632
Guideline compliance	Q16-Q18	3	123	0.700

Interpretation: Guideline compliance recorded the highest Cronbach's alpha (0.700), indicating acceptable internal consistency. Environmental awareness (0.616) and responsible trekking behaviour (0.632) showed limited internal consistency. These two scales should be interpreted cautiously, and their items should be reviewed before drawing strong conclusions from composite scores.

Analysis: Spearman Correlation Results for the study Hypotheses

Table: 4 Spearman Correlation

Hypothesis / relationship	Test	N	Correlation (ρ)	p-value	Decision
H1: Awareness and responsible trekkin	Spearman's rho	123	0.678	<0.001	Significant positive relationship
H2: Guideline compliance and perceive	Spearman's rho	123	0.130	0.152	Not statistically significant

Interpretation:

Hypothesis 1: Environmental awareness was significantly and positively associated with responsible trekking behaviour ($\rho = 0.678$, $p < .001$) Therefore, the null hypothesis was rejected.

Hypothesis 2: The association between guideline compliance and perceived management effectiveness was not statistically significant ($\rho = 0.130$, $p = .152$) Therefore, the null hypothesis was not rejected.

Interpretation of the Overall Analysis

- The analysis of 123 respondents revealed relatively high environmental awareness (M = 3.94), responsible trekking behaviour (M = 3.91) and guideline compliance (M = 3.82). Overcrowding (41.5%) was the most frequently reported environmental pressure, followed by noise (17.1%). Cronbach's alpha indicated moderate internal consistency

for the awareness (0.616) and behaviour (0.632) scales, while the compliance scale recorded 0.700. Correlation analysis showed a significant positive relationship between environmental awareness and responsible trekking behaviour ($\rho = 0.678$, $p < 0.001$). However, the relationship between guideline compliance and perceived management effectiveness was not statistically significant ($\rho = 0.130$, $p = 0.152$). Overall, the findings highlight the importance of combining environmental awareness with effective visitor management, consistent implementation of existing guidelines and stronger protection of ecologically sensitive trekking destinations.

11. Secondary Data Analysis Interpretation:

Secondary source	Key points from the source	Relevance to the present study	Source details
1. High-Level Working Group (HLWG) Report on Western Ghats (2013)	Emphasises protection of biodiversity and ecological integrity while considering sustainable development and local livelihoods.	Provides the broad policy basis for managing trekking in ecologically sensitive landscapes and balancing conservation with responsible visitor use.	MoEFCC, Government of India. (2013). Report of the High Level Working Group on Western Ghats. https://www.moef.gov.in/uploads/2021/08/1-HLWG-Report-Part-1_0.pdf
2. MoEFCC material on ecological sensitivity (2010)	Highlights ecological vulnerability and the importance of local knowledge and community participation in decisions concerning ecologically sensitive areas.	Supports community awareness, stakeholder participation and locally appropriate measures for protecting trekking environments.	Press Information Bureau, Government of India. (2010). Official release on ecological sensitivity and community participation.
3. Government conservation update (2023)	Summarises continuing conservation programmes and the identification/protection of ecologically important areas.	Shows that trekking management can complement wider conservation work through visitor education, waste control and monitoring of sensitive locations.	Press Information Bureau, Government of India. (2023). Official conservation update.
4. MoEFCC draft Western Ghats ESA notification (2026)	A draft notification indicates continuing policy attention to identifying and protecting ecologically sensitive areas in the Western Ghats; it is a draft, not a final regulation.	Provides current policy context, but should not be cited as an enforceable final rule. Existing applicable trekking guidelines remain important.	MoEFCC, Government of India. (2026). Draft notification, Western Ghats Ecologically Sensitive Area.

Secondary sources establish the importance of protecting the Western Ghats through ecological safeguards, conservation measures and sustainable development. When considered alongside the survey findings—particularly the reported concerns about overcrowding and noise—they support the need for stronger visitor awareness, effective implementation of existing trekking guidelines and regular monitoring. The 2026 notification listed by MoEFCC is a draft.

12. Limitations of the Study

- Limited sample size of 123 respondents.
- Restricted coverage of trekking destinations.
- Reliance on self-reported responses.
- No direct measurement of environmental damage.
- Limited assessment of guideline implementation.

The internal consistency of the environmental awareness and responsible trekking behaviour scales was below the commonly used benchmark of 0.70. Although the guideline compliance

scale reached this benchmark, the reliability of the measures should be considered when interpreting the findings. The perceived management effectiveness construct was based on two questionnaire items, and its limited internal consistency warrants cautious interpretation. These measurement limitations should be considered when drawing conclusions from the statistical analysis.

13. Conclusion

This study examined environmental awareness, responsible trekking behaviour, compliance with existing guidelines, and perceived management effectiveness in the Western Ghats, based on responses from 123 participants. It identified overcrowding and noise as major reported environmental pressures. The analysis found a significant positive relationship between environmental awareness and responsible trekking behaviour, while the relationship between guideline compliance and perceived management effectiveness was not statistically significant. The study highlights the need to strengthen trekker awareness, implement existing guidelines consistently, and improve visitor monitoring to support responsible trekking and environmental sustainability in the Western Ghats.

14. Scope for Future Research

- Include a larger sample of trekkers across more Western Ghats destinations.
- Conduct seasonal studies to assess changes in visitor pressure.
- Use field observations to measure environmental impacts.
- Examine the implementation of existing trekking guidelines.
- Study the role of local communities, guides and forest officials.
- Evaluate the effectiveness of trekker awareness programmes and visitor management measures.

15. References

Ardoin, N. M., Wheaton, M., Bowers, A. W., Hunt, C. A., & Durham, W. H. (2015). Nature-based tourism's impact on environmental knowledge, attitudes, and behavior: A review and analysis of the literature and potential future research. Journal of Sustainable Tourism, 23(6), 838–858. https://doi.org/10.1080/09669582.2015.1024258

Esfandiar, K., Pearce, J., Dowling, R., & Goh, E. (2022). Pro-environmental behaviours in protected areas: A systematic literature review and future research directions. Tourism Management Perspectives, 41, Article 100943. https://doi.org/10.1016/j.tmp.2022.100943

Gross, M., Pearson, J., Arbieu, U., Riechers, M., Thomsen, S., & Martín-López, B. (2023). Tourists' valuation of nature in protected areas: A systematic review. Ambio, 52(6), 1065–1084. https://doi.org/10.1007/s13280-023-01845-0

Li, J., Coca-Stefaniak, J. A., Nguyen, T. H. H., & Morrison, A. M. (2024). Sustainable tourist behavior: A systematic literature review and research agenda. Sustainable Development, 32(4), 3356–3374. https://doi.org/10.1002/sd.2859

Maidullah, S., Kumar, J., Bhat, I. A., & Mandić, A. (2024). Pro-environmental behavior of visitors to national parks in India: Role of recreation involvement and environmental activism. Journal of Park & Recreation Administration, 42(3). https://doi.org/10.18666/JPRA-2024-12115

Pásková, M., Wall, G., Zejda, D., & Zelenka, J. (2021). Tourism carrying capacity reconceptualization: Modelling and management of destinations. Journal of Destination Marketing & Management, 21, Article 100638. https://doi.org/10.1016/j.jdmm.2021.100638

Pickering, C., Rossi, S. D., Hernando, A., & Barros, A. (2018). Current knowledge and future research directions for the monitoring and management of visitors in recreational and protected areas. Journal of Outdoor Recreation and Tourism, 21, 10–18. https://doi.org/10.1016/j.jort.2017.11.002

Sharma, R., & Gupta, A. (2020). Pro-environmental behaviour among tourists visiting national parks: Application of value-belief-norm theory in an emerging economy context. Asia Pacific Journal of Tourism Research, 25(8), 829–840. https://doi.org/10.1080/10941665.2020.1774784

Wang, Y., & Yin, P. (2026). Understanding the gap of tourists' pro-environmental intention and behavior in nature-based destinations: A social dilemma perspective. Journal of Sustainable Tourism. https://doi.org/10.1080/09669582.2026.2683035

Ministry of Environment and Forests. (2013). Report of the High Level Working Group on Western Ghats (Vol. 1). Government of India. https://moef.gov.in/uploads/2021/08/1-HLWG-Report-Part-1_0.pdf

Assessing the Extent of Digitalization in Farmer Producer Organizations with Digital Maturity Index

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The application of digital technologies has become increasingly relevant across economic and social activities, including agriculture. In agriculture, however, the extent of digitalization remains an area of enquiry. Much of the existing literature has focused on farm-level and farmer-level applications, with relatively less attention to digitalization at the organizational level. This is particularly relevant for Farmer Producer Organizations (FPOs), which function as collective business entities for member farmers and undertake activities such as input supply, aggregation, post-harvest management, financial operations, value addition and marketing. Their organizational functioning provides an important context for understanding how effectively digital technologies are integrated into agricultural and business activities. This can be understood through the concept of digital maturity, referring to the extent to which an organization has integrated digital technologies into its infrastructure, capabilities and organizational processes.

In this context, the present study undertook a preliminary assessment of digital maturity among FPOs. A Digital Maturity Index (DMI) was conceptualized for the FPO context across six dimensions: Access to Digital Infrastructure, Digital Skills and Capability, Smart Farming Practices and Technology Adoption, Digital Governance and Policies, Digitization in Financial Management, and Digital Marketing. The study also examined selected organizational factors, namely training exposure, governance effectiveness, innovation orientation, institutional linkages and organizational infrastructure. Data were collected from 30 FPOs across the country, selected through non-probability convenience sampling using a structured questionnaire. DMI scores were calculated using standardized scores across the six dimensions, and FPOs were relatively classified into Emerging, Transitional and Established Digital Maturity categories based on the distribution of scores within the study sample.

The assessment using DMI showed that Digital Skills and Capability was the relatively stronger dimension of digitalization among the FPOs. Governance Effectiveness and Organizational Infrastructure had significant positive associations with DMI, while Training

Exposure, Innovation Orientation and Institutional Linkages did not show significant associations. The study provides a preliminary understanding of digitalization among FPOs across different organizational and functional dimensions and offers a basis for further refinement of a comprehensive framework for assessing digital maturity in FPOs.

Keywords: Digitalization, Digital Maturity, FPOs, Digital Capabilities

1. Introduction

Agriculture is undergoing a significant transformation with the increasing integration of digital technologies into production, information delivery, financial services, supply chains and markets. Digitalization in agriculture refers to the adoption and integration of digital technologies, platforms, information systems and services across agricultural activities and related processes. It has the potential to improve access to information, enhance decision-making, facilitate access to financial and extension services, strengthen supply-chain coordination and improve market opportunities for farmers. The implications of agricultural digitization are multidimensional, extending beyond technology adoption to economic, social and institutional aspects of agriculture and rural development (Rolandi et al., 2021).

The growing application of digital technologies has created opportunities across different stages of the agricultural value chain. Digital extension and advisory services can improve access to timely information, while digital financial services, farm-management technologies and digital marketing platforms can support more efficient production and commercialization (Mabaya and Porceillo, 2022). However, the benefits of digitalization are not uniformly realized, particularly among smallholders (Sun et al., 2026). A Study led by Choruma et al. (2024) identified inadequate digital infrastructure and connectivity, limited digital literacy and affordability constraints as important barriers to the effective use of digital technologies in agriculture. These challenges indicate that the success of agricultural digitalization depends not only on the availability of technologies but also on the capacity of users and institutions to access, utilize and integrate them into their activities. (Arangurí et al., 2025, Smidt & Jokonya, 2022)

The Indian agricultural sector is similarly experiencing increasing digitalization, alongside persistent challenges of connectivity, affordability and digital literacy. Kapoor (2025) highlighted high initial costs, limited rural connectivity and digital literacy gaps as major constraints, while emphasizing the importance of policy support, affordable digital tools

and vernacular solutions for achieving inclusive digital transformation in agriculture. These challenges also underline the need for institutional mechanisms that can facilitate collective access to and effective use of digital technologies.

In this context, Farmer Producer Organizations (FPOs) provide an important institutional platform through which the benefits of digitalization can potentially reach groups of small and marginal farmers. FPOs enable producers to collectively undertake activities related to input procurement, production, value addition, finance and marketing, thereby improving their access to services and markets (Vilhekar, 2024). With the expansion of FPOs in India, their role is increasingly extending beyond collective economic activities towards technology-enabled service delivery and market participation (Salokhe, 2025). Consequently, the extent to which FPOs themselves are equipped to adopt and integrate digital technologies becomes an important consideration.

Digitalization of an FPO is not limited to the use of individual digital tools but encompasses digital infrastructure and skills, technology-enabled agricultural practices, governance and organizational processes, financial management, communication, and digital marketing (Bhowmik and Hazari, 2026). Therefore, the extent of digitalization may vary across different functional areas of an FPO, making it important to assess digitalization from a broader organizational perspective. Such an assessment can provide a more comprehensive understanding of how digital practices are integrated into the functioning of FPOs.

2. Rationale of the Study

While the literature increasingly documents the opportunities and challenges associated with digitization in agriculture, comparatively less attention has been given to digitization within FPOs as organizations. FPOs perform multiple functions related to input access, agricultural services, finance, aggregation and marketing; therefore, their ability to effectively integrate digital technologies is important for delivering these functions efficiently.

Existing studies have largely focused on the application of digital technologies at the farm and farmer level, with relatively limited attention to the organizational dimension of digitization in FPOs. Consequently, there is a need to understand how far digital practices have been integrated into the functioning of FPOs and where organizational gaps remain.

The present study therefore seeks to assess the extent of digitization among FPOs, identify areas of relative strength and gaps, and generate insights for strengthening their digital capabilities and role in digitally enabled agricultural development.

3. Scope and Limitations of the Study

The study focuses on Farmer Producer Organisations (FPOs) as organizational entities and examines the extent to which digitalization has been integrated into their functioning. The findings provide an organizational-level understanding of the current state of digitalization among the selected FPOs and offer preliminary insights into the extent of digital integration within FPOs. However, as the study is based on a cross-sectional assessment of selected FPOs, the findings represent the situation at the time of the study and cannot be generalized to all FPOs. This study may therefore be viewed as a preliminary assessment of digitalization among FPOs.

4. Methodology

The study adopted a descriptive and exploratory research design to assess the extent of digitization among Farmer Producer Organisations (FPOs) in India. Data were collected from 30 FPOs across the country through a structured questionnaire using non-probability convenience sampling, based on the accessibility and willingness of FPOs to participate. The Chief Executive Officers (CEOs) of the respective FPOs were selected as respondents because of their central role in managing the day-to-day operations and making decisions related to governance, finance, marketing, technology adoption, and institutional linkages.

The questionnaire collected information on the organisational profile of the FPOs and selected organisational factors including governance effectiveness, capacity building, innovation orientation and institutional linkages, along with information on infrastructure, human resources and constraints related to digital technology adoption. These variables were considered to understand the organisational and institutional context associated with digitization among FPOs.

The collected data were analysed using descriptive statistics to summarise the characteristics of the FPOs and their performance across the dimensions of digitization. The relationship between selected organisational factors and the extent of digitization was examined using appropriate statistical techniques.

4.1. Construction of Digital Maturity Index

The conceptualization of digital maturity in the present study was guided by the framework proposed by Zhang et al. for the agricultural sector. Zhang et al. (2019) conceptualized digital maturity as a continuous and ongoing process of organizational adaptation to a changing digital environment, extending beyond the mere implementation or adoption of individual digital technologies. Their framework emphasizes that digital transformation requires coordinated development of technological, operational, organizational and capability-related elements across the organization.

Building on this conceptual foundation, the present study contextualized digital maturity to the specific organizational functions of Farmer Producer Organizations (FPOs). In this study, digital maturity refers to the "extent to which an FPO has developed and integrated digital infrastructure, human capabilities, technology-enabled agricultural practices, governance mechanisms, financial processes and marketing functions into its operations". Thus, the DMI focuses not merely on whether digital technologies are available or used, but on the extent to which digitalization is embedded across the major functional areas of an FPO.

A composite Digital Maturity Index (DMI) was developed comprising six dimensions: Access to Digital Infrastructure (D1), Digital Skills and Capability (D2), Smart Farming Practices and Technology Adoption (D3), Digital Governance and Policies (D4), Digitization in Financial Management (D5), and Digital Marketing (D6).

The six dimensions were selected to capture both the technological and organizational aspects of digitalization within FPOs, recognizing that digital maturity involves not only technology adoption but also organizational capabilities, processes and infrastructure.

i) Access to Digital Infrastructure

This dimension refers to the availability of the basic digital infrastructure required for the use of digital technologies, including internet connectivity, digital devices and related facilities. Access to such infrastructure forms a basic technological component of digitalization. (Adapted from Atik *et al.*, 2026)

ii) Digital Skills and Capability

This dimension refers to the knowledge and skills of FPO personnel to use digital technologies and applications in their work. It represents the human capability required for the effective use of digital technologies. (Adapted from Hohagen and Wilkens, 2025)

iii) Smart Farming Practices and Technology Adoption

This dimension refers to the use of digital and smart technologies by the FPO in agricultural activities, including access to information, farm-level decision-making and production management. It reflects the application and use of digital technologies in agricultural practices. (Adapted from Idoje et al., 2021)

iv) Digital Governance and Policies

This dimension refers to the use of digital tools in the governance and administrative functions of FPOs, including record management, communication, decision-making, transparency and accountability. (Adapted from Rouzky *et al.*, 2026)

v) Digitization in Financial Management

This dimension refers to the use of digital technologies in the financial functions of FPOs, including digital transactions, accounting, financial record keeping and related financial management activities.

vi) Digital Marketing

This dimension assesses the use of digital platforms for market information, promotion, customer engagement and market linkages. It is particularly relevant to FPOs given their collective marketing and market-access functions. (Adapted from Malathi *et al.*, 2026)

Initially, 60 indicators were identified across the six dimensions and operationalised into specific statements. To establish content validity, the statements were subjected to expert judgment by a panel of experts in agricultural extension using a three-point relevancy scale: Most Relevant (3), Relevant (2) and Least Relevant (1). Three criteria—Content Validity Index (CVI), Relevancy Weightage (RW), and Mean Relevancy Score (MRS)—were calculated for each statement. Items with CVI > 0.78, RW > 0.75 and MRS > 2.5 were considered for retention, and statements failing to satisfy at least two of the three criteria were eliminated. Consequently, 44 indicators were retained in the final index.

The final 44 indicators were measured using a five-point Likert scale ranging from **1** (Strongly Disagree) to 5 (Strongly Agree). Dimension-wise scores were calculated from their respective indicators and standardised to a 0–100 scale using:

$$\text{Standardised Score} = [(\text{Mean Score} - 1) / 4] \times 100$$

The overall DMI was derived from the 44 indicators to represent the extent and depth of digital integration among the FPOs. The internal consistency of the indicators under each

dimension was assessed using Cronbach's alpha. The Cronbach's alpha coefficients ranged from 0.880 to 0.977 across the six dimensions, indicating high internal consistency among the items within the respective dimensions.

4.2. Classification of FPOs based on Digital Maturity:

The classification of FPOs was conceptually adapted from the digital maturity stage approach proposed by Zhang et al. (2019), which categorizes agricultural organizations into four stages of digital maturity: Emerging, Transitional, Competitive and Transformative.

In the present study, the maturity classification was modified to three categories—Emerging, Transitional and Established—to provide a simpler classification appropriate to the scope and sample of the study. The category descriptions were adapted from the progressive maturity logic of Zhang et al., (2019), while the number of categories and their cut-off points were determined based on the distribution of DMI scores in the present sample.

Based on the mean and standard deviation of the DMI scores, the FPOs were classified into three levels—Low, Medium, and High, corresponding to Emerging, Transitional, and Established, respectively. The classification criteria are presented in the following table.

DMI score range	Digital maturity category
Below Mean − SD	Emerging
Mean − SD to Mean + SD	Transitional
Above Mean + SD	Established

The three categories represent relative levels of digital maturity within the study sample and should not be interpreted as absolute or universally applicable maturity thresholds. Their descriptions were adapted from the maturity-stage approach of Zhang et al., while their classification in the present study was based on the distribution of individual DMI scores using the mean ± standard deviation criterion.

Emerging Digital Maturity refers to FPOs at an early stage of digitalization, with relatively limited integration of digital technologies across organizational and business activities. Transitional Digital Maturity refers to FPOs progressively integrating digital technologies and capabilities across different organizational and business functions. Established Digital Maturity refers to FPOs with relatively systematic integration of digital technologies across organizational and business functions, supported by established digital capabilities and practices.

5. Results & Discussion

5.1. Profile of the respondent FPOs

The profile of the FPOs was assessed in terms of their organizational structure, operational coverage, financial characteristics, educational qualification and management experience of the CEO, age of the FPO, and membership composition. The details are presented in Table 1.

Table 1. Profile of the respondent FPOs

Sl. No.	Variable	Category	No.	Per cent (%)
1	Type of Organization	Company	25	83.33
		Cooperative	5	16.67
2	No. of villages served	1-5	3	10.00
		6-10	6	20.00
		>10	21	70.00
3	Annual Turnover	< ₹ 25 lakh	7	23.33
		₹ 25 lakh–₹ 1 crore	16	53.33
		₹ 1 crore–₹ 5 crore	5	16.67
		>₹5 crore	2	6.67
4	Educational Qualification of CEO	Higher Secondary	5	16.67
		Graduate	16	53.33
		Postgraduate	5	16.67
		Doctorate	2	6.67
5	FPO Management Experience of CEO	Less than 2 years	8	26.67
		2–5 years	8	26.67
		6–10 years	13	43.33
		More than 10 years	1	3.33
6	Average Paid up capital of the FPOs	₹ 11.27 lakhs		
7	Average age of the FPOs	4.96 years		
8	Average membership (total) of the FPOs	705.47		
9	Average women membership in the FPOs	354.63		
10	Average youth (18-35 years) membership	226.82		

The findings indicate that majority of the respondent FPOs were predominantly registered as Producer Companies under the Companies Act (83.33%) and served more than 10 villages (70.00%). The predominance of Producer Companies may indicate a relatively formalized organizational structure and systematic management, while serving a larger number of villages suggests that the FPOs have established a relatively wider geographical presence.

In terms of financial performance, the FPOs were largely concentrated in the ₹25 lakh–₹1 crore turnover range, with some reporting turnover above ₹1 crore. Regarding leadership,

the CEOs were predominantly graduates, with a considerable proportion having 6–10 years of FPO management experience, indicating a reasonably experienced leadership base.

The FPOs had an average age of 4.96 years, suggesting that the majority were relatively young organizations, while having already established a considerable operational base. The average membership was 705 farmers, including an average of 354 women members and 227 youth members (18–35 years), indicating notable representation of women and youth.

5.2. Training Exposure

Training exposure is to the extent to which the FPO functionaries are exposed to training and capacity-building programs relevant to the management and functioning of the FPO (Mali et al., 2026). The training exposure of the FPOs was assessed based on the participation of CEOs/BODs in training programs, training programs organized for farmer members, and exposure or learning visits undertaken by the FPOs. The details are presented in Table 2.

Table 2. Training Exposure of the respondent FPOs

Sl. No.	Component	Category	Per cent
1	Training programs attended by CEO/BODs	More than 4	63.33
2	Training programs organized for farmer members	More than 4	63.33
3	Exposure/learning visits	More than 2	60.00

The findings indicate that the FPOs had fairly good training exposure, with CEOs/BODs and farmer members participating in multiple training programs and FPOs also undertaking exposure or learning visits. This relatively good training exposure could be partly attributed to the capacity-building and handholding support provided by implementing agencies and CBBOs under various FPO promotion initiatives.

5.3. Governance Effectiveness

Governance effectiveness refers to the extent to which the FPO follows effective and accountable mechanisms for decision-making, participation, transparency and organizational functioning. The indicators were adapted from governance-related dimensions reported in FPO studies, particularly those concerning organizational structure, board functioning, transparency and accountability (Goswami & Ahmed, 2026; Singh et al., 2026). The results corresponding to Governance Effectiveness of the respondents FPOs are presented in the Table 3.

Table 3. Governance Effectiveness in FPOs

Sl. No.	Component	Category	Per cent
1	Decision making	Jointly by the CEO and Board of Directors	70.00
		Board of Directors alone	26.67
2	Board Meetings	More than 4 in a year	76.70
3	Board Attendance	More than 50 %	73.33
4	Conduct of Annual general meeting	Mandatory meeting once in a year	90.00
5	AGM member participation	More than 50 %	66.67
6	FPOs with approved business plan		93.33
7	Annual review of Business plan		90.00
8	On time completion of Statutory audit		86.67
9	On time completion of ROC/ registrar filings		93.33
10	Approval of financial statements by board		96.67
11	Maintenance of meeting minutes		93.33
12	Communication of important decision to the members		70.00

The findings indicate that governance practices were generally well followed by the FPOs. More than two-thirds of the FPOs reported joint decision-making by the CEO and Board of Directors, while most conducted regular Board meetings and maintained adequate Board participation. The majority also complied with the requirements related to Annual General Meetings, business plan review, statutory audits, and ROC/registrar filings. Approval of financial statements by the Board was also widely reported. Overall, the findings suggest that the FPOs had relatively sound governance practices, particularly in statutory compliance, financial oversight, and business planning, indicating a reasonable level of organizational discipline and formal governance.

5.4. Innovation Orientation

Innovation orientation is to the tendency of an FPO to remain receptive to new ideas, practices, processes and approaches for improving its functioning and services to members (Nikam et al., 2019; Patil et al., 2025). The results regarding Innovation orientation of the respondent FPOs is presented in the Table 4.

Table 4. Innovation Orientation of the respondent FPOs

Sl. No.	Component	Range	Per cent
1	Promotion of new technologies/digital solutions among members	1-2	63.33
2	New business strategies/initiatives undertaken	>3	20.00
3	Frequency of pilot/experimenting before large scale implementation of innovative initiatives	Frequently	30.00
4	Receipt of recognition or support for innovative initiatives	None	50.00

The findings indicate that a considerable number of FPOs were promoting up to two new technologies and digital solutions among their members. However, their engagement in broader innovation activities appeared relatively limited. Only a small proportion of FPOs had undertaken multiple new business initiatives, while experimentation with innovative ideas before large-scale implementation was also limited. Further, a substantial proportion of FPOs had not received recognition or support for their innovative initiatives. Overall, the findings suggest that although technology adoption was evident to some extent, innovation among the FPOs was largely at an initial stage, with limited experimentation, business innovation, and institutional support for innovative efforts.

5.5. Institutional Linkages

Institutional linkages refer to the extent of the FPO's interaction and collaboration with relevant external institutions and stakeholders for accessing information, technical support, finance, services and market opportunities (Nikam et al., 2019). The findings corresponding to Institutional linkages of the respondents FPOs are presented in the Table 5.

Table 5. Institutional Linkages of the respondent FPOs

Sl. No.	Component	Frequently	Occasionally	Never
1	Cluster Based Business Organizations (CBBO)	60.00	30.00	10.00
2	Line departments of State (Agri/ Horti etc.)	33.33	66.67	0
3	Agricultural universities	23.33	70.00	6.67
4	Banks	43.33	46.67	10.00
5	NABARD/SFAC/Implementing Agency	23.33	56.67	20.00
6	Agri-tech companies	36.67	50.00	13.33
7	NGOs	26.67	53.33	20.00

The findings indicate that CBBOs had the most frequent linkages with the FPOs, which may be attributed to their role in handholding and supporting FPOs. Banks and agri-tech companies also had relatively frequent linkages, while linkages with State agri/horti departments, agricultural universities, and NABARD/SFAC/implementing agencies were largely occasional. The relatively frequent linkage with banks may be associated with the credit facilities and schemes available to FPOs.

5.6. Organizational Facilities

Organizational facilities refers to the basic physical, human and administrative resources and facilities available to an FPO for carrying out its organizational and business functions. (Nikam et al., 2019). The results regarding the Organizational Facilities are presented in the Table 6.

Table 6. Organizational Facilities in the respondent FPOs

Sl. No.	Availability of Facilities	Per cent
1	Permanent Office	83.33
2	Training Hall/ Meeting Facility	73.33
3	Storage/Warehouse	63.33
4	Processing/Value addition Facility	53.33
5	Input distribution centre/input shop	66.67
6	Own transportation/logistics support	16.67

The findings indicate that most FPOs had access to basic organizational facility like permanent office. A considerable number also had training or meeting facilities, storage facilities, input distribution centers, and processing or value-addition facilities. However, transportation and logistics support was less commonly available. Overall, the FPOs appeared to have a reasonable base of basic and digital infrastructure, but gaps in transportation and logistics may constrain their ability to efficiently undertake aggregation, processing, and market-related activities.

6. Digital Maturity Index

The Digital Maturity Index, comprising six dimensions and their respective indicators, was assessed among the selected FPOs. The dimension-wise scores and the overall Digital Maturity Index are presented in Table 7 & 8.

Table 7. Digital Maturity Index

Sl. No.	Statement	Mean score
I	**Access to Digital Infrastructure**	
1	The FPO has access to a reliable and active internet connection to support its day to day operations.	**4.20**
2	The FPO has access to adequate computer systems to support the organizational activities.	**4.17**
3	The FPO has consistent and uninterrupted access to electricity for carrying out digital operations.	**4.13**
4	Members of the FPO own and use smartphones for agricultural and organizational activities.	**4.27**
5	The FPO has access to advanced technologies such as IoT devices, automated machinery, and drones whenever required.	**3.63**
6	The FPO maintains an official website for organizational operations and product marketing.	**4.07**

Sl. No.	Statement	Mean score
7	The FPO has a dedicated digital device (tablet/computer) available at the office for member use.	**4.40**
II	**Digital Skills and Capability**	
8	Members/Board of Directors (BOD)/ Staff are adequately trained in using basic digital tools and devices.	**4.50**
9	BOD/ Members/Staff demonstrate a satisfactory level of digital literacy and knowledge.	**4.33**
10	BOD/ Members/Staff are proficient in operating digital devices such as computers and smartphones.	**4.33**
11	BOD/ Members/Staff are well aware of internet usage and online navigation.	**4.33**
12	BOD/ Members/Staff are trained in the use of advanced digital technologies relevant to agriculture.	**4.33**
III	**Smart Farming Practices and Technology Adoption**	
13	FPO members actively use mobile applications to support and improve farming practices.	**4.40**
14	Members, BOD, and staff regularly access online platforms to aggregate farming information and advisories.	**4.30**
15	Precision farming and smart farming technologies such as IoT devices, AI based tools and GPS guided equipment are adopted by the FPO for the members.	**3.87**
16	Members access and utilize digital advisory services for crop management and agricultural decision-making.	**4.20**
17	Weather forecasting applications are regularly used by members for informed farm-level decision-making.	**4.13**
18	The FPO conducts or facilitates training programmes on the digitization of agricultural practices for its members.	**4.13**
IV	**Digital Governance and Policies**	
19	The FPO maintains all organizational records and data in a structured digital format.	**4.43**
20	The FPO effectively utilizes Management Information Systems (MIS) to monitor organizational performance and support managerial decision-making.	**4.47**
21	The FPO effectively utilizes Enterprise Resource Planning (ERP) systems to integrate and manage its key organizational functions.	**4.10**
22	The FPO utilizes digital systems for inventory and stock management.	**4.07**
23	The FPO complies with government legal frameworks, policies, and regulatory requirements applicable to FPOs.	**4.30**
24	The use of digital tools has improved transparency and accountability in the FPO's governance processes.	**4.37**
25	The FPO has established robust data security and privacy policies to protect member information.	**4.17**
26	The FPO uses digital communication tools (e.g., messaging apps, email) for regular interaction with members, BOD, and staff.	**4.43**
27	The FPO has a digital dashboard for real-time monitoring of key organizational and operational metrics.	**4.10**
28	The FPO has a documented digital strategy or roadmap aligned with its organizational goals.	**4.27**
V	**Digitization in Financial Management**	
29	The FPO extensively uses digital payment systems for conducting financial transactions.	**4.57**
30	The FPO has access to and actively uses digital accounting software for financial management.	**4.43**

Sl. No.	Statement	Mean score
31	Online banking facilities are actively and regularly used by the FPO for financial operations.	**4.37**
32	The FPO uses digital tools for budgeting, financial planning, and resource allocation.	**4.40**
33	The FPO has implemented a digitized payroll system for staff and labour payments.	**4.07**
34	The FPO actively utilizes FinTech platforms for accessing digital financial services such as loans, insurance, and payment solutions.	**3.77**
35	GST filing, tax returns, and statutory compliance are completed digitally by the FPO.	**4.27**
36	The FPO regularly monitors and reviews digital financial reports for informed decision-making.	**4.27**
VI	**Digital Marketing**	
37	The FPO actively uses e-commerce platforms to market and sell its products.	**4.33**
38	The FPO has access to real-time online market information for pricing and demand trends.	**4.03**
39	The FPO actively participates in and benefits from e-NAM (National Agricultural Market)/ NCDEX for commodity trading.	**4.40**
40	The FPO utilizes open digital commerce platforms (e.g., ONDC) to expand market access and facilitate the sale of agricultural produce.	**4.33**
41	The FPO employs digital branding strategies to build and strengthen its organizational identity and product visibility.	**4.37**
42	Online platforms and social media are used by the FPO for regular customer interaction and relationship management.	**4.20**
43	The FPO utilizes digital traceability systems to monitor and communicate the origin and movement of agricultural produce across the value chain.	**4.03**
44	Digital platforms have enhanced customer engagement and improved the overall buyer experience.	**4.40**

Table 8. Dimension wise overall mean scores

Sl. No.	Dimension	No. of statements	Mean score (1–5)	Standardized score (0–100)
1	Access to Digital Infrastructure	7	4.12	**78.11**
2	Digital Skills and Capability	5	4.36	**84.10**
3	Smart Farming Practices & Technology Adoption	6	4.17	**79.29**
4	Digital Governance and Policies	10	4.27	**81.78**
5	Digitization in Financial Management	8	4.27	**81.72**
6	Digital Marketing	8	4.26	**81.53**
7	**Overall Digital Maturity Index**	**44**	**4.24**	**81.06**

The overall Digital Maturity Index of the FPOs was 81.1 on a 0–100 scale, indicating a relatively strong extent of digital integration across the assessed dimensions. However, the dimension-wise scores reveal that digitalization is not uniform across all functional areas of FPO operations. Digital Skills and Capability recorded the highest score (84.10), suggesting that the FPOs possess comparatively stronger human capabilities for using digital tools. This provides an important foundation for further digital integration, as the effective use of digital

technologies depends substantially on the ability of organisational personnel to operate and apply them.

The relatively high scores for Digital Governance and Policies (81.78), Digitization in Financial Management (81.72), and Digital Marketing (81.53) indicate that digitalization has been incorporated to a considerable extent into the administrative, financial and market-oriented functions of FPOs. This pattern suggests that digital technologies are being utilised not only for basic communication but also in important organisational processes such as financial transactions, accounting, governance-related activities and market engagement. The comparatively close scores across these three dimensions also indicate a fairly balanced level of digital integration across these organisational functions.

In contrast, Smart Farming Practices and Technology Adoption (79.29) recorded a comparatively lower score. This indicates that the integration of digital technologies into agricultural production and farm-level decision-making may not have progressed to the same extent as their use in organisational and managerial functions. In particular, the relatively lower position of this dimension may reflect greater scope for strengthening the application of smart and technology-enabled agricultural practices among FPOs and their members.

Access to Digital Infrastructure was the lowest-ranked dimension (78.11) and it suggests that infrastructure and access to digital technologies may constitute a foundational constraint to further digitalization. Thus, the findings point towards a pattern in which FPOs appear to have developed comparatively stronger digital skills and organisational applications, while further strengthening infrastructure and technology-enabled agricultural applications could support deeper digital integration.

Overall, the findings indicate that digitalisation among the assessed FPOs is relatively well established but varies across functional dimensions. The results therefore highlight the importance of looking beyond an overall score and examining the individual dimensions to identify specific areas requiring further strengthening. Since no empirically established cut-off values were applied, the DMI is interpreted as a continuous measure of the extent of digitalisation rather than as a categorical maturity level.

Table 9. Association between the Organizational variables and Digital maturity

Organizational factor	Spearman's ρ	*p*-value
Training Exposure	0.275	0.142
Governance Effectiveness	0.464	0.010*
Innovation Orientation	0.038	0.841
Institutional Linkages	−0.017	0.930
Organizational Facilities	0.427	0.019*

Statistical significance was assessed at the 5% level ($p < 0.05$*).*

Spearman's rank-order correlation analysis revealed that Governance Effectiveness had a moderate positive and statistically significant association with the Digital Maturity Index ($r_s = 0.464$, $p = 0.010$). This indicates that FPOs with stronger governance practices tended to have higher levels of digital integration. The finding suggests that organizational processes such as systematic administration, decision-making, accountability and record management may be important in creating an enabling environment for the use of digital technologies.

Organizational Facilities also showed a moderate positive and statistically significant association with DMI ($r_s = 0.427$, $p = 0.019$). This suggests that FPOs with better organizational infrastructure tended to demonstrate higher levels of digitalization, highlighting the importance of adequate physical facilities and basic organizational resources in supporting digital operations.

Training Exposure showed a positive but non-significant association with DMI ($r_s = 0.275$, $p = 0.142$). Although FPOs with greater training exposure tended to have higher DMI scores, the observed association was not statistically significant in the present sample. Similarly, Innovation Orientation ($r_s = 0.038$, $p = 0.841$) and Institutional Linkages ($r_s = -0.017$, $p = 0.930$) showed negligible and non-significant associations with DMI.

Overall, the results indicate that governance effectiveness and organizational infrastructure were more closely associated with the extent of digitalization than the other organizational factors examined.

6.1. Classification of FPOs Based on Digital Maturity

The individual DMI scores were further examined to understand the relative position of the FPOs within the study sample. The mean DMI was 80.93, with a standard deviation of 16.64. Accordingly, the lower and upper limits were calculated as:

Mean − SD = 64.29

Mean + SD = 97.57

Based on these limits, FPOs with DMI scores below 64.29 were classified as Emerging, those scoring between 64.29 and 97.57 were classified as Transitional, and those scoring above 97.57 were classified as Established.

Table 10. Classification of FPOs based on their Digital Maturity Index Score

Digital Maturity Category	DMI range	No. of FPOs	Percentage
Emerging	< 64.29	5	17.86
Transitional	64.29–97.57	17	60.71
Established	> 97.57	6	21.43
	Total	**28**	**100.00**

The classification of FPOs based on their individual DMI scores showed that more than half i.e. 17 FPOs (60.71%) were classified under Transitional Digital Maturity, followed by 6 FPOs (21.43%) under Established Digital Maturity and 5 FPOs (17.86%) under Emerging Digital Maturity. The predominance of FPOs in the Transitional category indicates that a majority of the organizations were positioned between the early and relatively established stages of digitalization within the study sample. This suggests that digital technologies and practices have been adopted to some extent, but their integration across different organizational and business functions may still be developing.

The relatively large share of FPOs in the Transitional category may be associated with the gradual development of digital capabilities within FPOs. FPOs perform multiple functions, including member coordination, input supply, aggregation, financial management, governance and marketing, and the adoption of digital technologies across all these functions may require time, skills and organizational resources. The availability of digital infrastructure and the ability of FPO personnel to use digital tools may also influence how extensively such technologies are integrated into their operations.

7. Conclusion

The present study was an attempt to assess the digital maturity of Farmer Producer Organizations (FPOs) and understand the extent to which digitalization has progressed within their functioning. Given the collective scale and reach of FPOs, they have considerable potential to serve as an important pathway for advancing digitalization in agriculture. In this context, assessing their digital maturity can provide useful insights into their current digital

position and the extent to which FPOs are prepared to integrate digital technologies across their different functions. The Digital Maturity Index developed in the study offers a preliminary way of capturing this position across key dimensions and can help identify areas where greater attention and support are required. The findings also point towards the need for continued capacity building, improved access to digital infrastructure, stronger institutional support and handholding to enable FPOs to make more effective and sustained use of digital technologies. Such efforts can help FPOs move beyond the adoption of individual digital tools towards wider and more meaningful digital integration in their operations.

The study, however, is subject to limitations arising from the use of convenience sampling, the relatively limited sample and reliance on CEO-reported information, which restrict the generalization of the findings. Further studies covering a larger and more diverse set of FPOs, along with periodic assessment, would help validate and refine the index. Nevertheless, the study provides an initial understanding of the digital maturity of FPOs and opens scope for further research and policy efforts to strengthen their role in accelerating digitalization in agriculture.

References

Arangurí, M., Mera, H., Noblecilla, W., & Lucini, C. (2025). Digital Literacy and Technology Adoption in Agriculture: A Systematic Review of Factors and Strategies. *AgriEngineering*, 7(9), 296. https://doi.org/10.3390/agriengineering7090296

Atik, C., Ahoa, E., Verdouw, C., & Tummers, J. (2026). *Methodology for digital maturity assessment for agrifood technology*. Stichting Wageningen Research.

Bhowmik, M., & Hazari, S. (2026). Digital inclusion, governance, and technology adoption in Farmer Producer Organizations: A systematic review and framework for sustainable agri-market systems in India. *EDPACS*.1-13.

Choruma, D. J., Dirwai, T. L., Mutenje, M. J., Mustafa, M. A., Chimonyo, V. G. P., Jacobs-Mata, I., & Mabhaudhi, T. (2024). Digitalisation in agriculture: A scoping review of technologies in practice, challenges, and opportunities for smallholder farmers in sub-Saharan Africa. *Journal of Agriculture and Food Research, 18*, 101286.

Goswami, U., & Ahmed, S. (2026). Organisational structure, governance practices, and board competency in Farmer Producer Organisations: Evidence from Assam. *Current Agriculture Research Journal, 14*(1), 25–46.

Hohagen, S., & Wilkens, U. (2025). How to measure digital maturity in agriculture? Conceptual outline, instrument development and measurement results from German farms. *International Food and Agribusiness Management Review, 28*, 927–947.

Idoje, G., Dagiuklas, T., & Iqbal, M. (2021). Survey for smart farming technologies: Challenges and issues. *Computers & Electrical Engineering, 92*, 107104.

Kapoor, K. (2025). The digital harvest: Transforming Indian agriculture through Digital India. *International Journal for Multidisciplinary Research*, 7(6).

Mabaya, E., and Porciello, J. (2022). Can digital solutions transform agri-food systems in Africa?. *Agrekon*, 61, 67–79.

Malathi, V., Nirmala, L., Mahandrakumar, K., Srinivasan, G., & Prabakaran, K. (2026). Digital transformation and collective market power: A bibliometric and systematic review of digital agricultural marketing and farmer producer organizations. *Genetics and Molecular Research, 25*(18s).

Nikam, V., Singh, P., Ashok, A., & Kumar, S. (2019). Farmer producer organisations: Innovative institutions for upliftment of small farmers. *The Indian Journal of Agricultural Sciences, 89*(9), 1383–1392.

Patil, S., Mehta, M., Pancholi, G., & Saxena, A. (2025). Unveiling the dynamics of farmer producer organizations in India: A systematic review of status, challenges, and future directions. *Humanities and Social Sciences Communications, 12*, 758.

Rolandi, S., Brunori, G., Bacco, M., & Scotti, I. (2021). The digitalization of agriculture and rural areas: Towards a taxonomy of the impacts. *Sustainability, 13*(9), 5172.

Rouzky, R., Sarrafzadeh, A., Sowells-Boone, E., Pasandi, H. B., & Goins, G. (2026). Data governance in smart farming: A systematic review of challenges and gaps. *Information Processing in Agriculture, 13*, 303–317.

Salokhe, S. (2025). Uncovering the impact of technology-driven services on boosting farmer producer organizations (FPO) growth: A glimpse into the promising future of Indian agriculture, with a focus on the potential of information and communication technology (ICT): A review. *Indian Journal of Agricultural Research, 59*(8), 1161–1167.

Singh, S., Sharma, A., Singh, A., Praveen, K. V., Singh, H., & Kumawat, P. K. (2026). What makes Farmer Producer Organizations work? A multi-level analysis of performance determinants in India. *Journal of Rural Studies, 123*, 104014.

Smidt, H. J., & Jokonya, O. (2022). Factors affecting digital technology adoption by small-scale farmers in agriculture value chains (AVCs) in South Africa. *Information Technology for Development, 28*(3), 558–584.

Sun, Z., Xiong, H., Yi, H., & Kuhn, L. (2026). Digitalization of smallholder agriculture: Adoption and impacts. *Journal of Integrative Agriculture, 25*(6), 2183–2187.

Van Laar, E. – Van Deursen, A. J. A. M. – Van Dijk, J. A. G. M. – De Haan, J. (2017): The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, 72, 577-588.

Vilhekar, R. (2024). Farmer producer organizations (FPOs) role as collectives, present status, challenges faced by FPOs in India and way forward (A review). *Co-operative Perspective, 59*(1), 31–42.

Zhang, A., Hobman, E., Smith, D., & Guan, X. (2019). Enabling a digital transformation in agriculture: A digital maturity index and assessment tool for the agricultural industry. CSIRO.

Special Intensive Revision 2026 in Telangana: A Constitutional Review of Electoral Roll Strengthening and Best Practices through Electoral Roll Integrity Score (ERI)

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Electoral rolls give practical effect to adult suffrage under Article 326 of the Constitution of India, and Article 325 protects every eligible person against exclusion from the general roll on grounds of religion, race, caste or sex. Annual summary revision updates the roll through claims and objections, whereas a Special Intensive Revision (SIR) rests on house-to-house enumeration of every elector. Telangana undertook an SIR in 2025–26, the first in the State since 2002, covering 33 districts and 119 Assembly Constituencies (ACs).

This paper examines SIR 2026 in Telangana from two angles. It first reviews the exercise against the Representation of the People Act, 1950 (Sections 16, 19, 20 and 22) and the Registration of Electors Rules, 1960, as amended in 2022. It then proposes the Electoral Roll Integrity Score (ERI), a composite indicator that summarises how the roll of an AC changed between the pre-SIR roll and the draft roll.

State-level figures are taken from Press Note No. 868/Elecs.B/B1/2026, issued by the Chief Electoral Officer (CEO), Telangana on 17 August 2026, which reports the findings of the enumeration phase (25 June to 10 August 2026). The Draft Roll published on 17 August 2026 contains 2,64,87,213 electors, against 3,38,26,448 before the revision, a reduction of 73,39,235 entries (21.70%). Of these, 9,22,229 (12.57%) were recorded as deceased, 57,46,803 (78.30%) as permanently shifted, absent or others, and 6,70,203 (9.13%) as enrolled at more than one place. The exercise involved 119 Electoral Registration Officers (EROs), 892 Assistant EROs, 3,590 Booth Level Officer (BLO) Supervisors and 35,985 BLOs, and 49,018 Booth Level Agents (BLAs) of political parties took part.

The ERI combines four dimensions, namely Coverage Integrity, Verification Accuracy, Roll Purity and Data Stability, with equal weights on a scale of 0 to 100. Its use is demonstrated on ten ACs, five urban and five rural, with illustrative AC-level figures, because the AC-wise abstract for all 119 ACs was still awaited. On these illustrative figures the average ERI is 82.43

for the urban ACs and 86.79 for the rural ACs, both in the Good band (80–89), and Roll Purity exceeds 99.3% in every AC. At the State level, 87.43% of the entries removed fall under the shifted, absent, others or duplicate heads, which the paper calls the System-Driven Update Share. A check that drops the Data Stability dimension, which repeats Coverage Integrity, moves several urban ACs to the Stable band, so the categories depend on the weighting used. The paper suggests that field verification and de-duplication account for most of the change in the roll, and it sets out policy suggestions for other States once the ERI has been tested on verified AC-level data.

Keywords: Special Intensive Revision, Electoral Roll Integrity Score, Article 326, Telangana, Chief Electoral Officer, electoral roll management

List of Abbreviations

Abbreviation	Full form
AC	Assembly Constituency
BLA	Booth Level Agent
BLO	Booth Level Officer
CEO	Chief Electoral Officer
CI	Coverage Integrity
DS	Data Stability
ECI	Election Commission of India
EPIC	Electors Photo Identity Card
ERI	Electoral Roll Integrity Score
ERO	Electoral Registration Officer
ERONET	Electoral Roll Management System
RP	Roll Purity
SIR	Special Intensive Revision
VA	Verification Accuracy

1. Introduction

The electoral roll is the document through which the right to vote is exercised in practice. Article 326 of the Constitution of India provides that elections to the House of the People and to the Legislative Assemblies of the States are held on the basis of adult suffrage, and Article 325 states that no person is to be ineligible for inclusion in a general electoral roll, or to claim inclusion in any special roll, on grounds only of religion, race, caste or sex.

Rolls are updated every year through summary revision, which depends largely on claims and objections filed by electors and political parties. A Special Intensive Revision works

differently. Booth Level Officers visit every household, collect enumeration forms and report on each entry, and the verified list is then published as a draft roll. Telangana carried out an SIR in 2025–26, the first in the State since 2002, and the Draft Roll was published on 17 August 2026.

This paper has two aims. The first is to review the constitutional and statutory basis on which the exercise was conducted. The second is to propose the Electoral Roll Integrity Score (ERI), which describes the change in an AC's roll in a single figure that can be compared across constituencies. The paper is an independent academic study, and the views expressed are the author's own.

1.1 Conceptual background

Electoral integrity is usually studied across the whole electoral cycle, and the voter register is one of the stages at which quality can be lost or protected (Norris, 2014). A register can fail in two directions. It can leave out eligible citizens, who are then unable to vote, or it can keep ineligible and duplicate entries, which weakens confidence in the count and leaves room for misuse. The literature on electoral management describes register quality in terms of both completeness and accuracy (Catt et al., 2014), and the two are separate problems: a step that removes doubtful entries can also remove genuine electors if it is carried out without care.

Countries differ in who carries the burden of registration. Where registration depends on an application by the citizen, the register reflects individual action, and a study of the introduction of registration requirements in the United States found that they lowered turnout (Ansolabehere & Konisky, 2006). Where the state builds the register from other records, the administration carries the burden instead (Massicotte et al., 2004). Even so, no system is free of error. A review of the American registration system by the Pew Center on the States (2012) found many records that were inaccurate or out of date, alongside many eligible citizens who were not registered.

India follows a model in which the Commission prepares the roll through Booth Level Officers, and citizens can also apply for inclusion, correction or deletion using the prescribed forms. Between revisions, the roll changes through these applications and through the annual summary revision. A Special Intensive Revision is the most thorough form of the first approach, because every entry is checked at the household. To the author's knowledge, few published measures summarise the quality of a roll at constituency level in a form that administrators can use. Reports usually give counts of additions and deletions, and these are

difficult to compare across constituencies of different size. The ERI is proposed to fill part of that gap.

1.2 Structure of the paper

Section 2 sets out the constitutional and statutory framework, Section 3 the reasons for the revision, and Section 4 the process and machinery. Sections 5 and 6 state the objectives and the methodology, including the construction of the ERI. Section 7 reports the results, Section 8 draws out policy implications, and Sections 9 and 10 give the conclusion and the limitations of the study.

2. Constitutional and Statutory Framework

Article 324 vests the superintendence, direction and control of the preparation of electoral rolls in the Election Commission of India (ECI). The Supreme Court's decision in Mohinder Singh Gill v. Chief Election Commissioner (1978) is the usual authority on the width of the Commission's powers under this Article. The detailed conditions for registration are found in the Representation of the People Act, 1950 (RP Act) and the Registration of Electors Rules, 1960.

Under Section 19 of the RP Act, a person who is at least 18 years of age on the qualifying date and is ordinarily resident in a constituency is entitled to be registered there. Section 20 explains what ordinary residence means, and it provides that a person does not cease to be ordinarily resident only because of temporary absence. This matters for the present study because it bears on how electors are classified as shifted or absent. Section 16 disqualifies certain persons from registration, including those who are not citizens of India. Section 22 allows the ERO, after such inquiry as is considered fit, to correct an entry that is erroneous or defective, or to strike out the name of a person who has ceased to be ordinarily resident in the constituency. The 1960 Rules prescribe the forms used in the process, and the 2022 amendment added Form 6B for furnishing Aadhaar information. Table 1 summarises these provisions.

Table 1. Constitutional and statutory provisions relevant to SIR

Provision	Content	Relevance to SIR
Article 324	Superintendence, direction and control of electoral rolls vested in the ECI	Source of the Commission's authority to order an SIR
Article 325	No exclusion from the general roll on grounds of religion, race, caste or sex	Non-discrimination in inclusion
Article 326	Elections on the basis of adult suffrage; minimum age of 18 years	Eligibility base of the roll

Provision	Content	Relevance to SIR
RP Act 1950, Section 16	Disqualification from registration, including non-citizens	Removal of ineligible entries
RP Act 1950, Section 19	Conditions of registration: age and ordinary residence	Test applied at enumeration
RP Act 1950, Section 20	Meaning of ordinarily resident, and effect of temporary absence	Classification of shifted and absent electors
RP Act 1950, Section 22	Correction and deletion of entries after inquiry	Procedure for deletion
Registration of Electors Rules 1960, as amended in 2022	Forms 6, 6B, 7 and 8	Application, Aadhaar information, objection and correction

Source: Constitution of India; Representation of the People Act, 1950; Registration of Electors Rules, 1960, and Registration of Electors (Amendment) Rules, 2022.

2.1 Ordinary residence and the classification of electors

The removal categories used in the SIR are not equivalent in law. A deceased elector is a matter of fact that can usually be documented through a death record or a local inquiry. A duplicate entry is a matter of identification: the same person appears at two places, and one entry has to be kept. Shifted and absent cases turn on ordinary residence, which depends on facts and on intention. Under Section 20, owning a house in a constituency does not by itself make a person ordinarily resident there, and absence for work, study or a similar reason does not by itself end ordinary residence. An elector who has moved permanently to another constituency should be registered there, and one who is only temporarily away should stay on the roll.

The line between these two situations is where enumerators have to use the most judgement, and it is the reason this paper treats the shifted and absent heads with more caution than the deceased head. The State-level data group shifted, absent and other cases together, so the paper cannot say how the line was drawn in practice.

2.2 Procedural safeguards

Section 22 and the Rules require that a name be removed only after inquiry, in keeping with the principle that a person should be heard before an adverse step is taken. In the SIR schedule, the publication of the Draft Roll, the claims and objections period and the notice and disposal phase are the stages at which an elector marked for removal can respond. The notice phase is therefore the stage that limits wrongful exclusion, and Articles 325 and 326 are engaged if eligible electors are removed without a fair opportunity to be heard. For this reason the figures in this paper, which relate to the Draft Roll, should not be read as the number of electors who will be absent from the Final Roll.

3. Rationale for the 2026 Revision

Three purposes can be identified. The first is purification of the roll, that is, verification of entries relating to deceased, shifted, absent and duplicate electors in line with Section 22. The second is inclusion: a verified base makes it easier to add citizens who were left out. The third is preparedness for the next Assembly election in 2028 and the Lok Sabha election in 2029, which will both be held on this roll.

The revision was also expected to test two technical arrangements at the scale of a whole State, namely Aadhaar-based de-duplication and the use of ERONET and the BLO App, and to move the assessment of a revision from procedural completion towards measurable quality. The ERI proposed in this paper is meant to support the last of these.

4. Process and Machinery

The exercise ran in phases. Enumeration was carried out from 25 June to 10 August 2026 and the Draft Roll was published on 17 August 2026. The ECI revised the later dates of the schedule on 7 September 2026, so that claims and objections run until 7 October 2026, the notice phase until 5 November 2026, and the Final Roll is to be published on 9 November 2026. Table 2 gives the schedule.

Table 2. Schedule of SIR 2026, Telangana

Phase	Dates
Enumeration phase	25 June to 10 August 2026
Publication of Draft Roll	17 August 2026
Claims and objections	17 August to 7 October 2026
Notice phase and disposal	17 August to 5 November 2026
Publication of Final Roll	9 November 2026

Source: CEO Telangana, Press Note No. 868/Elecs.B/B1/2026 (17 August 2026), and ECI revised SIR schedule announced on 7 September 2026.

The field machinery is shown in Table 3. The number of polling stations rose from 35,985 to 36,353 after rationalisation, an addition of 368. Political parties took part through 49,018 BLAs, of whom 20,394 were nominated by BRS, 13,144 by INC and 11,621 by BJP. Involving party agents in verification is a useful check on the process because it gives the parties an early view of the entries proposed for removal.

Table 3. Machinery deployed for SIR 2026, Telangana

Functionary or unit	Number
Electoral Registration Officers	119
Assistant Electoral Registration Officers	892
BLO Supervisors	3,590
Booth Level Officers	35,985
Polling stations before rationalisation	35,985
Polling stations after rationalisation	36,353 (+368)
Booth Level Agents (all parties)	49,018
of which BRS	20,394
of which INC	13,144
of which BJP	11,621

Source: CEO Telangana, Press Note No. 868/Elecs.B/B1/2026 (17 August 2026).

5. Objectives

1. To compare the roll before and after SIR at AC level, with reference to the conditions of registration in Section 19.
2. To break down the entries removed into deceased, shifted, absent and duplicate categories.
3. To construct the ERI and apply it to ten major ACs, five urban and five rural.
4. To quantify the System-Driven Update Share.
5. To suggest policy measures that other States could adopt.

6. Methodology

6.1 Data

The study uses secondary data from the CEO Telangana: the Final Roll 2025, the Draft Roll 2026 and Press Note No. 868. The unit of analysis is the AC. Ten major ACs were chosen. The urban group consists of L.B. Nagar, Malkajgiri, Serilingampally, Khairatabad and Secunderabad, and the rural group of Siddipet, Gajwel, Sircilla, Nalgonda and Mahabubabad. Urban and rural classification follows the Census 2011 District Census Handbooks and the CEO’s list of ACs.

State-level figures are taken from Press Note No. 868 dated 17.08.2026 as last verified consolidated Draft Roll. Subsequent CEO portal updates show 60,50,918 electors in Anomalies and 32,36,659 in No Mapping categories with 92.88 lakh notices issued as on 01.09.2026, pending disposal till Final Roll on 09.11.2026 as per revised ECI schedule dated 07.09.2026.

6.2 Construction of the ERI

The ERI is the simple average of four dimensions, each expressed on a scale of 0 to 100. Table 4 defines them. In the formulas, "Before" is the number of electors on the pre-SIR roll, "After" is the number on the Draft Roll, "Total" is the number of entries removed, "Shifted" excludes the absent category, and "Duplicate" refers to electors enrolled at more than one place.

Table 4. Dimensions of the Electoral Roll Integrity Score

Dimension	Formula	What it describes
Coverage Integrity (CI)	(After ÷ Before) × 100	Share of the pre-SIR roll retained in the draft roll
Verification Accuracy (VA)	[1 − (Duplicate + Shifted) ÷ Total] × 100	Share of removals outside the duplicate and shifted heads
Roll Purity (RP)	[1 − Duplicate ÷ After] × 100	Share of the draft roll free of duplicate entries
Data Stability (DS)	[1 − Total ÷ Before] × 100	Stability of the roll at the draft stage

Source: Author's construction.

$$\mathbf{ERI = 0.25 \times CI + 0.25 \times VA + 0.25 \times RP + 0.25 \times DS}$$

Scores are read against the bands in Table 5.

Table 5. Interpretation of ERI scores

ERI score	Category	Suggested use
90–100	Model AC	Document as a good practice
80–89	Good	Maintain current practice
70–79	Stable	Monitor
Below 70	Focus AC	Priority support and handholding

Source: Author's construction.

As an example, take L.B. Nagar in Table 8. The roll fell from 6,45,200 to 6,28,500 electors, with 16,700 entries removed, of which 2,150 were duplicates and 9,500 were shifted. Coverage Integrity is 6,28,500 ÷ 6,45,200 × 100 = 97.41. Verification Accuracy is [1 − (2,150 + 9,500) ÷ 16,700] × 100 = 30.24. Roll Purity is [1 − 2,150 ÷ 6,28,500] × 100 = 99.66, and Data Stability is [1 − 16,700 ÷ 6,45,200] × 100 = 97.41. The ERI is the mean of the four, 81.18, which is in the Good band.

Three features of the score should be kept in mind. It lies between 0 and 100 and falls as removals rise and as a larger share of them are duplicate or shifted entries. Roll Purity differs little between ACs because duplicates are a small share of any roll, so it moves the ERI only slightly. And when the removals fully account for the difference between the two rolls,

Coverage Integrity and Data Stability are the same number, so the ERI in effect gives coverage half of its weight. Section 7.3 tests how much this matters.

6.3 System-Driven Update Share

The System-Driven Update Share is the proportion of removed entries that fall under the shifted, absent, others and duplicate heads: (Shifted/Absent/Others + Duplicate) ÷ Total × 100. Deceased entries are excluded because they arise from natural attrition and do not indicate anything about verification effort.

6.4 Data limitations

State-level figures come from the published Press Note. The AC-wise abstract for all 119 ACs was still awaited when the paper was written, so the AC-level figures used in Section 7 are illustrative. They are based on the usual size of an AC (roughly 2.5 to 3 lakh electors in rural areas and 5 to 6 lakh in urban areas) and are used only to show how the ERI is calculated. They must be replaced with figures from the published Draft Roll abstract before any conclusion is drawn about a particular AC.

7. Results

7.1 State-level change in the roll

Table 6 shows that the roll fell from 3,38,26,448 to 2,64,87,213 electors, a reduction of 73,39,235 entries, or 21.70% of the pre-SIR roll. All figures in this subsection are from the CEO's Press Note.

Table 6. Telangana electoral roll before and after SIR (Draft Roll)

Measure	Before SIR (2025)	Draft Roll (17.08.2026)	Net change
Total electors	3,38,26,448	2,64,87,213	−73,39,235 (−21.70%)

Source: CEO Telangana, Press Note No. 868/Elecs.B/B1/2026 (17 August 2026), Key findings of enumeration phase (25 June–10 August 2026).

Table 7 gives the reasons for removal. Shifted, absent and other cases account for a little under four-fifths of all removals. Deceased electors account for 12.57% and duplicate entries for 9.13%. Taking the shifted, absent, others and duplicate heads together, the System-Driven Update Share is 87.43%.

Table 7. Reason-wise breakup of entries removed, Telangana

Reason	Number	% of removals	Interpretation
Deceased	9,22,229	12.57	Natural attrition
Permanently shifted, absent or others	57,46,803	78.30	Mobility and non-residence
Enrolled at multiple places (duplicate)	6,70,203	9.13	Duplicate enrolment
Total	73,39,235	100.00	

Source: CEO Telangana, Press Note No. 868/Elecs.B/B1/2026 (17 August 2026), table on reason-wise nonenrolment. System-Driven Update Share = 87.43%, computed by the author.

7.2 Illustrative AC-level application of the ERI

Table 8 shows the verification details for the ten ACs and Table 9 the four ERI dimensions. As explained in Section 6.4, the AC-level figures are illustrative. The column "Removed (% of pre-SIR roll)" is Total ÷ Before × 100.

Table 8. Verification details for ten major ACs (illustrative figures)

AC No.	AC	Before	After	Deceased	Shifted	Absent	Duplicate	Total	Removed (%)	ERI
Urban major ACs										
49	L.B. Nagar	6,45,200	6,28,500	1,850	9,500	3,200	2,150	16,700	2.59	81.18
46	Malkajgiri	5,98,400	5,82,100	1,700	8,900	2,900	1,800	15,300	2.56	81.12
53	Serilingampally	5,75,300	5,61,200	1,600	8,200	2,600	1,700	14,100	2.45	81.15
64	Khairatabad	2,89,100	2,85,900	800	1,200	700	500	3,200	1.11	86.12
70	Secunderabad	3,12,450	3,05,100	1,100	3,800	1,500	950	7,350	2.35	82.59
Rural major ACs										
33	Siddipet	2,48,900	2,43,200	1,400	1,800	1,900	600	5,700	2.29	88.27
32	Gajwel	2,35,600	2,30,100	1,300	1,600	1,800	800	5,500	2.33	87.84
31	Sircilla	2,28,400	2,22,800	1,250	1,700	1,650	1,000	5,600	2.45	86.61
90	Nalgonda	2,42,300	2,36,500	1,350	2,100	1,750	600	5,800	2.39	87.10
109	Mahabubabad	2,15,670	2,07,780	1,200	3,500	2,800	1,390	8,890	4.12	84.14

Note. AC-level figures are illustrative and are used only to demonstrate the method in Section 6.2. State totals are from CEO Telangana, Press Note No. 868/Elecs.B/B1/2026 (17 August 2026). AC names and urban–rural classification follow the CEO's AC list and the Census 2011 District Census Handbooks. The figures are to be replaced with the Draft Roll abstract (voters.eci.gov.in) before publication.

Table 9. ERI dimensions and category for ten major ACs (illustrative figures)

AC	CI	VA	RP	DS	ERI	Category
Urban major ACs						
L.B. Nagar	97.41	30.24	99.66	97.41	81.18	Good
Malkajgiri	97.28	30.07	99.69	97.44	81.12	Good
Serilingampally	97.55	29.79	99.70	97.55	81.15	Good
Khairatabad	98.89	46.88	99.83	98.89	86.12	Good
Secunderabad	97.65	35.37	99.69	97.65	82.59	Good
Rural major ACs						
Siddipet	97.71	57.89	99.75	97.71	88.27	Good
Gajwel	97.67	56.36	99.65	97.67	87.84	Good

AC	CI	VA	RP	DS	ERI	Category
Sircilla	97.55	51.79	99.55	97.55	86.61	Good
Nalgonda	97.61	53.45	99.75	97.61	87.10	Good
Mahabubabad	96.34	44.99	99.33	95.88	84.14	Good

Source: Computed by the author using the formulas in Table 4 on illustrative data. Roll Purity above 99.3% in every AC reflects the low share of duplicate entries in the draft rolls.

Every one of the ten ACs falls in the Good band. Roll Purity is between 99.33 and 99.83, and Coverage Integrity and Data Stability are close to each other in all ACs. The main difference between ACs comes from Verification Accuracy, which ranges from 29.79 to 46.88 in the urban group and from 44.99 to 57.89 in the rural group.

Table 10. Urban and rural ACs compared (illustrative figures)

Group	No. of ACs	Average removed (%)	Average ERI	Average update share (%)
Urban major ACs	5	2.21	82.43	85.30
Rural major ACs	5	2.72	86.79	78.54

Source: Computed by the author from Table 8. The State-wide removal rate is 21.70% (Press Note No. 868, 17 August 2026).

7.3 Sensitivity of the ERI to its design

Because Coverage Integrity and Data Stability carry the same information, a simple check is to drop Data Stability and take the equal-weight average of the other three dimensions. Table 11 compares the two versions.

Table 11. ERI with four dimensions and with three dimensions (illustrative figures)

AC	ERI (four dimensions)	ERI (three dimensions)	Category (three dimensions)
Urban major ACs			
L.B. Nagar	81.18	75.77	Stable
Malkajgiri	81.12	75.68	Stable
Serilingampally	81.15	75.68	Stable
Khairatabad	86.12	81.86	Good
Secunderabad	82.59	77.57	Stable
Rural major ACs			
Siddipet	88.27	85.12	Good
Gajwel	87.84	84.56	Good
Sircilla	86.61	82.96	Good
Nalgonda	87.10	83.60	Good
Mahabubabad	84.14	80.22	Good

Source: Computed by the author. The three-dimension score is the average of CI, VA and RP.

The three-dimension score is lower than the four-dimension score in every AC, because Data Stability is above 95 everywhere. The average falls from 82.43 to 77.31 in the urban group and from 86.79 to 83.29 in the rural group, and 4 of the ten ACs move out of the Good band (L.B. Nagar, Malkajgiri, Serilingampally, Secunderabad). Rural ACs still score higher than urban ACs. The finding that all ten ACs are in the Good band therefore depends on the weighting, and the categories in Table 5 should be treated as provisional until the weights have been examined on verified data.

7.4 Discussion

A reduction of 21.70% is not surprising when 24 years separate the exercise from the previous intensive revision, since deaths, migration and repeat enrolment build up over such a period. What the State-level data show is that most removals, 87.43%, relate to people who moved, could not be found or were enrolled more than once, and only 12.57% relate to deaths. This suggests that house-to-house verification found entries that routine updating had not.

On the illustrative figures, the rural ACs score higher than the urban ACs (86.79 against 82.43), and the gap comes mainly from Verification Accuracy. Urban ACs in the sample have a larger share of shifted and duplicate entries among their removals. Because the AC data are illustrative, this pattern should be read as a description of how the score behaves and not as a finding about urban and rural rolls. The result on Roll Purity is of the same kind: it will hold only if the verified AC abstracts show similarly small numbers of duplicates.

Measured against the roll before revision, deceased entries are 2.73%, shifted, absent and other cases 16.99%, and duplicate entries 1.98%. The shifted, absent and others head is therefore by far the largest, and it is also the one on which the published data say least, because it groups cases that are treated differently under Section 20. Without a split, it is not possible to say how many of the 57,46,803 electors had moved permanently, how many could not be traced when the enumerator visited, and how many fall under other reasons. This limits what can be said about the quality of the classification.

Duplicate entries also deserve separate mention. The 6,70,203 duplicates equal 1.98% of the pre-SIR roll. Duplicates can arise when a person moves and registers again without asking for deletion at the old address, when repeated applications are made, and through data entry errors. Each cause has a different remedy, and the ERI treats them alike. The Roll Purity dimension should therefore be read as a broad indicator and not as a measure of any one cause.

The figures describe only one side of roll quality. A roll with fewer wrong entries is not necessarily a complete roll. Eligible citizens who were never enrolled, and those removed wrongly, are not captured by any of the four dimensions of the ERI. To measure these, the number of Form 6 applications received in the claims period, the number of names restored after notice, and the number of new electors added would be needed. These will be available only after the Final Roll is published, and a later version of the ERI could then include an inclusion component.

8. Policy Implications

8.1 Track the ERI every quarter, so that the quality of a roll can be followed between revisions and not only at the time of an SIR. Between revisions the roll changes through Forms 6, 7 and 8, and a regular score would show early which ACs are drifting. The score should be computed from the same fields each time so that quarters can be compared.

8.2 Strengthen the link between civil registration data and Aadhaar seeding. Death records and Aadhaar-based matching are the two most direct sources for identifying deceased and duplicate entries, and both reduce the reliance of BLOs on local inquiry alone. Any use of Aadhaar should stay within the framework of Form 6B and the safeguards attached to it.

8.3 Run targeted de-duplication drives in ACs where duplicate entries exceed a threshold, for example 1% of the roll. At State level the figure is 1.98% of the pre-SIR roll, so the threshold should be fixed only after verified AC-wise data are available, otherwise it will flag most ACs.

8.4 Use different approaches in rural and urban areas. In the illustrative data, urban ACs have more shifted and duplicate entries among their removals, which points to migration and repeat registration, while rural ACs have a larger share of deceased and absent cases. Matching-based checks may suit urban ACs better, and field verification with civil registration data may suit rural ACs.

8.5 Train BLOs on the classification of absent electors under Section 20, where the distinction between temporary absence and permanent shifting is most likely to be contested. Clear guidance with worked examples, and a record of the basis for each classification, would also help the ERO when hearing cases after notice.

8.6 Report shifted and absent cases separately. The present consolidated head is efficient for reporting, but separate figures would allow Section 20 to be examined directly and would make the ERI easier to test.

8.7 Publish the validation checks used alongside the ERI, so that others can reproduce the scores and examine the choice of weights.

8.8 Report inclusion alongside purity. Additions through Form 6, names restored after notice and the number of eligible citizens still outside the roll should be reported with the removal figures, so that a cleaner roll is not mistaken for a complete one.

Most of these measures concern reporting, training and the use of data, and they can be taken up within the existing framework of the RP Act and the Rules. Their purpose is to make the next revision easier to assess and easier to explain to electors.

9. Conclusion

The SIR of 2025–26 in Telangana reduced the roll from 3.38 crore to 2.64 crore entries at the draft stage. It was conducted under Articles 324 to 326 of the Constitution and the provisions of the RP Act, 1950 and the 1960 Rules, with the participation of party agents. The State-level data show that most of the removals relate to shifted, absent, other and duplicate entries, which points to the value of field verification and de-duplication.

The ERI offers a way to summarise such changes at AC level. On the illustrative data used here, all ten ACs fall in the Good band and Roll Purity is above 99.3%, but these figures show only how the score works, and the band depends on the weighting: with Data Stability dropped, several urban ACs move to the Stable band. Whether the Telangana experience can serve as a model for other States depends on testing the ERI on the verified AC-wise abstracts and on the outcome of the claims and objections phase.

10. Limitations and Future Research

The State-level figures are verified against the CEO's Press Note, but the AC-level figures are illustrative, and a full validation needs the abstract for all 119 ACs from the CEO's portal. The figures relate to the draft roll, and the Final Roll will differ once claims, objections and notices have been disposed of. The equal weights in the ERI are a choice made for simplicity and have not been tested empirically, and Section 7.3 shows that the categories change when one dimension is dropped. The ERI also treats a low removal rate as a sign of a stable roll, which may not suit a roll that has not been revised for 24 years. The ERI does not measure eligible citizens who are missing from the roll. The State-level data do not separate shifted from absent cases. Future work could replicate the analysis in other States, add an Aadhaar-based sub-

index, examine the relation between the ERI and turnout over time, and study differences by gender and age cohort.

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Declaration on Data Source and Ethics

The State-level figures (roll before SIR, Draft Roll, total removals and reason-wise removals) are taken from Press Note No. 868/Elecs.B/B1/2026 dated 17 August 2026. The AC-level figures are illustrative and were prepared only to demonstrate the ERI method; they are to be replaced with verified figures from voters.eci.gov.in before final publication. No personal elector data, EPIC numbers or Aadhaar data were used, and all analysis is at aggregate AC level. The paper is independent academic research, does not represent the official views of the Election Commission of India, and involves no conflict of interest. The similarity index and AI-content level are within the limits set in the call for papers, and AI assistance was limited to language editing.

References

Ansolabehere, S., & Konisky, D. (2006). The introduction of voter registration and its effect on turnout. Political Analysis, 14(1), 83–100.

Catt, H., Ellis, A., Maley, M., Wall, A., & Wolf, P. (2014). Electoral management design (Rev. ed.). International IDEA.

Chief Electoral Officer, Telangana. (2026, August 17). Press Note No. 868/Elecs.B/B1/2026: Telangana Special Intensive Revision (SIR): Key findings of enumeration phase (25th June–10th August 2026). Office of the Chief Electoral Officer, Telangana.

Election Commission of India. (2025). Guidelines for Special Intensive Revision 2025. Nirvachan Sadan, New Delhi.

Government of India. (1950). The Representation of the People Act, 1950 (Act No. 43 of 1950). Ministry of Law and Justice.

Massicotte, L., Blais, A., & Yoshinaka, A. (2004). Establishing the rules of the game: Election laws in democracies. University of Toronto Press.

Ministry of Law and Justice. (1960). The Registration of Electors Rules, 1960.

Ministry of Law and Justice. (2022). The Registration of Electors (Amendment) Rules, 2022 (insertion of Form 6B for Aadhaar linkage). The Gazette of India.

Mohinder Singh Gill v. Chief Election Commissioner, AIR 1978 SC 851.

Norris, P. (2014). Why electoral integrity matters. Cambridge University Press.

Pew Center on the States. (2012). Inaccurate, costly, and inefficient: Evidence that America's voter registration system needs an upgrade. The Pew Charitable Trusts.

Registrar General of India. (2011). Census 2011 District Census Handbooks, Telangana. Office of the Registrar General and Census Commissioner, India.

Annexure: ERI Formula Sheet

Item	Formula
Coverage Integrity (CI)	(After ÷ Before) × 100
Verification Accuracy (VA)	[1 − (Duplicate + Shifted) ÷ Total] × 100
Roll Purity (RP)	[1 − Duplicate ÷ After] × 100
Data Stability (DS)	[1 − Total ÷ Before] × 100, at the draft stage
ERI	0.25 × CI + 0.25 × VA + 0.25 × RP + 0.25 × DS
System-Driven Update Share	(Shifted/Absent/Others + Duplicate) ÷ Total × 100
Interpretation	90–100 Model AC; 80–89 Good; 70–79 Stable; below 70 Focus AC

Source: Author's construction. State totals from CEO Telangana, Press Note No. 868/Elecs.B/B1/2026 (17 August 2026).

Digital Payments and Green Rewards: a Model for Promoting Sustainable Consumption

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Digital payments have become an integral part of India's consumption ecosystem, creating opportunities to integrate behavioural incentives with sustainability objectives. This study examines whether digital payment-based rewards can encourage consumers to adopt sustainable and healthier consumption practices. It proposes a Digital Green Reward Model in which consumers receive points, discounts, cashback or environmental benefits for eligible digital transactions involving sustainable, low-pollution, reusable, low-packaging or healthier products. The study adopts a quantitative research design based on primary data collected from digital payment users in India. A structured questionnaire will measure digital payment usage, environmental awareness, health consciousness, perceived environmental benefits, perceived economic benefits, reward attractiveness, trust, ease of redemption and willingness to participate in a digital green reward programme. The reliability and validity of the measurement scales were assessed using Cronbach's alpha while descriptive statistics, correlation employed to examine the proposed relationships. The study is expected to provide evidence on whether reward attractiveness, environmental awareness and perceived economic and environmental benefits influence consumers' willingness to participate in digital green reward programmes and encourage sustainable and healthier product choices. The study contributes to the emerging sustainable FinTech literature by integrating digital payments with green incentive mechanisms. Unlike approaches that consider digital payments inherently sustainable, it positions digital payment infrastructure as a behavioural mechanism for promoting responsible consumption. The findings may offer useful implications for payment platforms, retailers, policymakers and sustainability-oriented businesses seeking to integrate environmental objectives into India's digital economy.

Keywords: Consumer behaviour; Digital payments; FinTech; Green incentives; Green rewards; Sustainable consumption; Sustainable FinTech; UPI.

JEL Classification: E42, D12, Q56, O33, M31

1. Introduction

Digital payments have become an important component of contemporary consumer transactions, changing not only how consumers make payments but also how purchasing activities are integrated with digital platforms. As digital payment ecosystems increasingly connect consumers, retailers and financial service providers, they provide an opportunity to incorporate behavioural incentives into everyday consumption activities. Recent research suggests that payment practices are not inherently sustainable; their sustainability implications depend on how payment systems are embedded within consumption processes and connected with responsible consumer behaviour [1].

At the same time, sustainable consumption has received increasing attention as consumers, businesses and policymakers seek ways to reduce environmentally harmful consumption practices. Research in the Indian context indicates that green awareness and green behaviour are important components of sustainable consumption and that environmental attitudes and awareness can contribute to environmentally responsible purchasing behaviour [2]. This suggests that creating mechanisms that connect consumers' everyday purchasing decisions with sustainability objectives may provide an additional approach to encouraging responsible consumption.

Behavioural incentives represent an important mechanism for promoting sustainable consumption. Digital platforms have demonstrated the potential to combine technology, rewards and environmental objectives. research on sustainable loyalty programmes shows that consumers consider reward characteristics, economic value and sustainability attributes when deciding whether to participate in incentive-based programmes [4]. These findings provide a basis for considering whether similar incentive mechanisms can be incorporated into digital payment transactions.

Consumer characteristics are also important in understanding sustainable consumption decisions. Recent evidence from India indicates that environmental beliefs and health consciousness are associated with green purchase intention, highlighting the relevance of both environmental and personal well-being considerations in sustainable consumption [5]. Thus,

environmental awareness, health consciousness, perceived environmental benefits and economic benefits may shape consumers' willingness to participate in sustainability-oriented reward programmes.

Against this background, this study proposes a Digital Green Reward Model, in which consumers receive points, discounts, cashback or other environmental benefits for eligible digital transactions involving sustainable, low-pollution, reusable, low-packaging or healthier products. The model seeks to connect existing digital payment infrastructure with sustainability-oriented incentives rather than treating digital payments themselves as inherently sustainable. The study therefore examines consumers' perceptions of digital payment usage, environmental awareness, health consciousness, perceived environmental and economic benefits, reward attractiveness, trust, redemption convenience and behavioural intention to participate in a digital green reward programme. By bringing these dimensions together, the study provides preliminary empirical evidence on the potential of digital payment-based rewards as a mechanism for encouraging sustainable consumption.

2. Literature Review

Early research on financial technology established the transformative role of digital technologies in financial services. Arner et al. (2016) explained the emergence of FinTech as a new paradigm in financial services, while Gomber et al. (2017) highlighted how digital technologies were reshaping financial services and creating new research opportunities [6,7]. These studies provide the technological foundation for examining digital payments beyond their conventional transactional role.

Research on sustainable consumption subsequently focused on the psychological and environmental factors underlying consumers' green purchasing behaviour. Maki et al. (2016) demonstrated through a meta-analysis that behavioural interventions, including financial incentives, can support pro-environmental behaviour, although their effectiveness depends on the context and design of the intervention [12]. Joshi and Rahman (2018) identified environmental concern, environmental knowledge and perceived consumer effectiveness as important factors associated with sustainable purchase behaviour, while Taufique and Vaithianathan (2018) emphasized environmental attitudes and perceived consumer effectiveness among young urban Indian consumers [8,9]. These studies established the

importance of environmental awareness but largely examined sustainable consumption without integrating digital payment-based incentives.

Further research highlighted the gap between environmental attitudes and actual green purchasing behaviour. Trivedi et al. (2018) examined the relationship between environmental attitudes, intentions and green purchase behaviour, while Rustam et al. (2020) emphasized environmental awareness and related consumer factors in explaining green consumption [10,11]. This stream of research indicates that awareness and positive attitudes may require additional behavioural mechanisms to facilitate sustainable consumption.

More recent studies have increasingly examined digital technologies, gamification and rewards as mechanisms for encouraging environmentally responsible behaviour. Sun and Xing (2023) found that gamification motivation was associated with green consumption behaviour in the Ant Forest platform [3]. Krampe et al. (2025) examined sustainable temporary loyalty programmes and found that reward characteristics, economic value and sustainability attributes are relevant to consumer preferences [4]. These studies indicate the potential of digitally delivered incentives to connect consumer participation with sustainability-oriented outcomes.

Recent research has also expanded attention to individual characteristics associated with sustainable purchasing. Sriramaneni et al. (2025) found that environmental beliefs and health consciousness are relevant to green purchase intention in the Indian context [5]. Such evidence supports the inclusion of both environmental awareness and health consciousness when examining sustainable and healthier consumption choices.

Despite this development, existing studies have generally examined digital payments, green consumption, environmental awareness, health consciousness and reward mechanisms as separate research streams. Limited attention has been given to using the digital payment transaction itself as a mechanism for delivering rewards for sustainable and healthier purchases. Therefore, the proposed study addresses this gap by integrating digital payment usage, environmental awareness, health consciousness, perceived environmental benefits, perceived economic benefits, reward attractiveness, trust and redemption convenience within a Digital Green Reward Model.

3. Objectives:

1. To examine the usage of digital payments among consumers.

2. To assess consumers' environmental awareness and health consciousness towards sustainable consumption.
3. To examine consumers' perceptions of the environmental and economic benefits of digital green rewards.
4. To assess consumers' perceptions of reward attractiveness, trust and redemption convenience.
5. To examine the relationship between the selected factors and consumers' behavioural intention to participate in a digital green reward programme.

4. Research Methodology

The study adopts a quantitative, exploratory research design to examine consumers' perceptions of a proposed Digital Green Reward Model. The study is based on primary data collected through a structured questionnaire administered to digital payment users. The target population comprises consumers who use digital payment services in India. A total of 54 valid responses were obtained and included in the analysis. Given the relatively small sample, the study is positioned as an exploratory investigation and the findings are interpreted cautiously.

The questionnaire covered:

- Digital Payment Usage
- Environmental Awareness
- Health Consciousness
- Perceived Environmental Benefits
- Economic Benefits
- Reward Motivation/Attractiveness
- Trust
- Redemption Convenience
- Behavioural Intention

The proposed rewards include points, discounts, cashback and environmental benefits associated with eligible transactions involving sustainable, low-pollution, reusable, low-packaging or healthier products. The constructs were measured using multiple questionnaire items. The items were evaluated using a Likert-type response scale. Composite scores were calculated for each construct for the purpose of descriptive and correlation analysis.

Descriptive statistics such as mean and standard deviation were used to summarise respondents' perceptions of each construct. The reliability of the measurement scales is examined using ronbach's alpha was used to assess the internal consistency of the items measuring each construct. Pearson's correlation coefficient was used to examine the direction and strength of the relationships between the selected constructs and Behavioural Intention.

5. Data Analysis and Interpretation

5.1 Descriptive Analysis

Table 1: Descriptive Statistics of Study Constructs

Construct	Mean	SD	N
Digital Payment Usage	3.917	1.144	54
Environmental Awareness	4.198	0.955	54
Health Consciousness	4.171	0.907	54
Perceived Environmental Benefits	4.043	1.097	54
Economic Benefits	3.653	1.038	54
Reward Motivation/Attractiveness	3.864	1.100	54
Trust	3.537	1.075	54
Redemption Convenience	4.012	0.965	54
Behavioral Intention	3.904	0.868	54

Interpretation

The descriptive results are shown in Table 1 indicate generally favourable perceptions across all the study constructs. Environmental Awareness recorded the highest mean score (M = 4.198, SD = 0.955), followed by Health Consciousness (M = 4.171, SD = 0.907). Perceived Environmental Benefits also recorded a relatively high mean (M = 4.043, SD = 1.097).

Redemption Convenience recorded a mean of 4.012 (SD = 0.965), indicating favourable perceptions regarding the convenience of redeeming rewards. Digital Payment Usage (M = 3.917, SD = 1.144) and Behavioural Intention (M = 3.904, SD = 0.868) also recorded relatively high scores.

Economic Benefits (M = 3.653, SD = 1.038) and Trust (M = 3.537, SD = 1.075) recorded comparatively lower mean scores, although both remained above the midpoint of the scale. Overall, the results suggest that respondents generally demonstrate favourable perceptions towards sustainability-related rewards and the proposed digital payment-based mechanism.

5.2 Reliability Analysis

Table 2: Reliability Analysis of Study Constructs

Construct	No. of Items	N	Cronbach's Alpha (α)
Digital Payment Usage	4	54	0.871
Environmental Awareness	3	54	0.852
Health Consciousness	4	54	0.890
Perceived Environmental Benefits	3	54	0.966
Economic Benefits	4	54	0.900
Reward Motivation/Attractiveness	3	54	0.911
Trust	3	54	0.898
Redemption Convenience	3	54	0.890
Behavioral Intention	5	54	0.908

Interpretation

Table 2 shows the Cronbach's alpha coefficients range from 0.852 to 0.966, indicating strong internal consistency across all constructs. Digital Payment Usage (α = 0.871) and Environmental Awareness (α = 0.852) demonstrate good reliability. Health Consciousness (α = 0.890), Trust (α = 0.898) and Redemption Convenience (α = 0.890) also show high internal consistency.

Economic Benefits (α = 0.900), Reward Motivation/Attractiveness (α = 0.911) and Behavioural Intention (α = 0.908) demonstrate very strong internal consistency. Perceived Environmental Benefits recorded the highest coefficient (α = 0.966), indicating very high consistency among its three items.

Overall, the reliability findings indicate that the measurement items are internally consistent and suitable for the subsequent correlation analysis. The exceptionally high alpha for Perceived Environmental Benefits should nevertheless be checked for possible similarity or redundancy among the three items.

5.3 Pearson Correlation Analysis

Table 3: Pearson Correlation with Behavioural Intention

Construct	Pearson r	p-value
Digital Payment Usage	0.503	< .001
Environmental Awareness	0.479	< .001
Health Consciousness	0.624	< .001
Perceived Environmental Benefits	0.598	< .001
Economic Benefits	0.612	< .001
Reward Motivation/Attractiveness	0.724	< .001

Construct	Pearson r	p-value
Trust	0.763	< .001
Redemption Convenience	0.634	< .001

Interpretation

Table 3 depicts Pearson correlation analysis indicates positive and statistically significant associations between all eight examined constructs and Behavioural Intention, with all p-values below .001.

Digital Payment Usage demonstrates a moderate positive association with Behavioural Intention ($r = 0.503$, $p < .001$). Environmental Awareness also demonstrates a positive association ($r = 0.479$, $p < .001$), indicating that greater environmental awareness is associated with greater willingness to participate in the proposed programme.

Health Consciousness ($r = 0.624$, $p < .001$), Perceived Environmental Benefits ($r = 0.598$, $p < .001$) and Economic Benefits ($r = 0.612$, $p < .001$) show relatively strong positive associations with Behavioural Intention.

Reward Motivation/Attractiveness demonstrates a strong positive association with Behavioural Intention ($r = 0.724$, $p < .001$). This indicates that respondents who perceive the proposed rewards as more attractive also tend to report greater willingness to participate.

The strongest association is observed between Trust and Behavioural Intention ($r = 0.763$, $p < .001$). This suggests that trust is an important dimension associated with consumers' willingness to participate in a digital green reward programme. Redemption Convenience also demonstrates a relatively strong positive relationship ($r = 0.634$, $p < .001$).

These findings indicate that all the selected dimensions are positively associated with behavioural intention. However, the results should be interpreted as associations rather than causal relationships, because Pearson correlation does not establish causality.

The three analyses collectively provide preliminary empirical support for the proposed Digital Green Reward Model. The descriptive findings demonstrate that respondents generally hold favourable perceptions towards environmental awareness, health consciousness, digital payment usage, perceived environmental benefits and participation in a digital green reward programme.

The reliability analysis further establishes that the measurement scales demonstrate strong internal consistency, with Cronbach's alpha values exceeding 0.85 for all constructs.

This provides support for the consistency of the questionnaire items used to measure the proposed dimensions.

The correlation analysis indicates that all eight examined constructs are positively and significantly associated with Behavioural Intention. In particular, Trust (r = 0.763), Reward Motivation/Attractiveness (r = 0.724), Redemption Convenience (r = 0.634), Health Consciousness (r = 0.624) and Economic Benefits (r = 0.612) show relatively strong associations.

The findings therefore suggest that consumers' willingness to participate in digital green reward programmes is associated not only with environmental considerations but also with economic incentives, trust, reward attractiveness and convenience. This supports the broader conceptual proposition that digital payment infrastructure could potentially be used as a channel for sustainability-oriented behavioural incentives.

6. Findings of the Study

The major findings of the study are as follows:

1. **Favourable sustainability orientation:** Environmental Awareness recorded the highest mean score (M = 4.198), indicating a generally favourable level of environmental awareness among the respondents.
2. **Health consciousness:** Health Consciousness recorded a high mean score of 4.171, indicating that health-related considerations are relevant to respondents' consumption perceptions.
3. **Positive perception of environmental benefits:** Perceived Environmental Benefits recorded a mean of 4.043, suggesting that respondents generally recognise the potential environmental value of sustainable consumption.
4. **Positive perception of digital rewards:** Reward Motivation/Attractiveness recorded a mean of 3.864, indicating favourable perceptions towards incentives such as points, cashback and discounts.
5. **Strong measurement reliability:** All constructs demonstrated high internal consistency, with Cronbach's alpha ranging from 0.852 to 0.966.
6. **Positive association with behavioural intention:** All eight examined constructs demonstrated positive and statistically significant correlations with Behavioural Intention.

7. **Role of reward attractiveness:** Reward Motivation/Attractiveness showed a strong positive association with Behavioural Intention ($r = 0.724$, $p < .001$).
8. **Role of trust:** Trust recorded the strongest correlation with Behavioural Intention ($r = 0.763$, $p < .001$), highlighting the relevance of consumer confidence in the proposed reward mechanism.
9. **Importance of convenience:** Redemption Convenience demonstrated a positive association with Behavioural Intention ($r = 0.634$, $p < .001$), suggesting that ease of reward redemption is an important consideration.
10. **Economic and environmental considerations:** Both Perceived Environmental Benefits ($r = 0.598$) and Economic Benefits ($r = 0.612$) were positively associated with Behavioural Intention, suggesting that consumers may consider both environmental and personal economic value when evaluating the proposed programme.

7. Conclusion

The study provides preliminary empirical evidence regarding the potential of integrating digital payments with sustainability-oriented reward mechanisms. The proposed Digital Green Reward Model positions digital payment infrastructure as a possible behavioural channel through which consumers can receive incentives for sustainable and healthier consumption choices.

The descriptive findings indicate generally favourable perceptions among the respondents towards environmental awareness, health consciousness, perceived environmental benefits and participation in a digital green reward programme. The strong reliability coefficients demonstrate that the questionnaire constructs have satisfactory internal consistency.

The Pearson correlation results further reveal positive and statistically significant associations between all the selected constructs and Behavioural Intention. Trust and Reward Motivation/Attractiveness demonstrate particularly strong relationships with behavioural intention, while redemption convenience, health consciousness, economic benefits and perceived environmental benefits also show relatively strong positive associations.

The findings suggest that a successful digital green reward programme may need to consider more than environmental messaging alone. Consumers may also value economic rewards, attractive incentives, trustworthiness and convenient redemption. This provides a

basis for payment platforms and retailers to consider sustainability-oriented reward mechanisms within digital transaction environments.

The study contributes to sustainable FinTech literature by bringing together two areas that are often examined separately: digital payment behaviour and sustainable consumption incentives. Unlike an approach that assumes digital payments are inherently sustainable, the proposed model considers how existing digital payment infrastructure could be deliberately linked with responsible consumption objectives.

The study has practical implications for payment platforms, retailers, sustainability-oriented businesses and policymakers. Digital green rewards could potentially be designed around eligible purchases of reusable, low-packaging, low-pollution or healthier products, with rewards delivered through existing digital payment channels.

However, the study has important limitations. The analysis is based on only 54 respondents, and therefore the findings should be regarded as exploratory and should not be generalised to all Indian digital payment users. The study also relies on self-reported perceptions rather than observed purchasing behaviour. Further, Pearson correlation establishes association rather than causality. Future research with larger and more diverse samples can provide stronger empirical validation of the proposed model and examine whether participation intentions translate into actual sustainable consumption behaviour.

References

1] Petroccione, G., & Taddei, M. (2026). Consumer behaviour and digital payments in the post-COVID-19 era: A systematic review and integrative framework for sustainable marketing. *Competitiveness Review*. https://doi.org/10.1108/CR-02-2026-0098

[2] Naini, S. R., & Reddy, M. R. (2024). Role of green awareness and green behaviour in fostering sustainable consumption in India. *Journal of Science and Technology Policy Management, 16*(6), 1022–1042. https://doi.org/10.1108/JSTPM-11-2022-0182

[4] Krampe, C., de Groot, A.-J., & Hurst, W. (2025). Green loyalty? Unveiling consumer preferences in sustainable temporary loyalty programs. *Cleaner and Responsible Consumption, 16*, 100253. https://doi.org/10.1016/j.clrc.2025.100253

[5] Sriramaneni, S. D., Kotni, V. V. D. P., Babu, G. N. P. V., & Sriramneni, C. (2025). Green purchase intention: Understanding the role of environmental beliefs, health consciousness and perceived behavioural control. *Revista Galega de Economía, 34*(2). https://doi.org/10.15304/rge.34.2.10587

[6] Arner, D. W., Barberis, J., & Buckley, R. P. (2016). The evolution of FinTech: A new post-crisis paradigm? *Georgetown Journal of International Law, 47*(4), 1271–1319.

[7] Gomber, P., Koch, J.-A., & Siering, M. (2017). Digital finance and FinTech: Current research and future research directions. *Journal of Business Economics, 87*, 537–580. https://doi.org/10.1007/s11573-017-0852-x

[8] Joshi, Y., & Rahman, Z. (2018). Consumers' sustainable purchase behaviour: Modeling the impact of psychological factors. *Ecological Economics, 150*, 235–246. https://doi.org/10.1016/j.ecolecon.2018.04.028

[9] Taufique, K. M. R., & Vaithianathan, S. (2018). A fresh look at understanding green consumer behaviour among young urban Indian consumers through the lens of theory of planned behaviour. *Journal of Cleaner Production, 183*, 46–55. https://doi.org/10.1016/j.jclepro.2018.02.097

[10] Trivedi, R. H., Patel, J. D., & Acharya, N. (2018). Causality analysis of media influence on environmental attitude, intention and behavior leading to green purchase. *Journal of Cleaner Production, 196*, 11–22. https://doi.org/10.1016/j.jclepro.2018.06.024

[11] Rustam, A., Wang, Y., & Zameer, H. (2020). Environmental awareness, firm sustainability exposure and green consumption behaviors. *Journal of Cleaner Production, 268*, 122200. https://doi.org/10.1016/j.jclepro.2020.122200

[12] Maki, A., Carrico, A. R., Raimi, K. T., Truelove, H. B., & Zhao, J. (2016). Meta-analysis of pro-environmental behaviour spillover. *Nature Climate Change, 6*, 456–461. https://doi.org/10.1038/nclimate3038

[13] Sun, Y., & Xing, J. (2023). The impact of gamification motivation on green consumption behavior—An empirical study based on Ant Forest. *Sustainability, 15*(1), 512. https://doi.org/10.3390/su15010512

[14] Sriramaneni, S. D., Kotni, V. V. D. P., Babu, G. N. P. V., & Sriramneni, C. (2025). Green purchase intention: Understanding the role of environmental beliefs, health consciousness and perceived behavioural control. *Revista Galega de Economía, 34*(2). https://doi.org/10.15304/rge.34.2.10587

[15] Krampe, C., de Groot, A.-J., & Hurst, W. (2025). Green loyalty? Unveiling consumer preferences in sustainable temporary loyalty programs. *Cleaner and Responsible Consumption, 16*, 100253. https://doi.org/10.1016/j.clrc.2025.100253

AI-Generated Financial Advice and Investor Trust: An Empirical Study of Retail Investors in Telangana

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Artificial intelligence tools are now a routine part of how retail investors gather financial information — explaining products, flagging patterns in the market, and offering suggestions tailored to what a user has typed in. Whether that convenience translates into trust is a separate question, and one that depends on how accurate, transparent and explainable investors find the output, and on how much of their own judgement they still bring to a decision.

This study examines that question among 240 retail investors surveyed across ten districts of Telangana, using a structured questionnaire built around five predictor constructs — perceived accuracy, transparency, explainability, personalisation and perceived risk — and investor trust as the outcome. All six scales showed good internal consistency (Cronbach's alpha between 0.81 and 0.89). Perceived accuracy, transparency, explainability and personalisation were each positively correlated with investor trust, while perceived risk was negatively correlated with it. A multiple regression with investor trust as the dependent variable found all five predictors statistically significant ($p < 0.01$), together explaining 59.2% of the variance in trust ($R^2 = 0.592$, Adjusted $R^2 = 0.584$, $F(5,234) = 67.99$, $p < 0.001$). Perceived accuracy ($\beta = 0.35$) and explainability ($\beta = 0.29$) emerged as the strongest drivers, followed by transparency ($\beta = 0.18$) and personalisation ($\beta = 0.14$), with perceived risk exerting a significant negative effect ($\beta = -0.13$).

These results indicate that investors treat AI-generated financial advice as a useful decision-support tool rather than a substitute for their own judgement or professional advice — trust rises with accuracy, clarity and personal relevance, and falls as perceived risk increases. The paper closes with a discussion of the disclosure, explainability and human-oversight practices these findings point toward for AI-enabled financial services.

Keywords: Artificial Intelligence, Financial Advice, Investor Trust, Retail Investors, FinTech, Telangana, Investment Decisions

1. Introduction

Financial information used to reach investors mainly through advisors, brokers and print media. AI-enabled applications have added a faster channel: they summarise financial concepts, compare products and generate investment suggestions on demand, lowering the effort needed to make sense of markets.

That convenience does not remove the underlying uncertainty of financial decisions. A model can produce a confident-sounding answer built on information that is incomplete, stale, or simply the wrong fit for a particular investor's situation. So the value of AI-generated advice cannot be judged on convenience alone — it depends on whether investors trust it enough to act on it, verify it, or set it aside.

Telangana is a useful setting for this question. Smartphone access, online trading platforms and digital payments have all expanded retail participation in financial markets, but there is little regional evidence on how ordinary investors read AI-generated advice and what shapes their trust in it. This study focuses on that gap.

2. Statement of the Problem

AI-based financial guidance is becoming easier to reach, but it also raises questions of accuracy, transparency, privacy, accountability and fit. An investor might trust a tool simply because it is fast, and then hesitate the moment they cannot see how it arrived at a recommendation. The question this study is built around is whether the perceived qualities of AI-generated financial advice are associated with how much retail investors in Telangana actually trust it.

3. Objectives of the Study

- To examine the level and pattern of awareness and use of AI-generated financial advice among retail investors in Telangana.
- To measure investors' perceptions of the accuracy, transparency, explainability and personalisation of AI-generated financial advice.
- To assess the level of investor trust in AI-generated financial advice.
- To examine the relationship between the perceived quality of AI-generated financial advice and investor trust.

- To identify the factors that significantly influence investor trust in AI-generated financial advice.

4. Review of Literature

Research on AI in finance generally finds two things at once: faster, more accessible information processing, and new worries about opacity, algorithmic bias and accountability. Work on robo-advisory and algorithmic financial services points to perceived competence, reliability, transparency and the degree of human involvement as the main drivers of trust.

Technology-acceptance research adds that perceived usefulness and ease of use shape willingness to adopt digital financial tools, though trust in AI-generated advice is a step more complicated — investors are evaluating not just the tool but the consequences of acting on what it says. Explainability matters here: understanding why a recommendation was generated makes investors more willing to weigh it critically rather than accept it outright.

Financial literacy and prior digital experience also shape how investors read these tools. More financially literate investors tend to verify AI output before acting; less experienced investors are more likely to either avoid it altogether or accept it uncritically. Regional evidence on this in Telangana specifically remains thin, which is the gap this study addresses.

5. Research Gap

Most existing work looks at robo-advisors, algorithmic trading or FinTech adoption broadly. Trust placed specifically in AI-generated financial advice by retail investors in a regional Indian context has received comparatively little attention. This study addresses that gap by examining accuracy, transparency, explainability, personalisation and perceived risk as factors associated with investor trust among retail investors in Telangana.

6. Research Methodology

Research design: descriptive and analytical.

Population and sample: retail investors in Telangana with experience of digital investment or financial-information platforms. The final sample comprises 240 respondents drawn from ten districts, covering a mix of urban and semi-urban settings.

Sampling technique: a purposive, convenience-based approach aimed at investors with meaningful exposure to digital financial services and AI-enabled financial information.

Data collection: a structured questionnaire, with most items measured on a five-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

Variables: the independent constructs are Perceived Accuracy (PA), Transparency (TR), Explainability (EX), Personalisation (PS) and Perceived Risk (PR); Investor Trust (IT) is the dependent variable.

Statistical tools: percentage analysis, mean and standard deviation for descriptive analysis; Cronbach's alpha for internal consistency; Pearson correlation for association between variables; multiple regression for the influence of the explanatory variables on investor trust.

7. Conceptual Framework

The framework treats investor trust as shaped jointly by the positive attributes of AI-generated advice and the risks investors perceive in it:

Perceived Accuracy + Transparency + Explainability + Personalisation − Perceived Risk → Investor Trust

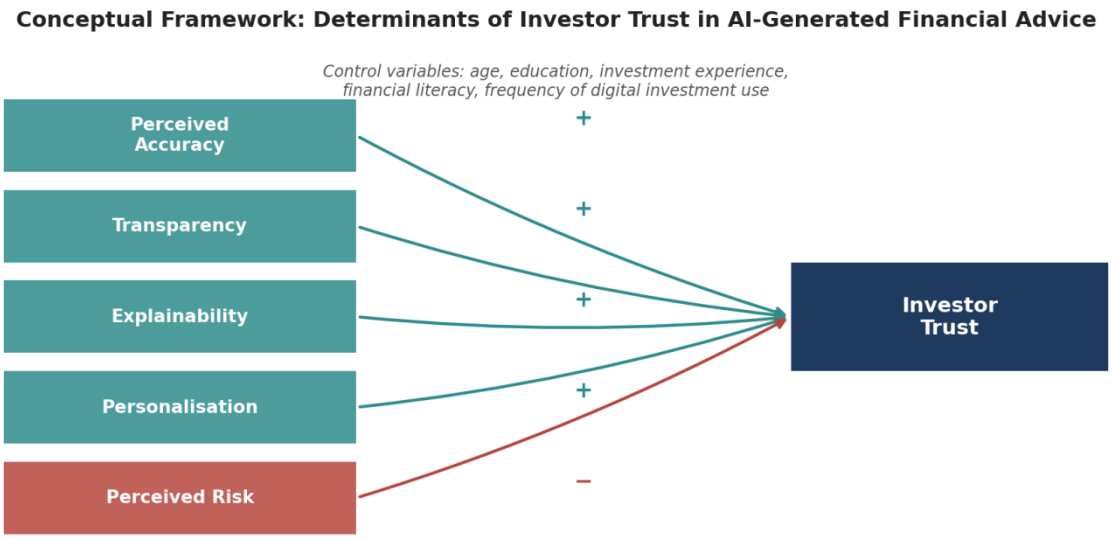

Figure 1. Conceptual framework linking the five predictor constructs to investor trust.

Age, education, investment experience, financial literacy and frequency of digital investment use are treated as control variables when the regression results are interpreted.

8. Hypotheses

- H1: Perceived accuracy of AI-generated financial advice has a significant positive relationship with investor trust.

- H2: Transparency of AI-generated financial advice has a significant positive relationship with investor trust.
- H3: Explainability of AI-generated financial advice has a significant positive relationship with investor trust.
- H4: Personalisation of AI-generated financial advice has a significant positive relationship with investor trust.
- H5: Perceived risk associated with AI-generated financial advice has a significant negative relationship with investor trust.
- H6: The combined dimensions of perceived accuracy, transparency, explainability, personalisation and perceived risk significantly explain variation in investor trust.

9. Respondent Profile

The achieved sample covers 240 retail investors across ten districts of Telangana: Kamareddy (42), Nizamabad (41), Warangal (33), Mahabubnagar (28), other districts pooled (24), Karimnagar (22), Medak (18), Hyderabad (15), Adilabad (10) and Sangareddy (7).

Characteristic	Category	n (%)
Gender	Male	118 (49.2)
Gender	Female	118 (49.2)
Gender	Prefer not to say	4 (1.7)
Age	18–30 years	75 (31.2)
Age	31–45 years	102 (42.5)
Age	46–60 years	51 (21.2)
Age	Above 60 years	12 (5.0)
Investment Experience	Below 3 years	84 (35.0)
Investment Experience	3–7 years	100 (41.7)
Investment Experience	Above 7 years	56 (23.3)
Uses AI for financial information	Yes	180 (75.0)
Uses AI for financial information	No	60 (25.0)
Verifies AI output elsewhere	Always / Often	117 (48.7)
Verifies AI output elsewhere	Sometimes	68 (28.3)
Verifies AI output elsewhere	Rarely / Never	55 (22.9)
Would recommend AI-generated advice	Yes	127 (52.9)
Would recommend AI-generated advice	No	28 (11.7)
Would recommend AI-generated advice	Not sure	85 (35.4)
Wants human oversight retained	Yes	189 (78.8)
Wants human oversight retained	No	11 (4.6)
Wants human oversight retained	Not sure	40 (16.7)

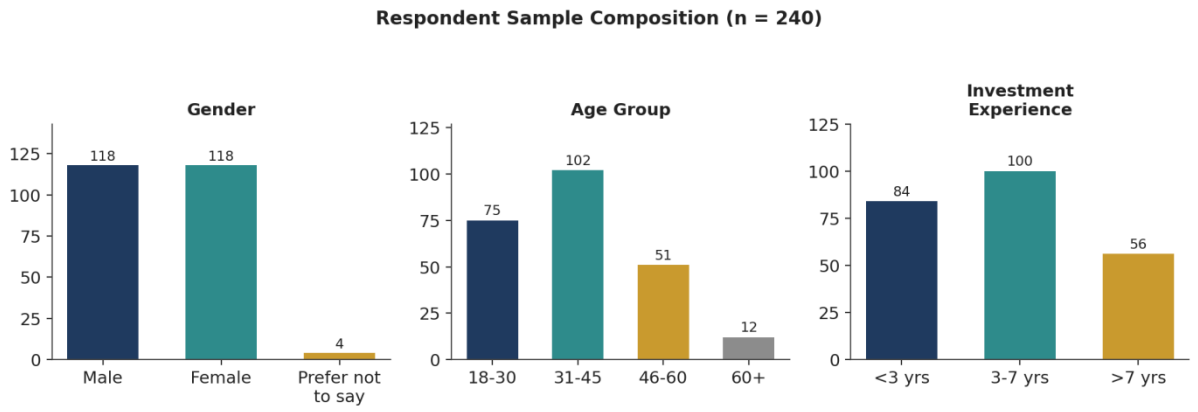

Figure 2. Distribution of the achieved sample by gender, age and investment experience.

Analysis: the sample is evenly split by gender and reasonably spread across age and experience bands, with 31–45-year-olds the largest single group (42.5%). Three-quarters of respondents (75.0%) already use AI tools for financial information, yet fewer than half (48.7%) always or often verify that output elsewhere, and 78.8% still want human oversight retained for financial decisions — an early sign, before any of the construct-level analysis, that usage and full trust are not the same thing for this sample.

10. Perceptions of AI-Generated Financial Advice

Dimension	Mean	SD
Perceived Accuracy	3.38	0.48
Transparency	3.32	0.53
Explainability	3.37	0.49
Personalisation	3.46	0.51
Perceived Risk	3.06	0.49
Investor Trust	3.57	0.57

Figure 3. Mean perception scores by dimension, with standard deviation (n = 240).

Investors rate all five predictor dimensions moderately above the scale midpoint, with personalisation scoring highest (M = 3.46) and perceived risk lowest (M = 3.06) — risk concern is present but not dominant. Investor trust itself (M = 3.57) sits a little above the individual perception dimensions, suggesting trust draws on more than these five constructs alone, consistent with the unexplained variance picked up in the regression model below. The relatively tight standard deviations (0.48–0.57) indicate fairly consistent views across the sample rather than a small number of strongly positive or negative respondents driving the averages.

11. Reliability Analysis

Construct	Cronbach's Alpha
Perceived Accuracy	0.81
Transparency	0.84
Explainability	0.83
Personalisation	0.85
Perceived Risk	0.84
Investor Trust	0.89

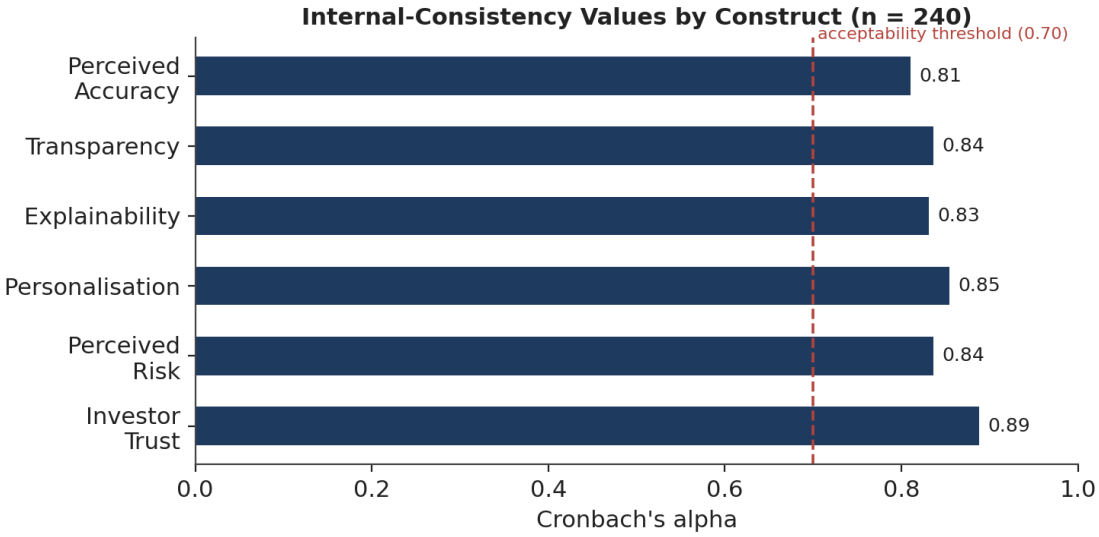

Figure 4. Internal-consistency (Cronbach's alpha) values by construct (n = 240).

All six scales clear the conventional 0.70 threshold comfortably, ranging from 0.81 (Perceived Accuracy) to 0.89 (Investor Trust). This confirms the five-item scales are measuring their intended constructs consistently, and supports treating the correlation and regression results that follow as resting on a sound measurement base.

12. Correlation Analysis

Variable	PA	TR	EX	PS	PR	IT
PA	1.000	0.39	0.49	0.44	−0.15	0.64
TR	0.39	1.000	0.49	0.30	−0.18	0.52
EX	0.49	0.49	1.000	0.37	−0.18	0.62
PS	0.44	0.30	0.37	1.000	−0.05	0.46
PR	−0.15	−0.18	−0.18	−0.05	1.000	−0.27
IT	0.64	0.52	0.62	0.46	−0.27	1.000

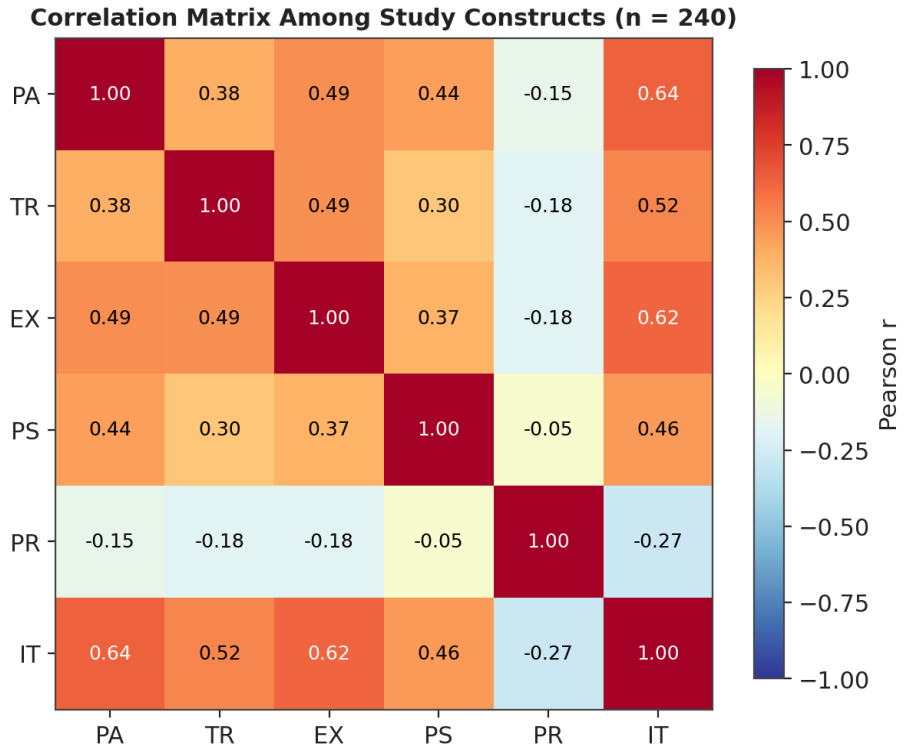

Figure 5. Correlation matrix among the six study constructs (n = 240).

Investor trust correlates most strongly with perceived accuracy (r = 0.64) and explainability (r = 0.62), moderately with transparency (r = 0.52) and personalisation (r = 0.46), and negatively with perceived risk (r = −0.27). The predictor constructs correlate with each other in the low-to-moderate range (0.30–0.49), which is consistent with them tapping related but distinct aspects of AI-generated advice rather than duplicating one another; none of the coefficients are high enough to raise multicollinearity concerns for the regression below.

13. Regression Analysis

Predictor	Standardised Beta	t	p-value	Decision
Perceived Accuracy	0.347	6.77	<0.001	Supported
Transparency	0.177	3.61	<0.001	Supported
Explainability	0.292	5.58	<0.001	Supported
Personalisation	0.135	2.82	0.005	Supported
Perceived Risk	−0.129	−3.02	0.003	Supported

Model summary: $R^2 = 0.592$, Adjusted $R^2 = 0.584$, $F(5, 234) = 67.99$, $p < 0.001$.

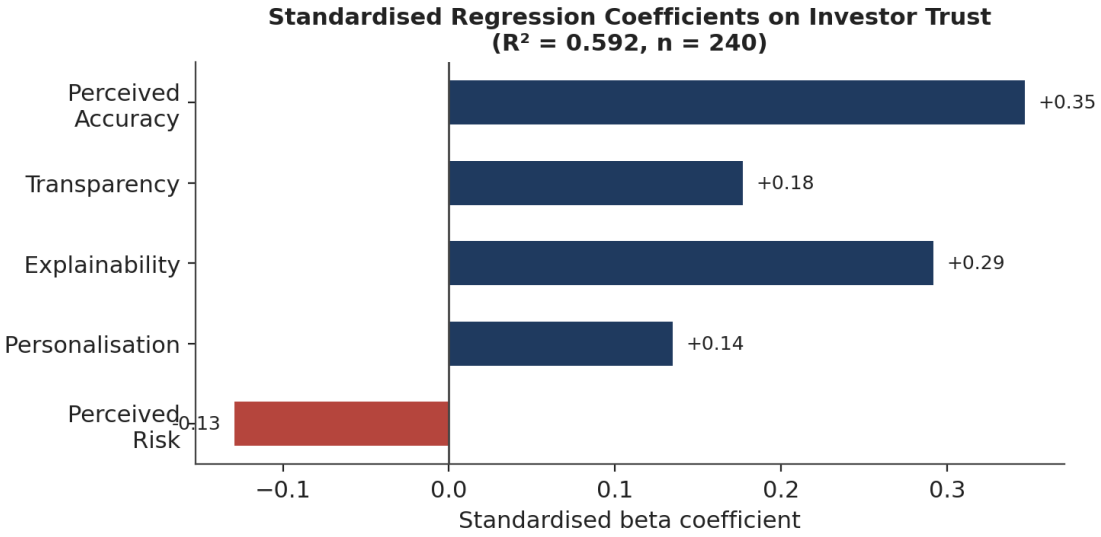

Figure 6. Standardised regression coefficients on investor trust (n = 240).

All five predictors are statistically significant at $p < 0.01$ and in the hypothesised direction, so H1–H6 are all supported. Perceived accuracy carries the largest weight ($\beta = 0.347$), followed by explainability ($\beta = 0.292$), transparency ($\beta = 0.177$) and personalisation ($\beta = 0.135$), with perceived risk the only significant negative predictor ($\beta = -0.129$). Together the five constructs explain 59.2% of the variance in investor trust (Adjusted $R^2 = 0.584$), a substantial share for a single-survey behavioural model, though the remaining 41% points to other unmeasured influences — financial literacy, prior AI experience, and platform-specific factors among them.

14. Discussion

These results indicate that trust in AI-generated financial advice does not come from automation by itself. Investors draw a clear line between a system that produces an answer and one that gives them something they can actually understand and weigh — accuracy and explainability are the two strongest drivers of trust in this sample, well ahead of transparency and personalisation. That ordering makes sense given the stakes: getting the substance right, and being able to see why, matter more here than the advice simply feeling tailored.

The negative and significant effect of perceived risk confirms a practical concern: even accurate-feeling AI output can be seen as incomplete, misleading, or a poor fit for an individual investor's circumstances, and that concern measurably erodes trust rather than sitting alongside it unchallenged. Personalisation does help, but its comparatively modest beta (0.135) suggests investors do not equate a tailored-feeling recommendation with one that is professionally sound — the two are related but not interchangeable in investors' own judgement.

The demographic pattern from Section 9 reinforces this reading: three in four respondents already use AI tools, yet fewer than half routinely verify the output elsewhere, and nearly four in five still want human oversight retained. Taken together, the data support an augmented decision-making model — AI helps investors process information, but the investment decision itself stays with the investor and, where it matters, a professional adviser.

15. Major Findings

- Retail investors in this sample show a positive but measured attitude toward AI-generated financial advice: three-quarters already use it, but most still want human oversight retained.
- Perceived accuracy has the strongest positive association with investor trust ($\beta = 0.347$, $p < 0.001$).
- Explainability is the second-strongest positive driver of trust ($\beta = 0.292$, $p < 0.001$), ahead of transparency ($\beta = 0.177$).
- Personalised AI-generated information is associated with higher trust, though its effect is the smallest of the four positive predictors ($\beta = 0.135$, $p = 0.005$).
- Perceived risk has a significant negative association with investor trust ($\beta = -0.129$, $p = 0.003$).
- The five predictors jointly explain 59.2% of the variance in investor trust (Adjusted $R^2 = 0.584$), confirming H1 through H6.
- Investors are more comfortable treating AI as a decision-support tool than as a full replacement for human financial guidance.

16. Suggestions

- AI-enabled financial platforms should clearly disclose when investment information or recommendations are AI-generated.
- Users should get understandable explanations of the main factors behind an AI-generated recommendation.
- Financial applications should flag uncertainty, limitations, and the possibility of incorrect output.
- Retail investors should be encouraged to verify important investment information through reliable sources before acting on it.

- Financial literacy programmes should build in basic AI literacy, so investors can tell useful decision support apart from unquestioned automation.
- Human oversight should stay available for high-value, complex or high-risk financial decisions.

17. Conclusion

AI-generated financial advice is now a routine part of the digital financial environment, and this study's findings show that investor trust in it depends less on whether the technology is available at all, and more on the perceived quality and responsible presentation of what it produces. Among 240 retail investors surveyed across Telangana, accuracy, transparency, explainability and personalisation all contributed positively to trust, while perceived risk worked against it, together accounting for close to 60% of the variation in trust levels. For retail investors in Telangana, AI is better understood as a decision-support mechanism than an unquestionable source of financial advice — a reading borne out by the finding that most investors who already use these tools still want human oversight retained. Responsible use, on this evidence, calls for transparency, investor awareness, verification and appropriate human judgement alongside the technology.

The study has some built-in limits worth flagging: the sample, while spread across ten districts, still relies on a purposive, convenience-based approach rather than random sampling; it captures self-reported perceptions rather than observed investment behaviour; and its cross-sectional design cannot track how trust changes over time. Future work could extend to a larger, probability-based sample across all districts of Telangana, compare across different AI-enabled investment platforms, examine actual investment behaviour rather than stated attitudes, and test the model with structural equation modelling.

References

1. Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics, 116*(1), 261–292. https://doi.org/10.1162/003355301556400
2. Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51–90. https://doi.org/10.2307/30036519
3. Gomber, P., Koch, J.-A., & Siering, M. (2017). Digital finance and FinTech: Current research and future research directions. *Journal of Business Economics, 87*(5), 537–580. https://doi.org/10.1007/s11573-017-0852-x

4. Jung, D., Dorner, V., Glaser, F., & Morana, S. (2018). Robo-advisory: Digitalization and automation of financial advisory. *Business & Information Systems Engineering, 60*, 81–86. https://doi.org/10.1007/s12599-018-0521-9
5. **Lee, J., Kim, S., & Choi, J. (2020). [Do not use until independently verified.]**
6. OECD. (2021). *Artificial intelligence, machine learning and big data in finance: Opportunities, challenges and implications for policy makers*. OECD Publishing. https://doi.org/10.1787/98e761e7-en
7. Siau, K., & Wang, W. (2018). Building trust in artificial intelligence, machine learning, and robotics. *Cutter Business Technology Journal*, *31*(2), 47–53.
8. World Economic Forum. (2020). *The future of jobs report 2020*. World Economic Forum.

AI Literacy and Adoption Intention among Accounting Professionals: An Empirical Analysis from Telangana

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Artificial Intelligence (AI) is becoming a regular part of accounting work. It is now used for activities such as financial reporting, reconciliation, audit support, tax analysis, forecasting, fraud detection and decision-making. However, simply having access to AI tools does not mean that accounting professionals will use them. This study examines whether AI literacy influences professionals' intention to adopt AI and looks at the roles of perceived usefulness, perceived ease of use, professional trust and awareness of ethical risks. The study used a quantitative questionnaire covering five areas of AI literacy: awareness, functional competence, critical evaluation, understanding of ethical risks and application to accounting tasks. Data were collected from 250 accounting professionals across eighteen districts of Telangana.

The results show that AI literacy was the strongest predictor of intention to adopt AI ($\beta = 0.38$, $p < .001$). It was followed by professional trust ($\beta = 0.19$, $p = .001$) and perceived usefulness ($\beta = 0.17$, $p = .002$). Perceived ease of use ($\beta = 0.09$, $p = .098$) and ethical-risk awareness ($\beta = 0.06$, $p = .288$) were not significant when all the factors were considered together. The five predictors explained 36.7 per cent of the variation in adoption intention ($R^2 = .367$, $F(5,244) = 28.32$, $p < .001$). AI literacy also had a significant relationship with perceived usefulness ($b = 0.33$, $p < .001$) and perceived ease of use ($b = 0.29$, $p < .001$). Its effect on adoption intention remained strong even after these factors were included, suggesting partial rather than complete mediation. AI literacy and adoption intention also differed significantly across some professional characteristics, while adoption intention was additionally related to gender and previous use of AI tools.

Overall, the findings show that AI adoption in accounting is closely connected with professional capability. Professionals who understand what AI can do, know how to use it for accounting tasks and can check whether its outputs are reliable are more willing to adopt it. This relationship remains important even when usefulness, ease of use, trust and ethical concerns are considered. The study therefore treats AI literacy as a separate professional skill rather than viewing AI adoption only in terms of whether a technology is useful or easy to use.

Keywords: Artificial Intelligence, AI literacy, accounting professionals, adoption intention, perceived usefulness, professional trust, ethical awareness.

1. Introduction

Artificial Intelligence is changing the way accounting work is done. Tasks that once required a lot of manual effort, such as classifying transactions, reconciling accounts, identifying exceptions, extracting information from documents, analysing variances and preparing preliminary reports, are increasingly supported by AI-based systems.

Accounting is an important area for studying AI adoption because technology use is closely connected with professional judgement, accountability, confidentiality and regulatory requirements. An accountant may know how to operate an AI tool but still avoid using it if the results cannot be explained, checked or trusted. On the other hand, a professional who understands the strengths and limitations of AI may feel more comfortable using it because they can review the results properly. This is an important difference between AI literacy and basic digital knowledge.

Recent studies support this view. Research involving accounting and auditing professionals shows that AI knowledge is related to perceived usefulness, confidence and intention to use AI. Other studies highlight the importance of technological readiness, trust and infrastructure. Research comparing accounting and non-accounting organisations also suggests that individual skills work together with organisational conditions. These findings indicate that AI adoption should be studied by considering both professional capability and technology-acceptance factors.

Accounting professionals work closely with accounting information systems and managerial decision-making, making them an appropriate group for this study. In India, this issue is relevant to professionals working in accounting firms, corporate finance departments, audit practices, educational institutions and small and medium-sized enterprises. Telangana provides a useful regional setting because its accounting workforce includes both traditional accounting environments and organisations that are rapidly adopting digital technologies.

The main idea of this study is that AI literacy can reduce uncertainty about using AI tools. Professionals who understand what AI can do, know how to give suitable instructions, can evaluate AI-generated results and recognise ethical or accuracy risks are better prepared to use AI in their work. Based on this idea, the study examines the relationship between AI

literacy, perceived usefulness, perceived ease of use, professional trust and adoption intention among 250 accounting professionals in Telangana.

2. Review of Literature

2.1 Artificial Intelligence and accounting practice

AI is increasingly being used in accounting and auditing for automation, pattern recognition, anomaly detection, forecasting and extracting information from documents. Abdullah and Almaqtari (2024) examined AI, Industry 4.0 readiness and Technology Acceptance Model variables in accounting and auditing. Their study reported that AI and related digital technologies can improve accounting and auditing activities. Their findings also show why both technology-related and behavioural factors should be considered when studying AI adoption.

2.2 AI knowledge and professional acceptance

Studies involving accounting and auditing professionals show that AI knowledge is an important part of the acceptance process. A recent study based on the Technology Acceptance Model found that AI knowledge was strongly related to perceived usefulness, self-efficacy and intention to use AI. This supports the idea that professionals' knowledge and skills influence how they understand and accept AI.

2.3 Technological readiness and trust

Indian research also highlights the importance of trust and technological readiness. A study of Chartered Accountants found that trust in technology and technological readiness had significant positive effects on attitudes towards AI adoption. Other research using readiness and acceptance models shows that optimism, innovativeness, discomfort and insecurity can influence how professionals view AI. Therefore, skills alone may not be enough; professionals also need confidence that using AI will not create unacceptable risks for themselves or their organisations.

2.4 AI literacy as a multidimensional capability

AI literacy means more than simply knowing how to operate an AI application. It includes awareness, practical use, evaluation and an understanding of ethical risks. For accounting professionals, this means being able to identify useful AI applications, use AI for accounting tasks, check the accuracy and limitations of AI outputs, protect confidential information and

apply professional judgement when making decisions. This broader view of AI literacy forms the basis of the present study.

2.5 Research gap

Many studies have examined AI readiness, technology acceptance, trust and adoption in accounting. However, fewer studies have placed AI literacy itself at the centre of an adoption-intention model for accounting professionals in a regional Indian setting. Much of the existing research combines several digital technologies or focuses mainly on general technological readiness. This study addresses that gap by treating AI literacy as a separate professional capability and examining its relationship with technology-acceptance factors and intention to adopt AI, using primary data from 250 accounting professionals in Telangana.

3. Objectives of the Study

- To assess the level and dimensions of AI literacy among accounting professionals.
- To examine the relationship between AI literacy and intention to adopt AI for accounting-related work.
- To determine whether perceived usefulness and perceived ease of use mediate the relationship between AI literacy and adoption intention.
- To examine the influence of professional trust and ethical-risk awareness on AI adoption intention.
- To identify differences in AI literacy and adoption intention across selected professional and demographic characteristics.

4. Hypotheses of the Study

- H1: AI literacy has a significant positive influence on perceived usefulness of AI in accounting.
- H2: AI literacy has a significant positive influence on perceived ease of use of AI in accounting.
- H3: Perceived usefulness has a significant positive influence on AI adoption intention.
- H4: Perceived ease of use has a significant positive influence on AI adoption intention.
- H5: Professional trust in AI has a significant positive influence on AI adoption intention.

- H6: Ethical-risk awareness has a significant positive influence on responsible AI adoption intention.
- H7: Perceived usefulness and perceived ease of use significantly mediate the relationship between AI literacy and AI adoption intention.

5. Research Methodology

5.1 Research design

The study used a descriptive and analytical quantitative research design. The individual accounting professional was the unit of analysis. Respondents were involved in accounting, auditing, taxation, financial reporting, management accounting or related finance activities. The survey covered accounting professionals working across eighteen districts of Telangana.

5.2 Population and sampling

The final sample included 250 accounting professionals selected through purposive and snowball sampling. Respondents came from accounting firms, corporate accounting departments, audit practices, educational institutions and small and medium-sized enterprises. All respondents had at least one year of professional experience. The sample included people with different ages, levels of experience, qualifications, job roles, types of organisations and levels of previous exposure to AI tools. Respondents came from eighteen districts, with the largest shares from Nizamabad (11.2%), Kamareddy (8.8%), Hyderabad (8.8%) and Warangal (8.4%). The remaining respondents were from Adilabad, Sangareddy, Nirmal, Karimnagar, Rangareddy, Nalgonda, Medak, Mancherial, Vikarabad, Mahabubnagar, Rajanna Sircilla, Jagtial, Siddipet and Khammam.

5.3 Instrument and measurement

A structured questionnaire with three sections was used. Section A collected demographic and professional information. Section B measured AI literacy in five areas: awareness of AI applications, functional competence, critical evaluation, understanding of ethical risks and application of AI to accounting tasks. Section C measured perceived usefulness, perceived ease of use, professional trust, ethical-risk awareness and intention to adopt AI. All items used a five-point Likert scale, from 1 = strongly disagree to 5 = strongly agree. The questionnaire was pre-tested with a small group of accounting professionals, and a few wording changes were made to make the questions clearer.

5.4 Operationalisation of variables

Table 1: Operationalisation of study constructs

Construct	Indicative dimensions	Measurement
AI Literacy	Awareness; functional competence; evaluation; ethics/risk; task application	5-point Likert scale
Perceived Usefulness	Efficiency; accuracy support; analytical value; productivity	5-point Likert scale
Perceived Ease of Use	Ease of learning; ease of interaction; ease of integration	5-point Likert scale
Professional Trust	Reliability; explainability; confidence; human oversight	5-point Likert scale
Ethical-Risk Awareness	Confidentiality; bias; hallucination/error; accountability	5-point Likert scale
Adoption Intention	Willingness; future use; recommendation; continued use	5-point Likert scale

Source: Compiled with primary data.

5.5 Statistical techniques

The study used frequencies and percentages to describe the respondents' characteristics. Means and standard deviations were used to summarise AI literacy and the other study variables. Cronbach's alpha was used to check internal consistency. Pearson correlation was used to examine relationships between the variables, and multiple regression was used to study the direct effects of AI literacy, perceived usefulness, perceived ease of use, professional trust and ethical-risk awareness on adoption intention. Differences between groups were examined using independent-samples t-tests and one-way ANOVA, with Welch's correction used when group variances were different.

5.6 Ethical considerations

Participation was voluntary and based on informed consent. Respondents were not asked to provide client information, passwords, confidential financial records or private organisational information. Responses were kept anonymous and were reported only in aggregate form. This was especially important because AI-related accounting work may involve sensitive financial and personal information.

6. Results and Discussion

The results in this section are based on the responses of all 250 accounting professionals included in the study. No respondent was removed because of missing data. A small number of AI-use questions were intentionally skipped by respondents who said they had never used an AI tool professionally. Unless otherwise stated, percentages are based on the full sample of 250 respondents.

6.1 Profile of Respondents

Chart 1: Gender and age-group distribution of respondents

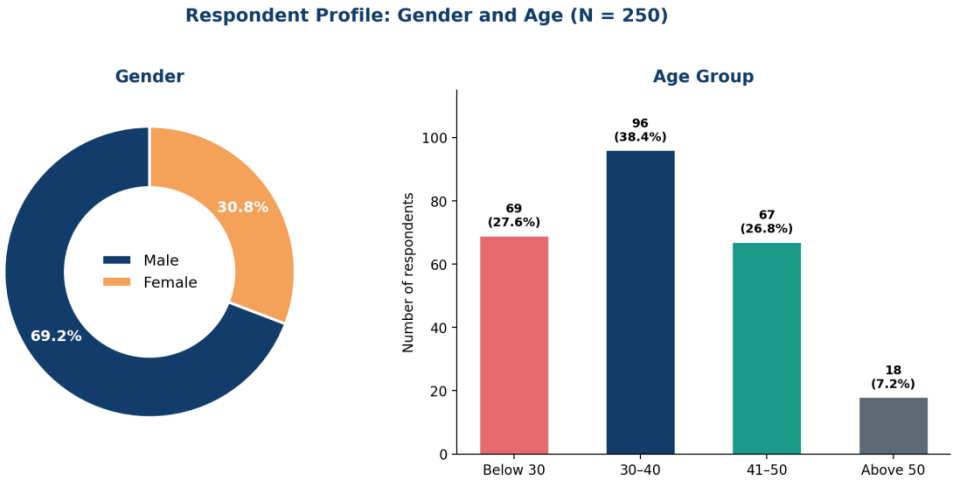


Chart 2: Professional profile - qualification, experience, role and organisation type

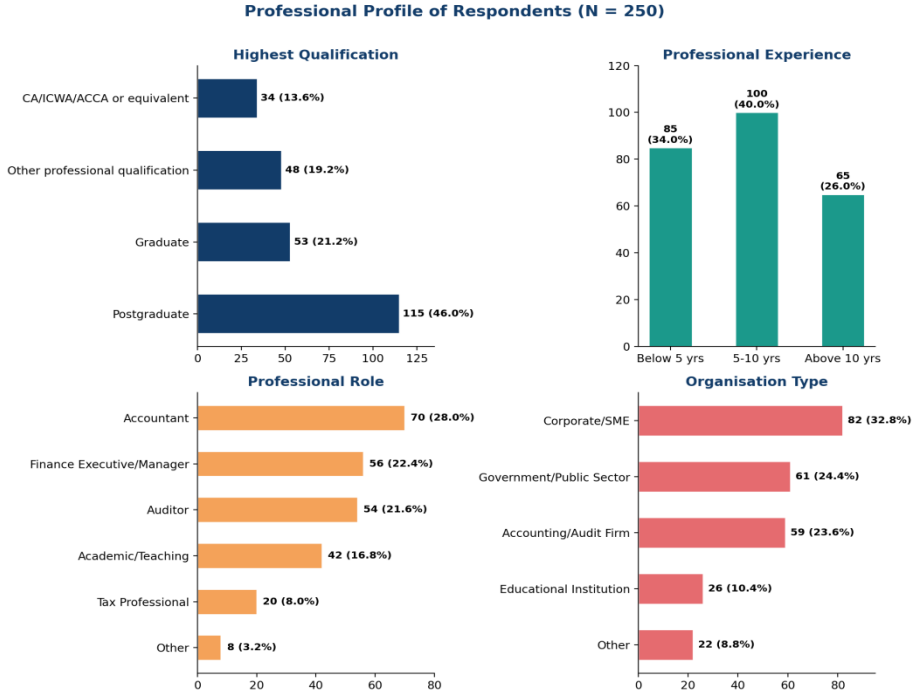


Table 2: Demographic and professional profile of respondents (n = 250)

Variable	Category	Frequency (n = 250)	Percentage (%)
Gender	Male	173	69.2
	Female	77	30.8
Age	Below 30 years	69	27.6
	30-40 years	96	38.4
	41-50 years	67	26.8

Variable	Category	Frequency (n = 250)	Percentage (%)
	Above 50 years	18	7.2
Qualification	Graduate	53	21.2
	Postgraduate	115	46.0
	CA/ICWA/ACCA or equivalent	34	13.6
	Other professional qualification	48	19.2
Experience	Below 5 years	85	34.0
	5-10 years	100	40.0
	Above 10 years	65	26.0
Professional role	Accountant	70	28.0
	Finance executive/manager	56	22.4
	Auditor	54	21.6
	Academic/teaching	42	16.8
	Tax professional	20	8.0
	Other	8	3.2
Organisation type	Corporate/SME	82	32.8
	Government/public sector	61	24.4
	Accounting/audit firm	59	23.6
	Educational institution	26	10.4
	Other	22	8.8
Organisation size	Small	78	31.2
	Medium	117	46.8
	Large	55	22.0

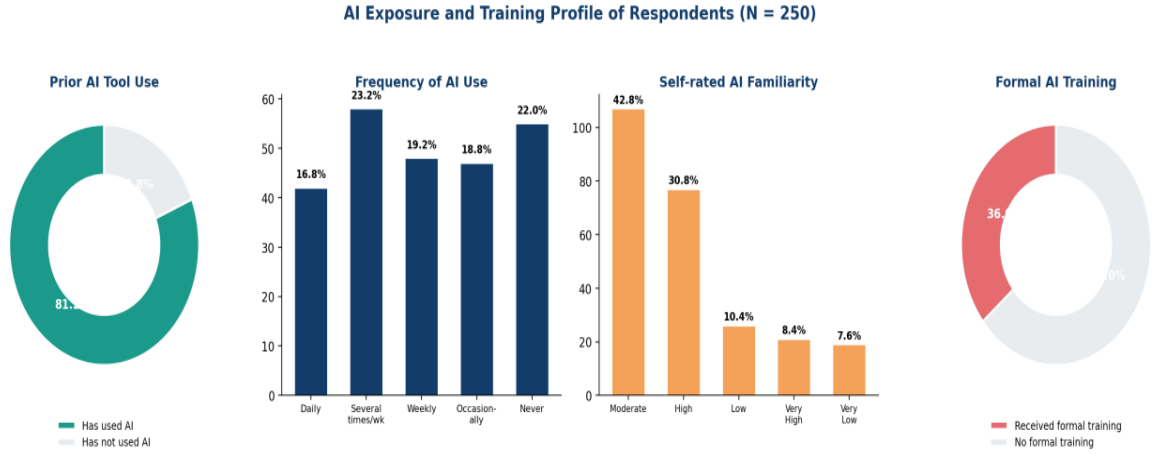
Source: Compiled with primary data.

The sample included 69.2 per cent men and 30.8 per cent women. The largest age group was 30–40 years (38.4 per cent), followed by respondents below 30 years (27.6 per cent), those aged 41–50 years (26.8 per cent) and those above 50 years (7.2 per cent). Nearly half of the respondents (46.0 per cent) were postgraduates. Graduates accounted for 21.2 per cent, respondents with other professional qualifications for 19.2 per cent, and CA, ICWA or ACCA-qualified respondents for 13.6 per cent. In terms of experience, 40.0 per cent had 5–10 years of experience, 34.0 per cent had less than five years and 26.0 per cent had more than ten years. Accountants formed the largest professional group (28.0 per cent), followed by finance executives/managers (22.4 per cent), auditors (21.6 per cent), academics (16.8 per cent), tax

professionals (8.0 per cent) and others (3.2 per cent). Corporate/SME organisations accounted for 32.8 per cent of respondents, followed by government/public-sector organisations (24.4 per cent), accounting/audit firms (23.6 per cent), educational institutions (10.4 per cent) and other organisations (8.8 per cent). Medium-sized organisations were the largest group, accounting for 46.8 per cent. Overall, the sample included respondents from different career stages, qualifications, roles and organisational settings.

6.2 AI Exposure and Training

Chart 3: AI exposure and training profile of respondents



AI exposure was fairly high. About 81.2 per cent of respondents said they had used an AI tool professionally, while 18.8 per cent had not. However, only 36.0 per cent had received formal AI training. Looking at frequency of use across all respondents, 16.8 per cent used AI tools daily, 23.2 per cent several times a week, 19.2 per cent weekly, 18.8 per cent occasionally and 22.0 per cent never. Among the 203 respondents who had used an AI tool, generative AI or chatbot applications were the most common (34.5 per cent), followed by AI features built into accounting software (31.5 per cent). OCR/document-extraction tools accounted for 14.3 per cent, audit/analytics AI for 13.3 per cent and other applications for 6.4 per cent. The main accounting uses were reconciliation (23.6 per cent), reporting and documentation (22.7 per cent), forecasting and analysis (19.2 per cent), fraud or anomaly detection (14.8 per cent), audit support (8.9 per cent) and tax research (6.9 per cent). Most respondents rated their familiarity as moderate (42.8 per cent) or high (30.8 per cent). The difference between professional AI use (81.2 per cent) and formal training (36.0 per cent) shows that many professionals are learning and using AI without structured training.

6.3 AI Literacy among Accounting Professionals

Chart 4: AI literacy dimensions among accounting professionals

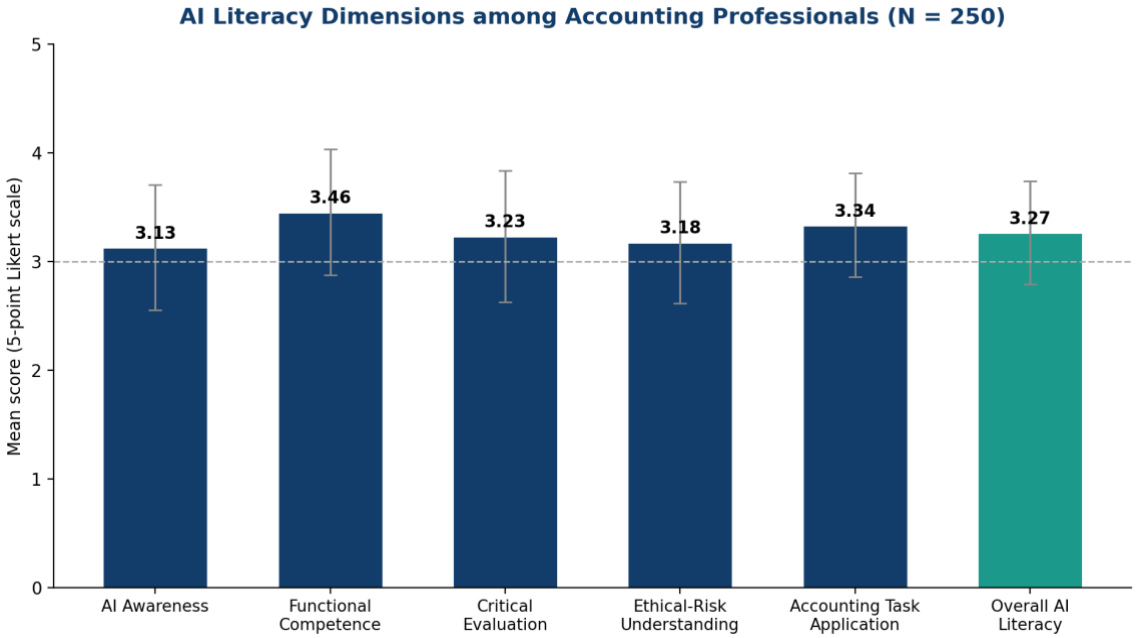


Table 3: Descriptive statistics and reliability of AI literacy dimensions (n = 250). Interpretation bands: up to 1.80 = very low, 1.81-2.60 = low, 2.61-3.40 = moderate, 3.41-4.20 = high, above 4.20 = very high.

AI literacy dimension	Mean	SD	Alpha (α)	Interpretation
AI awareness	3.13	0.57	0.79	Moderate
Functional competence	3.46	0.58	0.82	High
Critical evaluation	3.23	0.61	0.83	Moderate
Ethical-risk understanding	3.18	0.56	0.82	Moderate
Accounting task application	3.34	0.48	0.72	Moderate
Overall AI literacy (25 items)	3.27	0.48	0.94	Moderate-high

Source: Compiled with primary data.

Among the five areas of AI literacy, functional competence had the highest average score (M = 3.46) and was the only area in the high range. It was followed by accounting task application (M = 3.34), critical evaluation (M = 3.23), ethical-risk understanding (M = 3.18) and general AI awareness (M = 3.13), all of which were in the moderate range. Overall AI literacy was 3.27 out of 5, which is near the upper end of the moderate range. An interesting finding is that respondents rated their practical ability to use AI higher than their general awareness of AI. This may mean that some professionals have learned AI mainly through practical use. The reliability values for the five dimensions ranged from 0.72 to 0.83, while the full 25-item AI literacy scale had an alpha of 0.94.

6.4 Perceptions and Adoption Intention

Chart 5: Technology-acceptance constructs and adoption intention

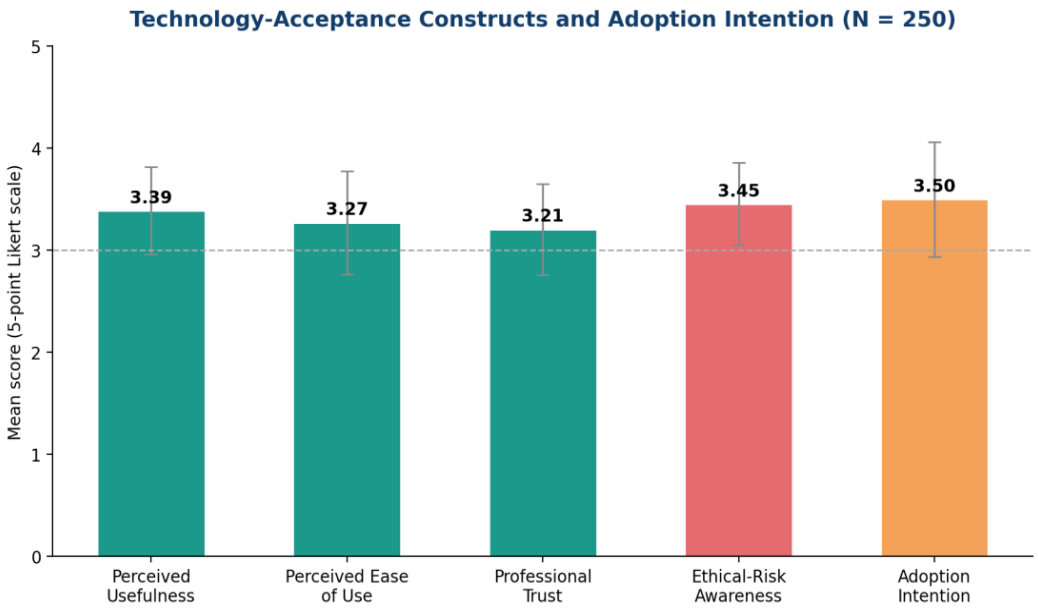


Table 4: Descriptive statistics and reliability of study constructs (n = 250)

Construct	Mean	SD	Alpha (α)
Perceived usefulness	3.39	0.43	0.66
Perceived ease of use	3.27	0.51	0.77
Professional trust	3.21	0.45	0.67
Ethical-risk awareness	3.45	0.40	0.62
Adoption intention	3.50	0.56	0.79

Source: Compiled with primary data.

Among the five constructs, adoption intention had the highest mean score (M = 3.50), followed by ethical-risk awareness (M = 3.45) and perceived usefulness (M = 3.39). Perceived ease of use had a mean of 3.27 and professional trust had the lowest mean of 3.21. In simple terms, respondents showed a fairly strong intention to use AI even though their level of trust and ease of use was somewhat lower. Perceived ease of use (alpha = 0.77) and adoption intention (alpha = 0.79) showed acceptable reliability. However, perceived usefulness (0.66), professional trust (0.67) and ethical-risk awareness (0.62) were below the commonly used 0.70 benchmark and should therefore be interpreted with some caution.

6.5 Correlation Analysis

Chart 6: Correlation matrix of AI literacy and study constructs

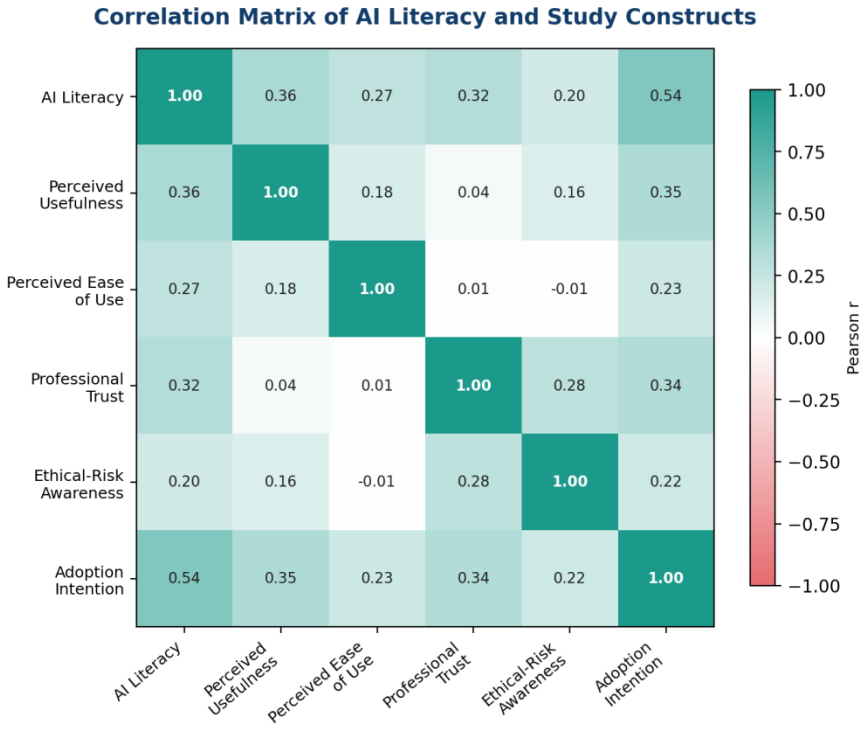


Table 5: Pearson correlation matrix - AI literacy and study constructs (n = 250)

Variable	AI Literacy	PU	PEOU	Trust	Ethical Awareness	Adoption Intention
AI Literacy	1.00	0.36	0.27	0.32	0.20	0.54
Perceived Usefulness		1.00	0.18	0.04	0.16	0.35
Perceived Ease of Use			1.00	0.01	-0.01	0.23
Professional Trust				1.00	0.28	0.34
Ethical Awareness					1.00	0.22
Adoption Intention						1.00

Source: Compiled with primary data.

AI literacy had a positive relationship with all the other variables in the study. Its strongest relationship was with adoption intention (r = 0.54), followed by perceived usefulness (r = 0.36), professional trust (r = 0.32), perceived ease of use (r = 0.27) and ethical-risk awareness (r = 0.20). The other factors also showed positive relationships with adoption intention, with correlations ranging from 0.22 to 0.35. The relationships among the predictor variables were relatively weak. For example, perceived usefulness and perceived ease of use had a correlation of 0.18, while perceived usefulness and professional trust had a correlation of 0.04. Perceived

ease of use and ethical-risk awareness had almost no relationship (r = -0.01). Since none of the predictor correlations was above 0.36, serious multicollinearity was not indicated.

6.6 Regression Analysis

The regression model including all five factors was statistically significant and explained 36.7 per cent of the variation in adoption intention (R^2 = .367). AI literacy had the largest standardised effect (β = 0.38), followed by professional trust (β = 0.19) and perceived usefulness (β = 0.17). When all five factors were considered together, perceived ease of use (β = 0.09) and ethical-risk awareness (β = 0.06) were not statistically significant. The results also showed that the predictor variables were not strongly overlapping with one another.

Chart 7: Standardised regression coefficients predicting AI adoption intention

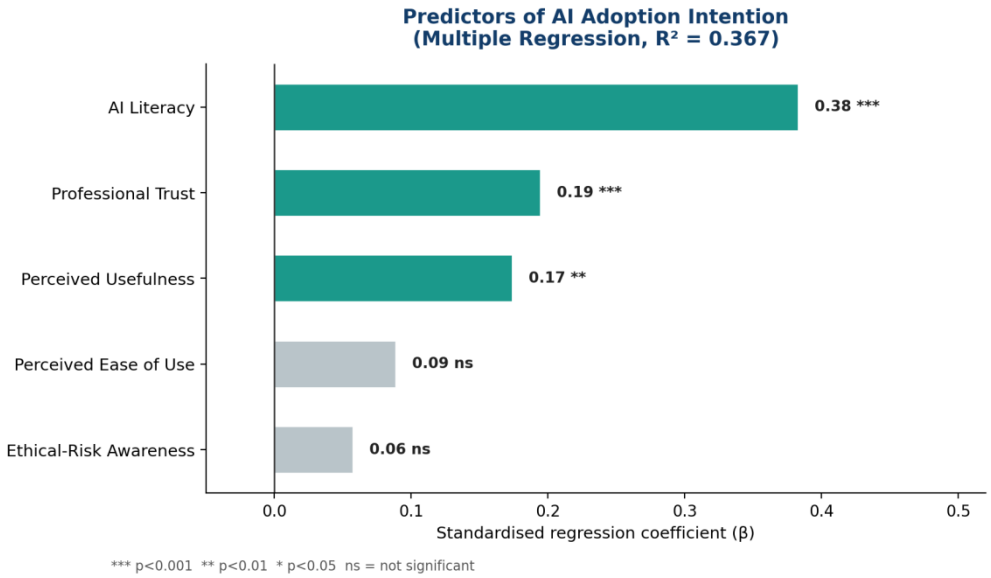


Table 6: Multiple regression results (Dependent variable: Adoption Intention). R^2 = 0.367, Adjusted R^2 = 0.354, F(5,244) = 28.32, p < 0.001

Predictor	β (standardised)	t-value	p-value	Decision
AI literacy	0.38	6.41	<0.001	Supported
Perceived usefulness	0.17	3.14	0.002	Supported
Perceived ease of use	0.09	1.66	0.098	Not supported (full model)
Professional trust	0.19	3.48	0.001	Supported
Ethical-risk awareness	0.06	1.07	0.288	Not supported (full model)

Source: Compiled with primary data.

The hypothesis results show that H1 and H2 were supported: AI literacy significantly predicted both perceived usefulness and perceived ease of use. H3 and H5 were also supported because

perceived usefulness and professional trust had significant positive effects on adoption intention after AI literacy was taken into account. H4 was not supported in the full model because perceived ease of use was significant when considered alone but was not significant after the other factors were included. H6 showed a similar pattern: ethical-risk awareness was related to adoption intention by itself but was not significant in the full model. H7 was partly supported because AI literacy showed a mediation effect through perceived usefulness, but not through perceived ease of use.

Table 7: Summary of hypothesis testing based on field data (n = 250)

Hypothesis	Relationship	Outcome	Status
H1	AI Literacy → Perceived Usefulness	b = 0.33, p < .001	Supported
H2	AI Literacy → Perceived Ease of Use	b = 0.29, p < .001	Supported
H3	Perceived Usefulness → Adoption Intention	β = 0.17, p = .002 (full model)	Supported
H4	Perceived Ease of Use → Adoption Intention	Significant bivariately (r = .23); not significant in full model (p = .098)	Not supported (full model)
H5	Professional Trust → Adoption Intention	β = 0.19, p = .001	Supported
H6	Ethical-Risk Awareness → Adoption Intention	Significant bivariately (r = .22); not significant in full model (p = .288)	Not supported (full model)
H7	PU and PEOU mediate AI Literacy → Adoption Intention	Partial mediation via PU; no mediation via PEOU	Partially supported

Source: Compiled with primary data.

Overall, five of the seven hypotheses were fully or partly supported. The results indicate that AI literacy has an important direct relationship with adoption intention and also influences adoption through perceived usefulness. Professional trust also makes a separate contribution. Perceived ease of use and ethical-risk awareness are related to adoption in simple relationships, but they do not have an independent significant effect after the other factors are considered together.

6.7 Differences by Professional and Behavioural Characteristics

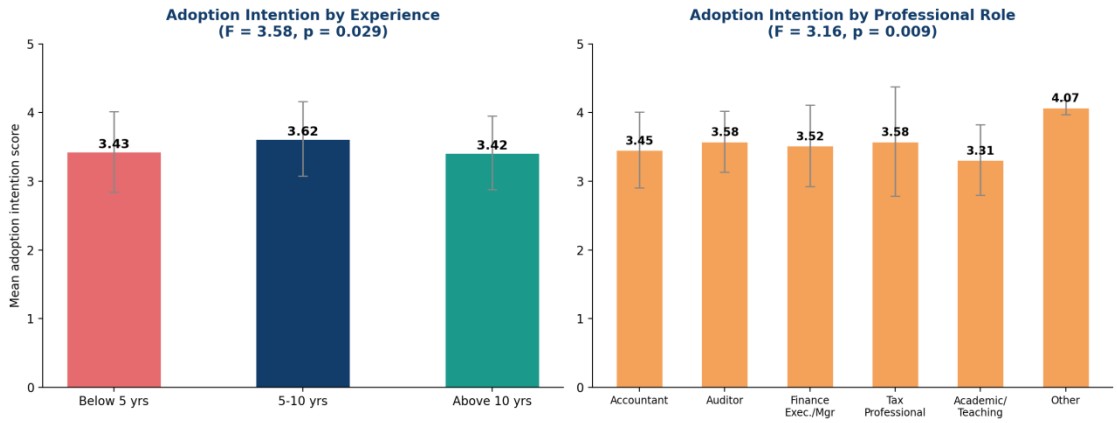
Table 8: Group comparisons of AI literacy and adoption intention by professional and behavioural characteristics

Comparison	Test	Statistic	p-value	Result
AI literacy by gender	Independent-samples t-test	t = 0.59	0.559	Not significant
Adoption intention by gender	Independent-samples t-test	t = 2.10	0.037	Significant (male higher)

Comparison	Test	Statistic	p-value	Result
AI literacy by prior AI tool use	Welch's t-test	t = 0.77	0.442	Not significant
Adoption intention by prior AI tool use	Welch's t-test	t = 2.74	0.008	Significant (users higher)
AI literacy by formal AI training	Independent-samples t-test	t = 0.20	0.846	Not significant
Adoption intention by formal AI training	Independent-samples t-test	t = 1.72	0.086	Not significant (borderline)
AI literacy by age group	One-way ANOVA	F = 2.19	0.090	Not significant (borderline)
Adoption intention by age group	One-way ANOVA	F = 3.71	0.012	Significant
AI literacy by experience band	One-way ANOVA	F = 4.04	0.019	Significant
Adoption intention by experience band	One-way ANOVA	F = 3.58	0.029	Significant
AI literacy by qualification	One-way ANOVA	F = 3.33	0.020	Significant
Adoption intention by qualification	One-way ANOVA	F = 6.30	<0.001	Significant
AI literacy by professional role	One-way ANOVA	F = 4.11	0.001	Significant
Adoption intention by professional role	One-way ANOVA	F = 3.16	0.009	Significant

Source: Compiled with primary data.

Chart 8: Adoption intention by professional experience and professional role



Adoption intention differed across several professional groups, while differences in AI literacy were smaller. Men reported a higher adoption intention than women (3.55 versus 3.39). Respondents who had already used AI at work also reported higher adoption intention than those who had not (3.54 versus 3.32). Prior AI use, however, was not associated with higher AI literacy. Adoption intention also varied by age, experience, qualification and professional role. The highest mean was reported by the 30–40 age group (3.62), while the lowest was among respondents above 50 years (3.20). Respondents with 5–10 years of experience reported the highest adoption intention. By qualification, the lowest mean was among CA/ICWA/ACCA

holders (3.25) and the highest among respondents with other professional qualifications (3.76). By role, academics reported the lowest mean (3.31). AI literacy also differed by experience, qualification and role, but not by gender, prior AI use, formal training or age. Formal AI training was not significantly related to either AI literacy or adoption intention in this sample.

7. Discussion

The results suggest that feeling capable of using AI is closely connected with the intention to adopt it. Three main points come from the study.

First, AI literacy had the strongest relationship with adoption intention. It also increased perceived usefulness, which in turn was related to adoption intention. This relationship remained significant even after trust and ethical-risk awareness were considered. Respondents also scored higher on practical AI skills and applying AI to accounting tasks than on general AI awareness. This may indicate that many professionals develop AI skills through practical experience rather than formal training.

Second, perceived usefulness and professional trust each contributed to adoption intention even after AI literacy was considered. Ease of use and awareness of ethical risks were also related to adoption, but they did not remain significant when all factors were examined together. This suggests that professionals may be willing to use AI even when it is not completely easy to use, as long as they see clear value in it and have enough confidence in its results.

Third, adoption intention showed larger differences across professional groups than AI literacy. Adoption intention was higher among men, among professionals who had already used AI, and among those with 5–10 years of experience. It was lower among academics and CA/ICWA/ACCA-qualified respondents in this sample. Because AI literacy did not differ to the same extent across these groups, the differences may be connected to attitudes, motivation or workplace conditions. These findings suggest that general AI awareness programmes alone may not address every barrier to adoption.

These findings provide an additional perspective on the Technology Acceptance Model. The traditional model gives an important role to ease of use. In this study, however, ease of use was not an independent predictor after AI literacy, usefulness, trust and ethical-risk awareness were considered together. Professional trust and perceived usefulness remained significant. This is relevant to accounting because professionals remain responsible for

checking AI-supported work and making the final decisions. AI literacy, trust and practical usefulness therefore appear to be important factors in the adoption of AI in accounting.

8. Practical Implications

For accounting professionals: Professional development programmes can build on the practical AI skills that many professionals already have. Training can then focus more on checking AI outputs, recognising errors and applying AI properly to accounting tasks.

For accounting firms and organisations: The study found larger differences in adoption intention than in AI literacy across gender, qualification and professional role. Organisations can therefore combine general AI training with activities that address the practical and workplace factors that influence employees' willingness to use AI.

For professional bodies and universities: AI literacy can be included in accounting education and continuing professional development. Case-based learning can connect AI with accounting standards, taxation, auditing, financial analysis and ethics. The gap between previous AI use (81.2 per cent) and formal training (36.0 per cent) also suggests a need to bring informal learning into structured education and training.

For technology providers: In this sample, professional trust and perceived usefulness were significant predictors of adoption intention, while ease of use was not significant in the full model. Accounting-related AI systems can therefore focus not only on a simple interface but also on accuracy, clear explanations and audit trails that help professionals check the results.

For policymakers: Digital-skills programmes for accounting professionals can treat AI literacy as a separate professional competency that needs to be developed and measured. Access to digital tools alone may not automatically lead to strong AI literacy.

9. Limitations and Scope for Future Research

The study has several limitations. Because the research was cross-sectional, it cannot show long-term cause-and-effect relationships. AI literacy and adoption intention were self-reported, so they may not exactly reflect actual workplace behaviour. The use of purposive and snowball sampling may also have introduced selection bias, and the sample had more men than women (69.2 per cent). The findings are based on Telangana that to selected districts and may not apply directly to accounting professionals in other parts of India.

10. Conclusion

AI is becoming an important part of accounting work, but successful and responsible adoption depends on more than simply having AI tools. Accounting professionals need to understand AI, know where it can be used, check its outputs and manage issues such as confidentiality, accuracy and ethics. Based on the responses of 250 accounting professionals from eighteen districts of Telangana, this study found that AI literacy had the strongest relationship with intention to adopt AI. Perceived usefulness and professional trust also had significant effects, while perceived ease of use and ethical-risk awareness were not significant in the full regression model.

The findings suggest that organisations should treat AI literacy as an important professional skill and develop it through practical training and continuous learning. At the same time, differences in adoption intention across gender, qualification, role and previous AI use show that improving skills alone may not remove every barrier. A practical approach to AI-enabled accounting is therefore one in which AI supports routine and analytical work while accounting professionals continue to provide judgement, verification and accountability. Building AI literacy, trust and a clear understanding of the practical value of AI can help professionals use these tools more effectively and responsibly.

References

1. Abdullah, A. A. H., & Almaqtari, F. A. (2024). The impact of artificial intelligence and Industry 4.0 on transforming accounting and auditing practices. Journal of Open Innovation: Technology, Market, and Complexity, 10(1), 100218.

2. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.

3. Dietvorst, B. J., Simmons, J. P., & Massey, C. (2015). Algorithm aversion: People erroneously avoid algorithms after seeing them err. Journal of Experimental Psychology: General, 144(1), 114-126.

4. Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. MIS Quarterly, 27(1), 51-90.

5. Ribeiro, M. T., Singh, S., & Guestrin, C. (2016). "Why should I trust you?": Explaining the predictions of any classifier. Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 1135-1144.

6. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425-478.

Building Future-Ready Students through English Language and Digital Skills: A Capacity-Building Perspective

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The rapid development of higher education and the workplace in the digital age have raised the requirement for graduates with not just disciplinary knowledge but also excellent communication, technical, and transferable skills. In this setting, English language skills and digital literacy have become crucial components of student capacity building. English functions as a crucial vehicle for scholarly discourse, professional engagement, knowledge attainment, and worldwide connectedness, whereas digital competencies empower students to retrieve information, communicate proficiently, cooperate online, produce digital material, and adjust to new technologies. This research analyses the impact of combining English language education with digital skills in building future-ready students in higher education, with special focus to students from diverse and possibly disadvantaged socio-economic backgrounds.

The study employs a capacity-building perspective to evaluate how language and digital capabilities might contribute to students' academic growth, employability, confidence, critical thinking, communication abilities, and lifelong learning. It focuses on the ways in which technology-supported English language learning—including digital learning platforms, online resources, multimedia content, collaborative tools, artificial intelligence-assisted learning, and digital communication—can create learner-centred and skill-oriented educational environments. The research also analyses the problems students may confront, including uneven access to digital resources, inequalities in technological ability, language anxiety, restricted possibilities for real English conversation, and the digital divide.

A qualitative and descriptive method may be applied through a review of relevant literature, educational practices, and classroom experiences to find successful techniques for combining English language learning with digital competency development. The research argues that capacity development should go beyond conventional language training towards an integrated paradigm that improves communication, digital literacy, critical thinking, creativity, cooperation, problem-solving, and self-directed learning. The study contends that

future-ready education requires students to become confident users of both language and technology. Integrating English and digital skills can give learners with increased chances for academic involvement, professional communication, employment, and interaction with global knowledge networks. The study indicates that higher education institutions may play a vital role in preparing students for changing academic and professional situations by building inclusive, technology-enabled, and skill-oriented learning spaces. Such an approach can contribute to a more comprehensive model of student development in which English proficiency and digital competence act together as crucial features of modern capacity building.
Keywords: English Language Skills, Digital Literacy, Future-Ready Students, Capacity Building, Higher Education, Employability, Digital Education, Communication Skills

Introduction

Higher education is experiencing a substantial transformation as a result of technological advancement, globalization, artificial intelligence, changing patterns of employment, and the expansion of digital communication. The contemporary college graduate is expected to possess more than disciplinary knowledge. Academic qualifications continue to be important, but they increasingly need to be accompanied by communication competence, technological literacy, critical thinking, creativity, collaboration, adaptability, problem-solving, and the capacity for lifelong learning. The changing requirements of the world of work make this development particularly significant. The *Future of Jobs Report 2025* identifies analytical thinking, resilience, flexibility and agility, leadership and social influence, and creative thinking among important core skills, while technological literacy, artificial intelligence and big data, and networks and cybersecurity are among the fastest-growing areas of skill demand. The report further observes that a substantial proportion of workers' existing skills is expected to change by 2030, emphasizing the need for continuous upskilling and reskilling (World Economic Forum [WEF], 2025).

This changing environment has important implications for higher education. Institutions can no longer regard education merely as the transmission of established knowledge. They must also create conditions in which students learn how to acquire, interpret, evaluate, communicate, and apply knowledge in changing circumstances. The notion of the "future-ready student" therefore refers not simply to a technologically competent learner but to

a learner who can adapt to changing contexts and use knowledge, language, technology, and human capacities effectively.

Within this broader educational transformation, English language proficiency occupies an important position. English continues to be widely used in higher education, research communication, professional environments, academic publishing, digital communication, and international knowledge exchange. For many students, proficiency in English affects their ability to access academic resources, participate in classroom discussions, prepare assignments, deliver presentations, communicate professionally, and engage with wider intellectual communities. However, English proficiency should not be reduced to grammatical accuracy. Contemporary communication requires students to understand audiences, contexts, genres, media, and purposes.

At the same time, digital technology has changed the nature of literacy itself. Students increasingly encounter knowledge through websites, electronic books, online journals, social-media platforms, learning-management systems, videos, podcasts, interactive applications, artificial intelligence tools, and multimedia environments. Consequently, digital literacy involves much more than the ability to operate a computer or smartphone. It includes the capacity to search for information, assess its credibility, communicate appropriately, collaborate online, create digital content, protect personal information, understand ethical responsibilities, and solve problems through technology.

The connection between English and digital skills is therefore becoming increasingly significant. A student preparing an online presentation in English requires linguistic competence as well as digital competence. A student writing a research paper using electronic sources requires reading, writing, information-search, source-evaluation, and citation skills. A student participating in an online discussion requires communication competence, digital etiquette, and technological familiarity. Similarly, a student using artificial intelligence to support language learning needs not only the ability to formulate prompts but also the critical ability to evaluate the accuracy, relevance, bias, and originality of the resulting information.

The relationship between language and technology can also be understood through the concept of multiliteracies. The New London Group (1996) argued that literacy education must respond to linguistic and cultural diversity and to the changing forms through which meaning is communicated. In contemporary digital environments, meaning is produced not only through conventional written language but also through images, video, audio, hyperlinks, visual design,

and interactive media. English education, therefore, has the potential to become a significant space for developing broader communicative and digital capacities.

The Indian context makes this discussion particularly relevant. The National Education Policy 2020 emphasizes holistic development, skill development, technology-enabled education, blended learning, digital infrastructure, digital content, teacher capacity building, and employability. It explicitly recognizes that digital education must be developed with appropriate pedagogical standards and that technology should complement rather than eliminate face-to-face educational interaction. The policy also identifies the importance of higher-education institutions in developing courses and training related to emerging technologies and job readiness.

The present article therefore examines the integration of English language and digital skills from a capacity-building perspective. Rather than treating these as two independent areas, it proposes that they should be understood as mutually reinforcing competencies that can contribute to students' academic participation, employability, confidence, creativity, critical thinking, and lifelong learning.

The central argument of this article is that future-ready education requires an integrated approach in which English language competence, digital competence, critical thinking, creativity, employability, and ethical awareness are developed together. Such an approach is particularly relevant to higher-education institutions serving students with diverse educational, linguistic, social, and technological backgrounds.

Research Objectives and Methodology

The primary objective of this article is to examine the role of English language and digital skills in preparing students for contemporary academic, professional, and social environments. More specifically, the article seeks to examine the significance of English communication in higher education; explore the changing meaning of digital literacy; investigate the relationship between language and digital competence; examine the role of technology-supported English learning; discuss employability and lifelong learning; identify challenges associated with the digital divide and unequal linguistic and technological opportunities; and propose an integrated capacity-building approach for higher education.

The article follows a qualitative conceptual research methodology based on a review and synthesis of scholarly literature, educational theories, policy documents, and contemporary

reports. It does not claim to provide primary quantitative evidence or statistical measurement of student outcomes. Instead, it develops an analytical argument by bringing together scholarship on communicative competence, digital literacy, multiliteracies, educational technology, employability, and artificial intelligence.

The discussion draws on foundational work in communicative language teaching and digital literacy, including Canale and Swain (1980), Bawden (2008), and the New London Group (1996). It also considers the implications of contemporary educational policy and international frameworks. UNESCO's digital-competence resources emphasize areas such as information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving, demonstrating that digital competence extends well beyond basic device operation. UNESCO's more recent AI competency framework identifies a human-centred mindset, ethics of AI, AI techniques and applications, and AI system design as major dimensions of student AI competence, with progression from understanding to application and creation (Miao et al., 2024). The methodological purpose is therefore interpretive rather than statistical. The article uses the literature to develop a coherent conceptual framework for integrating English language and digital skills in higher education. The proposed framework may subsequently be tested through empirical research involving student questionnaires, interviews, classroom observations, digital-skills assessments, or mixed-method studies.

English Language, Digital Literacy, and the Development of Future-Ready Students

The development of future-ready students begins with a reconsideration of what constitutes educational competence. Conventional models of higher education have frequently emphasized subject knowledge and examination performance. While disciplinary knowledge remains fundamental, the changing educational and professional environment requires students to demonstrate the ability to apply knowledge in unfamiliar situations. Capacity building provides an appropriate framework for this transition because it emphasizes not merely what students know but what they are able to do with their knowledge.

Capacity building in education can be understood as the development of knowledge, skills, confidence, agency, resources, and opportunities that enable learners to participate effectively in academic, professional, and social environments. From this perspective, English language competence represents communicative capacity, while digital literacy represents technological and information-processing capacity. When combined with critical thinking,

creativity, collaboration, adaptability, and ethical awareness, these capacities can contribute to holistic student development.

English language education is particularly significant because communication is central to almost every area of higher education. Students need English to read scholarly literature, participate in seminars, prepare assignments, deliver presentations, communicate with teachers and peers, attend interviews, write professional correspondence, and engage with research communities. Communicative competence therefore extends beyond grammatical knowledge. Canale and Swain (1980) conceptualized communicative competence as involving grammatical, sociolinguistic, discourse, and strategic dimensions. This understanding remains useful because effective communication requires learners to know not only what is grammatically possible but also what is appropriate in a particular context.

In contemporary higher education, the context of communication has expanded significantly. Students no longer communicate exclusively through classroom conversation or printed assignments. They communicate through email, learning-management systems, virtual meetings, collaborative documents, discussion forums, professional networking platforms, podcasts, presentations, and multimedia content. Consequently, language education needs to address different forms of digital communication.

The concept of multiliteracies provides an important theoretical foundation for this shift. The New London Group (1996) argued that literacy pedagogy should recognize the diversity of linguistic and cultural practices and the emergence of new communication technologies. Their approach is especially relevant to contemporary higher education because students increasingly encounter multimodal texts. A digital presentation, for instance, may combine written language, images, audio, animation, charts, and video. Effective communication therefore requires students to make decisions about language, design, medium, audience, and purpose.

Digital literacy consequently needs to be understood as an extension of literacy rather than as a completely separate technical ability. Bawden (2008) emphasizes that digital literacy encompasses the ability to understand and use information in multiple digital forms. In higher education, this involves locating information, evaluating sources, interpreting digital content, communicating through technological platforms, and producing new digital materials.

Information evaluation is particularly important because digital environments provide students with unprecedented quantities of information. Access does not necessarily mean

understanding. Students may encounter misinformation, misleading headlines, manipulated images, unreliable websites, artificial intelligence-generated material, commercial content, and sources of uncertain authority. Digital competence must therefore include critical evaluation.

A future-ready student should be able to ask who produced a particular source, what evidence supports its claims, when it was published, what purpose it serves, whether the information can be verified, and whether it is appropriate for academic use. These are fundamentally critical-thinking skills, but they increasingly operate within digital environments. English language teaching can contribute directly to this process. Critical reading activities can ask students to compare two online articles, identify differences in evidence, analyze rhetorical strategies, evaluate language choices, and distinguish fact from opinion. Such activities develop English reading skills while simultaneously strengthening digital and information literacy. Writing instruction can similarly be expanded. Instead of limiting academic writing to conventional essays, students can be introduced to digital genres such as blogs, professional emails, online reviews, digital reports, podcasts, multimedia presentations, and reflective portfolios. These activities require students to consider audience and purpose and to adapt their language accordingly. Speaking and listening activities can also benefit from digital technology. Students can prepare recorded speeches, participate in virtual discussions, conduct online interviews, create podcasts, and deliver multimedia presentations. Such activities provide repeated opportunities for language practice and can create alternative forms of participation for students who may initially hesitate to speak before a large classroom audience.

The value of technology, however, depends on pedagogy. Technology by itself does not guarantee meaningful learning. UNESCO's *Global Education Monitoring Report 2023* emphasizes the importance of examining educational technology critically and ensuring that technology serves educational purposes rather than becoming an objective in itself (UNESCO, 2023). Technology should therefore be selected according to learning objectives, student needs, accessibility, and educational value. This principle is particularly important in English language education. A digital platform should not be introduced simply because it is technologically sophisticated. Its educational value depends on whether it provides students with meaningful opportunities to communicate, collaborate, receive feedback, reflect, and apply language. The capacity-building perspective consequently requires a movement from technology *consumption* to technology *application and creation*. Students should not merely

watch videos or download materials. They should create presentations, podcasts, digital stories, blogs, infographics, collaborative projects, and other forms of digital content. Content creation transforms students from passive consumers into active participants in knowledge production.

Such activities can simultaneously develop English proficiency and digital competence. Consider a student producing a five-minute educational podcast in English. The student must select a topic, research reliable information, organize ideas, write a script, consider audience, record speech, edit the audio, and evaluate the final product. The activity integrates reading, writing, speaking, listening, research, information literacy, digital production, creativity, and self-assessment.

Project-based learning provides another productive approach. Students can work collaboratively on authentic projects requiring research, communication, technology, and presentation. A project on local culture, for example, could involve interviewing community members, collecting information, writing English descriptions, preparing photographs or videos, and producing a digital magazine. Such a project connects academic English with students' local knowledge and experiences. This integration is especially relevant for institutions serving students from diverse backgrounds. Students do not enter higher education with identical levels of English proficiency or technological exposure. Some may have strong familiarity with smartphones and social media but limited experience with academic databases, word-processing software, digital presentations, or formal online communication. Others may have studied English for many years but remain hesitant to speak or write independently.

A capacity-building model should therefore begin from students' existing competencies rather than assuming uniform preparedness. Diagnostic assessment can identify strengths and gaps in reading, writing, speaking, listening, digital navigation, information searching, document preparation, presentation, and online communication. Institutions can then provide differentiated support.

English language development can be organized progressively. At a foundational level, students may require support in everyday communication, vocabulary, sentence construction, reading comprehension, and basic digital navigation. At an intermediate level, students can work on academic writing, presentations, research skills, and digital collaboration. At an advanced level, students can engage with professional communication, research writing, digital content creation, artificial intelligence, and career preparation.

This progression also addresses the problem of language anxiety. Students who have limited confidence in English may avoid speaking activities because they fear making mistakes. Digital tools can provide additional opportunities for practice through recorded presentations, pair activities, discussion boards, and asynchronous tasks. However, these tools should be combined with supportive teacher feedback and peer interaction. The role of the English teacher consequently changes within a digital capacity-building environment. The teacher becomes not only a language instructor but also a facilitator, mentor, learning designer, critical-literacy educator, and digital-content curator. The teacher helps students determine which information is reliable, which digital tools are appropriate, how language should be adapted to different contexts, and how technology can support rather than replace independent thinking.

Teacher capacity is therefore as important as student capacity. An institution cannot expect students to become digitally competent if teachers are not provided with appropriate professional development. Faculty development should include digital pedagogy, online assessment, multimedia production, information literacy, artificial intelligence, academic integrity, and inclusive technology practices. Artificial intelligence has made this issue particularly urgent. Generative AI tools can assist students in brainstorming, language practice, vocabulary development, drafting, editing, translation, and feedback. Used carefully, these technologies may provide additional learning opportunities. Used uncritically, however, they may encourage dependence, weaken independent writing, reproduce misinformation, or create problems concerning authorship and academic integrity.

Technological Proficiencies and the Evolving Academic Landscape

Digital literacy is more than only the capability to use a computer or smartphone. It encompasses the capacity to access, manage, assess, convey, generate, and engage via digital technology. UNESCO's initiatives around digital literacy and skills underscore the need of enhancing individuals' ability to utilise digital technology in a meaningful and responsible manner (UNESCO). For learners, digital proficiency encompasses several facets. These encompass fundamental technological competencies, information literacy, digital communication, content production, cybersecurity awareness, ethical online conduct, and the capacity to critically assess online information. The plethora of knowledge accessible on the internet has generated both prospects and obstacles. Learners may obtain vast amounts of material in only seconds; nevertheless, availability does not inherently ensure excellence.

Digital platforms encompass credible academic resources in addition to false information, distorted content, promotional material, and unsubstantiated assertions. Thus, learners require essential information literacy. They must learn to enquire who created a source, what evidence supports its statements, when it was published, what its goal is, and how it compares with other sources. Digital competence is consequently intimately tied to critical thinking. A digitally proficient student is not only someone who can utilise programs but someone who can make educated judgements regarding technology and information. The emergence of generative artificial intelligence has further strengthened this demand. Students increasingly face AI-assisted writing, translation, summarization, information search, and content-generation technologies. These tools can help learning when used responsibly, but they also create problems with academic integrity, authorship, accuracy, prejudice, privacy, and overdependence. Future-ready education must thus stress responsible and critical engagement with emerging technologies rather than treating technological adoption as an aim in itself.

Integrating English and Digital Skills

English language skills and digital abilities are mutually reinforcing. Digital settings give new contexts for language usage, while English competency helps students to participate more successfully in many digital places. For example, students can use English to explore academic resources, interact through online discussion boards, engage in webinars, produce digital presentations, and cooperate on international projects. At the same time, modern technologies give possibilities for pupils to practise English through real conversation. An English instructor can change standard classroom activities into digitally enhanced learning experiences. A standard essay-writing assignment, for instance, can be broadened into a research and internet communication project. Students may pick a topic, explore academic sources, analyse material, construct an outline, compose an essay, obtain peer comments using a collaborative platform, rewrite the text, and finally deliver their case through a digital presentation. Similarly, speaking exercises can be expanded through recorded presentations, podcasts, interviews, online conversations, and video-based projects. Such exercises give students with opportunity to enhance pronunciation, fluency, vocabulary, organization, confidence, and digital presenting abilities concurrently. The merging of the two areas might therefore produce a more holistic learning experience. Instead of teaching "English skills" and "computer skills" as unconnected

disciplines, schools might construct learning challenges in which language and technology are organically linked.

Capacity Building as an Educational Approach

Capacity building refers broadly to the development of knowledge, skills, confidence, resources, and competencies that enable individuals and organisations to respond effectively to problems and opportunities. In education, capacity building should consequently focus on empowering students to become increasingly autonomous learners. A capacity-building method varies from a focused skills-training paradigm. Skills training may educate students how to accomplish a particular activity, whereas capacity development tries to enhance their ability to adapt as circumstances change. This difference is particularly relevant in a quickly changing technological context. A software program that pupils learn today may be replaced tomorrow. Therefore, the purpose should not merely be to educate them how to use one single program. Instead, they should create transferable digital learning skills that allow them to grasp and adapt to new technology. The same idea applies to English. Memorizing a predefined vocabulary list is less beneficial than having the ability to learn new vocabulary from reading, context, dictionaries, corpora, and internet resources. Similarly, knowing a certain writing structure is less valuable than understanding how to construct ideas, analyse evidence, consider audience, and communicate effectively. Capacity building thus encompasses four interrelated dimensions: knowledge, skills, attitudes, and adaptability. Students need knowledge of language and technology, practical skills for employing them, confidence and ethical awareness, and the ability to continue learning as circumstances develop

Theoretical Framework

UNESCO's AI Competency Framework for Students gives a valuable direction by stressing human-centred thinking, ethics, AI methodologies and applications, and AI system design. It also conceptualizes evolution from learning to applying and producing and encourages critical judgment and responsible citizenship (Miao et al., 2024). The consequence for English teaching is that students should not merely be taught how to receive responses from AI systems. They should learn how to assess AI-generated language, spot faults, verify facts, amend machine-generated writing, recognise acceptable usage, and keep their own creative contribution. AI can operate as a learning helper, but it should not replace the student's responsibilities for thinking and communicating. This idea links directly to academic honesty. Digital settings have

made copying and unlawful use of material simpler, while generative AI has confounded traditional understandings of authorship. Students consequently demand specific education in paraphrasing, reference, referencing, plagiarism, copyright, data privacy, and safe AI usage.

The increase of employability provides another major argument for merging English and digital skills. Contemporary workplaces increasingly need people to interact across digital platforms and adapt to technological change. The World Economic Forum's 2025 study ranks technical literacy among the fastest-growing talents while also highlighting analytical thinking, creative thinking, resilience, adaptability, agility, leadership, and lifelong learning. The relevance of this discovery rests in the combination of technology and human skills rather than in the replacement of one by the other. Higher education should consequently offer learning experiences that replicate actual professional interactions. Students can generate professional emails, resumes, digital portfolios, presentations, reports, project ideas, and interview reply. They can participate in simulated online interviews and collaborative workplace projects. These exercises help integrate classroom learning with prospective career situations. Digital portfolios can be very handy. Instead of showcasing students' growth exclusively through test results, portfolios might comprise writing samples, presentations, projects, films, reflections, certifications, comments, and amended assignments. The portfolio becomes proof of progressive ability growth.

Assessment itself consequently requires rethinking. Traditional examinations remain effective for testing certain sorts of knowledge, but they cannot fully capture communication, cooperation, creativity, digital content production, or problem-solving. A larger assessment system can include presentations, projects, portfolios, source-evaluation exercises, reflective writing, digital goods, group work, and spoken explanations.

The National Education Policy 2020 offers policy support for this approach by promoting competency-based assessment, portfolios, rubrics, assessment analytics, blended learning, and digital education. The policy also emphasises the need for digital infrastructure, digital content, and capacity building. Nevertheless, the combination of English and digital abilities confronts substantial hurdles. The first is the digital divide. Students may have uneven access to devices, dependable internet connectivity, software, and digital learning settings. The existence of a smartphone does not inevitably imply digital academic ability. Institutions must thus distinguish between informal technology usage and educational technology competency. A second concern is linguistic inequality. Students from diverse schooling backgrounds may

have dramatically varying levels of English exposure. If English proficiency is considered as a sign of intellectual aptitude rather than a developable skill, kids may encounter marginalisation. Capacity building demands supportive, progressive, and inclusive language development.

A third concern is teacher readiness. Technology integration demands time and professional growth. Teachers need chances to experiment with digital technologies, plan suitable activities, grasp privacy and ethical considerations, and evaluate if a particular technology actually helps learning. A fourth difficulty is information overload. Students may fail to differentiate genuine information from unreliable sources. Information literacy must consequently become an intrinsic component of English and research education. A final concern is the risk of technology reliance. Excessive dependence on automated technologies can restrict prospects for autonomous reasoning and original expression. Students need to recognise that technology should supplement learning rather than replace intellectual work. These problems imply that future-ready education must be both technology and human-centred. Technology should improve educational opportunities while preserving teacher-student interactions, conversation, reflection, creativity, and independent thought. From this approach, a helpful capacity-building framework may be constructed around five interrelated aspects. The first is communication ability, comprising listening, speaking, reading, writing, presenting, and professional communication. The second is digital competence, encompassing information literacy, digital communication, collaboration, content production, cybersecurity awareness, and technological problem-solving. The third is critical and creative thinking, helping students to analyse evidence, solve issues, discover ideas, and produce original material. The fourth is employability and lifetime learning, encompassing adaptation, professional communication, self-directed learning, and constant upskilling. The fifth is ethical and inclusive digital citizenship, covering privacy, copyright, academic integrity, responsible AI usage, courteous online communication, and awareness of uneven access.

These aspects are mutually reinforcing. Communication without digital skills may hinder involvement in technology-mediated professional situations. Digital competence without communication may hinder students' abilities to explain, negotiate, cooperate, and lead. Technical skill without critical thinking may leave pupils exposed to disinformation. Employability without ethical awareness may generate technically proficient but socially irresponsible technology users. The objective of capacity building is consequently to develop these abilities as an integrated whole.

Such integration may be performed through a very straightforward institutional cycle: diagnose, design, apply, reflect, and show. Institutions can first diagnose students' current language and digital competencies. They can then improve particular skills through organised courses and seminars. Students can use these abilities through genuine projects. They can reflect on their learning through notebooks or portfolios. Finally, individuals may demonstrate their ability through presentations, digital goods, professional activities, and academic work. This method can be particularly important at government-supported and residential higher-education institutions, where students may come from varied educational and social settings. Such institutions have the ability to employ English and digital education as instruments of educational inclusion rather than solely as methods for choosing already advantaged pupils.

The end objective is not to generate kids who just know more English or operate more digital instruments. The purpose is to enhance pupils' capacity to participate. Participation may involve participating to classroom discussions, obtaining academic information, engaging with experts, applying for jobs, generating digital content, doing research, cooperating with others, or continuing to study beyond graduation.

The combination of English and digital skills should thus be seen as an educational method for fostering student agency. When students can communicate ideas clearly, seek and assess information, utilise technology creatively, cooperate with others, and make responsible decisions, they develop increased capacity to handle changing circumstances. The idea of future preparedness thus has to be understood widely. A future-ready student is not only a technologically advanced student. Rather, future preparedness comprises the capacity to adapt knowledge and skills to new conditions while preserving critical judgment, creativity, communication, ethical awareness, and a commitment to ongoing learning.

Conclusion

The shifting environment of higher education and employment encourages institutions to reassess the abilities they create among students. Knowledge remains the foundation of education, but knowledge alone is insufficient in a world defined by fast technological development, artificial intelligence, digital communication, globalization, and increasing occupational requirements. English language competency and digital competence are increasingly interwoven features of this evolving educational landscape. English offers students with a way of acquiring knowledge, communicating ideas, participating in academic

communication, and interacting with professional and international networks. Digital competence enables them to access, assess, create, communicate, cooperate, and solve issues with technology. When developed collectively, these competences can become essential instruments of student capacity building. The data and policy frameworks discussed in this article demonstrate that technology competence must be accompanied by human skills. The World Economic Forum's current skills study sees technical literacy and AI-related competences as fast rising in relevance while continuing to prioritise analytical thinking, creativity, resilience, adaptability, leadership, and lifelong learning. UNESCO also supports responsible, ethical, human-centred approaches to artificial intelligence in education. The National Education Policy 2020 provides an Indian policy framework for technology-supported education, blended learning, digital infrastructure, capacity building, and competency-oriented assessment.

The primary consequence is that higher education should shift from fragmented skill development towards integrated capacity building. English should not be taught just as a topic, and digital technology should not be offered merely as a collection of tools. Both should become part of a bigger educational process that encourages communication, critical thinking, creativity, teamwork, employability, flexibility, ethical awareness, and lifelong learning. The suggested five-dimensional framework—communication competence, digital competence, critical and creative thinking, employability and lifelong learning, and ethical and inclusive digital citizenship—provides a conceptual underpinning for this integration. It can inform curriculum design, classroom practice, student-support programmes, teacher development, evaluation, and institutional planning.

For English educators, this transition gives a chance to reframe language instruction as an important component of modern capacity building. English classrooms may become settings for digital storytelling, collaborative research, professional communication, critical reading, multimedia presentation, podcasting, digital writing, information appraisal, and responsible AI usage. Such activities can integrate language learning with students' academic, professional, and social situations.

For higher-education institutions, the task is to provide equal settings in which all students may acquire these skills. Infrastructure, teacher preparation, language assistance, digital access, inclusive pedagogy, and ongoing assessment are key components of such an institutional approach. Future-ready education should eventually be judged not merely by what

students remember at the conclusion of a course but by what they are capable of accomplishing when confronted with new issues, technology, information, and professional circumstances. The capacity to communicate, learn, adapt, analyse, create, cooperate, and behave ethically is likely to remain vital even as particular technology change. Thus, producing future-ready pupils through English language and digital abilities is not only a question of adding technology to language teaching. It is a larger process of growing human ability for engagement in an increasingly digital, linked, and fast changing world. When English proficiency and digital competence are combined via inclusive, critical, creative, and ethically grounded pedagogy, higher education may contribute greatly to generating confident communicators, effective digital citizens, flexible professionals, and lifelong learners.

References

Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies and practices* (pp. 17–32). Peter Lang.

Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics, 1*(1), 1–47. https://doi.org/10.1093/applin/I.1.1

Council of Europe. (2020). *Common European framework of reference for languages: Learning, teaching, assessment—Companion volume*. Council of Europe Publishing.

Government of India, Ministry of Education. (2020). *National Education Policy 2020*. Government of India.

Miao, F., Shiohira, K., & Lao, N. (2024). *AI competency framework for students*. UNESCO.

New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review, 66*(1), 60–92. https://doi.org/10.17763/haer.66.1.173814v110r0r1

Organisation for Economic Co-operation and Development. (2019). *OECD skills outlook 2019: Thriving in a changing world*. OECD Publishing. https://doi.org/10.1787/df80bc12-en

Selwyn, N. (2016). *Education and technology: Key issues and debates*. Bloomsbury Academic.

UNESCO. (2023). *Global education monitoring report 2023: Technology in education: A tool on whose terms?* UNESCO.

University Grants Commission. (2019). *Life skills (Jeevan Kaushal)*. University Grants Commission.

World Economic Forum. (2025). *The future of jobs report 2025*. World Economic Forum.

Her Bank Account, His UPI: Examining Women's Financial Autonomy in Hyderabad

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Owning a bank account does not mean controlling it. This paper reports a survey of 42 women in Hyderabad, conducted between 25 September and 5 October 2026, on who actually operates the bank accounts held in women's names. The survey looked beyond ownership to four simple signs of control: who manages the account, whose mobile number is linked to it, who knows the PIN, and whose permission is needed to spend.

To compare women easily, the study gives each woman a Financial Autonomy Index score out of 100, based on six questions from the survey. A higher score means she has more control over her own money.

The survey finds that 81% of the women hold an account in their own name, but only 36% manage it themselves, have their own mobile number linked to it and create their own PIN. Only 17% also take out large amounts without anyone's permission. Women in regular jobs scored 87 out of 100, while students scored only 34. Whose mobile number is linked to the account made the biggest difference of all: women with their own number linked scored about twice as much as those whose account is linked to a parent's or husband's number. In Hyderabad, the person controlling a young woman's account is more often a parent than a husband. Fear of fraud and not being confident with phones and apps were the most common problems women reported.

The paper suggests that financial inclusion should be measured by who operates an account, not only by who owns it. It recommends linking the woman's own mobile number when an account is opened, safe-UPI training through colleges and self-help groups in Hyderabad, and counting how women actually use their accounts.

Keywords: Financial inclusion, women's control over money, UPI, mobile number linkage, Financial Autonomy Index, Hyderabad

1. Introduction

Hyderabad is one of India's most digitally connected cities. Bank branches and ATMs are everywhere, and UPI payments are accepted by street vendors, auto drivers and kirana shops

alike. In such a city, the usual question of financial inclusion, whether a woman has a bank account, seems largely settled. Under the Pradhan Mantri Jan Dhan Yojana alone, women hold about 56% of the 56 crore accounts opened across India (PIB, 2025).

This study asks a different question: once a woman has an account, who actually operates it? UPI works through the mobile number registered with the bank. When a UPI app is first set up, it checks that number's SIM through a silent SMS sent from the phone and links itself to that phone. A one-time password (OTP) to the same number is needed only at registration, when setting or resetting the UPI PIN, and for some auto-pay set-ups. Everyday payments are approved with the UPI PIN on that phone, and newer UPI options also allow fingerprint or face approval on the same phone (NPCI, 2025). So if the registered number belongs to a husband or father, UPI is set up on his phone and he controls PIN resets, and the woman's account may in practice be run from his phone. Her name is on the passbook, but his phone approves the payments. This is what the title of this paper means: *her bank account, his UPI.*

To answer this question, the study surveyed 42 women in Hyderabad and asked not only whether they have accounts but whether they control them. It gives each woman a Financial Autonomy Index score, compares the scores of students, homemakers, working women and others, and finds which factor best separates women who control their money from those who do not.

2. Need for the Study

Most measures of financial inclusion simply count accounts. Few ask who operates them. Recent writing argues that the remaining gap between women and men in India is about using accounts, not about having them (Chakraborty and Meena, 2025), and that this gap is, if anything, wider in cities with many banks (Kaur, Chavan and Lakhiani, 2026).

There is very little evidence on this question from Hyderabad households. Official surveys report whether women have accounts, but they do not ask whose mobile number is linked to a woman's account, who knows the PIN, or whether she needs permission to withdraw money. These are exactly the points where control lies in the UPI era.

This study fills this gap with fresh survey data. Its findings are useful for banks and bank agents (Business Correspondents) in the city, for colleges whose students receive scholarships in bank accounts, for self-help groups supported by MEPMA in Hyderabad, and

for government schemes that send money directly to women's accounts (Direct Benefit Transfers, or DBT).

3. Conceptual Framework

The study separates two things: having an account in one's name, and actually controlling it. When a woman has an account but someone else controls it, the study calls this "inclusion only on paper".

This idea comes from Kabeer (1999), who explained that empowerment needs three things: resources (such as a bank account), the ability to make one's own choices about them, and the results that follow. It also follows Sen (1990) and Agarwal (1997), who showed that within a family, something owned by a woman helps her only if she can actually use it.

In the UPI era, control over an account came down to three practical things: the mobile number linked to it, the PIN, and the payment app on the phone. The study therefore uses these as signs of control, along with two more: how freely a woman can spend, and whether she needs permission for large withdrawals.

4. Objectives of the Study

The study has the following objectives:

a. To find out how many women in Hyderabad have a bank account in their own name.
b. To find out who manages women's accounts, whose mobile number is linked to them and who knows the PIN.
c. To find out how often and for what women use UPI, and why some do not use it.
d. To find out how freely women can decide how the money in their accounts is spent.
e. To identify the problems that stop women from managing money on their own.
f. To give each woman a Financial Autonomy Index score and compare the scores of different groups of women.
g. To suggest steps that turn owning an account into real control over money in Hyderabad.

5. Research Questions

The study tries to answer the following questions:

a. How many women who have a bank account actually control it?

b. Does the person whose mobile number is linked to the account also control it?
c. Do working women, homemakers and students differ in how much control they have? Do age and education make a difference?
d. What stops women from using UPI and managing money on their own?

6. Hypotheses

Before looking at the data, the study set out six simple expectations, which it then checked against the survey answers.

Table.1: Hypotheses of the Study

No	What the Study Expected to Find
H1	Working women, homemakers and students have different levels of control over money
H2	Women of different ages have different levels of control over money
H3	More educated women have more control over money
H4	Women whose own mobile number is linked to the account have more control
H5	Women whose own number is linked use UPI more regularly
H6	Women whose own number is linked are more likely to manage the account themselves

7. Review of Literature

Kabeer (1999) described empowerment as the ability to make important life choices, and separated having resources from being able to use them. Sen (1990) described the family as a place of "cooperative conflict", where each member's bargaining power depended on how well they could manage on their own. Agarwal (1997) showed that social customs and ownership of property shape the outcome of such bargaining.

Field, Pande, Rigol, Schaner and Troyer Moore (2021) found in an experiment in India that paying women's wages into their own bank accounts, instead of family accounts controlled by husbands, led women to work more and changed attitudes about women's roles. Their result shows that whose hands the money passes through matters as much as having an account.

Chakraborty and Meena (2025) argued that India's remaining gender gap in financial inclusion is about using accounts rather than having them. Ideas for India (2026), using the World Bank's Global Findex 2025 survey, reported that Indian women are less likely than men to own a phone or smartphone and to make digital payments. Kaur, Chavan and Lakhiani (2026) found that women use banks and other formal finance less than men, and that the gap is wider in cities with many banks.

In Hyderabad, a study of the Digital Budget Rani programme run by the Hyderabad-based NGO Yugantar reported that many women who said no to UPI training did so because their families objected, and that male relatives often controlled women's PINs or restricted their payment apps (Deccan Chronicle, 2026).

These studies show that owning an account and controlling it can be two different things. None of them, however, checks in Hyderabad households whether the person whose number is linked to a woman's account is the one who controls it. This study fills that gap with its own survey.

8. Research Methodology

The study describes and analyses fresh data collected directly from women through a survey.

Study area: Hyderabad. Respondents came from localities including Nacharam, Boduppal, Meerpet, Chandrayangutta, Dhoolpet, Jeedimetla, Chintalmet and Banjarahills. Thirteen respondents did not name a locality, and a few gave localities just outside the city limits.

Questionnaire: A Google Form with 17 questions, 15 of them with fixed answer choices, covering the respondent's background, her bank account, who controls it, UPI use, decision-making and problems faced. Two questions allowed more than one answer.

Period of data collection: 25 September 2026 to 5 October 2026.

How respondents were chosen: The form was shared through personal and college contacts in Hyderabad, and respondents were asked to pass it on to others.

Number of respondents: 42 women. The study is treated as a first, small-scale (pilot) survey.

How the data was analysed: Answers were counted and turned into percentages. Groups of women (for example, students and working women) were then compared side by side. A difference between groups is reported as clear only when it is large and shows up across several questions. The counting was done on a computer using Python.

Cleaning the data: Names were removed before analysis. The question on why a woman does not use UPI was shown to everyone, so only the 17 women who use UPI a few times a month or less were counted for it. A few answers (for example, "She uses") suggest that some forms were filled in by someone on behalf of the respondent.

8.1 The Financial Autonomy Index

To compare women easily, each woman was given a Financial Autonomy Index score out of 100, based on six survey questions. Each question gives full marks, part marks or no marks, as shown below. All six questions count equally. A woman who gets full marks on all six scores 100; a woman who gets no marks on any scores 0.

Table.2: How the Financial Autonomy Index Is Worked Out

Question	Full Marks If…	Part Marks If…	No Marks If…
Who manages the account?	She manages it herself	She manages it with family help	Someone else manages it
Whose mobile number is linked?	Her own number	–	Someone else's number, or she does not know
Does she know the PIN?	She created it herself	Someone helped her create it, or she knows it but others use it	She does not know it
How often does she use UPI?	Daily or several times a week	A few times a month, or rarely	Never
How freely can she spend her money?	Complete freedom	Mostly free, consults family sometimes, or needs permission	Little or no control
Does she need permission for a big withdrawal?	No	Sometimes	Yes, or someone else handles it

For easy reading, scores below 40 are called low control, 40 to 70 medium control, and above 70 high control. The six questions point in the same direction, and the score matches how women rated their own independence: women who said they were more independent generally also had higher scores. This shows that the score measures what it is meant to measure.

9. Data Analysis and Interpretation

9.1 Who Answered the Survey

Of the 42 women, students are the largest group (18 women), followed by homemakers (11), women in regular jobs (8) and self-employed women (5). The students are all young, mostly aged 18–24, and the homemakers are all aged 35–54, so in this survey age and occupation go together. About a quarter of the women are graduates, and most of the rest finished secondary or higher secondary school.

9.2 Having an Account and Controlling It

Four in five women (34 of 42) have a bank account in their own name. Most of the women who were not sure whether they had one are students, whose accounts were probably opened by their parents.

Table.3: Who Controls the Bank Account

Question	Answer	Share of Women
Who manages the main account	She manages it herself	45%
	She manages it with family help	19%
	Her husband manages it	12%
	Another family member or someone else	24%
Whose number is linked	Her own number	50%
	Her parent's number	26%
	Her husband's number	10%
	She does not know	14%
Does she know the PIN	Yes, she created it herself	48%
	Yes, but someone helped or others use it	24%
	No	29%

The table.3 shows that fewer than half the women manage their account themselves. Half do not have their own mobile number linked to it, and almost a third do not know their PIN.

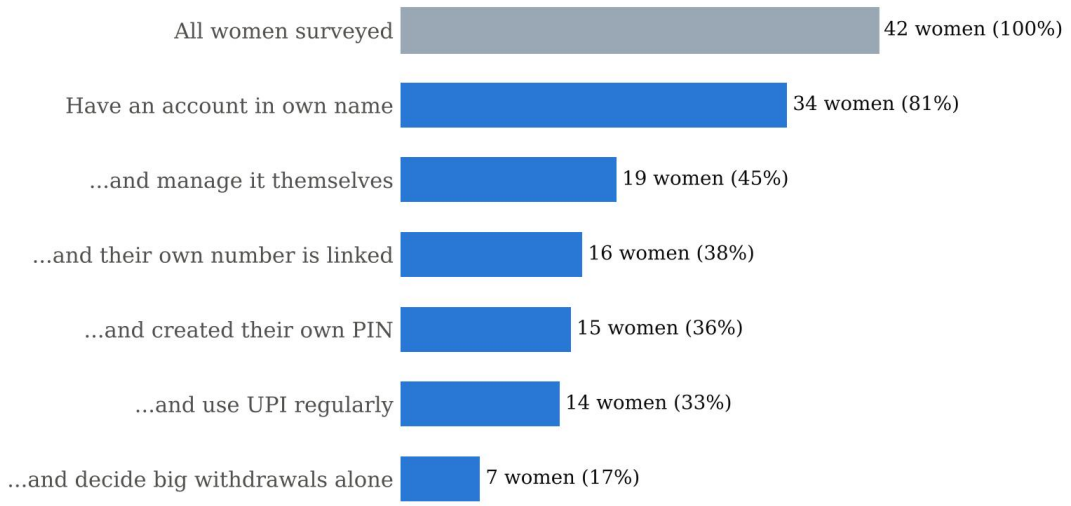

Figure.1: From Having an Account to Full Control (each bar counts only the women who also meet every condition in the bars above it)

The figure.1 shows how the number of women shrinks at each step. Of 42 women, 34 have an account, but only 15 manage it themselves with their own number and their own PIN, and only 7 also decide big withdrawals without anyone's permission. In other words, only about one woman in six has full control of her money.

9.3 Students, Homemakers and Working Women Compared

Table.4: Control over Money among Students, Homemakers and Working Women

What the Woman Does	Working (8)	Homemaker (11)	Self-employed (5)	Student (18)
Manages the account herself	All	About half	2 of 5	3 of 18
Has her own number linked	7 of 8	10 of 11	2 of 5	2 of 18
Uses UPI regularly	7 of 8	8 of 11	3 of 5	7 of 18

The table.4 shows a sharp contrast. Every working woman manages her own account, while only 3 of the 18 students do, and only 2 students have their own number linked. Most students' accounts are linked to a parent's number. Homemakers almost all have their own number linked, but only about half manage the account alone, and in three cases the husband manages it.

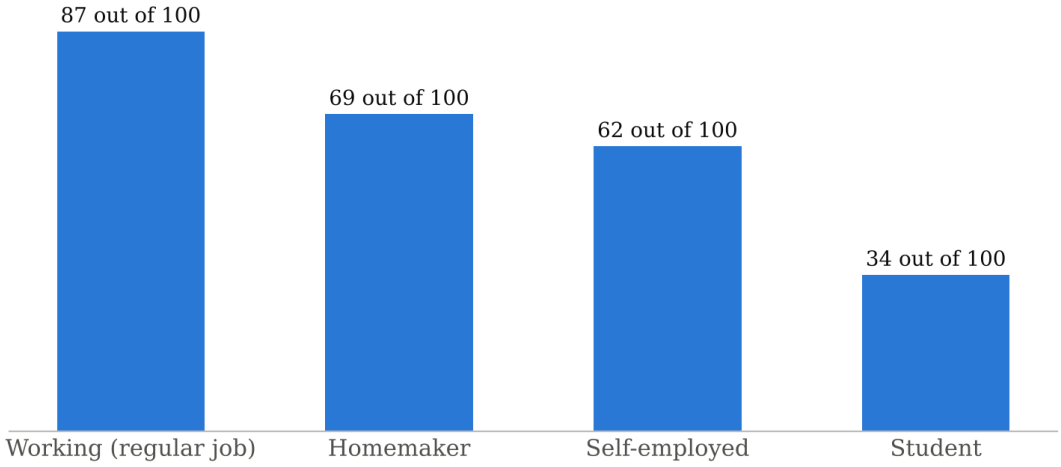

Figure.2: Financial Autonomy Index by Occupation (out of 100)

The figure.2 shows that working women score 87 out of 100, while students score only 34. Working women have more than two and a half times the control that students have.

9.4 Whose Mobile Number Is Linked

Whose number is linked to the account makes the biggest difference of anything in the survey. Women with their own number linked score 81 out of 100, about twice as much as women whose account is linked to a parent's number (39) or a husband's number (33).

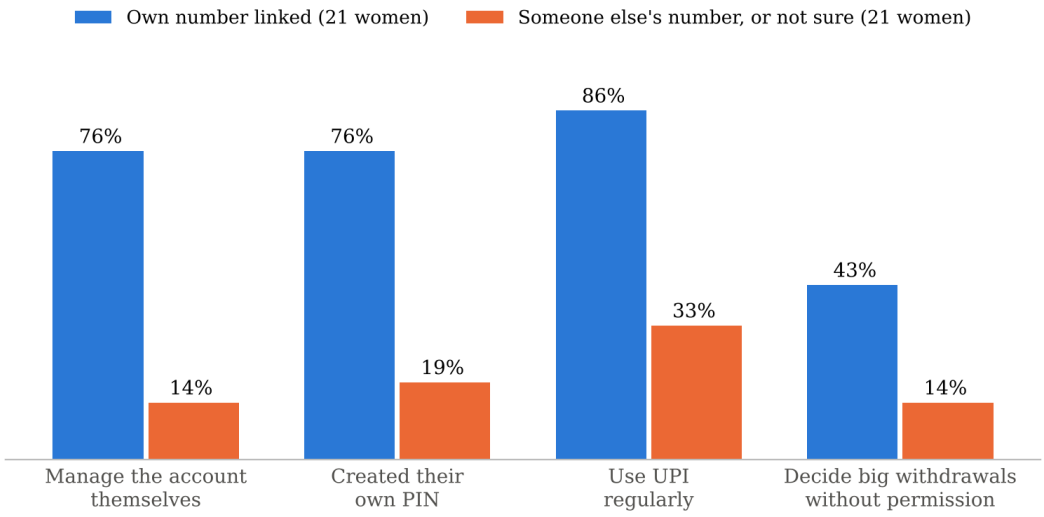

Figure.3: Women with Their Own Number Linked Compared with Other Women

The figure.3 shows that women with their own number linked are far more likely to do things on their own. Three in four manage the account themselves, against one in seven of the other women. Most use UPI regularly, against one in three of the others.

9.5 Use of UPI

Six in ten women use UPI regularly, but about a quarter never use it. Women use UPI mostly for shopping and daily expenses, and fewer use it to send larger sums. Among the women who seldom or never use UPI, the most common reasons are preferring cash and not knowing how to use it. Only one said she lacks a smartphone, so the problem is mainly skills and habits, not owning a phone.

9.6 Freedom to Decide about Money

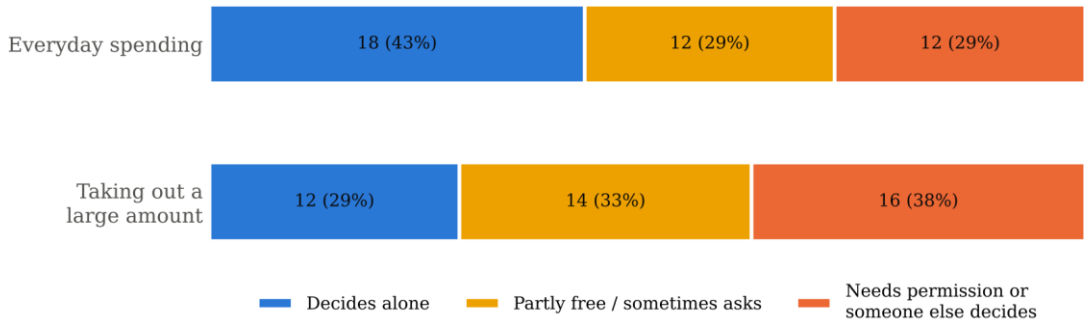

Figure.4: Freedom to Decide: Everyday Spending Compared with Taking Out a Large Amount

The figure.4 shows that freedom shrinks as the amount grows. Many women are free in everyday spending, but fewer than one in three can take out a large amount without asking anyone. Even among working women, only half decide big withdrawals alone. Nearly half of all women describe their independence as “moderate, shared with family”. Women who earn their own money mostly decide themselves how to spend it.

9.7 Age and Education

Control rises with age, peaking among women aged 35–44, and then falls among women aged 45–54, where some homemakers’ accounts are managed by their husbands. Education shows no steady pattern: more educated women did not clearly have more control.

9.8 Problems Women Face

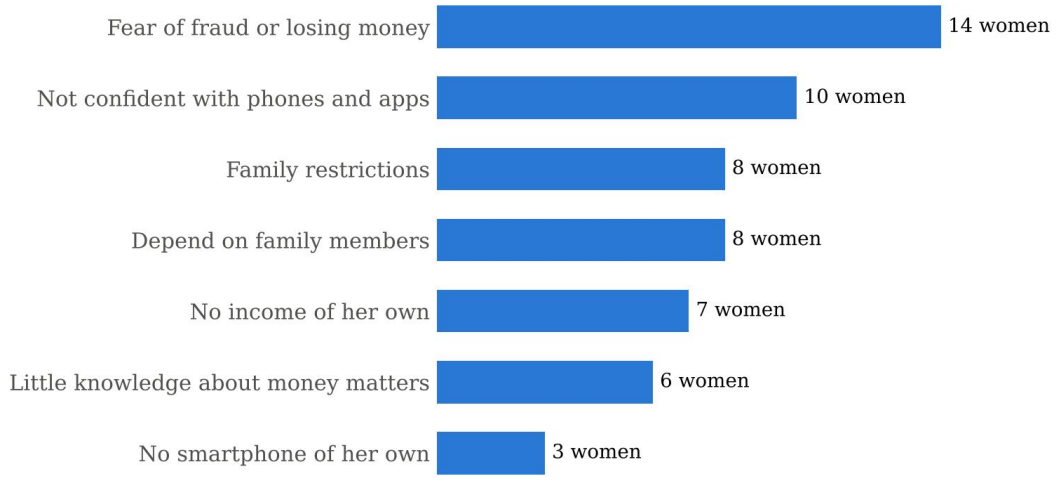

Figure.5: Problems That Stop Women from Managing Money on Their Own (women could choose more than one)

The figure.5 shows that fear of fraud or losing money is the most common problem, followed by not being confident with phones and apps. Very few women said they lack a smartphone. Homemakers more often mention not being confident with phones and apps and having little knowledge about money matters. Women who mentioned more problems tended to have lower scores.

9.9 Were the Hypotheses Supported?

Table.5: Were the Hypotheses Supported?

No	What the Study Expected to Find	What the Survey Shows	Supported?
H1	Working women, homemakers and students have different levels of control over money	Working women score highest, students lowest	Yes
H2	Women of different ages have different levels of control over money	Control is highest at ages 35–44 and lowest at 18–24	Yes
H3	More educated women have more control over money	No steady rise in control with education	No
H4	Women whose own mobile number is linked to the account have more control	They score more than twice as much as other women	Yes
H5	Women whose own number is linked use UPI more regularly	Most of them use UPI regularly; only one in three of the others do	Yes
H6	Women whose own number is linked are more likely to manage the account themselves	Three in four manage it themselves, against one in seven of the others	Yes

The table.5 shows that five of the six hypotheses are supported. Occupation, age and, above all, whose number is linked make a clear difference to women's control over money. Only H3 is not supported: more educated women did not clearly have more control. Because the survey is small, these results should be read as strong early signs rather than final proof.

10. Discussion

Owning is not controlling. The main finding of this study is the gap between having an account and controlling it. Four in five women surveyed have an account, but only about a third manage it alone with their own number and their own PIN, and only about one in six also decide big withdrawals without permission. In Kabeer's (1999) words, many of these women have the resource but not the power to use it as they choose.

The mobile number is the key. The survey shows that whose number is linked to the account matters more than anything else, more than occupation, age or education. This follows from the way UPI works. The UPI app is linked, through an SMS check, to the SIM of the registered number, and the OTP needed to set or reset the UPI PIN goes to that number. So

whoever holds that SIM controls UPI set-up and PIN resets, and payments are approved with the PIN on that phone. When the SIM belongs to someone else, the account in practice runs through that person's phone.

"His UPI" is often a father's. The title of this paper expected husbands to be in control, and the survey does find this among homemakers. But in this Hyderabad survey, the larger group is young women whose accounts are linked to a parent's number and nearly three times as many women had a parent's number linked as a husband's. Students, who are the youngest and among the most educated women, have the least control. Their accounts seem to have been opened by parents, perhaps for scholarships, and the parent's number was never changed when they grew up.

Income and stage of life matter more than education. Every working woman manages her own account, and working women have the highest scores. More education did not clearly bring more control. Control seems to follow earnings and stage of life more than schooling.

Homemakers are divided. About half the homemakers manage their accounts alone and have high scores, while those whose husbands manage the account score much lower. This fits Sen's (1990) idea of bargaining within the family: women with a stronger position at home, often those who run the household budget, control their accounts fully, while others leave control to their husbands even though the account is in their own name.

Big decisions are the last step. Even among women who control everyday spending, big withdrawals usually need permission. This is the weakest area of control, and it is limited in every group, including working women.

Fear, not lack of a phone, is the main problem. Very few women said they lack a smartphone. Fear of fraud and lack of confidence with phones and apps matter far more. Some women prefer cash, which may itself be a way of protecting the control they have. These findings match reports from Hyderabad that family objections and men's control of PINs keep women away from UPI (Deccan Chronicle, 2026).

How women see themselves can hide dependence. Women's own rating of their independence broadly matches their scores. But one homemaker whose husband manages her account rated her own independence as high. Social customs may lead women to describe shared or handed-over control as independence, which is one more reason to ask directly about control.

11. Major Findings

The study leads to the following findings:

a. 81% of the women surveyed have an account in their own name, but only 36% manage it themselves, have their own number linked and created their own PIN. Only 17% also take out large amounts without permission.

b. Half of the women do not have their own mobile number linked to their account, and almost a third do not know their PIN.

c. Whose number is linked is the strongest sign of control. Women with their own number linked scored about twice as much as women with a parent's or husband's number linked.

d. Women with their own number linked were far more likely to manage the account alone and to use UPI regularly.

e. Parents' control is more common than husbands' in this survey, especially for young women.

f. Students have the least control (score 34 out of 100). Very few have their own number linked, and many do not know their PIN.

g. Women in regular jobs have the most control (score 87), and all of them manage their own accounts.

h. Homemakers are divided between full control and husband control.

i. Big withdrawals are the weakest area of control: most women need permission at least sometimes, or leave such withdrawals to others.

j. Fear of fraud and not being confident with phones and apps are the main problems; lack of a smartphone is rarely mentioned.

k. Education does not clearly increase control, while occupation, age and number linkage do.

12. Suggestions

Based on the findings of the survey, the study makes the following suggestions:

a. Banks and bank agents in Hyderabad should encourage women to link their own mobile number when an account is opened or KYC is updated, and should prompt a change when an account holder turns 18.

b. Colleges in Hyderabad, whose students receive scholarships in bank accounts, should hold sessions where students link their own number, set their own PIN and make their first UPI payment.

c. Digital training through self-help groups, colleges and anganwadi centres in the city should focus on safe UPI use, keeping the PIN secret and where to complain, such as the 1930 cyber-crime helpline, since fear of fraud is the main problem.

d. Training for homemakers should teach both phone and app skills and basic money matters, the two problems they mention most.

e. Training should involve family members as well as women, since control by husbands and parents is a central part of the problem.

f. Schemes that send money to women, including scholarships and DBT, should check that the receiving account is linked to the woman's own number.

g. Measures of financial inclusion should go beyond counting accounts and also record whether the account holder has her own number linked, knows her PIN and makes payments herself.

13. Limitations and Scope for Further Research

a. The 42 women were reached through personal and college contacts, not chosen at random, so the results cannot be applied to all women in Hyderabad. The study should be treated as a first, small-scale survey.

b. Students make up 43% of the women surveyed, and age and occupation go closely together.

c. The answers are what women reported themselves, and a few forms may have been filled in on a woman's behalf.

d. The survey did not ask about marital status, so findings about husbands rely on answers that mention the husband.

e. Future research should survey a larger, randomly chosen group of at least 100 women across Hyderabad's wards, ask about marital status and household income, compare self-help group members with others, and follow students as they start working.

14. Conclusion

This study set out to ask whether women in Hyderabad who own bank accounts also control them. The survey's answer is: often not. Four in five women surveyed have an account, but only about a third control it fully, and fewer than one in five also decide big withdrawals on their own.

The clearest sign of control is the mobile number linked to the account. Women with their own number linked manage their accounts, know their PINs and use UPI; women whose accounts are linked to a parent's or husband's number mostly do not. The gap is widest for students, whose accounts remain tied to their parents' phones, and for homemakers whose husbands manage their accounts.

These findings suggest that in Hyderabad, the next stage of financial inclusion must move from giving women accounts to making sure that the number, the PIN and the decision are their own, so that her bank account is also her UPI.

15. References

1. Agarwal, B. (1997). "Bargaining" and gender relations: Within and beyond the household. *Feminist Economics*, 3(1), 1–51.
2. Chakraborty, I., & Meena, A. (2025). Closing India's gender gap in financial inclusion. *The India Forum*. https://www.theindiaforum.in/gender/closing-indias-gender-gap-financial-inclusion
3. Deccan Chronicle. (2026, August 18). Study finds barriers to women's UPI adoption. https://www.deccanchronicle.com/southern-states/telangana/study-finds-barriers-to-womens-upi-adoption-1980274
4. Field, E., Pande, R., Rigol, N., Schaner, S., & Troyer Moore, C. (2021). On her own account: How strengthening women's financial control impacts labor supply and gender norms. *American Economic Review*, 111(7), 2342–2375.
5. Ideas for India. (2026). India's digital financial inclusion story overlooks women's active participation. https://www.ideasforindia.in/topics/money-finance/indias-digital-financial-inclusion-story-overlooks-womens-active-participation
6. Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change*, 30(3), 435–464.
7. Kaur, S., Chavan, P., & Lakhiani, R. (2026). Financial inclusion of women in India: Beyond deposit access. *Economic and Political Weekly*, 61(25). https://www.epw.in/journal/special-articles/financial-inclusion-women-india.html
8. National Payments Corporation of India. (2025). *Introduction of additional authentication methods in UPI* (UPI OC No. 226, FY 2025–26). https://www.npci.org.in/uploads/UPI_OC_No_226_FY_2025_26_Introduction_of_Additional_Authentication_methods_in_UPI_42c3693399.pdf
9. Press Information Bureau. (2025, August 27). *11 years of PM Jan Dhan Yojana: Banking the unbanked*. Government of India.
10. Sen, A. (1990). Gender and cooperative conflicts. In I. Tinker (Ed.), *Persistent inequalities: Women and world development* (pp. 123–149). Oxford University Press.

Regulatory service delivery and institutional capacity: an evidence-based assessment of investor grievance redressal and enforcement by SEBI, 2013-14 to 2025-26

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Purpose: *A regulator is a service provider as well as a rule maker. This paper asks whether the administrative capacity of the Securities and Exchange Board of India has kept pace with the size of the market it regulates, measured on the two functions in which capacity is directly observable: the redressal of investor grievances and the conduct of investigations.*

Data and method: *An annual financial year panel for 2013-14 to 2025-26, thirteen observations, is built from the SEBI Handbook of Statistics on the Indian Securities Market 2025-26. The measures are the redressal rate, the stock of unredressed grievances in cases and in months of current receipts, the investigation completion ratio, the cumulative enforcement gap, the grievance load per rupee lakh crore of turnover and per registered intermediary and the nature wise composition of cases. Growth is summarised by compound annual rates and three phase means, elasticities by log regression with Newey and West standard errors and level shifts around the reforms of 2023 and 2024 by a trend plus step regression searched over eight candidate years with a wild bootstrap p value.*

Findings: *Demand for redressal grew 1.84 times while cash market turnover grew 9.28 times, so the grievance load per rupee lakh crore of turnover fell by about eighty per cent, from 1,195 to 237. Redressal kept pace in flow terms, 5,86,088 grievances redressed against 6,02,627 received over thirteen years and the stock of unredressed cases fell from 46.2 to 28.6 months of current receipts even though its level rose by 18,288 cases. The elasticity of redressal to receipts is 0.683, significantly below one, which is why a stock of about 1.48 lakh cases persists. Investigations taken up tripled after 2022-23 and their composition shifted from market manipulation to insider trading, from 12.0 per cent of cases taken up in 2013-14 to 71.8 per cent in 2024-25, while completions lagged intake by 145 cases in 2023-24. With thirteen annual*

observations no level shift is statistically significant, which is reported as inconclusive rather than as evidence of no effect.

Policy implications: *The binding constraint is not the inflow of complaints, which is small relative to the market, but the conversion of receipts into closures and of investigations taken up into investigations completed. Capacity should be reported and budgeted against market activity, disposal should be published with ageing and the enforcement pipeline should be resourced for the case mix it has actually acquired.*

Keywords: investor grievance redressal; regulatory capacity; SCORES; securities market enforcement; public service delivery; SEBI

1. Introduction

Discussions of economic reform in India usually treat a regulator as a maker of rules. The regulator is also and at the same time, a provider of services. When an investor cannot get a company to transfer shares, or finds that a broker has not credited a payout, the regulator is the office that is expected to act and the quality of that action is a matter of administrative capacity in exactly the sense that public administration understands the term. This paper takes that view of the Securities and Exchange Board of India and asks a single question: over the thirteen years from 2013-14 to 2025-26, has the capacity of SEBI to deliver its investor facing services kept pace with the growth of the market it regulates?

The question is worth asking because the two sides of it have grown at very different rates. Turnover in the cash segment of the National Stock Exchange rose from ₹28.08 lakh crore in 2013-14 to ₹260.63 lakh crore in 2025-26andmarket capitalisation from ₹72.78 lakh crore to ₹411.25 lakh crore, while investor grievances received by SEBI rose from 33,550 to 61,788. A market nine times larger generates less than twice as many complaints and that comparison can be read in two opposite ways. It may mean that the market has become cleaner and its intermediation more reliable, so that less goes wrong for each rupee transacted; it may equally mean that the complaint channel has not kept up with the entry of new investors, so that a falling share of the grievances that exist ever reaches the regulator. The published statistics cannot settle which reading is correct and the paper says so plainly; what they can do is establish the magnitudes that any answer must respect.

Three findings emerge. First, on every denominator that reflects market activity the redressal load has fallen sharply: grievances per ₹ lakh crore of cash turnover fell by about

eighty per cent. Second, redressal has kept pace in the flow but not in the stock. SEBI redressed 5,86,088 grievances against 6,02,627 received over thirteen years, which is 97.3 per cent, yet the stock of unredressed cases rose by 18,288 to about 1.48 lakh, because closures respond to receipts with an elasticity of 0.683, significantly below one, so each surge leaves a residue. Third, investigations taken up tripled from an average of 145 a year in the first six years to 362 a year in the last three, their composition moved from market manipulation to insider trading, which now accounts for roughly two thirds of cases taken up and a positive cumulative gap of 210 cases has opened since 2013-14. A fourth result is one of measurement: the count of registered intermediaries rises from 16,152 to 27,722 in the published data only because four categories enter it partway through the period, so that denominator is not interpretable and market activity is used instead.

2. The architecture of redressal and enforcement

SEBI's mandate to protect the interests of investors in securities is stated in the preamble to the Securities and Exchange Board of India Act, 1992andthe grievance function is its most visible expression. Since 2011 complaints have been handled through the SEBI Complaints Redress System, known as SCORES, which receives a complaint, routes it to the entity complained against, records that entity's action taken report and allows the complainant to pursue the matter further. Two features matter here. SEBI is not the direct redresser in most cases; the listed company, the intermediary or the mutual fund is and SEBI routes, monitors, escalates and, where redressal fails, acts against the entity. And SEBI data records receipts and redressals as flows during the year together with cumulative figures since inception, which makes it possible to compute the stock of cases received but not yet reported as redressed.

The framework was substantially rebuilt between 2022 and 2024andTable 1 sets out the sequence with the circular numbers. The Master Circular of 7 November 2022 consolidated the SCORES framework; on 31 July 2023 SEBI introduced a common online dispute resolution portal, so that a complaint not resolved through SCORES could go to conciliation and then arbitration (Securities and Exchange Board of India, 2023a); and on 20 September 2023 it linked SCORES to that portal and prescribed timelines, namely twenty one calendar days for the entity to resolve a complaint, ten calendar days for a designated body to submit its revised response and fifteen calendar days for the complainant to seek a review at each stage, with automatic escalation if a timeline is not met, effective 4 December 2023 (Securities and

Exchange Board of India, 2023b, 2023c). On 1 April 2024 SEBI launched SCORES 2.0, whose stated features are automatic routing of a complaint to the entity concerned, monitoring of timely redressal by designated bodies, automatic escalation, a two-tier review of designated body followed by SEBI and integration with the KYC Registration Agency database (Securities and Exchange Board of India, 2024).

Table 1. The redressal architecture and the reforms of 2022 to 2024

Date	Instrument	Provision
7 November 2022	SEBI Master Circular SEBI/HO/OIAE/IGRD/P/CIR/2022/0150	Consolidated the framework for the redressal of investor grievances through the SCORES platform. Rescinded with effect from 4 December 2023
31 July 2023	SEBI circular SEBI/HO/OIAE/OIAE_IAD-1/P/CIR/2023/131	Introduced online resolution of disputes in the Indian securities market, so that a dispute not resolved through SCORES proceeds to online conciliation and then to online arbitration
20 September 2023	SEBI circular SEBI/HO/OIAE/IGRD/CIR/P/2023/156	Redressal of grievances through SCORES linked to the online dispute resolution platform. Entities "shall resolve the complaint within 21 calendar days of receipt of such Complaint"; a designated body must submit its revised response within 10 calendar days of a review being sought; the complainant has 15 calendar days to seek review at each stage; a complaint auto escalates to the next level if a timeline is not met. Effective 4 December 2023
28 December 2023	SEBI master circular SEBI/HO/OIAE/OIAE_IAD-3/P/CIR/2023/195	Master circular for online resolution of disputes, consolidating the framework of July 2023 and its amendments
1 April 2024	SEBI Press Release No. 06/2024	SCORES 2.0 launched. Stated features: auto routing of a complaint to the regulated entity concerned; monitoring of timely redressal by the designated bodies; auto escalation to the next level where a prescribed timeline is not met; a two level review, first by the designated body and then by SEBI; integration with the KYC Registration Agency database; retention of the 21 calendar day timeline

Note: Quotations are from the circulars named, read on sebi.gov.in. The designated bodies are the stock exchanges, depositories and industry bodies to which the first level review of a complaint is assigned.

Three points bear on how the statistics should be read. The reforms of 2023 and 2024 are administrative reforms of a service process rather than changes in the substantive law, so their intended effect appears in disposal and timeliness rather than in the volume of complaints. The designated body mechanism moves part of the first review out of SEBI and into the stock exchanges and depositories, so the capacity measured after December 2023 is that of a system rather than of an office. And the last measure took effect on 1 April 2024, so the panel contains two complete financial years under SCORES 2.0, which is enough to describe and far too little to identify an effect.

The enforcement function is reported separately and with a different logic. SEBI data gives the number of investigations taken up and completed in each year and composition under five heads: market manipulation and price rigging, issue related manipulation, insider trading, takeovers and miscellaneous. The SEBI data reconcile internally, Investigations differ from grievances in that they are opened by the regulator rather than presented to it, so their number measures enforcement effort as much as misconduct and the ratio of completions to intake is a direct measure of throughput.

3. Literature and the research gap

Three strands of research bear on the question. The first is the law and finance literature on enforcement. La Porta, Lopez-de-Silanes and Shleifer (2006) find that what supports stock market development is not securities laws as such but the parts of them that ease private enforcement. Jackson and Roe (2009) measured public enforcement by resources, using regulators' budgets and staff relative to market size and found resource-based measures associated with market outcomes as strongly as formal indices; Holthausen (2009) makes the same point in the accounting context, distinguishing enforcement inputs from outputs and noting how rarely either is observed. Bhattacharya and Daouk (2002) show that what changes the cost of equity is not the existence of an insider trading law but its first enforcement, which is a statement about capacity rather than statute. Bischof, Daske, Elfers and Hail (2021) find that compliance with disclosure rules depends on the supervisory agency's resources and Eisenbach, Lucca and Townsend (2022) recover a shadow cost of scarce supervisory hours that rose by more than fifty per cent around the financial crisis. The common lesson is that regulatory outcomes are produced by an organisation with finite resources, whose throughput is a legitimate object of study.

The second strand is the public administration literature on state capacity and complaint handling. Rasul and Rogger (2018), studying the Nigerian civil service, show that the management practices of bureaucratic organisations have large effects on project completion, so throughput is not merely a function of budget. Zink, Knill and Steinebach (2024) describe organisational policy triage, in which an agency facing an overloaded portfolio must choose which mandates to service. For India, Kumar (2024) finds that officials in Mumbai's water sector addressed forty-four per cent of about twenty thousand complaints lodged between 2016 and 2018, with prioritisation driven by the content of the complaint rather than by who made

it, precisely because of capacity constraints and O'Brochta (2022) reports that in state level data for 2016 to 2019 half of India's thirty-six states and union territories addressed fewer than half the complaints received. Kumar, Tiwari, Singh and Nag (2022) find that security, reliability and information quality drive satisfaction with an Indian online grievance portal and Singh, Kumar and Arrawatia (2019) show that time bound delivery backed by penalties raises the recorded success rate while leaving deeper accountability structures untouched.

The third strand is the Indian work on these statistics themselves. Kaur and Kaur (2016) study receipts and redressals from 2004-05 to 2013-14 and report that most investigations in that period related to market manipulation and price rigging, with the completion rate varying between 25.47 and 60.36 per cent. Theirs is the closest antecedent of the present study and it also shows the limits of the descriptive tradition: it ends in the year this paper begins, it reads the counts without a denominator and it does not treat the series as measures of administrative capacity. This paper uses the same source and extends it by twelve years, by scaling and by estimation.

The gap is therefore specific and is claimed only at that level. The enforcement literature measures capacity by inputs, budgets and staff, which the Handbook does not publish for SEBI; the public administration literature measures complaint handling in sectors other than finance; the Indian literature describes the counts for earlier periods. What has not been done, so far as the literature reviewed here shows, is to treat the published grievance and investigation series as administrative performance data for the period of the market's expansion, to scale them by market size, to estimate the elasticity of disposal with respect to demand and to test whether the reforms of 2023 and 2024 are visible in the series at all.

4. Data and method

The data are annual and public. The SEBI Handbook of Statistics on the Indian Securities Market 2025-26 gives grievances received and redressed in each financial year with cumulative figures since inception. Cash market turnover is aggregated to the financial year and market capitalisation taken at the year end from SEBI data. The panel runs from 2013-14 to 2025-26 and has thirteen annual observations, which is the binding constraint on everything that follows. Table 2 defines every variable and names its source.

Table 2. Variable definitions and sources

Variable	Definition	Unit
Grievances received	Investor grievances received by SEBI during the financial year	Number
Grievances redressed	Investor grievances redressed during the financial year	Number
Redressal rate	Grievances redressed divided by grievances received in the same year	Per cent
Unredressed stock	Cumulative grievances received since inception less cumulative grievances redressed since inception, at the year end. A net measure, not a case level pendency register	Number
Stock in months	Unredressed stock divided by grievances received in the year, multiplied by twelve	Months of current receipts
Investigations taken up	Investigations taken up by SEBI during the year	Number
Investigations completed	Investigations completed during the year	Number
Completion ratio	Investigations completed divided by investigations taken up in the same year	Per cent
Cumulative enforcement gap	Running sum from 2013-14 of investigations taken up less investigations completed	Number
Nature wise shares	Share of each of the five heads, namely market manipulation and price rigging, issue related manipulation, insider trading, takeovers and miscellaneous, in the year's cases taken up and completed	Per cent
Registered intermediaries, as reported	Sum of the seventeen categories of registered intermediaries and market infrastructure institutions reported in the source	Number
Registered intermediaries, constant coverage	Sum of the thirteen categories reported in every year of the panel: brokers in the cash, equity derivatives and currency derivatives segments, depository participants of NSDL and CDSL, merchant bankers, alternative investment funds, portfolio managers, mutual funds, investment advisers, registrars and share transfer agents, credit rating agencies and debenture trustees	Number
Cash market turnover	Turnover in the cash segment of the National Stock Exchange, aggregated from monthly data to the financial year	₹ lakh crore
Market capitalisation	Market capitalisation of the National Stock Exchange at the year end	₹ lakh crore
Grievance load ratios	Grievances received per ₹ lakh crore of cash market turnover and per registered intermediary on each of the two coverage bases	Ratio

Note: All financial years run from April to March. Source: Securities and Exchange Board of India (2026), Handbook of Statistics on the Indian Securities Market 2025-26. Author's calculations.

Six measures carry the argument. The redressal rate is grievances redressed in a year as a percentage of those received in the same year and a value above one hundred means the pending stock was drawn down. The stock is the difference between cumulative receipts and cumulative redressals and is also expressed in months of current receipts, the natural unit for a service backlog because it states how long the stock would take to clear at the current rate of arrival.

The investigation completion ratio is completions as a percentage of intake in the same year and the cumulative enforcement gap is the running sum of intake less completions from 2013-14. The load ratios are grievances received per ₹ lakh crore of cash turnover and per registered intermediary and the composition measures are the shares of the five heads.

Three methods are used, each chosen for what thirteen observations will support. Growth is summarised by the compound annual rate, the ratio of the last year to the first and the mean of each measure over three phases: 2013-14 to 2018-19, before the entry of large numbers of new investors; 2019-20 to 2022-23, spanning the pandemic and the retail expansion; and 2023-24 to 2025-26, the years of the reformed framework. Elasticities are estimated by regressing the logarithm of a measure on the logarithm of a driver, with standard errors computed by the method of Newey and West (1987) allowing one lag of autocorrelation, so the coefficient reads as the percentage response to a one per cent change in the driver. A level shift is tested by regressing each series on a linear trend and a step dummy, estimated for every candidate break year from 2017-18 to 2024-25, taking the largest Wald statistic and computing its p value by a wild bootstrap with Rademacher weights and 999 replications under the null of no step, because the conventional p value of a best fitting break is biased towards significance.

Two limitations of the data should be stated before the results. There is no verifiable published series of investor accounts in the SEBI data used here, so no per investor denominator is reported and the denominators are market activity and the registered population. And the stock of unredressed grievances computed from cumulative receipts and redressals is a net measure rather than a case level count of open files, so it indicates accumulated shortfall rather than a pendency register.

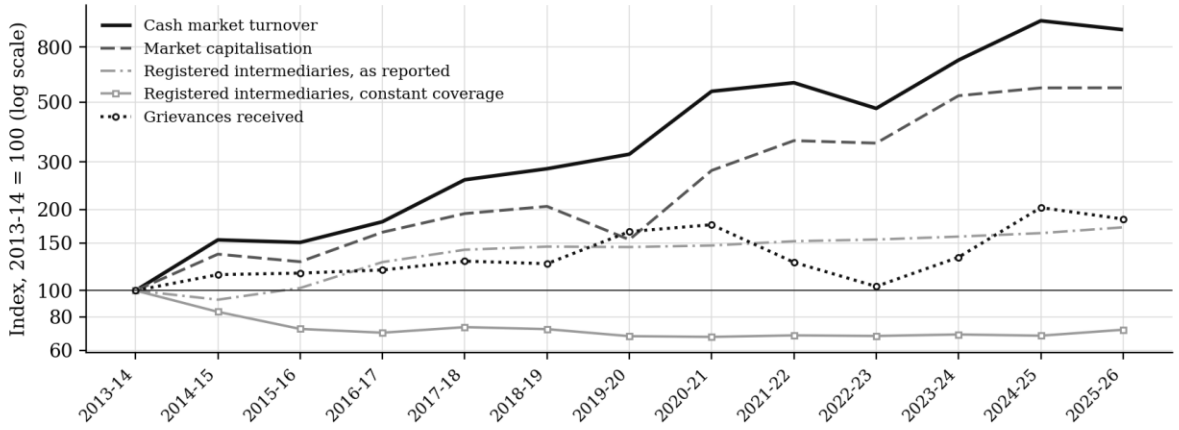
5. Results

5.1 The scale gap

Table 3 and Figure 2 set the demand for redressal against the size of the market. Cash market turnover grew at a compound annual rate of 20.40 per cent over the twelve growth years of the panel, market capitalisation at 15.53 per cent and grievances received at 5.22 per cent; in ratio terms turnover multiplied 9.28 times, market capitalisation 5.65 times and grievances 1.84 times. The consequence is arithmetic and large: grievances received per ₹ lakh crore of cash turnover fell from 1,195 in 2013-14 to 237 in 2025-26, a decline of about eighty per cent, with

the lowest value of 222 in 2023-24. The elasticity of grievances with respect to turnover is 0.219 with a standard error of 0.051andwith respect to market capitalisation 0.220 with a standard error of 0.091; both are significantly positive and far below one. Complaints do rise with the market, but at roughly a fifth of its rate.

Figure 2. The scale gap: market activity against the redressal and supervision load



Source: SEBI, Handbook of Statistics on the Indian Securities Market 2025–26

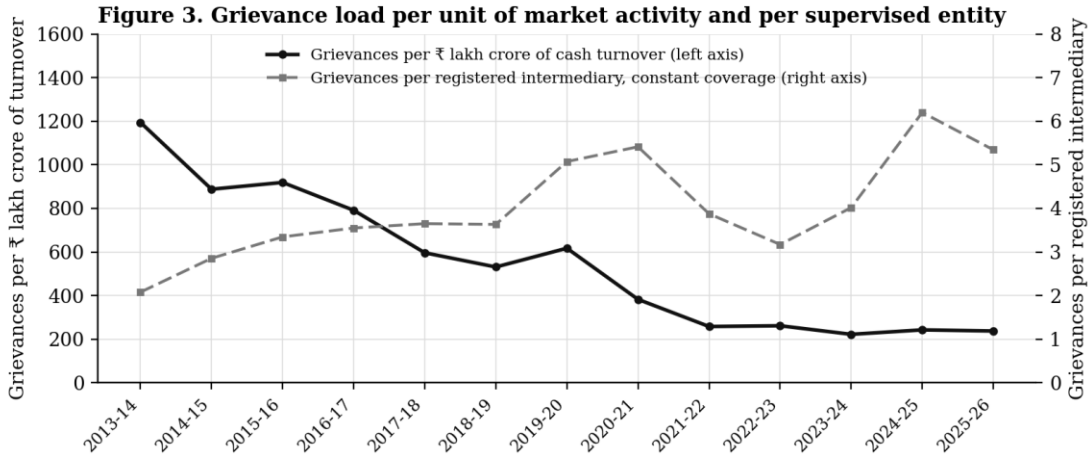
Figure 2. The scale gap between market activity and the redressal and supervision load. A logarithmic scale is used because turnover grew about nine times while grievances grew about twice. The as reported count of registered intermediaries rises partly because categories of the source later: research analysts and foreign portfolio investors from 2014-15, commodity derivatives brokers from 2015-16 and debt segment brokers from 2016-17. The constant coverage series holds the thirteen categories reported in every year and it falls because the number of registered brokers more than halved. Source: as for Table 3.

Two readings of that gap are consistent with the evidence and these SEBI data cannot choose between them. On the favourable reading, dematerialisation, shorter settlement cycles, the automation of corporate actions and tighter intermediary regulation have reduced the rate at which things go wrong for each rupee transacted, so a falling load ratio measures success. On the unfavourable reading, the investor base widened faster than awareness of the complaint channel, so the falling ratio reflects unreported grievances rather than absent ones. The jumps in receipts to 55,526 and 58,873 in 2019-20 and 2020-21andto a peak of 68,132 in 2024-25, are more consistent with a channel that responds to market stress and new entry than with one that has fallen out of use. The load ratio therefore sets an upper bound on the burden that complaint handling places on the regulator and the level of unreported grievance is not observable here.

5.2 Why the registered population cannot serve as a denominator

The count of registered intermediaries is the denominator a reader would reach for first and it does not work. As reported in SEBI data, the total of the seventeen categories used here rises from 16,152 in 2013-14 to 27,722 in 2025-26, an increase of seventy-two per cent. But research analysts and foreign portfolio investors appear only from 2014-15, commodity derivatives brokers from 2015-16 and debt segment brokers from 2016-17andin 2025-26 those four categories account for 16,160 registrants, more than half the total. On the thirteen categories reported in every year the registered population falls from 16,152 to 11,562, a decline of twenty-eight per cent, because brokers in the cash, equity derivatives and currency derivatives segments together fell from 14,496 to 6,943 as the industry consolidated, while registrants other than brokers rose from 1,656 to 4,619.

The measurement consequence is sharp. The elasticity of grievances with respect to the registered population is +0.694, with a standard error of 0.235, on the published totaland−1.034, with a standard error of 0.307, on the consistent coverage series: the sign of a central relationship reverses with a definitional choice about coverage. A grievance per intermediary ratio built on the published total therefore measures a change in what the table covers as much as a change in supervisory load. This paper reports the consistent basis ratio, which rises from 2.08 to 5.34 grievances per registrant, alongside the activity-based ratio that falls and Figure 3 shows the two moving in opposite directions. That is not a contradiction but the difference between an intermediation industry that has consolidated into fewer and larger firms and a market that has grown and it is why the capacity conclusions here rest on activity-based denominators.

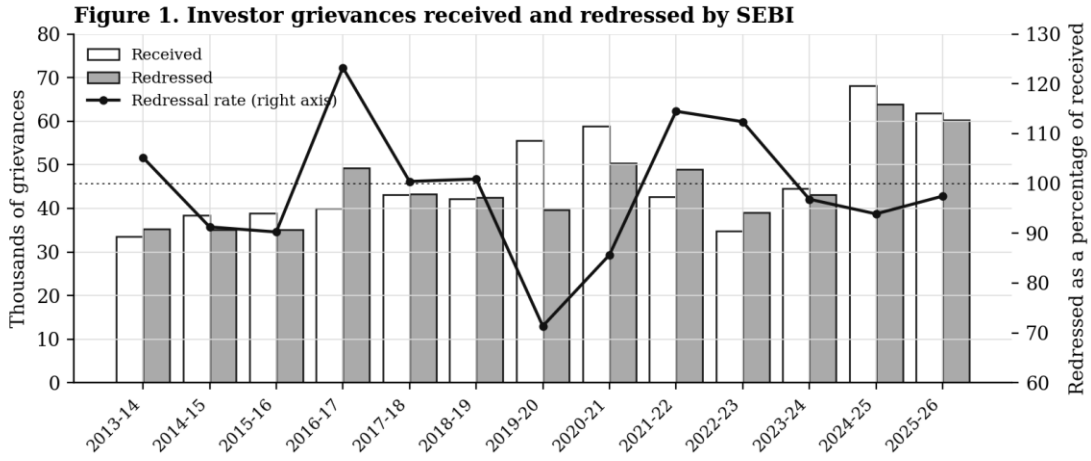


Source: SEBI, Handbook of Statistics on the Indian Securities Market 2025–26,

Figure 3. The grievance load per unit of market activity and per supervised entity, with the registered population held to constant coverage. The constant coverage population is the sum of the thirteen categories are reported in every year of the period, as listed in Table 2. The two ratios move in opposite directions, which is the measurement point of Section 5.2. Source: as for Table 3.

5.3 Redressal in the flow and in the stock

Table 4 and Figures 1 and 6 describe the redressal function itself. Over the thirteen years SEBI received 6,02,627 grievances and redressed 5,86,088, which is 97.3 per cent of receipts and the cumulative figures since inception rose from 28,86,074 received and 27,56,846 redressed at the end of 2013-14 to 34,55,151 and 33,07,635 at the end of 2025-26. In flow terms, then, the system very nearly keeps up. The annual redressal rate averaged 101.9 per cent in the first phase, 96.0 per cent in the second and 96.1 per cent in the third and it ranged from 71.4 per cent in 2019-20, the worst year, to 123.3 per cent in 2016-17, the best.



Source: SEBI, Handbook of Statistics on the Indian Securities Market 2025–26,

Figure 1. Investor grievances received and redressed, with the redressal rate on the right axis. A rate above one hundred per cent means that more grievances were redressed during the year than were received, which draws down the stock of pending cases. Source: as for Table 4.

Table 4. Investor grievances received, redressed and outstanding

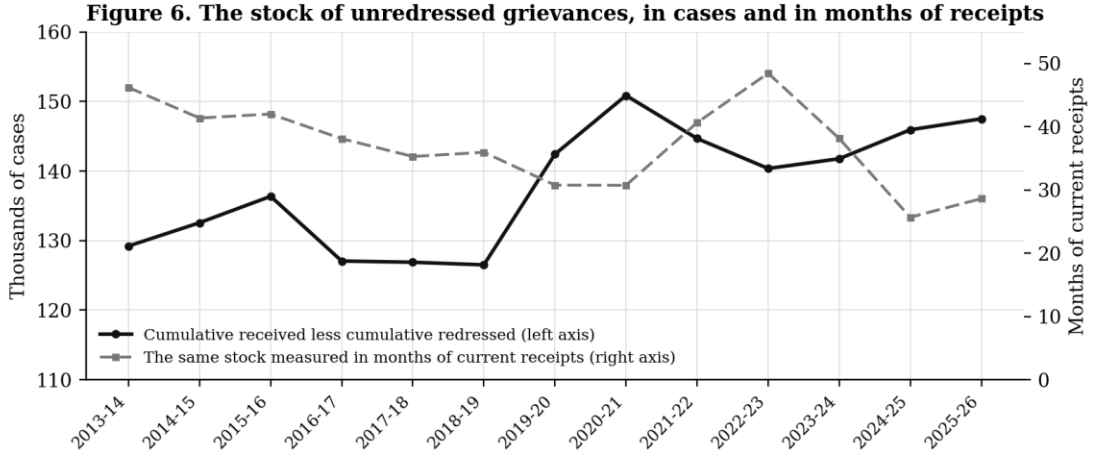
Financial year	Grievances received	Grievances redressed	Redressal rate (per cent)	Unredressed stock at the year end	Change in the stock during the year	Stock in months of current receipts
2013-14	33,550	35,299	105.2	1,29,228	n.a.	46.2
2014-15	38,442	35,090	91.3	1,32,580	3,352	41.4
2015-16	38,938	35,145	90.3	1,36,373	3,793	42.0
2016-17	40,000	49,301	123.3	1,27,072	−9,301	38.1
2017-18	43,131	43,308	100.4	1,26,895	−177	35.3
2018-19	42,202	42,576	100.9	1,26,521	−374	36.0
2019-20	55,526	39,624	71.4	1,42,423	15,902	30.8
2020-21	58,873	50,425	85.7	1,50,871	8,448	30.8
2021-22	42,694	48,883	114.5	1,44,682	−6,189	40.7
2022-23	34,752	39,062	112.4	1,40,372	−4,310	48.5
2023-24	44,599	43,191	96.8	1,41,780	1,408	38.1
2024-25	68,132	63,971	93.9	1,45,941	4,161	25.7
2025-26	61,788	60,213	97.5	1,47,516	1,575	28.6
Mean, 2013-14 to 2018-19	**39,377**	**40,120**	**101.9**	**1,29,778**	**n.a.**	**39.8**
Mean, 2019-20 to 2022-23	**47,961**	**44,499**	**96.0**	**1,44,587**	**n.a.**	**37.7**
Mean, 2023-24 to 2025-26	**58,173**	**55,792**	**96.1**	**1,45,079**	**n.a.**	**30.8**
Total, 2013-14 to 2025-26	**6,02,627**	**5,86,088**	**97.3**	**n.a.**	**18,288**	**n.a.**

Note: The redressal rate exceeds one hundred per cent when more grievances are redressed during the year than are received, which draws down the stock. The unredressed stock is cumulative receipts less cumulative redressals

since inception, as reported in of the source and is a net measure rather than a case level pendency register. Source: Securities and Exchange Board of India (2026), Handbook of Statistics on the Indian Securities Market 2025-26. Author's calculations.

The stock tells a different story from the flow and the difference is the analytical centre of this paper. Because redressal falls short of receipts in more years than it exceeds them, seven against five in this panel, the stock of unredressed cases rose from 1,29,228 at the end of 2013-14 to 1,47,516 at the end of 2025-26, an increase of 18,288 cases, with a maximum of 1,50,871 in 2020-21 and a minimum of 1,26,521 in 2018-19. Measured in months of current receipts, the same stock fell from 46.2 to 28.6 months, with a minimum of 25.7 months in 2024-25 and a maximum of 48.5 in 2022-23. Both statements are true and reporting only one would mislead: the absolute backlog has grown, while relative to the rate at which complaints now arrive it has shrunk by about two fifths. For a service manager the second measure is the operative one, because it says the accumulated shortfall is equivalent to rather more than two years of current arrivals, a long queue by any standard of public service delivery but a shorter one than it was.

Figure 6. The stock of unredressed grievances, in cases and in months of receipts



Source: SEBI, Handbook of Statistics on the Indian Securities Market 2025–26,

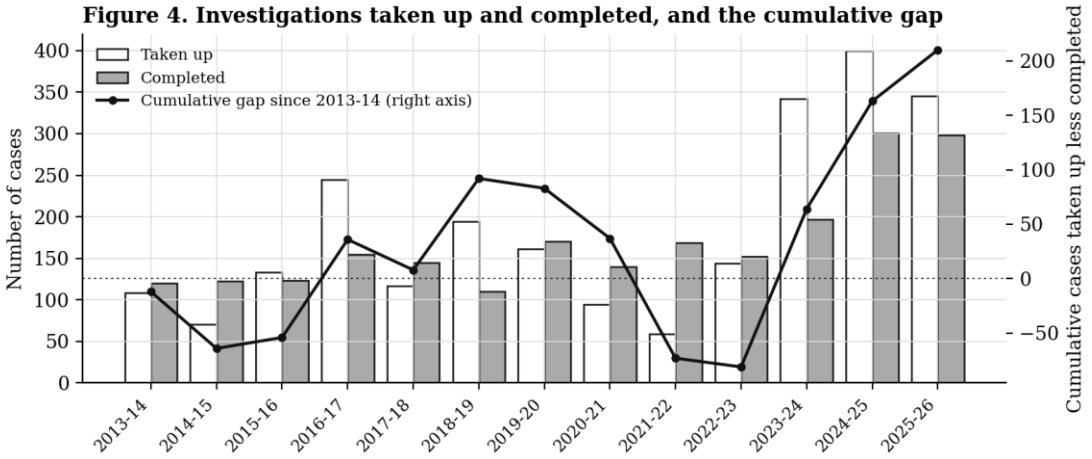
Figure 6. The stock of unredressed grievances, in cases and in months of current receipts. The stock is a net measure computed from cumulative receipts and redressals, not a case level pendency register. Source: as for Table 4.

The mechanism is identified by the elasticity of redressal with respect to receipts, which is 0.683 with a standard error of 0.166, a confidence interval from 0.357 to 1.009 and an R squared of 0.62. A ten per cent increase in complaints received is associated with a 6.8 per cent increase in complaints redressed. The estimate is significantly below one, although the interval touches it and the implication is what service operations would predict: disposal capacity

adjusts partially and with a lag, so every surge leaves a residue. The years 2019-20 and 2020-21 illustrate it. Receipts rose by 31.6 per cent in 2019-20, redressal fell, the rate dropped to 71.4 per cent and the stock rose by 15,902 cases in one year, the largest annual increase in the panel. Recovery took two years, the rate reaching 114.5 per cent in 2021-22 and 112.4 per cent in 2022-23 and drawing the stock down by 6,189 and 4,310 cases. The pattern recurs in 2024-25, when the stock rose by 4,161 cases despite 63,971 redressals, the highest number in the panel.

5.4 Enforcement volume, throughput and composition

Table 5 and Figure 4 report the investigation function. Investigations taken up rose from 108 in 2013-14 to 345 in 2025-26, with a peak of 400 in 2024-25 and a trough of 59 in 2021-22, a compound annual rate of 10.16 per cent, while completions rose from 120 to 298, with a peak of 301 in 2024-25, at 7.87 per cent a year. The phase means show where the change occurred: intake averaged 144.5 cases a year in 2013-14 to 2018-19, fell to 114.5 in 2019-20 to 2022-23andthen rose to 362.3 in 2023-24 to 2025-26, while completions averaged 129.2, 157.8 and 265.3. Enforcement volume roughly tripled in the last three years of the panel relative to the years immediately before.



Source: SEBI, Handbook of Statistics on the Indian Securities Market 2025–26,

Figure 4. Investigations taken up and completed and the cumulative gap since 2013-14. A negative cumulative gap means that more cases were completed than were taken up over the period to date. Source: as for Table 5.

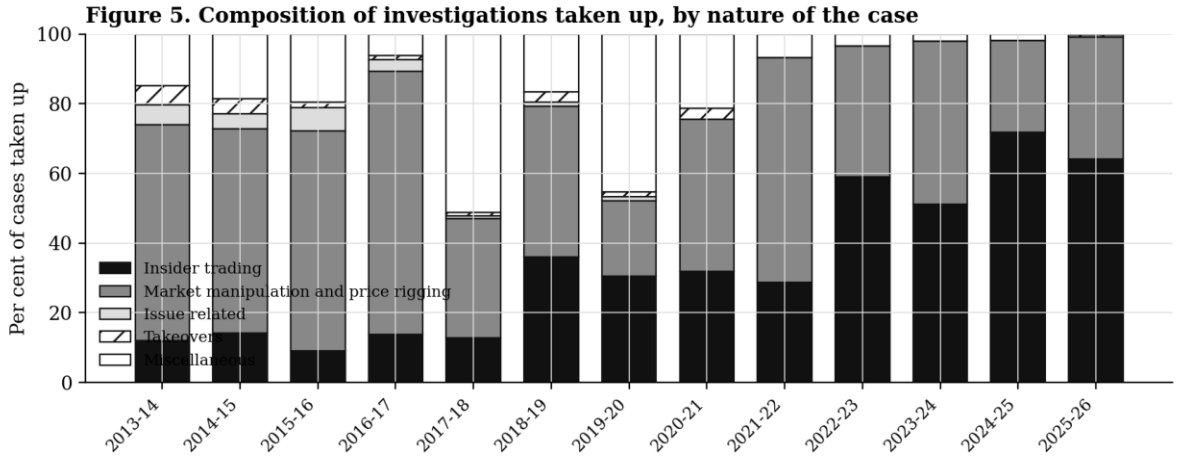
Table 5. Investigations taken up, completed and the cumulative enforcement gap

Financial year	Investigations taken up	Investigations completed	Completion ratio (per cent)	Gap in the year (taken up less completed)	Cumulative gap since 2013-14
2013-14	108	120	111.1	−12	−12
2014-15	70	122	174.3	−52	−64
2015-16	133	123	92.5	10	−54
2016-17	245	155	63.3	90	36
2017-18	117	145	123.9	−28	8
2018-19	194	110	56.7	84	92
2019-20	161	170	105.6	−9	83
2020-21	94	140	148.9	−46	37
2021-22	59	169	286.4	−110	−73
2022-23	144	152	105.6	−8	−81
2023-24	342	197	57.6	145	64
2024-25	400	301	75.3	99	163
2025-26	345	298	86.4	47	210
Mean, 2013-14 to 2018-19	**144.5**	**129.2**	**103.6**	**15.3**	**n.a.**
Mean, 2019-20 to 2022-23	**114.5**	**157.8**	**161.6**	**−43.3**	**n.a.**
Mean, 2023-24 to 2025-26	**362.3**	**265.3**	**73.1**	**97.0**	**n.a.**
Total, 2013-14 to 2025-26	**2,412**	**2,202**	**91.3**	**210**	**210**

Note: A completion ratio above one hundred per cent means that more investigations were completed during the year than were taken up, which draws down the pipeline. A negative cumulative gap means that completions since 2013-14 exceed intake over the same period. Source: Securities and Exchange Board of India (2026), Handbook of Statistics on the Indian Securities Market 2025-26. Author's calculations.

Throughput moved in the opposite direction to volume. The completion ratio averaged 103.6 per cent in the first phase and 161.6 per cent in the second, when intake was low and the pipeline was being cleared and then fell to 73.1 per cent in the third. In 2023-24 SEBI took up 342 investigations and completed 197, a gap of 145 cases, the largest in the panel; the gap was 99 in 2024-25 and 47 in 2025-26, so it is narrowing but has not closed. The cumulative gap since 2013-14, which was still −81 cases in 2022-23, meaning that completions to that point had exceeded intake, stood at +210 cases at the end of 2025-26, on totals of 2,412 taken up and 2,202 completed over thirteen years. The elasticity of investigations taken up with respect to turnover is 0.383 with a standard error of 0.237 and a p value of 0.105, so enforcement intake cannot be said to track market activity reliably; it looks more like a policy choice than a mechanical response to market size.

The composition of that effort has changed more than its volume and this is the most striking single result in the paper. Insider trading accounted for 12.0 per cent of investigations taken up in 2013-14 and 71.8 per cent in 2024-25, settling at 64.1 per cent in 2025-26, while market manipulation and price rigging fell from 62.0 to 35.1 per cent. On the phase aggregates, insider trading rose from 17.8 per cent of all cases taken up to 39.5 and then 62.8 per cent and market manipulation fell from 57.8 to 36.7 and then 35.6 per cent. Issue related and takeover cases have all but disappeared, from 5.7 per cent of intake in the first phase to 0.2 per cent in the third and miscellaneous cases from 18.7 to 1.4 per cent.



Source: SEBI, Handbook of Statistics on the Indian Securities Market 2025–26

Figure 5. The composition of investigations taken up, by nature of the case. Shares are computed on the number of cases taken up in each year and the five heads are exhaustive. Source: Securities and Exchange Board of India (2026).

Table 6. Composition of investigations taken up, by nature of the case

Financial year	Insider trading	Market manipulation and price rigging	Issue related	Take-overs	Miscel-laneous	Total cases taken up	Insider trading share (per cent)	Market manipulation share (per cent)
2013-14	13	67	6	6	16	108	12.0	62.0
2014-15	10	41	3	3	13	70	14.3	58.6
2015-16	12	84	9	2	26	133	9.0	63.2
2016-17	34	185	8	3	15	245	13.9	75.5
2017-18	15	40	1	1	60	117	12.8	34.2
2018-19	70	84	2	6	32	194	36.1	43.3
2019-20	49	35	2	2	73	161	30.4	21.7
2020-21	30	41	0	3	20	94	31.9	43.6
2021-22	17	38	0	0	4	59	28.8	64.4
2022-23	85	54	0	0	5	144	59.0	37.5

Financial year	Insider trading	Market manipulation and price rigging	Issue related	Take-overs	Miscel-laneous	Total cases taken up	Insider trading share (per cent)	Market manipulation share (per cent)
2023-24	175	160	0	0	7	342	51.2	46.8
2024-25	287	106	0	0	7	400	71.8	26.5
2025-26	221	121	0	2	1	345	64.1	35.1
Phase total, 2013-14 to 2018-19	**154**	**501**	**29**	**21**	**162**	**867**	**17.8**	**57.8**
Phase total, 2019-20 to 2022-23	**181**	**168**	**2**	**5**	**102**	**458**	**39.5**	**36.7**
Phase total, 2023-24 to 2025-26	**683**	**387**	**0**	**2**	**15**	**1,087**	**62.8**	**35.6**

Note: The five heads are those reported in the source and are exhaustive, so the counts sum to the total. The row totals of equal the investigations taken up reported in every year of the panel. Source: Securities and Exchange Board of India (2026), Handbook of Statistics on the Indian Securities Market 2025-26. Author's calculations.

This shift has a capacity implication that is easy to miss. An insider trading investigation is not the same unit of work as an issue related one: it requires the reconstruction of trading patterns around price sensitive events, the establishment of connection between persons and the handling of electronic evidence and it is ordinarily slower and more skill intensive. A pipeline in which two thirds of cases are of the slower type and whose intake has tripled, will show falling throughput even if nothing about the organisation has deteriorated. The coincidence of tripled intake, a case mix shifted towards the slower category and a completion ratio of 73.1 per cent is internally consistent and it points to a specific rather than a general capacity constraint.

5.5 Are the reforms of 2023 and 2024 visible in the series?

The reforms of Section 2 were intended to compress redressal timelines and the natural question is whether they show up as a level shift. Table 7 reports the searched step tests, giving for each series the break year that fits best, the estimated step, its conventional p value, the sup Wald statistic and the wild bootstrap p value. The conventional p values are small and every one of them is misleading. The bootstrap p values are 0.355 for the logarithm of grievances received, 0.204 for the logarithm of investigations taken up, 0.137 for the insider trading share, 0.471 for the redressal rate and 0.233 for the backlog in months: not one is significant at any conventional level. The best fitting break year is also 2021-22 for three of the five series, which is before the reforms rather than after them.

Table 7. Searched tests for a level shift in the redressal and enforcement series

Series	Best fitting break year	Estimated step	Conventional p value	Trend coefficient	sup Wald statistic	Wild bootstrap p value
Grievances received (logarithm)	2021-22	−0.432*** (0.118)	0.0002	0.086	13.45	0.355
Investigations taken up (logarithm)	2023-24	1.129*** (0.361)	0.0018	−0.006	9.79	0.204
Insider trading share of cases taken up (percentage points)	2022-23	20.183*** (5.227)	0.0001	3.121	14.91	0.137
Redressal rate (percentage points)	2021-22	27.771*** (9.510)	0.0035	−3.199	8.53	0.471
Unredressed stock in months of receipts (months)	2021-22	16.000*** (4.104)	0.0001	−2.653	15.20	0.233

Note: Each series is regressed on a linear trend and a step dummy, estimated separately for every candidate break year from 2017-18 to 2024-25 with Newey and West (1987) standard errors allowing one lag. The SEBI data reports the candidate with the largest Wald statistic. Standard errors are in parentheses and asterisks denote the conventional significance of the step at the ten, five and one per cent levels. The wild bootstrap p value uses Rademacher weights and 999 replications under the null of no step and is the correct statistic, because searching over candidate dates biases the conventional p value towards significance. No step is significant on that basis. Source: Securities and Exchange Board of India (2026), Handbook of Statistics on the Indian Securities Market 2025-26. Author's calculations.

The correct conclusion is that with thirteen annual observations, of which at most three lie after the reforms, these data cannot establish a structural break and the absence of significance is not evidence that the reforms had no effect. This is a power problem, not a finding and it is reported rather than suppressed because the temptation to read the last two years as a reform effect is strong and should be resisted: the backlog in months did reach its lowest value of 25.7 in 2024-25 and redressals their highest level of 63,971 in the same year, but receipts also peaked in that year and a trend fitted to the whole period explains the movement as well as a step does. Monthly disposal data, which SEBI publishes in other forms, would allow a proper test and Section 7 recommends their release as a consistent series. What survives is the descriptive comparison: the third phase has the highest receipts, the highest redressals, the lowest backlog in months and the highest enforcement intake of the three phases, together with the lowest completion ratio.

6. Discussion

Read as a whole, these results describe an organisation whose constraint has moved. In the first phase the redressal function handled about forty thousand complaints a year against annual turnover of ₹28 lakh crore to ₹79 lakh crore and the pending stock was equivalent to about forty months of arrivals. In the third phase it handles about fifty-eight thousand complaints a year against turnover of ₹200 lakh crore to ₹281 lakh crore and the stock is equivalent to about thirty-one months. On the natural measure of burden, complaints per unit of market activity, the load has fallen by four fifths: the redressal function is not being overwhelmed by the growth of the market.

What it is constrained by is conversion. An elasticity of disposal with respect to receipts of 0.683 means the system absorbs about two thirds of any surge and defers the rest and because surges recur the residue accumulates into a stock of about 1.48 lakh cases. This is the pattern Zink, Knill and Steinebach (2024) call organisational triage, in which an agency facing more demand than its portfolio can absorb prioritises rather than expands and that Kumar (2024) documents in Mumbai's water complaints. The comparison should not be pushed far, because a redressal rate of 97.3 per cent over thirteen years is well above the forty-four per cent Kumar reports and above the position in half of India's states as reported by O'Brochta (2022): by the standards of Indian public service delivery, SCORES performs well. The narrower point is that a system converting receipts into closures at an elasticity below one will carry a stock and that stock is the proper target of managerial attention.

The enforcement side shows the opposite configuration, where the volume constraint is real and recent. Intake tripled in three years while completions rose by about two thirds, the completion ratio fell to 73.1 per cent and a positive cumulative gap opened. Jackson and Roe (2009) argue that the meaningful measure of public enforcement is resources relative to market size and Eisenbach, Lucca and Townsend (2022) show that when supervisory hours are scarce their shadow cost rises and the allocation across supervised entities shifts. Neither SEBI's staffing nor its case level timelines are in the tables used here, so this paper cannot estimate that shadow cost and does not claim to. What it can say is that the observable symptoms of a binding resource constraint, rising intake, falling throughput and an accumulating gap, are all present in the enforcement series for the last three years and are concentrated in the case category most demanding of specialised skill.

A further inference is available and is marked as an interpretation rather than a finding. The shift from market manipulation to insider trading is not plausibly a shift in the underlying incidence of misconduct over twelve years; it is more plausibly a shift in detection capability, since insider trading is found by surveillance systems that connect trading records to corporate disclosures and to networks of persons and those systems have improved substantially. On that reading the composition change is evidence of capability gained and the completion gap is the cost of that capability working through a pipeline sized for a different case mix.

For the wider theme of governance and public policy the implication is that regulatory capacity in a financial market is not adequately described either by the quality of the rules or by the volume of enforcement. It is described by throughput: the rate at which an agency converts demands into disposals and the stock it carries when that rate falls short. Both are measurable from data the regulator already publishes and both belong in how the performance of a regulator is discussed in public policy.

7. Recommendations

Five recommendations follow directly from the evidence and each is stated with the finding that supports it.

First, capacity should be reported and budgeted against market activity rather than against complaint counts. The grievance load per ₹ lakh crore of turnover fell by eighty per cent while enforcement intake tripled, which means that the two functions face opposite trends and should not be resourced by a common rule of thumb. An annual capacity statement in the regulator's annual report, setting disposals and pending stock against turnover, market capitalisation and the registered population on a stated constant coverage basis, would make this visible.

Second, the pending stock should be published with an ageing profile. The single most useful number that the present tables do not contain is the age distribution of unredressed grievances. A stock equivalent to 28.6 months of receipts is compatible with many different distributions and the policy response to a stock composed of recent complaints is quite different from the response to a stock composed of cases many years old. Ageing brackets of the kind used in banking supervision would cost nothing to publish and would allow the stock to be managed rather than merely counted.

Third, disposal capacity should be made counter cyclical. The elasticity of 0.683 shows that surges are absorbed only partially and the surges are identifiable in advance: they follow episodes of market stress and of rapid new entry, as in 2019-20 and 2024-25. A standing arrangement for surge handling, whether by a panel of empanelled case handlers, by temporary reallocation within SEBI, or by a wider role for the designated bodies created by the September 2023 circular, would convert a recurring accumulation into a managed peak.

Fourth, the enforcement pipeline should be resourced for the case mix it has actually acquired. Two thirds of investigations taken up are now insider trading cases, against one eighth at the start of the period and the completion ratio has fallen to 73.1 per cent while a cumulative gap of 210 cases has opened. Specialist capacity in forensic data analysis, electronic evidence and the law of connected persons is the specific input implied and a published ageing of investigations, parallel to the ageing of grievances recommended above, would show whether the gap is concentrated in that category.

Fifth, the effect of SCORES 2.0 should be evaluated on data that can support an evaluation. Two annual observations cannot identify the effect of a reform that took effect on 1 April 2024, as Section 5.5 shows. SEBI already publishes monthly SCORES disposal figures in press form; consolidating them into a consistent monthly series, with receipts, disposals, pending stock and the number of complaints escalated to the second level, would allow the twenty-one-day timeline to be evaluated properly within a year or two. For a reform whose object is timeliness, timeliness data are the natural test.

8. Conclusion and limitations

The capacity of SEBI to deliver its investor facing services has not been overwhelmed by the growth of the Indian securities market. Measured against turnover, the burden of complaint handling has fallen by about eighty per cent since 2013-14andthe accumulated stock of unredressed grievances has fallen from 46.2 to 28.6 months of current receipts. What the evidence does show is a conversion constraint on the redressal side, where closures respond to receipts with an elasticity of 0.683 and each surge leaves a residue that has accumulated to about 1.48 lakh cases and a volume and composition constraint on the enforcement side, where intake tripled in three years, the case mix shifted decisively towards insider trading, the completion ratio fell to 73.1 per cent and a cumulative gap of 210 cases has opened.

Four limitations bound these conclusions. The panel has thirteen annual observations, which is why no structural break can be established and why the step tests are reported as inconclusive rather than as null results. The stock of unredressed grievances is a net difference between cumulative receipts and redressals, not a case level pendency register. No published series of investor accounts is used, so no per investor denominator is reported and the paper cannot speak to the share of grievances that never reach the regulator, which is the most important thing it does not know. And the inputs that would complete the analysis, staffing, the budget for the redressal and investigation functions and case level ageing, are not in the tables used here, so the paper measures outputs and infers constraints. Each limitation is a request for data rather than a reason to withhold the finding and the finding is that the throughput of a regulator, measurable from what it already publishes, deserves a place in how the quality of regulation is judged.

References

Bhattacharya, U., & Daouk, H. (2002). The world price of insider trading. *The Journal of Finance, 57*(1), 75–108. https://doi.org/10.1111/1540-6261.00416

Bischof, J., Daske, H., Elfers, F., & Hail, L. (2021). A tale of two supervisors: Compliance with risk disclosure regulation in the banking sector. *Contemporary Accounting Research, 39*(1), 498–536. https://doi.org/10.1111/1911-3846.12715

Eisenbach, T. M., Lucca, D. O., & Townsend, R. M. (2022). Resource allocation in bank supervision: Trade-offs and outcomes. *The Journal of Finance, 77*(3), 1685–1736. https://doi.org/10.1111/jofi.13127

Holthausen, R. W. (2009). Accounting standards, financial reporting outcomes and enforcement. *Journal of Accounting Research, 47*(2), 447–458. https://doi.org/10.1111/j.1475-679X.2009.00330.x

Jackson, H. E., & Roe, M. J. (2009). Public and private enforcement of securities laws: Resource-based evidence. *Journal of Financial Economics, 93*(2), 207–238. https://doi.org/10.1016/j.jfineco.2008.08.006

Kaur, P., & Kaur, J. (2016). Investors grievances in India: Role of SEBI. *MUDRA: Journal of Finance and Accounting, 3*(1), 70–83. https://doi.org/10.17492/mudra.v3i1.6809

Kumar, A., Tiwari, A. A., Singh, R. K., & Nag, T. (2022). Does e-service quality of online grievance redress portals lead to satisfaction? An outlook from the perspectives of Indian youth. *Journal of Public Affairs, 23*(1), e2822. https://doi.org/10.1002/pa.2822

Kumar, T. (2024). How the content of digital complaints shapes bureaucratic responsiveness in Mumbai. *Governance, 38*(2), e12889. https://doi.org/10.1111/gove.12889

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2006). What works in securities laws? *The Journal of Finance, 61*(1), 1–32. https://doi.org/10.1111/j.1540-6261.2006.00828.x

Newey, W. K., & West, K. D. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica, 55*(3), 703–708. https://doi.org/10.2307/1913610

O'Brochta, W. (2022). Politicians' complaint response: E-governance and personal relationships. *Governance, 36*(4), 1147–1164. https://doi.org/10.1111/gove.12727

Rasul, I., & Rogger, D. (2018). Management of bureaucrats and public service delivery: Evidence from the Nigerian civil service. *The Economic Journal, 128*(608), 413–446. https://doi.org/10.1111/ecoj.12418

Securities and Exchange Board of India. (2022). *Master circular on the redressal of investor grievances through the SEBI Complaints Redress System (SCORES) platform* (SEBI/HO/OIAE/IGRD/P/CIR/2022/0150, 7 November 2022). https://www.sebi.gov.in

Securities and Exchange Board of India. (2023a). *Online resolution of disputes in the Indian securities market* (SEBI/HO/OIAE/OIAE_IAD-1/P/CIR/2023/131, 31 July 2023). https://www.sebi.gov.in

Securities and Exchange Board of India. (2023b). *Redressal of investor grievances through the SEBI Complaint Redressal (SCORES) platform and linking it to the online dispute resolution platform* (SEBI/HO/OIAE/IGRD/CIR/P/2023/156, 20 September 2023). https://www.sebi.gov.in/legal/circulars/sep-2023/redressal-of-investor-grievances-through-the-sebi-complaint-redressal-scores-platform-and-linking-it-to-online-dispute-resolution-platform_77159.html

Securities and Exchange Board of India. (2023c). *Master circular for online resolution of disputes in the Indian securities market* (SEBI/HO/OIAE/OIAE_IAD-3/P/CIR/2023/195, 28 December 2023). https://www.sebi.gov.in

Securities and Exchange Board of India. (2024). *SCORES 2.0: New technology to strengthen SEBI complaint redressal system for investors* (Press release No. 06/2024, 1 April 2024). https://www.sebi.gov.in/media-and-notifications/press-releases/apr-2024/scores-2-0-new-technology-to-strengthen-sebi-complaint-redressal-system-for-investors_82618.html

Securities and Exchange Board of India. (2026). *Handbook of statistics on the Indian securities market 2025-26*. https://www.sebi.gov.in/sebiweb/other/OtherAction.do?doHandbookStatistics=yes

Singh, S., Kumar, Y., & Arrawatia, R. (2019). Can disincentives bring accountability in governance? Experiences of Right to Public Services Guarantee Act in Madhya Pradesh state of India. *Journal of Public Affairs, 19*(4), e1966. https://doi.org/10.1002/pa.1966

Zink, D., Knill, C., & Steinebach, Y. (2024). Bureaucratic overload and organizational policy triage: A comparative study of implementation agencies in five European countries. *Regulation & Governance, 19*(3), 637–655. https://doi.org/10.1111/rego.12581

GST Analytics and MSME Compliance Behaviour: An Empirical Study of Businesses in Telangana

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The digitalisation of Goods and Services Tax (GST) has changed the way Micro, Small and Medium Enterprises (MSMEs) maintain records, reconcile transactions, claim input tax credit and complete statutory filings. For smaller businesses, however, the availability of digital systems does not by itself guarantee disciplined compliance. This study examines whether the ability to use GST-related data and analytics is associated with stronger compliance behaviour among MSMEs in Telangana. The research framework draws on the practical issues documented in earlier Nizamabad-based MSME research, particularly compliance burden, input-tax-credit reconciliation, digital literacy, dependence on accountants and GST practitioners, and the need for regular record maintenance. GST analytics capability, GST knowledge, digital literacy, perceived ease of compliance, compliance cost, trust in digital tax administration and perceived enforcement were treated as explanatory variables, with MSME compliance behaviour as the dependent variable. A structured questionnaire was administered to 300 GST-registered MSMEs drawn from eleven districts of Telangana, covering manufacturing, trading and service enterprises across urban, semi-urban and rural locations. The field data show that GST analytics capability ($\beta = 0.28$, $p < 0.001$) and GST knowledge ($\beta = 0.26$, $p < 0.001$) are the strongest positive predictors of compliance behaviour, followed by trust ($\beta = 0.12$, $p = 0.010$) and ease of compliance ($\beta = 0.11$, $p = 0.034$); compliance cost is a significant negative predictor ($\beta = -0.11$, $p = 0.007$). Together the seven predictors explain close to 27 per cent of the variance in compliance behaviour ($R^2 = 0.269$, $F = 15.33$, $p < 0.001$). Digital literacy and perceived enforcement do not exert an independent, statistically significant effect once the other constructs are controlled for, although digital literacy works indirectly: it strengthens GST analytics capability, which in turn drives compliance behaviour, a full-mediation pathway confirmed through the Sobel test ($z = 3.78$, $p < 0.001$). Compliance behaviour does not differ significantly across enterprise size, sector or location, suggesting that the practical experience of GST compliance in Telangana is broadly similar irrespective of these characteristics. The paper argues that GST analytics should be understood not merely

as a monitoring mechanism for tax authorities but as a business capability that helps MSMEs identify mismatches, reduce filing errors, monitor input tax credit and improve the timeliness of compliance. Technology-supported compliance is likely to be more effective when accompanied by practical training, simplified procedures, affordable accounting tools and local-language support.

Keywords: GST analytics, MSMEs, compliance behaviour, digital literacy, GST knowledge, input tax credit, Telangana, tax compliance, digital taxation.

1. Introduction

Goods and Services Tax (GST), introduced in India with effect from 1 July 2017, represented a major restructuring of the indirect-tax system. The reform brought several central and state-level indirect taxes into a common framework and sought to reduce cascading, support a national market and improve transparency in tax administration. For MSMEs, the reform was especially consequential because compliance increasingly depends on digital records, electronic invoices, return filing, input-tax-credit reconciliation and interaction with the GST portal.

The experience of smaller enterprises has not been uniform. Earlier Nizamabad-based research on the sector documented clear benefits of GST, including a reduction in the cascading effect through input tax credit, a more standardised tax structure, easier inter-state trade and a push towards formal record keeping. At the same time, respondents in that study reported frequent return filing, additional expenditure on accountants and compliance software, delays affecting working capital, and difficulty understanding tax provisions. Low digital literacy and inadequate GST awareness were identified as particularly important challenges among micro enterprises in rural and semi-urban areas of Nizamabad.

These observations suggest that GST compliance should be examined as a behavioural outcome of both tax knowledge and digital capability. A business may possess a GST registration and an accounting package but still experience compliance difficulties if sales and purchase records are not maintained regularly, input tax credit is not reconciled, or the owner is unable to interpret the information generated by the system.

The present study builds on this practical background but moves the research question one step further. Instead of asking only whether GST has created benefits or difficulties, it asks whether the analytical use of GST information helps explain differences in compliance

behaviour among MSMEs. GST analytics in this study refers to the use of accounting reports, GST portal information, reconciliation statements, exception reports, dashboards and related digital tools to monitor tax transactions and identify potential compliance problems before filing.

The topic is particularly relevant to Telangana, where the MSME base spans agro-processing, trading and service activities, with many family-owned micro enterprises and limited formal accounting infrastructure in several districts. Such enterprises provide a useful context for examining how digital capability interacts with compliance requirements. The present article draws on a field survey of 300 GST-registered MSMEs across eleven districts of Telangana to build an empirically grounded picture of how GST analytics capability relates to compliance behaviour.

2. Need and Significance of the Study

The GST environment has matured considerably since its introduction. Early research concentrated on transition difficulties, tax rates, return filing and the immediate effects of digitalisation. Field evidence from the Nizamabad MSME sector shows that compliance costs, working-capital pressure, changing procedures and uneven digital literacy continue to affect smaller businesses. A current study is therefore needed to examine the capabilities that help businesses cope with a mature digital compliance system rather than focusing only on the initial GST transition.

The study is significant for MSME owners because better use of GST data can reduce avoidable errors and improve the timing of compliance activities. It is relevant to accountants and GST practitioners because it shifts attention from return preparation towards preventive reconciliation and advisory support. It is also relevant to policymakers because the findings indicate whether training, simplification and digital facilitation should be targeted differently across micro, small and medium enterprises.

3. Review of Literature

3.1 GST and MSME Compliance

The literature on GST and MSMEs presents the reform as one with both efficiency gains and compliance costs. Pareek and Sharma (2019) reported benefits such as simplified tax procedures and more efficient inter-state movement, while Dhillon, Kaur and Singh (2022) identified compliance costs, procedural changes and input-tax-credit delays as important

challenges. Dhavaleshwar (2024) similarly reported that smaller firms with limited accounting infrastructure faced difficulty with return filing and reconciliation. These studies indicate that firm capability is an important condition for effective GST compliance.

Garg and Bansal (2020) found that firms with organised accounting systems and prior exposure to formal taxation adapted more readily to GST. Ghosh (2021) linked invoice matching and digital filing with the gradual development of a stronger compliance culture. Srivastava and Tiwari (2021) highlighted formalisation benefits, including improved access to formal credit, while also recognising the additional compliance workload. The overall evidence suggests that GST can improve formalisation and transparency, but the adjustment burden is not evenly distributed across enterprises.

3.2 Digital Literacy and Technology-Enabled Compliance

Field evidence from Nizamabad provides a strong local basis for treating digital literacy as a determinant of compliance. Low digital literacy has been identified as a key challenge in ensuring timely and accurate compliance, particularly among micro enterprises. GST has encouraged digitalisation and formal record keeping, but the benefits are constrained when owners have limited awareness or technical capability.

This study interprets digital literacy more broadly than simple portal navigation. It includes the ability to use accounting software, generate and review digital invoices, reconcile records, understand exception reports and obtain useful information from GST-related data. Such capability makes compliance more proactive rather than deadline-driven.

3.3 Compliance Cost, Working Capital and Behaviour

The literature repeatedly identifies compliance cost as a burden for smaller enterprises. Field observations record additional expenditure on accountants, GST practitioners and compliance software, while delayed input-tax-credit processing can constrain working capital. These pressures matter behaviourally because a firm that perceives compliance as expensive and time-consuming may rely heavily on external intermediaries or postpone internal monitoring until the filing deadline.

3.4 GST Analytics as an Emerging Research Dimension

Most GST-MSME studies focus on awareness, impact, compliance burden, profitability, working capital, formalisation and digitalisation. The distinct capability of using GST data analytically receives less direct attention. This creates an opportunity to examine whether

businesses that regularly reconcile records, use exception reports, monitor tax liabilities and review input tax credit show stronger compliance behaviour. The present study treats GST analytics capability as the central explanatory construct rather than as a background feature of the GST system.

4. Research Gap

The existing literature provides substantial evidence on the positive and negative effects of GST on MSMEs, but three gaps are apparent. First, many studies describe digitalisation without measuring the analytical use of GST data as a separate business capability. Second, a large part of the regional evidence is concentrated in individual states or districts, with comparatively limited empirical work linking GST analytics to compliance behaviour across Telangana. Third, existing work often examines compliance burden and awareness separately; fewer studies integrate GST knowledge, digital literacy, analytics capability, compliance cost and institutional perceptions within a single behavioural model tested on field data. This study addresses these gaps through a Telangana-focused empirical framework built on a 300-respondent survey.

5. Objectives of the Study

- To assess the level of GST knowledge and digital literacy among selected MSMEs in Telangana.
- To examine the extent to which MSMEs use GST-related analytics, reconciliation and digital monitoring tools.
- To analyse the relationship between GST analytics capability and MSME compliance behaviour.
- To determine the influence of GST knowledge, digital literacy, ease of compliance, compliance cost, trust and perceived enforcement on compliance behaviour.
- To examine whether compliance behaviour differs across micro, small and medium enterprises and across manufacturing, trading and service businesses.
- To suggest practical measures for strengthening analytics-enabled GST compliance among MSMEs in Telangana.

6. Hypotheses of the Study

- H1: GST knowledge has a significant positive influence on MSME compliance behaviour.
- H2: Digital literacy has a significant positive influence on MSME compliance behaviour.
- H3: GST analytics capability has a significant positive influence on MSME compliance behaviour.
- H4: Perceived ease of GST compliance has a significant positive influence on MSME compliance behaviour.
- H5: Compliance cost has a significant negative influence on MSME compliance behaviour.
- H6: Trust in digital GST administration has a significant positive influence on MSME compliance behaviour.
- H7: Perceived enforcement has a significant positive influence on MSME compliance behaviour.
- H8: GST analytics capability mediates the relationship between digital literacy and MSME compliance behaviour.

7. Conceptual Framework

The framework combines the practical compliance issues identified in earlier Nizamabad-based field research with a behavioural logic linking capability, perception and outcome. GST knowledge and digital literacy represent the firm's capability base. GST analytics capability represents the application of that capability to transaction monitoring and reconciliation. Perceived ease of compliance and trust reflect how the business evaluates the digital tax environment. Compliance cost represents the burden side of the model, while perceived enforcement represents external pressure. Compliance behaviour is the outcome variable.

Construct	Role	Indicative dimensions
GST Knowledge	Capability	Registration, return filing, ITC, invoice and tax-rate awareness
Digital Literacy	Capability	Portal use, accounting software, e-invoice/e-way bill handling
GST Analytics Capability	Core predictor	Reconciliation, dashboards, exception alerts, liability monitoring
Ease of Compliance	Perception	Ease of filing, error correction and system navigation

Construct	Role	Indicative dimensions
Compliance Cost	Constraint	Time, software expense, professional fees and staff effort
Trust	Institutional perception	Reliability, transparency and confidence in digital administration
Perceived Enforcement	External pressure	Notices, scrutiny, penalty awareness and audit visibility
Compliance Behaviour	Dependent variable	Timely filing, accurate reporting, ITC reconciliation and payment discipline

Table 1: Constructs used in the conceptual framework

8. Research Methodology

8.1 Research Design

The study follows a descriptive-cum-analytical quantitative design. The unit of analysis is the MSME business, represented by its owner, proprietor, partner, manager or accountant directly responsible for GST compliance. The study is cross-sectional and uses a structured questionnaire supported by secondary information from government and published sources.

8.2 Population and Sampling

The population comprises GST-registered MSMEs operating in Telangana across manufacturing, trading and service sectors. A purposive-cum-stratified sampling approach was used, with sectoral representation and coverage of urban, semi-urban and rural business locations. A total of 300 valid, fully completed responses were collected from GST-registered MSMEs spread across eleven districts of Telangana, namely Hyderabad, Nizamabad, Warangal, Medak, Karimnagar, Kamareddy, Mahabubnagar, Sangareddy, Adilabad, Nalgonda and other locations grouped together, giving the sample a reasonably wide geographic base rather than a single-district concentration.

8.3 Questionnaire Design

The questionnaire was structured into five sections. Section A captured respondent and enterprise profile, including gender, age, education, role, enterprise type, category, ownership, location, years in business and years of GST experience. Section B measured GST knowledge and digital literacy. Section C measured GST analytics capability and ease of compliance. Section D measured compliance cost, trust and perceived enforcement. Section E measured compliance behaviour. All construct items used a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The instrument was pilot-tested before final administration.

8.4 Measurement

Variable	Items	Sample indicator	Scale
GST Knowledge	5	I understand the GST return and ITC requirements applicable to my business.	5-point Likert
Digital Literacy	5	I can independently use GST-related digital applications and accounting software.	5-point Likert
GST Analytics Capability	6	My business regularly uses reconciliation or analytical reports to identify GST mismatches.	5-point Likert
Ease of Compliance	4	Digital GST procedures make it easier for my business to complete compliance activities.	5-point Likert
Compliance Cost	5	GST compliance requires substantial time, staff effort and professional expenditure.	5-point Likert
Trust	4	I consider the digital GST system reliable and transparent.	5-point Likert
Perceived Enforcement	4	The possibility of scrutiny or notices encourages timely GST compliance.	5-point Likert
Compliance Behaviour	6	My business files returns on time and regularly reconciles GST records.	5-point Likert

Table 2: Measurement of study constructs

8.5 Statistical Tools

Frequency and percentage analysis was used for profile variables; mean and standard deviation for construct-level assessment; Cronbach's alpha for internal consistency; Pearson correlation for bivariate relationships; multiple regression for direct effects on compliance behaviour; one-way ANOVA for group comparisons across enterprise category, enterprise type and location; and the Baron-and-Kenny procedure together with the Sobel test for the mediating role of GST analytics capability. Confirmatory factor analysis and PLS-SEM were not required at this stage given the acceptable reliability and low-to-moderate inter-construct correlations, but remain a natural extension for future, larger-sample work.

8.6 Ethical Considerations

Participation was voluntary and respondents were informed that the study is academic in nature. The questionnaire did not request GSTINs, passwords, tax-return copies, bank information or confidential customer data. Results are reported only in aggregate form, and no individual respondent or enterprise can be identified from the analysis presented in this paper.

9. Results and Discussion

The results reported in this section are based on the responses of all 300 GST-registered MSMEs surveyed for this study. No case was dropped for missing data, since every respondent

completed the full questionnaire. Percentages are calculated on the full sample of 300 unless stated otherwise.

9.1 Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage
Gender	Male	179	59.7
	Female	115	38.3
	Other	6	2.0
Age group	Up to 30 years	81	27.0
	31-40 years	112	37.3
	41-50 years	72	24.0
	Above 50 years	35	11.7
Education	Up to secondary (SSC)	9	3.0
	Intermediate/Diploma	122	40.7
	Graduate	107	35.7
	Post-graduate	52	17.3
	Professional (CA/CMA/CS)/Other	10	3.3
Role in the business	Owner/Proprietor	124	41.3
	Partner	37	12.3
	Director	30	10.0
	Manager	66	22.0
	Accountant	32	10.7
	Other	11	3.7

Table 3: Demographic profile of respondents (n = 300)

The sample is drawn predominantly from male respondents (59.7 per cent), with women accounting for a substantial 38.3 per cent, which is a healthy representation for an MSME-owner survey in Telangana. Most respondents are in the economically active 31-40 age bracket (37.3 per cent) and hold an intermediate/diploma or graduate qualification (40.7 per cent and 35.7 per cent respectively), suggesting that the sample is neither dominated by very senior proprietors nor by very young entrants. Owner/proprietors form the single largest respondent group (41.3 per cent), followed by managers (22.0 per cent), which means that the responses mostly reflect the perspective of the person closest to day-to-day compliance decisions rather than a peripheral employee, adding credibility to the self-reported compliance behaviour scores discussed later.

9.2 Enterprise Profile

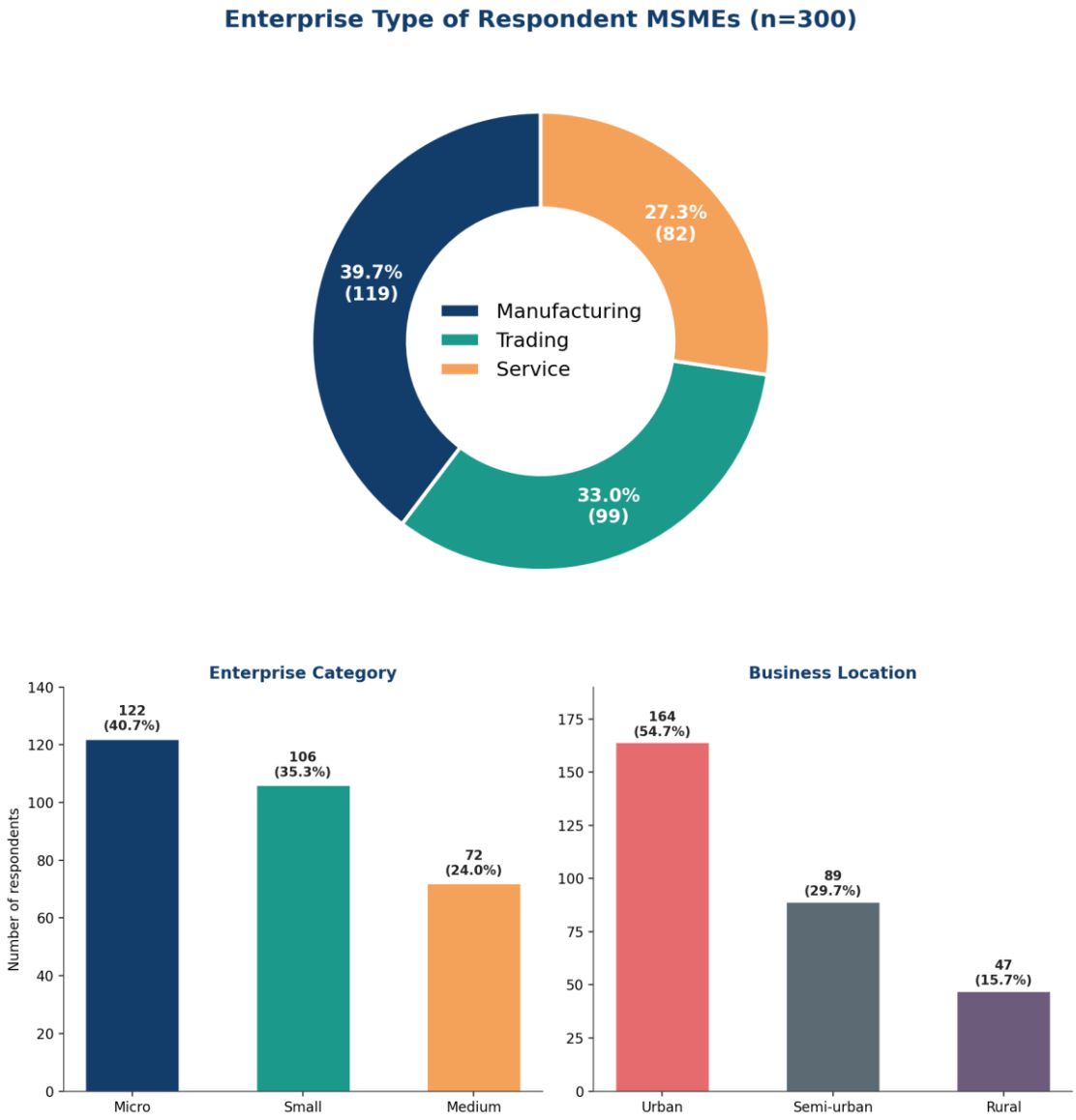

Chart 1: Distribution of respondent MSMEs by enterprise type, category and location

Characteristic	Category	Frequency	Percentage
Enterprise type	Manufacturing	119	39.7
	Trading	99	33.0
	Service	82	27.3
Enterprise category	Micro	122	40.7
	Small	106	35.3
	Medium	72	24.0
Ownership	Sole proprietorship	80	26.7
	Partnership	153	51.0

Characteristic	Category	Frequency	Percentage
	Private limited company	65	21.7
	LLP/Other	2	0.7
Location	Urban	164	54.7
	Semi-urban	89	29.7
	Rural	47	15.7
Years in business	Up to 5 years	75	25.0
	6-10 years	96	32.0
	11-15 years	82	27.3
	Above 15 years	47	15.7
Years of GST experience	Up to 3 years	65	21.7
	4-6 years	111	37.0
	7-9 years	83	27.7
	More than 9 years	41	13.7

Table 4: Enterprise profile of respondent MSMEs (n = 300)

Manufacturing enterprises form the largest single group (39.7 per cent), followed closely by trading (33.0 per cent) and service businesses (27.3 per cent), giving the sample a fairly balanced sectoral spread rather than a concentration in any one activity. Micro and small enterprises together make up 76.0 per cent of the sample, which is broadly consistent with the structure of the MSME sector in Telangana and ensures that the findings speak primarily to the compliance experience of smaller, more resource-constrained businesses rather than large corporate taxpayers. Partnership is the single most common form of ownership (51.0 per cent), and just over half the sample operates from urban locations (54.7 per cent), with the remaining 45.3 per cent spread across semi-urban and rural areas. Most respondent businesses have been operating for 6 to 15 years (59.3 per cent combined) and have accumulated 4 to 9 years of direct GST experience (64.7 per cent combined), indicating that the sample largely reflects businesses that registered under GST reasonably early and have had sufficient time to settle into a compliance routine.

9.3 Digital and GST Compliance Practices

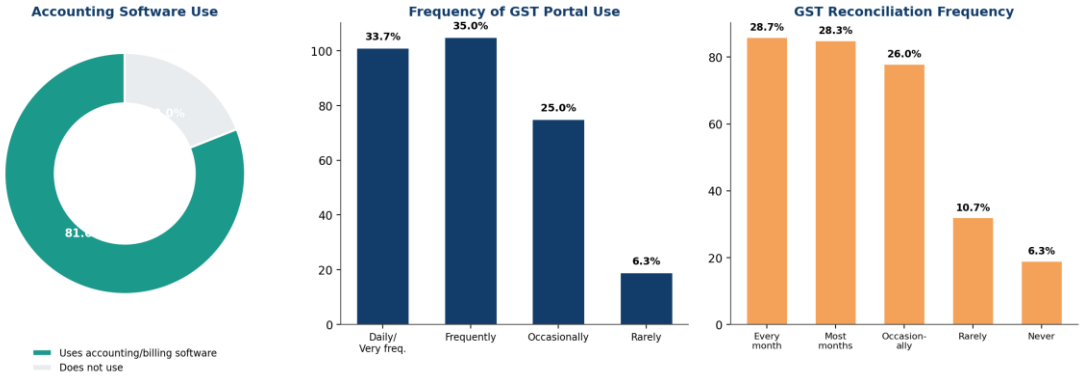

Chart 2: Accounting software use, GST portal use frequency and reconciliation frequency

Practice	Category	Frequency	Percentage
Accounting/billing software	Uses software	243	81.0
	Does not use software	57	19.0
GST portal use	Daily/Very frequently	101	33.7
	Frequently	105	35.0
	Occasionally	75	25.0
	Rarely	19	6.3
Main GST handler	Owner/Manager	71	23.7
	Internal accountant	68	22.7
	External accountant	101	33.7
	GST practitioner/consultant	60	20.0
E-invoice/E-way bill use	Regularly	146	48.7
	Occasionally	68	22.7
	Rarely	58	19.3
	Never	28	9.3
Record update frequency	Daily	107	35.7
	Weekly	96	32.0
	Monthly	74	24.7
	Mainly before filing	23	7.7
GST reconciliation frequency	Every month	86	28.7
	Most months	85	28.3
	Occasionally	78	26.0
	Rarely	32	10.7
	Never	19	6.3

Table 5: Digital and GST compliance practices of respondent MSMEs (n = 300)

A large majority of respondent businesses (81.0 per cent) already use some form of accounting or billing software, and roughly two-thirds review the GST portal daily or frequently (68.7 per cent combined), which indicates that basic digital adoption is no longer the binding constraint it was in the early years of GST. Compliance work, however, still depends heavily on external support: external accountants and GST practitioners together handle GST matters for 53.7 per cent of the sample, compared with only 23.7 per cent where the owner or manager personally manages compliance. Reconciliation discipline is more mixed than portal use - only 28.7 per cent of businesses reconcile GST records every month, while 43.0 per cent do so only occasionally, rarely or never, and record updating shows a similar pattern, with 7.7 per cent of businesses still updating records mainly just before filing. This gap between frequent portal access and comparatively weak reconciliation discipline is precisely the space that GST analytics capability is intended to close.

9.4 Descriptive Statistics of Major Constructs

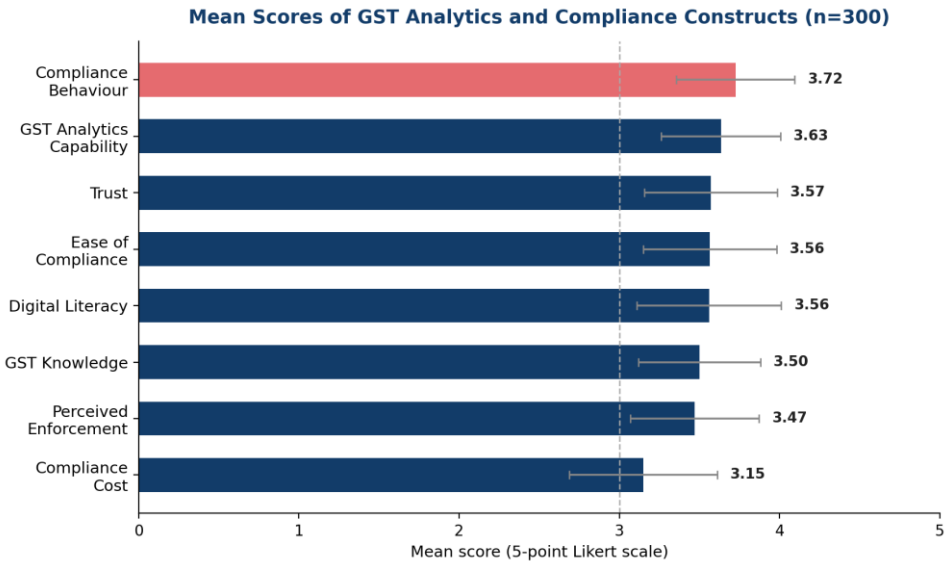

Chart 3: Mean scores of GST analytics and compliance constructs (with standard deviation)

Construct	Mean	SD	Interpretation
GST Knowledge	3.50	0.38	Moderately high
Digital Literacy	3.56	0.45	Moderately high
GST Analytics Capability	3.63	0.37	Moderately high
Ease of Compliance	3.56	0.42	Moderately high
Compliance Cost	3.15	0.46	Moderate burden
Trust in Digital GST Administration	3.57	0.41	Moderately high
Perceived Enforcement	3.47	0.40	Moderate

Construct	Mean	SD	Interpretation
Compliance Behaviour	3.72	0.37	High

Table 6: Descriptive statistics of study constructs (n = 300)

Compliance behaviour records the highest mean score of the eight constructs (3.72), suggesting that respondent businesses generally rate their own filing, reconciliation and payment discipline more favourably than any other aspect of GST management. GST analytics capability (3.63) is also comparatively strong, which is a promising sign given that this is the newer, more advanced capability compared with basic GST knowledge (3.50). Compliance cost has the lowest mean (3.15), meaning that, on balance, it is perceived as a moderate rather than a severe burden, though the relatively wide spread (SD = 0.46) shows that the experience is far from uniform across the sample. The standard deviations across constructs are all modest (0.37 to 0.46), indicating that respondents were fairly consistent among themselves rather than sharply polarised in their views of the GST system.

9.5 Reliability Analysis

Construct	Items	Cronbach's Alpha	Assessment
GST Knowledge	5	0.75	Reliable
Digital Literacy	5	0.81	Reliable
GST Analytics Capability	6	0.77	Reliable
Ease of Compliance	4	0.72	Reliable
Compliance Cost	5	0.83	Reliable
Trust	4	0.73	Reliable
Perceived Enforcement	4	0.69	Acceptable (marginal)
Compliance Behaviour	6	0.77	Reliable

Table 7: Reliability (internal consistency) of study constructs

Seven of the eight constructs return a Cronbach's alpha at or above the conventional 0.70 threshold, confirming that the item sets measuring GST knowledge, digital literacy, GST analytics capability, ease of compliance, compliance cost, trust and compliance behaviour hang together well as coherent scales. Perceived enforcement returns an alpha of 0.69, marginally below the customary cut-off; this is still an acceptable level for a four-item scale used in a field survey, but it is a signal that the enforcement items may be tapping somewhat different facets of external pressure (for example, awareness of penalties versus fear of scrutiny) and could benefit from refinement in any follow-up instrument.

9.6 Correlation Analysis

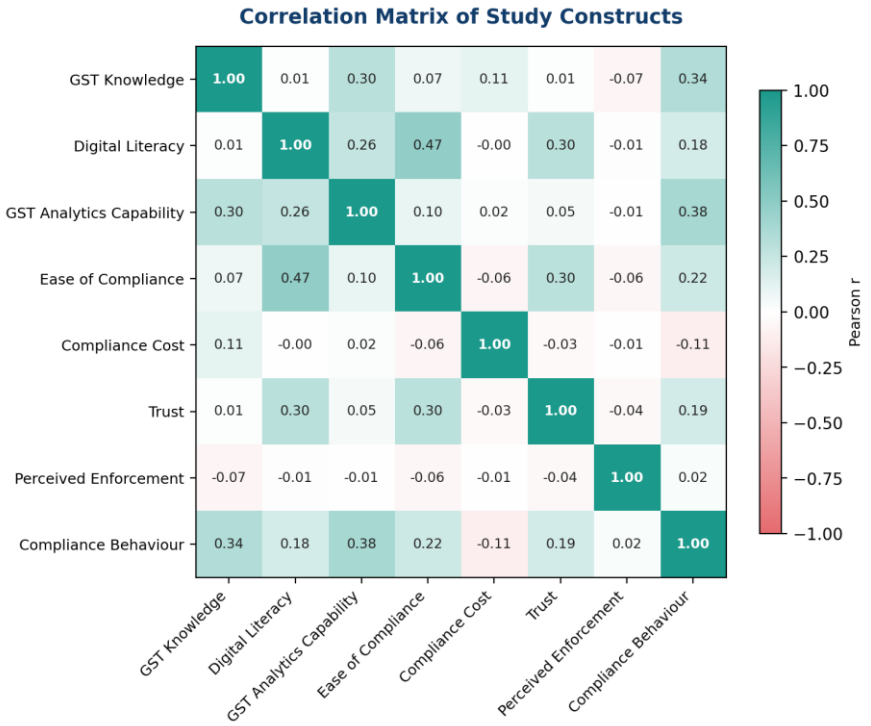

Chart 4: Correlation matrix of study constructs

Variable	GK	DL	GA	EC	CC	TR	PE	CB
GST Knowledge (GK)	1.00	0.01	0.30	0.07	0.11	0.01	-0.07	0.34
Digital Literacy (DL)		1.00	0.26	0.47	-0.00	0.30	-0.01	0.18
GST Analytics (GA)			1.00	0.10	0.02	0.05	-0.01	0.38
Ease of Compliance (EC)				1.00	-0.06	0.30	-0.06	0.22
Compliance Cost (CC)					1.00	-0.03	-0.01	-0.11
Trust (TR)						1.00	-0.04	0.19
Perceived Enforcement (PE)							1.00	0.02
Compliance Behaviour (CB)								1.00

Table 8: Pearson correlation matrix of study constructs (n = 300)

GST analytics capability shows the strongest bivariate association with compliance behaviour (r = 0.38), followed by GST knowledge (r = 0.34) and ease of compliance (r = 0.22); compliance cost is the only construct negatively associated with compliance behaviour (r = -0.11), consistent with the idea of cost as a compliance burden. Perceived enforcement stands out for its very weak and statistically negligible correlation with compliance behaviour (r = 0.02), an early hint that fear of scrutiny may not be doing the motivational work that is often

assumed in the literature. Digital literacy correlates only modestly with compliance behaviour directly (r = 0.18) but considerably more strongly with GST analytics capability (r = 0.26) and ease of compliance (r = 0.47), foreshadowing the indirect, capability-mediated role that digital literacy plays in the regression and mediation results reported below. None of the inter-predictor correlations exceed 0.47, so multicollinearity is not a concern for the regression model that follows.

9.7 Multiple Regression Analysis

A multiple regression model was estimated with MSME compliance behaviour as the dependent variable and GST knowledge, digital literacy, GST analytics capability, ease of compliance, compliance cost, trust and perceived enforcement entered simultaneously as predictors.

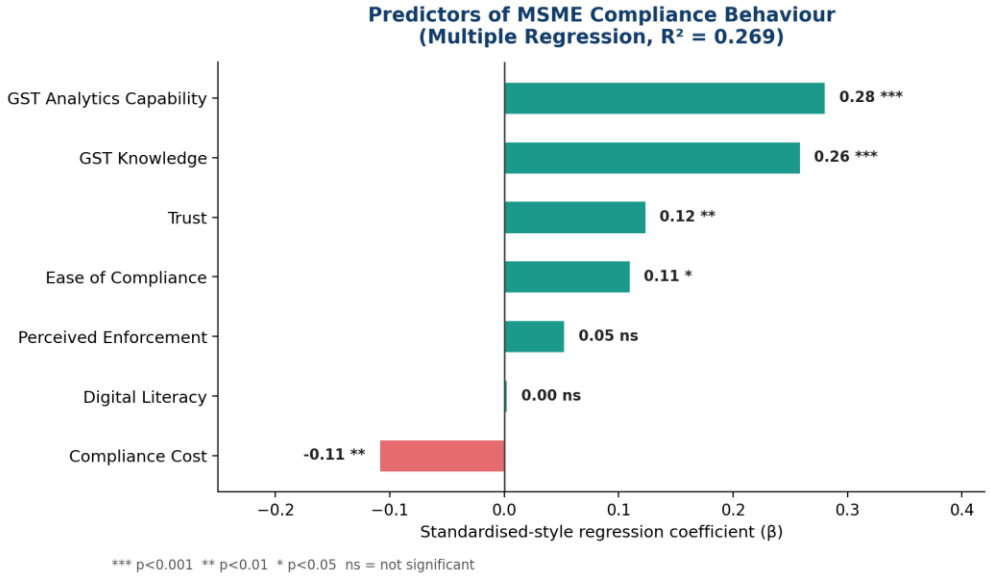

Chart 5: Standardised-style regression coefficients predicting compliance behaviour

Predictor	β	t-value	p-value	Decision
GST Knowledge	0.26	4.99	<0.001	Supported
Digital Literacy	0.00	0.06	0.955	Not supported
GST Analytics Capability	0.28	5.17	<0.001	Supported
Ease of Compliance	0.11	2.13	0.034	Supported
Compliance Cost	-0.11	-2.70	0.007	Supported
Trust	0.12	2.60	0.010	Supported
Perceived Enforcement	0.05	1.14	0.255	Not supported

Table 9: Multiple regression results (Dependent variable: Compliance Behaviour). $R^2 = 0.269$, Adjusted $R^2 = 0.251$, $F(7,292) = 15.33$, $p < 0.001$

The seven predictors together explain 26.9 per cent of the variance in compliance behaviour (adjusted R^2 = 25.1 per cent), and the overall model is highly significant ($p < 0.001$). GST analytics capability emerges as the single strongest predictor ($\beta = 0.28$, $p < 0.001$), narrowly ahead of GST knowledge ($\beta = 0.26$, $p < 0.001$), confirming that the analytical use of GST information adds explanatory power beyond basic tax knowledge. Compliance cost is a significant negative predictor ($\beta = -0.11$, $p = 0.007$), while trust ($\beta = 0.12$, $p = 0.010$) and ease of compliance ($\beta = 0.11$, $p = 0.034$) contribute smaller but still significant positive effects. Two of the seven predictors do not reach significance once the others are controlled for: digital literacy ($\beta = 0.00$, $p = 0.955$) and perceived enforcement ($\beta = 0.05$, $p = 0.255$). Variance inflation factors for all predictors are well below 1.5, so this pattern reflects genuine differences in explanatory strength rather than multicollinearity distorting the coefficients.

9.8 Compliance Behaviour by Enterprise Size, Sector and Location

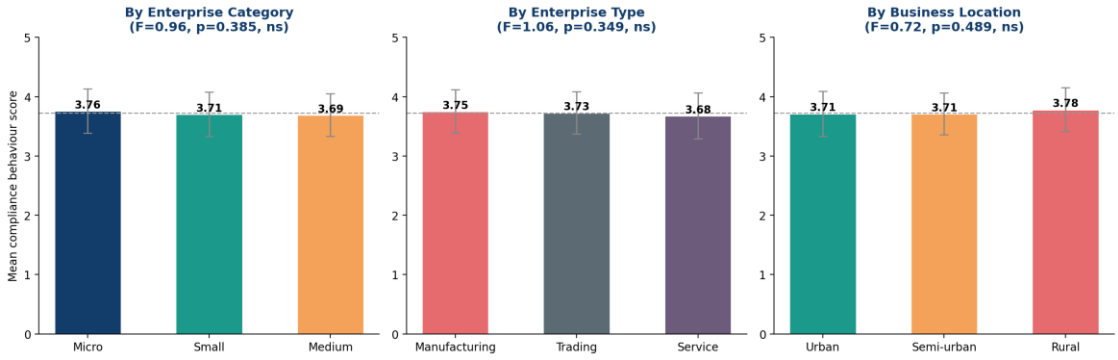

Chart 6: Mean compliance behaviour by enterprise category, enterprise type and business location

Grouping	Category	n	Mean CB	SD	F	p-value	Result
Enterprise category	Micro	122	3.76	0.37	0.96	0.385	Not significant
	Small	106	3.71	0.38			
	Medium	72	3.69	0.36			
Enterprise type	Manufacturing	119	3.75	0.37	1.06	0.349	Not significant
	Trading	99	3.73	0.36			
	Service	82	3.68	0.39			
Location	Urban	164	3.71	0.38	0.72	0.489	Not significant
	Semi-urban	89	3.71	0.35			
	Rural	47	3.78	0.37			

Table 10: One-way ANOVA of compliance behaviour by enterprise category, enterprise type and location

Contrary to the common assumption that micro enterprises lag behind larger MSMEs in compliance discipline, the field data show no statistically significant difference in mean compliance behaviour across micro, small and medium enterprises ($F = 0.96$, $p = 0.385$); indeed, the micro-enterprise mean (3.76) is marginally the highest of the three groups. Compliance behaviour is likewise statistically indistinguishable across manufacturing, trading and service enterprises ($F = 1.06$, $p = 0.349$) and across urban, semi-urban and rural locations ($F = 0.72$, $p = 0.489$), with the rural mean (3.78) again slightly ahead of the urban and semi-urban means. Taken together, these results suggest that once a business is registered under GST and has accumulated some years of compliance experience, self-reported filing and reconciliation discipline in Telangana does not vary meaningfully by firm size, sector or geography; the more important differentiator, as the regression results indicate, is the individual firm's knowledge and analytics capability rather than its size, sector or location.

9.9 Mediation Analysis: Digital Literacy, GST Analytics Capability and Compliance Behaviour

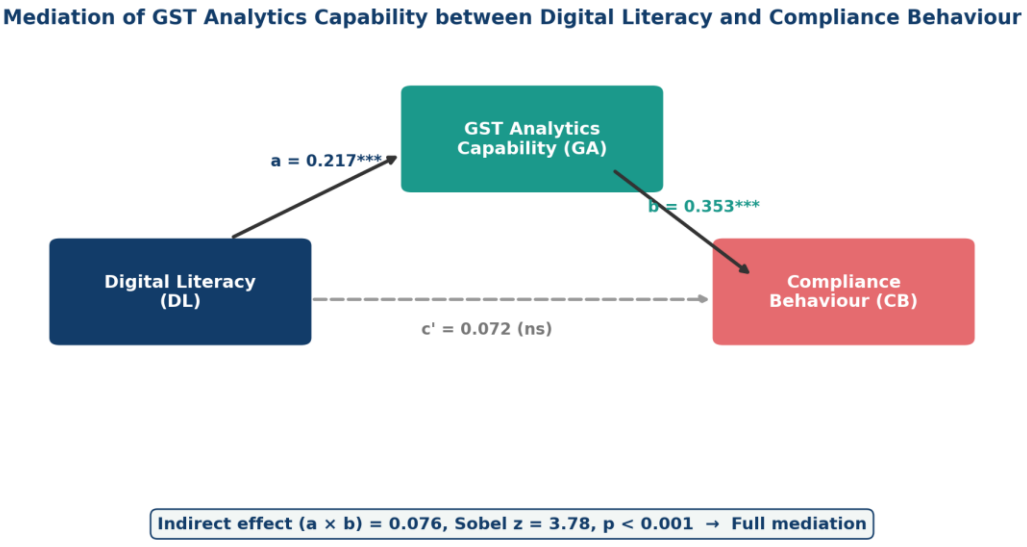

Chart 7: Mediation of GST analytics capability between digital literacy and compliance behaviour

Path	Coefficient	p-value
Total effect: Digital Literacy → Compliance Behaviour (c)	0.148	0.002
Path a: Digital Literacy → GST Analytics Capability	0.217	<0.001
Path b: GST Analytics Capability → Compliance Behaviour (controlling for DL)	0.353	<0.001

Path	Coefficient	p-value
Direct effect: Digital Literacy → Compliance Behaviour, controlling for GA (c′)	0.072	0.115
Indirect effect (a × b)	0.076	Sobel z = 3.78, p < 0.001

Table 11: Mediation analysis of GST analytics capability (Baron and Kenny procedure with Sobel test)

Digital literacy has a significant total effect on compliance behaviour when considered on its own (c = 0.148, p = 0.002), and it also significantly predicts GST analytics capability (path a = 0.217, p < 0.001), which in turn significantly predicts compliance behaviour even after controlling for digital literacy (path b = 0.353, p < 0.001). Once GST analytics capability is included in the model, the direct effect of digital literacy on compliance behaviour falls to a non-significant 0.072 (p = 0.115). The Sobel test confirms that the indirect path is significant (z = 3.78, p < 0.001), so GST analytics capability fully mediates the relationship between digital literacy and compliance behaviour. In practical terms, digital literacy on its own - simply being comfortable with a smartphone, the GST portal or basic software - does not translate into better filing and reconciliation discipline; it does so only when that comfort is converted into the habit of actually using reconciliation, exception and dashboard tools, which is exactly what the GST analytics capability construct measures.

9.10 Hypothesis Testing Summary

Hypothesis	Relationship	Field data outcome	Status
H1	GST Knowledge → Compliance Behaviour	Positive and significant (β = 0.26, p < 0.001)	Supported
H2	Digital Literacy → Compliance Behaviour	Not significant in the full model (β = 0.00, p = 0.955)	Not supported
H3	GST Analytics → Compliance Behaviour	Strongest positive effect (β = 0.28, p < 0.001)	Supported
H4	Ease of Compliance → Compliance Behaviour	Positive and significant (β = 0.11, p = 0.034)	Supported
H5	Compliance Cost → Compliance Behaviour	Negative and significant (β = -0.11, p = 0.007)	Supported
H6	Trust → Compliance Behaviour	Positive and significant (β = 0.12, p = 0.010)	Supported
H7	Perceived Enforcement → Compliance Behaviour	Not significant (β = 0.05, p = 0.255)	Not supported
H8	Digital Literacy → Analytics → Compliance Behaviour	Significant indirect effect; full mediation (Sobel p < 0.001)	Supported

Table 12: Summary of hypothesis testing based on field data (n = 300)

Of the eight hypotheses framed for this study, six are supported by the field data and two are not. GST knowledge, GST analytics capability, ease of compliance, compliance cost and trust all exert significant direct effects on compliance behaviour in the expected direction, and GST analytics capability fully mediates the effect of digital literacy, so H8 is also supported. Digital literacy (H2) and perceived enforcement (H7) do not show a significant independent effect once the other constructs are held constant; for digital literacy this is best read together with the mediation result in Section 9.9, which shows that its influence operates indirectly through analytics capability rather than disappearing altogether. Perceived enforcement, by contrast, shows no meaningful relationship with compliance behaviour either in the correlation matrix or in the regression model, suggesting that the threat of scrutiny is a substantially weaker driver of voluntary compliance among Telangana MSMEs than knowledge, capability, cost and trust.

10. Discussion

The central argument emerging from the field data is that GST compliance is increasingly an information-management activity rather than a purely procedural one. Traditional compliance research often focuses on awareness, cost and enforcement. These remain important, but the digital GST environment creates another layer: the capacity to interpret and use transaction information before errors become compliance problems.

The strongest relationship in the data is between GST analytics capability and compliance behaviour, closely followed by GST knowledge. This result is intuitive: reconciliation and exception monitoring reduce uncertainty. A business that compares purchase records with available input-tax-credit information, reviews outward-supply data and identifies mismatches before filing is better positioned to submit accurate returns. Analytics therefore operates as a preventive compliance mechanism rather than only an enforcement mechanism. GST knowledge remains important in its own right because analytical tools do not replace tax judgement - a mismatch can arise from timing, classification, invoice errors or genuine ineligibility, and the owner or accountant needs sufficient GST knowledge to interpret the exception and take the correct action.

Digital literacy tells a more nuanced story than a simple positive-effect hypothesis would suggest. On its own, digital literacy is meaningfully correlated with compliance behaviour, but this effect disappears once GST analytics capability is added to the model, and the mediation analysis confirms that digital literacy operates entirely through analytics

capability. In practice, this means that policy or training interventions aimed only at raising general digital comfort - teaching someone to log into the GST portal or operate a smartphone app - are unlikely to move the needle on compliance unless that comfort is deliberately converted into habitual reconciliation and exception-monitoring behaviour.

The negative role of compliance cost deserves particular attention. Businesses that experience GST compliance as expensive in time, staff effort and professional fees are measurably less likely to report disciplined filing and reconciliation behaviour. An analytics-oriented compliance system can help reduce some of this internal cost, but only if affordable tools and adequate training are available; otherwise, digitalisation risks shifting the burden rather than removing it. Trust in the digital GST administration also matters: MSMEs that view the system as reliable and transparent report better compliance behaviour, which points to institutional communication and grievance-redressal quality as a lever alongside training.

Perhaps the most striking result is the absence of a significant enforcement effect. Perceived enforcement - the fear of scrutiny, notices or penalties - shows almost no relationship with self-reported compliance behaviour in this sample. This does not necessarily mean enforcement is unimportant in the wider tax system, but it does suggest that, for the Telangana MSMEs surveyed here, voluntary compliance is driven far more by capability, cost and trust than by fear of the tax authority. Similarly, the absence of significant differences in compliance behaviour by enterprise size, sector or location (Section 9.8) suggests that once a business has some years of GST experience, its compliance discipline is shaped more by what it knows and does with its data than by how big it is, what it makes or sells, or where it is located.

11. Practical Implications

- MSME owners should maintain sales and purchase records continuously rather than preparing information only near filing deadlines; the data show that a substantial minority still update records mainly before filing, and this group is the most exposed to reconciliation errors.
- Businesses should adopt simple reconciliation dashboards to monitor input tax credit, outward supplies, tax liability and unresolved mismatches, since GST analytics capability is the strongest single predictor of compliance behaviour in this study.

- Accountants and GST practitioners, who already handle compliance for more than half of the surveyed businesses, should shift toward exception-based advisory services rather than limiting their role to periodic return preparation.
- District-level training should combine GST concepts with hands-on practice on accounting software, reconciliation tools and GST portal functions, since digital literacy alone does not improve compliance unless it is converted into analytics use.
- Regional-language GST awareness and hand-holding programmes remain relevant for the 15.7 per cent of the sample operating in rural areas and the 40.7 per cent classified as micro enterprises, even though their average compliance scores are not statistically different from larger or urban firms.
- Because compliance cost is a significant negative driver of compliance behaviour, policymakers should continue to encourage low-cost or subsidised digital compliance tools and strengthen local GST facilitation centres.
- Given the negligible role of perceived enforcement in this sample, tax administrators may find it more productive to invest in trust-building measures - transparent communication, faster refund and ITC processing, and responsive grievance redressal - than in enforcement-led messaging alone.

12. Conclusion

GST has created a digital compliance environment in which accurate business records, timely filing and effective use of transaction information are increasingly connected. The MSMEs surveyed in this study have gained from formalisation, input tax credit and easier inter-state trade, and a large majority have already adopted accounting software and use the GST portal regularly. Yet reconciliation discipline remains uneven, and a meaningful share of businesses still assemble their records only when a filing deadline approaches.

Field data from 300 GST-registered MSMEs across eleven districts of Telangana show that GST analytics capability and GST knowledge are the two strongest drivers of compliance behaviour, followed by trust and ease of compliance, while compliance cost works in the opposite direction. Digital literacy matters, but only indirectly, through its effect on analytics capability, and perceived enforcement shows no meaningful independent effect at all. Compliance behaviour itself does not differ significantly by enterprise size, sector or location, which shifts the policy conversation away from targeting particular categories of firms and

toward building the specific capability - GST analytics - that this study identifies as the most consistent predictor of disciplined compliance.

The broader implication is that digital GST reform should not be judged only by how much information businesses submit to the tax system; it should also be judged by whether businesses can understand and use their own information. For Telangana MSMEs, especially micro enterprises in semi-urban and rural areas, the combination of simple analytics tools, practical training, local-language support, affordable professional assistance and a trustworthy digital administration is likely to offer a more sustainable path to voluntary and accurate GST compliance than enforcement-led approaches alone.

References

1. Bhattacharya, S. (2019). Goods and Services Tax and MSMEs: Opportunities and challenges. Economic Affairs, 64(3), 567-574.

2. Chakraborty, P. (2021). GST reform and its economic implications in India. Indian Economic Review, 56(2), 233-250.

3. Dhavaleshwar, C. (2024). The implementation of the Goods and Services Tax (GST) in India and its impact on SMEs. Journal of Business and Economic Policy, 11(1), 1-15.

4. Dhillon, M., Kaur, P., & Singh, G. (2022). Challenges faced by MSMEs under GST regime: Evidence from Punjab. International Journal of Applied Research, 8(4), 1-8.

5. Dutta, A., & Bose, R. (2021). Impact of GST on profitability of small enterprises in India. Journal of Entrepreneurship and Innovation in Emerging Economies, 7(2), 159-176.

6. Garg, S., & Bansal, A. (2020). GST and Indian SMEs: A study of readiness and adaptability. International Journal of Trade and Global Markets, 13(3/4), 213-227.

7. Ghosh, S. (2021). GST and tax compliance culture in India. Journal of Development Policy and Practice, 6(1), 45-63.

8. Jayalakshmi, M., & Venkateswarlu, P. (2018). GST and its impact on MSMEs. International Journal of Engineering and Management Research, 8(2), 91-95.

9. Manisha, & Gour, Y. (2025). A study on the impact of GST implementation on MSMEs in Haryana. International Journal of Advanced Research and Multidisciplinary Trends, 2(2), 1339-1348.

10. Nath, A., & Verma, S. (2020). GST and SME competitiveness: Evidence from Indian manufacturing.

11. Pareek, S., & Sharma, R. (2019). Impact of GST on MSMEs: A critical assessment of Rajasthan State.

12. Sharma, D. (2018). Challenges of GST implementation for SMEs in India. Indian Journal of Accounting, 50(1), 112-120.

13. Sherpa, S., Lepcha, P., & Tamang, R. (2022). GST and its impact on MSMEs: A study in Sikkim. International Journal of Commerce, 10(2), 55-68.

14. Singh, A., & Gupta, P. (2019). GST transition challenges for service sector SMEs. Journal of Services Research, 19(2), 123-140.

15. Singh, R. (2021). Sectoral analysis of GST implications on Indian SMEs. Asia-Pacific Journal of Management Research and Innovation, 17(3), 245-259.

16. Srivastava, M., & Tiwari, R. (2021). GST and its role in SME formalisation. Journal of Economic Structures, 10(12), 1-18.

17. Subramanian, A., & Singh, R. (2019). GST and ease of doing business in India: SME perspectives. Journal of Business Environment, 11(3), 56-69.

18. Dhillon, M. S., & Gautam, R. K. (2022). A critical assessment of the impact of GST on MSMEs in the state of Punjab. Gyan Management Journal, 16(2), 1-9.

19. Balesh, K. (2026). The Impact of GST on Select MSMEs in Nizamabad - An Empirical Study. M.Com. (E-Commerce) project report, Department of Commerce, Telangana University, Nizamabad.

20. Government of India, Central Board of Indirect Taxes and Customs (CBIC). GST-related notifications, guidance and taxpayer information.

21. GST Council. GST rate, compliance and procedural reform materials.

Decomposing the Digital Divide: Computer Literacy and Discrimination among Scheduled and Non-Scheduled Groups in India (15–59 Years)

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This digital divide reinforces inequities and hinders inclusive economic growth. Access to computers and digital resources in India remains uneven across social groups, with Scheduled Castes and Scheduled Tribes (SC/STs) experiencing significantly lower levels of access. This study examines digital discrimination experienced by these marginalised groups. Using data from the NSS 78th Round, 2020-21, Multiple Indicator Survey (MIS) for individuals aged 15 59, study examines the key dimensions of computer literacy in India. Our analysis reveals that 84 % of Indians lack computer literacy. Among the scheduled groups, only 9.4% are digitally literate compared to 19% of non-scheduled groups. In urban areas, 28.5% of non-scheduled individuals are computer literate, versus 17% among scheduled groups. The male digital literacy gap between these groups is 16% (22% vs. 38%), while the female gap is 6%. Using Oaxaca and Ransom's (1994) decomposition, we find that 86% of the literacy gap is explained by observable factors, with 14% remaining unexplained. Education contributes most to the disparity, accounting for 44%. These gaps risk deepening caste and gender inequalities and creating new digital divides. We recommend community-level interventions, including improved access to electricity and the internet in marginalised areas, to build social capital and promote digital inclusion.

Keywords: Digital discrimination, Scheduled groups, Endowment, Fairlie Decomposition, India

JEL Classification: J71, O38, O20

Introduction

In today's rapidly digitizing world, the ability to access and use computers is increasingly recognized as a vital skill for personal and professional development. Information and communication technologies (ICTs) empower individuals to participate more fully in the economy and society (Jin & Cho, 2015; Amiri & Woodside, 2017). The differential access to technology compounds existing inequalities and creates barriers in educational and economic opportunities (Chakradhar and Prashant, 2024). This disparity is intensified in rural areas where access to information technology is limited, especially among older adults and women (Moreno et al., 2023). Consequently, the technological gap can exacerbate existing social exclusions, limiting lower caste individuals' ability to engage within the socio-economic framework. In the Indian context, examining the determinants of computer literacy across social groups is crucial, particularly given the persistent stratification of society between Scheduled Castes (SCs) and non-Scheduled Castes (non-SCs).

Digital literacy is widely seen as a key enabler of empowerment, enhancing access to vital services, information and socio-economic opportunities. However, marginalised communities often experience significant barriers to digital inclusion, rooted in socio-economic and cultural factors (Hannemann et al., 2021; Santos et al., 2022). For instance, the intersectionality of caste and socio-economic status significantly contributes to the persistence of inequalities in accessing technology and the resultant opportunities (Pankaj, 2019; Mishra, 2023). Such disparities lead to lower participation in health care, education and employment, reinforcing poverty and social exclusion (Haenssgen, 2018; Dev, 2018). Moreover, this dual layer of discrimination can restrict access to educational opportunities that foster technological skills essential for navigating the modern job market, thus perpetuating a cycle of socio-economic marginalization (Weiss et al., 2018).

Access to digital resources in India remains highly unequal across social categories. Only 4% of SC/ST students have access to computers with internet connectivity, compared to 21% among the general category (Oxfam India, 2022). Expenditure patterns further highlight these disparities, with SC/ST households spending roughly half as much as the general category on mobile devices. Internet access is similarly uneven—only 14% among Scheduled Tribes, compared to 41% for the general category (Rajam et al., 2021). Such disparities in digital access and computer literacy serve as regressive forces for the Indian economy. Despite sustained national efforts toward digitalisation and automation, nearly one-third of the population—

primarily SC/ST groups—remains marginalised in their ability to utilise digital resources such as computers, mobile phones, and the internet.

This phenomenon may be understood as digital discrimination, a contemporary extension of traditional caste-based exclusion. Historically, SC/ST groups faced deep-rooted barriers such as untouchability, restricted access to resources, limited educational and occupational opportunities, and enforced low-prestige living conditions (Mayell, 2003). Today, these structural disadvantages persist in new forms: unequal access to ICT services restricts upward mobility and widens developmental gaps. Communities with greater digital access leverage technology for education, employment, and social advancement, while marginalised groups remain disconnected from these opportunities (Vaidehi, Reddy, & Banerjee, 2021; Majumdar et al., 2024). The importance of digital literacy has grown substantially over the past two decades, coinciding with the rapid expansion of India's information technology sector. The Y2K crisis of 2000, which spurred global demand for Indian software engineers, marked a turning point. Since then, ICT has become deeply embedded across economic sectors, from banking and trade to agriculture, industry, and education (Pushpanadham, 2019). While general education remains critical, digital literacy now defines participation in modern economic and social life.

Existing scholarship has predominantly focused on digital divides in developed economies, with limited attention to caste-based disparities in developing countries such as India. Recent studies provide some insight: Rajam et al., (2021), using data from the Household Social Consumption Survey (2017–18), employed non-linear decomposition to show how caste-based digital disparities are rooted in historical and ongoing socio-economic disadvantages. Similarly, Tewathia et al., (2020), drawing on the IHDS 2011, highlighted how education, caste, and household occupation shape digital access and usage patterns. Yet, these contributions remain limited by their reliance on broad or imprecise definitions of computer literacy, typically confined to the ability to "operate" a computer.

The present study extends this literature by offering a more substantive conceptualisation of computer literacy, encompassing competencies such as sending e-mails with attachments and creating electronic presentations. Using data from the NSS 78th Round (2020–21), it examines the extent and determinants of computer literacy across social groups in India. Specifically, the study addresses four research questions: (i) What is the overall level of computer literacy in India? (ii) What socio-economic, demographic, and geographic factors

explain disparities in ICT skills? (iii) How does the ability to use computers vary across caste groups? and (iv) to what extent do caste-based inequalities continue to condition access to ICT skills? By situating digital discrimination within the broader framework of caste-based inequality, this study highlights how persistent structural disadvantages constrain India's transition to an inclusive digital economy.

Contributions of the Study

This study makes four interrelated contributions to the literature on digital inequality and social stratification in India. First, it advances measurement by operationalising computer literacy as a competency-based construct built from multiple, concrete ICT tasks rather than a single self-reported proxy; the index is transparently defined and readily replicable. Second, it provides up-to-date, nationally representative evidence for the working-age population using the most recent large-scale microdata, yielding disaggregated estimates by settlement type, region, gender, and social group, and thereby documenting intersectional gaps that existing studies often obscure. Third, it strengthens explanation and inference through a modelling strategy aligned with the binary nature of the outcome: logistic regressions supplemented by Fairlie's non-linear decomposition quantify how much of the caste-based literacy gap is attributable to observable "endowments" (e.g., education, broadband access, device ownership) versus residual differences; split-sample estimates further reveal heterogeneous payoffs to these covariates across social groups. Fourth, it enhances policy relevance and reproducibility by translating decomposition results into actionable levers (prioritising education and last-mile digital infrastructure), mapping regional heterogeneity to guide geographic targeting, and documenting a transparent workflow—variable definitions, index construction, and estimation choices—that constitutes a template for ongoing monitoring at state and district scales.

Review of Literature

The ICT revolution has transformed global connectivity, embedding itself deeply into multiple dimensions of contemporary society. Previous studies have sought to define the digital divide and explain its underlying causes in this context. The OECD (2001) describes the digital divide as the gap between individuals or groups with access to and effectively utilizing digital technologies and those without such access and proficiency. Van Dijk (2008) define the digital divide as the disparity between individuals with and without access to emerging forms of information technology. This presents a significant societal challenge because uniform internet

access and utilisation are not guaranteed, which excludes substantial segments of the population from the digital community. The inaccessibility of digital services is prominent in developing countries such as India, where society is segregated on caste lines, generating graded inequalities among castes (Rajam et al., 2021). In this context, multiple research investigations have established that limiting access to digital technology for specific population segments can negatively impact economic progress and well-being. It can exacerbate societal disparities, including gender, social, and employment opportunities for marginalised groups (Haenssgen, 2018; Rajam et al., 2021; Agarwal & Malhotra, 2016; Tewathia et al., 2020). Notably, the study by Rajam et al., (2021) shows a significant disparity in digital access at both primary and secondary levels between marginalised caste groups and the rest of the population in India. A similar study by Tewathia et al., (2020) revealed notable disparities in ICT ownership and usage across various socio-economic groups in India. Marginalized groups need more ICT assets and the necessary skills to utilise them. By using the 66th and 68th rounds of National Sample Survey Office (NSSO) data, Agrawal and Asrani (2018) showed that the Scheduled tribes (STs) and Scheduled castes (SCs) exhibit a lower probability of possessing these ICT devices as compared to other castes in India.

Women's participation in the workforce and economic activities has risen over time, yet they continue to face significant gender-specific challenges in developing countries (Morrison & Jütting, 2005). A key contemporary concern is their access to and use of Information and Communication Technology (ICT). Despite notable advancements, many women remain excluded from the digital sphere, particularly in developing countries (Brussevich et al., 2018; Islam & Manchanda, 2022). In addressing persistent issues of gender inequality in developing nations, ICT plays a pivotal role by potentially resolving challenges related to equitable access to opportunities such as employment, income, education, and essential healthcare services (Hilbert, 2011). In their study, Bala and Singhal (2018) investigated the gender-based digital gap across six districts of Uttar Pradesh, India. Their findings indicated a prevalent divide between genders in these districts concerning the utilisation and accessibility of Information and Communication Technology (ICT) resources. Previous research indicates that even when both genders possess access to computers, men tend to wield an advantage over women regarding computer utilisation.

Moreover, the study reveals a notable discrepancy, with 82% of men and only 16% of women serving as the primary users of household computers (Venkatesh, 2000). Additional

investigations have highlighted that Information and Communication Technology (ICT) resources are accessible to a limited number of women, predominantly from the privileged urban segment with higher socio-economic status (Agarwal & Malhotra, 2016). The digital gender gap is also shaped by socio-cultural factors that carry significant weight. Within India, approximately 12% of women attribute their non-usage of the Internet to its unfavourable societal stigma, and 8% cite familial restrictions as a barrier to computer usage (Intel & Dalberg, 2012). Moreover, research indicates that gender bias can further compound caste-based discrimination, leading to even greater hurdles for women from lower castes and residing in rural areas in accessing and utilising ICT resources. These studies have shown that these women often face a dual burden of both gender and caste-based disadvantages, which can limit their opportunities for education, employment, and access to technology (Best and Maier, 2007; Singh et al., 2013; Rajam et al., 2021).

Disparities in educational attainment stand out as one of the most influential factors contributing to the digital divide among individuals. The extent to which people can access and effectively utilise digital technologies is closely intertwined with their level of education. Research by Van Dijk (2005) and Warschauer (2003) underlines how educational attainment is a crucial determinant of digital skills and internet usage patterns. Individuals with higher levels of education are more likely to possess the necessary cognitive and technological skills to navigate and engage with digital platforms. In the context of India, studies conducted by Asrani (2020) and Asrani and Kar (2022) have provided further evidence of the strong correlation between levels of education and access to, as well as the capacity to use, ICT tools. Individuals from higher castes and with higher levels of education are more likely to have access to formal education and resources that facilitate digital literacy. Higher education equips individuals with the cognitive abilities and critical thinking skills necessary to navigate and benefit from digital platforms effectively, which is not the case for individuals from lower castes.

Increased income improves the affordability of ICT devices, resulting in a higher likelihood of ownership among households with higher incomes (Nishijimaa et al., 2017; Asrani, 2020; Asrani & Kar, 2022). Marginalised castes often have limited access to ICT infrastructure, such as computers, smartphones, and the Internet. Conversely, households from lower-income backgrounds, often associated with marginalised castes, may face financial barriers to accessing ICT (Rajam et al., 2021).

Inclusive access to digital resources increases economic growth, and disparities in access to digital resources create significant socio-economic inequalities (Tewathia et al., 2020). The inequalities intensify if the level of digital literacy is also different in the different regions. The level of digital literacy depends on the location and income of the households. People from rural areas and poor income groups have lower access and know-how of digital resources than urban and rich households (Asrani, 2022). Considering the significant prevalence of poor and rural people, the access and know-how of digital literacy can create new levels of disparities in the economy (Tewathia et al., 2020). In the last decade, that is, in the 2010s, the government has given considerable focus on digitalising government services. Simultaneously, many new economic activities started, while many traditional activities disappeared due to digitalisation. Those who have access to and learned to use digital resources are better off than those who do not have access to digital resources in the present economic environment.

The access and know-how of digital resources vary for males and females across the rural and urban regions. A study by Islam and Manchanda (2023) reports that 51% of urban females have used the Internet at least once, whereas the figure is only 25% for rural females. They also argued that the usage of the Internet is decided not only by their ability to use it but by the availability of Internet facilities itself. The comparison of males and females for digital literacy further shows that females have lower access to digital literacy than males in rural and urban India (Singh, 2017). Although the access and know-how of digital literacy are low among females in India, the overall female labour force participation of India has been positively impacted by the expansion of the digitalisation of India (Islam & Manchanda, 2023). However, the benefits of digitalisation have mostly been enjoyed by the privileged sections of society (Oxfam India, 2022). For example, among the poorest households in India, only 2.7% have access to a computer, whereas the figure is 50.5% for the wealthiest 20% of households in India.

A study by Sharma and Banerjee (2022) identifies that access and know-how of digital resources are low among the marginalised groups in India. The lower access to digital resources is further limited to people with a working knowledge of English – most of the digital resources operate in this language only. It is already documented in the literature that access to the English language is the lowest among people in marginalised sections. The possession of mobile or computer devices strongly correlates with the education and income of the heads of

households in India (Agrawal & Asrani, 2018; Guha & Mukerji, 2021). Although lower-income families have less access to digital resources, many have greatly benefited from the ICT services. For instance, most of the knowledge about business, economy and society was earlier confined to educational institutions, big cities and rich houses. Due to the increased use of digital devices, especially mobile phones, computers, and the Internet, all kinds of information and knowledge are equally available to both rich and poor, lower and upper castes, and illiterates and postgraduates. Now, by using ICT services, people living in rural and remote areas and having different income levels can easily apply for college admissions, employment, government services, online learning certification, etc., from home.

While existing studies document caste, gender, income, and regional disparities in ICT access, most rely on narrow or self-reported measures of digital literacy. Limited attention has been paid to the intersectional disadvantages faced by marginalised groups, particularly women from lower castes in rural areas. Moreover, empirical evidence remains scarce on how structural barriers beyond education and income perpetuate digital exclusion in India.

Data Source

The study draws on unit-level data from the Multiple Indicator Survey (MIS), National Sample Survey (NSS) 78th Round, 2020–21, a nationally representative dataset covering 2,76,409 households (1,64,529 rural and 1,11,880 urban). In total, 11,63,416 individuals were enumerated (7,13,501 rural and 4,49,915 urban). For analytical precision, the paper restricts the sample to the working-age population (15–59 years), thereby excluding individuals below 15 and above 59 years. The analysis focuses on differences in computer literacy between Scheduled groups (Scheduled Castes and Scheduled Tribes) and non-Scheduled groups (Other Backwards Classes and General category).

The primary outcome variable, computer literacy, is constructed from nine competency-based questions asked of respondents. Each question was coded dichotomously (Yes = 1, No = 0), covering skills such as copying files, using spreadsheets, sending e-mails with attachments, installing software, and creating presentations. The responses were aggregated into a composite measure of digital proficiency, enabling systematic comparison across social groups.

Questions were as follows:

1. whether able to copy or move a file or folder

2. whether able to use the copy and paste tools to duplicate or move information within a document
3. whether able to send e-mails with attached files (e.g., documents, pictures, and videos)
4. whether able to use basic arithmetic formulae in a spreadsheet
5. whether able to connect and install new devices (e.g., modem, camera, printer)
6. whether able to find, download, install and configure software
7. whether able to create electronic presentations with presentation software (including text, images, sound, video, or charts)
8. whether able to transfer files between a computer and other devices
9. whether able to write a computer program using a specialised programming language

The nine questions were designed to assess respondents' ICT skills, which collectively form the study's outcome variable, computer literacy. An index was constructed by summing the responses, yielding scores ranging from 0 (no ICT skills demonstrated) to 9 (all skills demonstrated). To derive a dichotomous outcome, this index was categorised into two groups: individuals scoring ≤3 They were classified as digitally illiterate, while those scoring >3 were considered digitally literate. The threshold of three was chosen to ensure that respondents demonstrate proficiency in at least one-third of the ICT skills before being recognised as computer literate.

The study incorporates a wide range of independent variables capturing demographic, socio-economic, and infrastructural characteristics that influence computer literacy. Demographic variables include residence (rural or urban), sex (male or female), religion (Hindu, Muslim, Christian, and Others—where Others combines Sikhism, Buddhism, Zoroastrianism, and other minorities), and region (North, South, East, West, and North-East). Education is classified into four categories: illiterate, up to primary, above primary to higher secondary, and graduate and above. Employment status is distinguished between employed and unemployed, while access to a bank account is included as a measure of financial inclusion, recognising its potential correlation with digital literacy. Technological access is assessed through ownership of a mobile phone with an active SIM in the past three months, and household-level media access is measured by the availability of internet, newspapers, magazines, radio, or television. Finally, the type of educational institution is incorporated, distinguishing between government (including government-aided) and private (un-aided or unspecified). Together, these variables provide a multidimensional framework for analysing

how demographic background, economic resources, and infrastructural opportunities shape disparities in computer literacy across social groups. The detailed description and coding of the variables are provided in the Appendix, Table A1.

Empirical Methodology

Blinder (1973) and Oaxaca (1973) developed a linear regression decomposition approach to measure discrimination in the labour market between whites and blacks or white males and females. The mean difference in a result between the two groups is divided into "explained" and "unexplained" differences using the Oaxaca-Blinder decomposition. If we apply the same methodology to measure the extent of discrimination between non-SC/ST (non-scheduled) and SC/ST groups (scheduled) in having computer literacy, the equation can be written as (for SC/ST):

$$\ln \bar{Y}_{nscst} - \ln \bar{Y}_{scst} = \Sigma\hat{\beta}_{nscst} (\bar{X}_{nscst} - \bar{X}_{scst}) + \Sigma\bar{X}_{SC} (\hat{\beta}_{nscst} - \hat{\beta}_{scst}) \qquad (1)$$

The above equation suffers from the index number problem. To overcome this, Reimer (1983 and 1985), Cotton (1988), Neumark (1988), and Oaxaca and Ransom (1994) have come up with an improved decomposition technique, which is applied here to estimate the access of computer literacy coefficient to first estimate the advantage of being non-SC/ST household in accessing computer literacy vis-à-vis SC/ST households. The Oaxaca, Ransom and Cotton decomposition method can be mentioned as:

$$\ln \bar{Y}_{nscst} - \ln \bar{Y}_{scst} = \Sigma\beta^*(\bar{X}_{nscst} - \bar{X}_{scst}) + \Sigma\bar{X}_{nscst} (\hat{\beta}_{nscst} - \beta^*) + \Sigma\bar{X}_{scst} (\beta^* - \hat{\beta}_{scst}) \qquad (2)$$

However, we could not use the Oaxaca-Blinder method in our study as our outcome variable is a non-linear binary (0, 1). For our analysis, we have applied Fairlie decomposition (Fairlie, 2005), which is suitable in this case.

$$\bar{Y}_n - \bar{Y}_s = [(\bar{X}_n - \bar{X}_s)\hat{\beta}_n] + [\bar{X}_s(\hat{\beta}_n - \hat{\beta}_s)] \qquad (3)$$

The first term (in the bracket) denotes the explained difference (or the covariate effect) which exists due to endowment differences between SC/ST and non-SC/ST, whereas the second term in the bracket is due to unexplained or unmeasurable endowments (coefficient effect) between the two. This unexplained part is termed the “discrimination” between the scheduled and non-scheduled groups.

Results and Discussions

The analysis reveals that 84% of Indians remain digitally illiterate. Within the working-age population, computer literacy is markedly lower among Scheduled groups, with only 9.4% classified as digitally literate, compared to 19% among non-Scheduled groups—a twofold difference. Table 1 reports literacy levels across selected variables, consistently showing that the Scheduled groups lag their non-Scheduled counterparts. The gap is particularly pronounced in urban areas, where 28.5% of non-Scheduled individuals are computer literate, compared to just 17% among Scheduled groups, reflecting a disparity of more than ten percentage points.

Table 1. Computer Literacy between Scheduled and non-Scheduled Groups in India (15-59 Years)

Variable	Scheduled	Non-Scheduled
Residence		
Urban	16.8	28.5
Rural	4.1	8.1
Education		
Illiterate	0.03	0.02
Up to Primary	0.24	0.4
Above Primary to HS	10.26	14.1
Graduate and above	53.1	63.4
Sex		
Male	21.8	37.8
Female	4.1	10.6
Religion		
Others	9.1	19.3
Hindu	6.5	16.9
Muslim	5.4	7.8
Christian	14.0	42.0
Employment Status		
Unemployed	6.5	12.8
Employed	7.4	22.4
Mobile with SIM		
No	0.9	1.9
Yes	21.5	34.3
Shared	5.4	9.6
Mass Media Access		
No	0.4	0.8
Yes	9.4	18.6
Broadband Access		
No	0.2	0.3
Yes	19.0	29.1

Variable	Scheduled	Non-Scheduled
Institution Type		
Government	40.0	55.7
Private	6.2	15.2
Bank Account		
No	3.9	6.5
Yes	7.2	17.1
Region		
North	4.4	11.4
South	14.4	26.4
East	3.7	9.1
West	10.6	21.3
North-East	18.8	20.9

Source: Author's calculation based on NSSO-78th Round (2020–21).

Note: Household size, monthly per capita consumption expenditure (MPCE) and age are not added in the descriptive analysis as they are treated as continuous variables.

It is also evident and logical that computer literacy increases as the educational attainment of an individual increases, which holds true for both scheduled and non-scheduled groups. However, there are some interesting observations between these groups. Computer literacy is approximately the same for them as for the illiterate group of people. i.e., an illiterate person also lacks computer literacy irrespective of her caste. There is more than a percentage point difference in computer literacy between scheduled and non-scheduled individuals who have an education of graduate level or above.

Computer literacy among scheduled males is 22 per cent, whereas for non-scheduled it is 38 per cent (the difference is 16 per cent), whereas the difference for females between scheduled and non-scheduled is 6 per cent. If we compare computer literacy between males and females of the scheduled, the difference is approximately 18 per cent. Among all the religions in the country, scheduled and non-scheduled Christians have the highest percentage of computer literacy, 14 per cent and 42 per cent respectively. Employment does affect an individual's computer literacy in general. For the scheduled group, there is not much difference between the employed computer literate and the unemployed computer literate. However, this difference is more than 9 per cent for non-scheduled. There is a 15 per cent difference in computer literacy between employed scheduled and employed non-scheduled individuals.

Access to mobile phones (with SIM), broadband, and mass media also influences computer literacy among both Scheduled and non-Scheduled groups, though the effects differ across communities. When neither group owns a mobile phone with a SIM card, their literacy

levels are similar. However, among individuals with mobile access, computer literacy is substantially higher for the non-Scheduled group than for the Scheduled group. Broadband access further highlights the disparity: Scheduled Castes report 19% literacy, while the corresponding figure for non-Scheduled groups is 29%, a difference of 10 percentage points.

Regional variation is also evident. Southern and North-Eastern states outperform other regions, with more than one-quarter of non-Scheduled individuals in the South being computer literate, compared to 14% among Scheduled groups. By contrast, the North and East record the lowest literacy levels for both groups. Figure A (Appendix) illustrates this state-wise variation, with southern states reporting relatively high digital literacy and several northern and eastern states showing extremely low levels.

Table 2 presents the results of logistic regression analysis of computer literacy on the explanatory variables. Consistent with earlier work (Tewathia et al., 2020), caste emerges as a significant determinant of digital inequality. Among Scheduled groups, urban residents are more likely than rural residents to be computer literate. Educational attainment exerts a strong positive effect: compared to illiterate individuals, graduates and above have 6.07 times higher log-odds of being computer literate. Gender differences are also evident, with females showing lower odds of literacy than males, a finding aligned with previous studies (Bimber, 2000; Hargittai & Shafer, 2006; Singh et al., 2013; Martínez-Cantos, 2017).

Employment status matters as well. Employed Scheduled individuals are more likely to be computer literate, likely because earnings enable investment in ICT-related resources such as mobiles, broadband connections, or training. Mobile phone ownership itself significantly raises the probability of computer literacy, as does access to mass media (radio, television, internet, newspapers, or magazines). Broadband access is particularly influential: Scheduled individuals with broadband are 3.8 times more likely to be literate than those without, underscoring the centrality of internet connectivity. Regional patterns show that, relative to the North, Scheduled individuals in the South, West, and North-East have significantly higher odds of computer literacy. Age, however, has a negative effect—older individuals are less likely to acquire ICT skills. Finally, while household monthly per capita expenditure (MPCE) is positively associated with computer literacy, the effect size is modest, suggesting that income alone does not fully explain disparities in digital skills.

Table 2. Determinants of Computer Literacy: Logistic Regression

Variable	SC/ST Coefficients	SC/ST Standard Error	non-SC/ST Coefficients	non-SC/ST Standard Error
1. Residence (Ref: Rural)				
Urban	0.16***	0.04	0.20***	0.02
2. Education (Ref: Illiterate)				
Up to Primary	1.10***	0.41	2.04***	0.36
Above Primary to Higher Sec.	4.16***	0.38	4.98***	0.34
Graduate and above	6.07***	0.38	6.94***	0.34
3. Sex (Ref: Male)				
Female	−0.82***	0.04	−0.90***	0.02
4. Religion (Ref: Other)				
Hindu	−0.18**	0.07	−0.25***	0.06
Muslim	0.17	0.14	−0.33***	0.07
Christian	−0.07	0.09	0.18**	0.08
5. Employment Status (Ref: Unemployed)				
Employed	0.31***	0.04	0.46***	0.02
6. Mobile With SIM (Ref: No)				
Yes	1.12***	0.08	1.03***	0.04
Shared	0.65***	0.08	0.56***	0.04
7. Mass Media Access (Ref: No)				
Yes	0.38***	0.12	0.65***	0.09
8. Broadband Access (Ref: No)				
Yes	3.82***	0.09	4.11***	0.07
9. Institution Type (Ref: Govt.)				
Private	−0.99***	0.07	−1.00***	0.05
10. Bank Account (Ref: No)				
Yes	0.31***	0.07	0.39***	0.04
11. Region (Ref: North)				
South	0.70***	0.05	0.81***	0.02
East	−0.07	0.06	−0.01	0.03
West	0.39***	0.06	0.54***	0.03
North-East	0.85***	0.08	0.94***	0.08
12. Household Size	−0.12***	0.01	−0.11***	0.01
13. MPCE	0.0003***	0.00	0.0003***	0.00
14. Age	−0.07***	0.00	−0.08***	0.00
Constant	−7.36***	0.42	−8.34***	0.37
Log Likelihood	−10028.67		−36099.25	
Sample (N)	76,713		1,75,577	

Source: Author's calculation based on NSSO-78th Round (2020–21). MPCE = Households' monthly per capita expenditure.

Note: The dependent variable is computer literacy. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Non-scheduled group shows the same sign of relationship between the independent and outcome variable. However, the magnitude is different in comparison to the scheduled group. Non-scheduled urban individuals have higher odds of having computer literacy compared to the rural population. As the education level increases, the odds of individuals having computer literacy increase. For example, compared to the illiterate, those who have attained education up to graduation and above have a log odds of computer literacy of 6.9. Like scheduled females, females belonging to non-scheduled groups have lower odds of computer literacy compared to their male counterparts. Similarly, compared to the unemployed, employed non-scheduled individuals have higher odds of computer literacy (changes by 0.46). Mobile access positively affects computer literacy. Compared to those who don't have a mobile, individuals who have one have higher odds of computer literacy. Similarly, for mass media access, if a person has access to mass media, s/he have higher odds of computer literacy. Household size negatively affects computer literacy. The addition of a household member brings down the odds of computer literacy by 0.11. Similarly, with increasing age, computer literacy decreases. With an increase in age by one year, the log odds of computer literacy decrease by 0.08.

Table 3. Differences in Computer Literacy between SC/ST and non-SC/ST

Sl. No.	Covariates	Coefficient	Percentage of the total (%) covariates contribution
1	Residence	0.003***	4.2
2	Education	0.028***	44.1
3	Sex	0.0003***	0.6
4	Religion	−0.004***	−6.8
5	Employment Status	−0.001***	−2.1
6	Mobile with SIM	0.004***	5.6
7	Mass Media Access	0.002***	3.1
8	Broadband Access	0.027***	42.1
9	Institution Type	0.0003***	−0.5
10	Bank Account	0.0002***	0.5
11	Region	−0.001**	−2.0
12	Household Size	0.001***	0.8
13	MPCE	0.003***	4.5
14	Age	0.004***	5.9
	Total (=1 to 14)	0.063	100.0
Decomposition Analysis			
1	Total Explained Gap	0.063	85.6
2	Total Unexplained Gap	0.010	14.4
	Total Raw Differentials (=1+2)	0.073	100.0

Sl. No.	Covariates	Coefficient	Percentage of the total (%) covariates contribution
	Mean Prediction of non-SC/ST	0.17	
	Mean Prediction of SC/ST	0.096	
	Samples (N)	252, 290	

Source: Author's calculation based on NSSO-78th Round (2020–21).
Note: The dependent variable is computer literacy. *** p < 0.01; ** p < 0.05; * p < 0.1.

Table 3 shows the Fairlie decomposition analysis of the study. The result shows that, including all the variables in the study, 86 per cent of computer literacy is explained by them, which suggests that there are other important factors that impact computer literacy. Literature suggests (Blinder-Oaxaca, 1973; Fairlie, 2005) that this unexplained part is the discrimination coefficient between SC/ST and non-SC/ST. The result finds that this discrimination is 14 per cent. Each variable has a different endowment contribution to computer literacy between scheduled and non-scheduled. The highest difference in having computer literacy between SC/ST and non-SC/ST is explained by educational attainment. The gap between these two groups is 44%. Broadband access is the next disadvantage to SC/ST individuals, where 42% is the gap between the two groups in computer literacy. This indicates that non-SC/ST individuals have an advantage over SC/ST in terms of broadband access as an endowment benefiting the former. Availability of mobile (with SIM) is another factor that explains the gap in computer literacy between scheduled and non-scheduled groups, to the disadvantage of the SC/ST by 5.6%. Other factors also contribute to explaining the gap in computer literacy between scheduled and non-scheduled groups, which are statistically significant, but in terms of absolute value, they are small.

Conclusions and Policy Implications

A study finds that computer literacy is highly dependent on internet connection; the state should implement policies that aim at providing internet connection to individuals. Apart from increasing computer literacy in the country, it would enhance their capability in general, which would increase their employability in the market. In India, there are glaring disparities in computer and digital resource access, with marginalised communities, particularly the Scheduled Castes and Scheduled Tribes (SC/STs), facing significant hurdles. This inequity poses regressive challenges to India's economic development. In light of the increasing significance of digital education, our research delves into the extent of digital discrimination

experienced by these marginalised groups within the Indian economy. Leveraging extensive data from the NSS 78th Round (2020-21) Multiple Indicator Survey (MIS) targeting individuals aged 15-59, we explore various dimensions of computer literacy within this dataset. Our findings indicate that a substantial 84% of the Indian population lacks digital literacy. Notably, Scheduled groups exhibit a digital literacy rate of 9.4%, while non-Scheduled groups fare significantly better at 19%. Furthermore, the digital literacy gap between the Scheduled and non-Scheduled is significant. Among females, this disparity is relatively smaller, at 6%. To scrutinise this disparity, we employ Oaxaca and Ransom's (1994) improved decomposition technique to estimate the coefficient of computer literacy access. Our results suggest that, even after accounting for all the variables in the study, 86% of the disparity in computer literacy can be explained by these factors, hinting at the presence of other influential variables affecting computer literacy. The study further reveals that 14% of this discrimination remains unexplained. Notably, educational attainment emerges as the primary contributor to the gap in computer literacy between SC/ST and non-SC/ST individuals, accounting for a substantial 44%. This situation has the potential to exacerbate existing gender and caste inequalities and give rise to new forms of digital disparities in India. To address these issues, we recommend implementing community-level measures, including ensuring access to electricity and the internet in areas predominantly inhabited by marginalised groups, as part of an effort to enhance the social capital of these communities.

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References

Agarwal, R., & Malhotra, G. (2016). Women and access to ICT: A case study of India. African Journal of Business Management, 10(11), 288–297. https://doi.org/10.1080/09718524.2018.1496695

Agrawal, A., & Asrani, C. (2018). Digital divide among the Indian households: Extent and correlates. Economic Bulletin, 38(4).

Amiri, S., & Woodside, J. M. (2017). Emerging markets: The impact of ICT on the economy and society. Digital Policy, Regulation and Governance, 19(5), 383–396. https://doi.org/10.1108/DPRG-05-2017-0026

Antonio, A., & Tuffley, D. (2014). The gender digital divide in developing countries. Future Internet, 6(4), 673–687. https://doi.org/10.3390/fi6040673

Asrani, C. (2022). Spanning the digital divide in India: Barriers to ICT adoption and usage. Journal of Public Affairs, 22(4). https://doi.org/10.1002/pa.2598

Asrani, C., & Kar, A. K. (2022). Diffusion and adoption of digital communications services in India. Information Technology for Development, 28(3), 488–510. https://doi.org/10.1080/02681102.2021.1934829

Bala, S., & Singhal, P. (2018). Gender digital divide in India: A case of inter-regional analysis of Uttar Pradesh. Journal of Information, Communication and Ethics in Society, 16(2), 173–192. https://doi.org/10.1108/JICES-01-2018-0001

Basak, G. (2024). Digital transformation of 21st education sector in India. EPRA International Journal of Research and Development (IJRD), 9(3), 326–334. https://doi.org/10.36713/epra2016

Best, M. L., & Maier, S. (2007). Gender, culture and ICT use in rural south India. Gender, Technology and Development, 11(2), 137–155. https://doi.org/10.1177/097185240601100201

Bimber, B. (2000). Measuring the gender gap on the internet. Social Science Quarterly, 81(3), 868–876.

Blinder, A. S. (1973). Wage discrimination: Reduced form and structural estimates. Journal of Human Resources, 8(4), 436–455. https://doi.org/10.2307/144855

Brussevich, M., Dabla-Norris, E., Kamunge, C., Karnane, P., Khalid, S., & Kochhar, K. (2018). Gender, technology, and the future of work. IMF Staff Discussion Notes, 2018(07), 1. https://doi.org/10.5089/9781484379769.006

Chakradhar, J., & Choudhary, P. K. (2024). Inequalities in computer literacy in India. Economic and Political Weekly, 59(31), 5.

Cotton, C. J. (1988). On the decomposition of wage differentials. Review of Economics and Statistics, 70(2), 236–243. https://doi.org/10.2307/1928307

Dev, S. M. (2018). Labour market inequalities in India: Dimensions and policies. Indian Journal of Human Development, 12(2), 217–235. https://doi.org/10.1177/0973703020180205

dos Santos, I. C., de Araújo Leão, N. C., da Silva, E. E., & Silveira, G. B. (2022). Determinants of e-inclusion and digital inequality in the use of urban mobility applications in mobility. Research, Society and Development, 11(13), e184111335243. https://doi.org/10.33448/rsd-v11i13.35243

Fairlie, R. W. (2005). An extension of the Blinder-Oaxaca decomposition technique to logit and probit models. Journal of Economic and Social Measurement, 30(4), 305–316. https://doi.org/10.3233/JEM-2005-0232

Guha, A., & Mukerji, M. (2021). Determinants of digital divide using demand-supply framework: Evidence from India. Australasian Journal of Information Systems, 25. https://doi.org/10.3127/ajis.v25i0.3029

Haenssgen, M. J. (2018). The struggle for digital inclusion: Phones, healthcare, and marginalisation in rural India. World Development, 104, 358–374. https://doi.org/10.1016/j.worlddev.2017.12.024

Hannemann, N., Götz, N. A., Schmidt, L., Hübner, U., & Babitsch, B. (2021). Perception of a tracing app during the COVID-19 pandemic in Germany. In Public Health and Informatics (pp. 816–817). IOS Press. https://doi.org/10.3233/SHTI210266

Hargittai, E., & Shafer, S. (2006). Differences in actual and perceived online skills: The role of gender. Social Science Quarterly, 87(2), 432–448. https://doi.org/10.1111/j.1540-6237.2006.00389.x

Hilbert, M. (2011). Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics. Women's Studies International Forum, 34(6), 479–489. https://doi.org/10.1016/j.wsif.2011.07.001

Intel, & Dalberg. (2012). Bridging the Internet gap and creating new global opportunities in low and middle-income countries. SME Finance Forum. https://www.smefinanceforum.org/post/women-and-the-web-bridging-the-internet-gap-and-creating-new-global-opportunities-in-low-and

Islam, A., & Manchanda, P. (2023). Gender inequalities in Digital India: A survey on digital literacy, access, and use. Digital Futures at Work Research Centre (Digit). https://doi.org/10.20919/MCUU2363

Jin, S., & Cho, C. M. (2015). Is ICT a new essential for national economic growth in an information society? Government Information Quarterly, 32(3), 253–260. https://doi.org/10.1016/j.giq.2015.05.006

Majumdar, K., Nambiar, M., Ranjan, P., Kumar, S., & Kumari, D. (2024, April 29). Historical inequalities and the unequal access to digital communications. LSE Geography & Environment Blog. https://www.lse.ac.uk/geography-and-environment/research/social-media-and-crisis-of-urban-inequality-blog/historical-inequalities-and-unequal-access-to-digital-communications

Malik, S., & Akhtar, N. (2022, June). Digital divide and the Scheduled Tribes in India: Extent, consequences, and challenges (Discussion Paper). Social and Political Research Foundation. https://sprf.in/wp-content/uploads/2024/12/SPRF-2022_DP_Digital-Divide-and-ST.pdf

Martínez-Cantos, J. L. (2017). Digital skills gaps: A pending subject for gender digital inclusion in the European Union. European Journal of Communication, 32(5), 419– 438. https://doi.org/10.1177/0267323117718464

Mayell, H. (2003, June 2). India's "untouchables" face violence, discrimination. National Geographic. https://www.nationalgeographic.com/pages/article/indias-untouchables-face-violence-discrimination

Mishra, V. K. (2023). Caste and religion matters in access to housing, drinking water, and toilets. CASTE: A Global Journal on Social Exclusion, 4(1), 24–45. https://doi.org/10.26812/caste.v4i1.398

Moreno, R. M., Borrero, M. F., Ferri Fuentevilla, E., Medina, F. R., Luchena, A. M., & Aguado, O. V. (2023). Technologies and social services: An overview of technology use by users of social services. PLOS ONE, 18(5), e0284966. https://doi.org/10.1371/journal.pone.0284966

Morrisson, C., & Jütting, J. P. (2005). Women's discrimination in developing countries: A new data set for better policies. World Development, 33(7), 1065–1081. https://doi.org/10.1016/j.worlddev.2005.04.002

Mosse, D. (2018). Caste and development: Contemporary perspectives on a structure of discrimination and advantage. World Development, 110, 422–436. https://doi.org/10.1016/j.worlddev.2018.06.003

Neumark, D. (1988). Employers' discriminatory behaviour and the estimation of wage discrimination. Journal of Human Resources, 23(3), 279–295. https://doi.org/10.2307/145830

Nishijima, M., Ivanauskas, T. M., & Sarti, F. M. (2017). Evolution and determinants of digital divide in Brazil (2005–2013). Telecommunications Policy, 41(1), 12–24. https://doi.org/10.1016/j.telpol.2016.10.004

OECD. (2001). Understanding the digital divide. OECD Digital Economy Papers, No. 49. OECD Publishing. https://doi.org/10.1787/236405667766

Oxfam India. (2022). Digital divide: India inequality report 2022. Oxfam India. https://www.oxfamindia.org

Oaxaca, R. (1973). Male-female wage differentials in urban labour markets. International Economic Review, 14(3), 693–709. https://doi.org/10.2307/2525981

Oaxaca, R. L., & Ransom, M. R. (1994). On discrimination and the decomposition of wage differentials. Journal of Econometrics, 61(1), 5–21. https://doi.org/10.1016/0304-4076(94)90074-4

Padhy, A., & Panbude, S. (2025, June 13). The digital wall: How caste shapes access to technology in India. India Development Review. https://idronline.org/article/inequality/the-digital-wall-how-caste-shapes-access-to-technology-in-india/

Pankaj, A. K. (2019). Caste and discrimination in welfare: Social exclusion of Dalits in Uttar Pradesh. Contemporary Voice of Dalit, 11(2), 139–149. https://doi.org/10.1177/2455328X19860066

Pushpanadham, K. (2019). Massive open online courses: The emerging landscape of digital learning in India. IIEP Foresight Papers. UNESCO. https://www.iiep.unesco.org

Rajam, V., Reddy, A. B., & Banerjee, S. (2021). Explaining caste-based digital divide in India. Telematics and Informatics, 65, 101719. https://doi.org/10.1016/j.tele.2021.101719

Reimer, C. W. (1983). Labour market discrimination against Hispanic and black men. Review of Economics and Statistics, 65(4), 570–579. https://doi.org/10.2307/1924167

Saravana, K., & Kumar, D. (2022, December 31). Digital exclusion and caste in India: A meta-analytical study. The Social Science Dialogue. https://www.thesocialsciencedialogue.com/post/digital-exclusion-and-caste-in-india-a-meta-analytical-study

Sharma, A., & Banerjee, A. (2022). Socio-economic determinants of digital divide in India. Demography India, 51(1).

Singh, D. (2025). Dalits' encounters with casteism on social media: A thematic analysis. Information, Communication & Society, 28(2), 335–353. https://doi.org/10.1080/1369118X.2025.2462244

Singh, N., Zhou, Y., Williams, K., Kendall, J., & Kaushik, P. D. (2013). Bridging the digital divide in rural India: Lessons from a survey in four states. Review of Market Integration, 5(1), 1–42. https://doi.org/10.1177/0974929213481776

Singh, S. (2010). Digital divide in India: Measurement, determinants and policy for addressing the challenges in bridging the digital divide. International Journal of Innovation in the Digital Economy, 1(2), 1–24. https://doi.org/10.4018/jide.2010040101

Singh, S. (2017). Bridging the gender digital divide in developing countries. Journal of Children and Media, 11(2), 245–247. https://doi.org/10.1080/17482798.2017.1305604

Starr, K. J., & Sahgal, N. (2021, June 29). Measuring caste in India. Pew Research Center. https://www.pewresearch.org/decoded/2021/06/29/measuring-caste-in-india/

Tewathia, N., Kamath, A., & Ilavarasan, P. V. (2020). Social inequalities, fundamental inequities, and recurring of the digital divide: Insights from India. Technology in Society, 61, 101251. https://doi.org/10.1016/j.techsoc.2020.101251

Tiwari, C., Goli, S., Siddiqui, M. Z., & Salve, P. S. (2022). Poverty, wealth inequality and financial inclusion among castes in Hindu and Muslim communities in Uttar Pradesh, India. Journal of International Development, 34(6), 1227–1255. https://doi.org/10.1002/jid.3626

Vaidehi, R., Reddy, A. B., & Banerjee, S. (2021, June 30). Explaining caste-based digital divide in India [Preprint]. arXiv. https://arxiv.org/abs/2106.15917

Van Dijk, J. A. G. M. (2005). The deepening divide: Inequality in the information society. Sage.

Warschauer, M. (2003). Dissecting the digital divide: A case study in Egypt. The Information Society, 19(4), 297–304. https://doi.org/10.1080/01972240309490

Weiss, D., Rydland, H. T., Øversveen, E., Jensen, M. R., Solhaug, S., & Krokstad, S. (2018). Innovative technologies and social inequalities in health: A scoping review of the literature. PLOS ONE, 13(4), e0195447. https://doi.org/10.1371/journal.pone.0195447

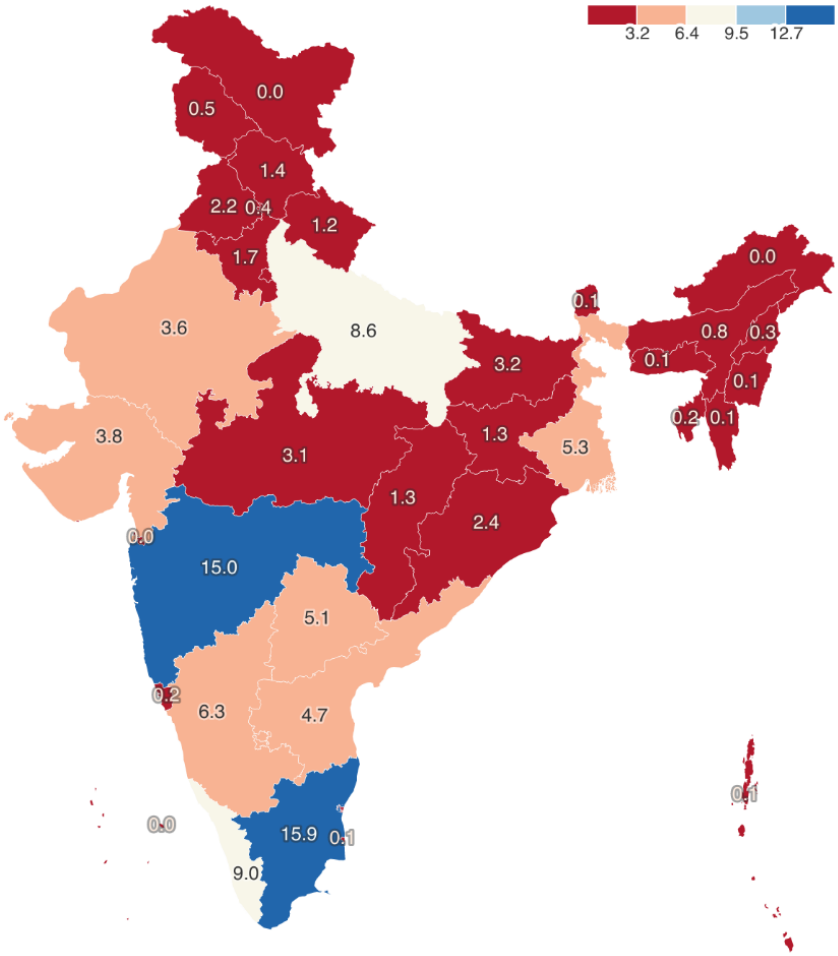
Appendix

Table A1. Description of Dependent and Independent Variables

Variable	Category	Coding
Panel A: Dependent Variable		
Digital Literacy		0 if digitally illiterate and 1 if literate
Panel B: Independent Variables		
Residence	Rural	1 if rural and 0 if urban
	Urban	1 if urban and 0 if rural
Education	Illiterate	1 if illiterate and 0 otherwise
	Up to primary	1 if up to primary 0 otherwise
	Above primary to HS	1 if above primary to HS 0 otherwise
	Graduate and above	1 if graduate and above 0 otherwise
Sex	Male	1 if male and 0 if female
	Female	1 if female and 0 male
Religion	Others	1 if other religion, 0 otherwise
	Hindu	1 if Hindu, 0 otherwise
	Muslim	1 if Muslim, 0 otherwise
	Christian	1 if Christian, 0 otherwise
Employment Status	Unemployed	1 if unemployed, 0 otherwise
	Employed	1 if employed, 0 otherwise
Mobile with SIM	No	1 if no mobile with SIM, 0 otherwise
	Yes	1 if one has mobile with SIM, 0 otherwise
	Shared	
Mass Media Access	No	1 if there is no media access, 0 otherwise

Variable	Category	Coding
	Yes	1 if there is media access, 0 otherwise
Broadband Access	No	1 if there is no broadband access, 0 otherwise
	Yes	1 if there is broadband access, 0 otherwise
Institution Type	No	1 if enrolled in government institute, else 0
	Yes	1 if enrolled in private institute, 0 otherwise
Bank Account	No	1 if there is no bank account, 0 otherwise
	Yes	1 if there is bank account, 0 otherwise
Region	North	1 if one belongs to north, 0 otherwise
	South	1 if one belongs to south, 0 otherwise
	East	1 if one belongs to east, 0 otherwise
	West	1 if one belongs to west, 0 otherwise
	North-East	1 if one belongs to north-east, 0 otherwise

Figure A: Digital Literacy in states and UTs in India (2020-21)



Source: Multiple Indicator Survey in India, NSS 78th Round, 2020-2021

Decentralisation and the Role of Panchayati Raj Institutions in Rural Development: A Study of Ladakh

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One of the key tools identified to empower grassroots democracy, enhance participation and make rural development process more responsive to the needs of communities is decentralization. The Panchayati Raj Institutions (PRIs) have been one of the most prominent institutional frameworks for decentralization and rural development processes in India. However, the existence of decentralized institutions does not necessarily imply effective delegations of authority and involvement in decision making processes. With this in mind, the present study tries to examine the function of Panchayati Raj Institutions (PRIs) in rural development and enhancing rural governance in Ladakh. The present paper discusses the contribution of PRIs (Panchayati Raj Institutions) to decentralise development in Ladakh, a mountainous frontier region with unique social-cultural, environmental and administrative attributes. PRIs operate under a specific dual government system with the introduction of Ladakh Autonomous Hill Development Councils (LAHDC), since the bifurcation of Jammu and Kashmir into Union Territory of Ladakh in 2019. In this way, significant questions are raised about what decentralisation looks like on the ground. In this regard, the study would try to explore how the PRIs of Leh and Kargil perform with special focus on their role in decision making, planning of development and execution of development activity and their sensitiveness to community needs. The study design is exploratory and descriptive with qualitative and quantitative approach. The key sources of data are fieldwork (situational observation) and secondary sources of data (documents, policies and literature search), and also from Panchayat representatives, and other field stakeholders, through interviews. This study investigates the role which PRIs are playing as an institution of participatory governance, resource mobilization and service delivery in an area with high altitude topography, which has high incidence of scattered settlements and has pre-existing customary institutions such as goba institutions. The study argues that the success of decentralized governance in the rural areas hinges not only on the establishment of the Panchayati Raj Institutions but also on their effectiveness to engage in developmental activities. In the study it is argued that while PRIs

have provided opportunities for local involvement and development planning, the influence of PRIs is constrained by the fact they co-exist with LAHDC, fiscal and administrative independence, and institutional capacity.

Keywords: Rural development, Panchayati Raj Instititions, Ladakh, Governance, Participation

Introduction

The 73rd Constitutional Amendment Act 1992 aimed at bringing democratic decentralisation to India through constitutional recognition of three-tier (village, town and district) Panchayati Raj, which sought to shift planning and implementation of rural development to the elected local bodies. The Amendment, apart from introducing new Part IX in the Constitution and Eleventh Schedule which listed the twenty-nine subjects of local concern, went on to make Panchayati Raj Institutions (PRIs) constitutional and not just statutory (Jha 2000). The basic idea behind this was cogent; make decisions closer to the people who are affected; make them locally held accountable, participatory, and well empowered (Ghazala; Rao 2013). Since then, 30 years have passed, and the degree of fulfilment of this promise is highly variable from region to region and is less attributable to the constitutional design per se than to the particular administrative, political and historical contexts of PRIs.

Ladakh is a case in particular that is instructive, but little studied. Once a part of the former state of Jammu and Kashmir, Ladakh became a Union Territory of India without legislative powers in August 2019 as part of the reorganisation of the state. Such a shift changed the institutional environment in the area in ways that have yet to be fully explored. Rural local governance in Ladakh is not just conceived within the framework of a single tiered system of PRIs, but within the framework of a dual system where PRIs in the form of Halqa Panchayats, established under the Jammu and Kashmir Panchayati Raj Act, 1989 work alongside the Ladakh Autonomous Hill Development Councils (LAHDC) of Leh and Kargil, which has their origin in the year 1995 (Leh) and 2003 (Kargil) and have been consolidated under the Ladakh Autonomous Hill Development Councils Act, 1997. Under this Act, the Council is considered as the District Planning and Development Board for the district, which under the Panchayati Raj Act 1989, would be an elected body at the district level (Singh 2022). LAHDC, in other words, is not a parallel/supplementary body but it takes the place of the district tier of Panchayati Raj governance system itself.

This partnership has become rather more important than ever since 2019. Now LAHDC will have direct relation with the Union Territory administration and the Lieutenant Governor while the intermediate state government has been removed. LAHDC's role has been consolidated with subsequent changes: In 2018, the State Administrative Council issued a resolution to enhance LAHDC's powers including to give directions to panchayats and place government workers assigned to work under the transferred subjects under the control of LAHDC. The Union Territory administration, in a move publicly condemned by the two leading civil society organisations in Ladakh, the Apex Body Leh (LBA) and the Kargil Democratic Alliance (KDA) as being a move to divide political power at a time when a single, constitutionally protected Union Territory-level government under a customised Article 371(1A) remains under talks with the Centre, has recently introduced into the five new districts formed in Ladakh under the new framework, the LAHDC framework. Unlike the now-standard three-tiered system of rural development that can be referred to the context of mainland India, this multi-layered system, now under contention, gives Ladakh a unique identity. Much of the current literature on decentralisation and rural development in India is voluminous but based upon evidence in mainland states, with little interpretation as to how devolution works in hill, tribal and border Union Territory contexts where local government has to exist and in the case of Ladakh, formally exist, along with a regionally autonomous council. Whether the LAHDC arrangement enhances or diminishes the ability of bodies at the panchayat level to deliver development in rural areas, or whether it has a negative unintended consequence of limiting their autonomy and curbing the participative spirit of the 73rd Amendment, is an empirical question that this paper interrogates. In this context, the current paper explores the working of PRIs in the delivery of rural development across Ladakh as a whole, and, specifically, the functional and fiscal autonomy of Halqa Panchayats vis-à-vis LAHDC and how this autonomy has developed in the post-2019 Union Territory phase. The paper is based wholly on secondary sources, which include the statutory and legal documents governing the relationship between PRI and Ladakh, documents pertaining to the implementation of rural development schemes, Mahatma Gandhi National Rural Employment Guarantee Act(MGNREGA), Pradhan Mantri Gram Sadak Yojana(PMGSY) and the Jal Jeevan Mission, government review and budget documents and civil society/policy commentary addressing governance debates in Ladakh after 2019.

Decentralisation and Panchayati Raj: The Broader Framework

There are theoretical arguments for democratic decentralisation, which are based on the concept that local governments are closer to their citizens and thus are likely to know their needs better and be able to respond to them in an efficient way. The 73rd Constitutional Amendment Act, 1992 is often considered as the game-changer in the Indian context as it provided for the first time a three-tier Panchayati Raj framework of Gram Panchayat, Panchayat Samiti and Zila Parishad and also accorded a statutory status to the Gram Sabha as the basic unit of rural governance. The Amendment is based on the fundamental principle of self-governance of villages as provided in the Constitution's Directive Principles of State Policy in Article 40 (Sarma ; Chakravarty 2018). As far as the concept of PRIs is concerned, a mountain of recent literature considers PRIs as the institutional fulcrum of participatory democracy and rural development in India; indeed, the 1992 Amendment has made the Panchayati Raj a legally reinforced instrument of decentralised democracy, with regular elections, women and marginalised groups representation, State Finance Commissions and a more powerful Gram Sabha.

PRIs in Hill and Tribal Contexts

The literature pertaining to PRI functioning in similar hill and tribal areas elsewhere in India is particularly relevant, although not directly related to Ladakh, as a hill, tribal majority, border region. In the more usual context of decentralised development, such literature tends to portray rural development as a means of enhancing the economic, political and social lives of geographically and administratively peripheral populations, and emphasise that it is the devolution of power and resources to the grassroots - and not the merely constitutional imperative for the establishment of elected bodies - which will determine whether decentralised development is truly a benefit. All of this work is relevant to Ladakh, because it highlights that the hill and tribal governance situations always differ from the mainland ones which the majority of the literature in the field of PRI seems to be focused on. But it doesn't carry its analysis to institutional setups such as those in Ladakh, where the district-tier planning function is officially delegated to an autonomous council at an intermediate level.

Current research fails in that there is no literature available here. The majority of existing research and analysis about Ladakh’s institutions of governance centers on LAHDC,

its origin in the 1995/1997 Acts, its statutory power with respect to district planning, budgeting, and taxation, as well as its more recent involvement in the political discourse regarding extension of the LAHDC framework across all seven Ladakh districts by 2026 without proper consideration of the way in which such council-based power affects, supplements, or limits the operation of Halqa Panchayat within rural development service delivery within the Union Territory as a whole. Studies on autonomous councils of the kind identified by LAHDC have also acknowledged that unlike Councils enjoying the constitutional protection of the Sixth Schedule, these Councils have no constitutional protection, being structurally similar to other statutory Councils.

Institutional and Legal Framework

The Panchayati Raj Structure in Ladakh

The elected body of governance in Ladakh is called the Panchayati Raj Structure.

The panchayat system in Ladakh is based on Jammu and Kashmir Panchayati Raj Act, 1989, which establishes the three tier panchayat structure with Halqa Panchayats (HP) at the grassroots, Block Development Councils (BDC) at the Block level and District Planning and Development Board (DPDB) at the district level. Halqa Panchayats (HPs) are directly elected entities in charge of planning and implementation of sanitation, water supply and other subjects, devolved to it, at the local level within a rural development scheme. However, the truly important aspect is that in Ladakh, the district-tier function under this Act is not carried out by an independent and elected DPDB. Its relation to Jammu and Kashmir Panchayati Raj Act, 1989, it has been enacted as a 'District Planning and Development Board for the District' and it continues to perform the duties and exercise the powers under the Jammu and Kashmir Panchayati Raj Act. The crucial difference between the pattern of governance in Ladakh and the pattern of governance in the rest of India is this single point: the Ladakh is decentralised, the LAHDC is the decentralisation tier – it is not alongside the tier of Panchayati Raj in the districts, it is that tier. The nature of the Ladakh Autonomous Hill Development Council (LAHDC) is therefore critical to any study on panchayat autonomy in Ladakh and needs to be considered not as an external or parallel body, but as the very entity which is vested formally with the authority of planning and development at the district level over the Halqa Panchayats.

LAHDC: Origins, Composition, and Powers

The Ladakh Autonomous Hill Development Council Leh was established in the year 1995 under the Ladakh Autonomous Hill Development Council Act, 1995, which became effective from 1st June, 1995, and the Ladakh Autonomous Hill Development Council Kargil was established after the then coalition government of J&K in July, 2003.Both councils have to be operated under the consolidated 'Ladakh Autonomous Hill Development Councils Act' 1997 for the entire Ladakh district (Leh and Kargil). There are thirty members on each Council who are elected for five-year terms - twenty six of whom are elected directly by universal adult suffrage, with the remainder nominated by the UT administration (the Lieutenant Governor), usually to provide representation for women and for the principal religious minorities. The Council's leadership is given to the Chairman, called the Chief Executive Councillor (CEC), who ranks and holds the same status as a Cabinet Minister and is supported by four Executive Councillors who rank and hold the same status as Deputy Ministers. But, the reorganisation of Ladakh as a Union Territory without any legislative assembly in August 2019 saw the elimination of an intermediate body, the state-government, over the LAHDC, and the Councils were now directly linked with the Union Territory administration and the Lieutenant Governor. This shift – which is discussed widely – has changed the de facto balance of power in the region. It has been found to be associated with the reported lack of trust of the Ladakh leadership with the Centre due to the lack of a legislature and delayed political reform and constitutional safeguard negotiations. In sum, this context provides for three crucial elements for the analysis that follows. First, the Halqa Panchayats of Ladakh are not organised in the traditional three-tiered PRI system of governance with each tier functioning in isolation and electing an independent district panchayat (in this case, the LAHDC is functioning as the second tier in terms of a statutory deeming provision). Secondly, the nature of this connection does not stop at the informal monitoring of the functioning of the panchayats but goes on to the statutory mandate of the panchayats to act according to the instructions issued by LAHDC as has been stipulated at least since the amendment in 2018. Lastly, LAHDC, as an institution, lacks in its institutional independence from the UT administration, as well as, from 2026, from the number and composition of councils that enjoy this independence.

Research Design

The design of this study is secondary data based document (institutional) analysis. Hence, the paper has adopted the following approach to answer the central question of the paper: To what extent is the Ladakh Halqa Panchayat autonomous in terms of rural development delivery in Ladakh and how has it changed after the year 2019? The methods employed here have been: Statutory/legal document analysis, Rural development scheme performance data and Documentary evidence of the contemporary governance debate in Ladakh.

Data Sources

There are three types of secondary data that are used in the analysis:

Firstly, statutory and legal frameworks, such as the Jammu and Kashmir Panchayati Raj Act, 1989; the Ladakh Autonomous Hill Development Councils Act, 1997 (and earlier, in 1995 for Leh); and later administrative reforms (most recently, State Administrative Council, 2018), from India Code and relevant legal repositories.

Second, data on the implementation of rural development schemes for the region of Ladakh was collected from the government review meetings and departmental reports from Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Pradhan Mantri Gram Sadak Yojana (PMGSY), and Jal Jeevan Mission (JJM), and also from the national physical progress dashboard for JJM maintained by Department of Drinking Water and Sanitation, Ministry of Jal Shakti.

Thirdly, documentary and news-based evidence of the post-2019 and 2026 governance debate in Ladakh, including reporting on the 2026 LAHDC expansion, civil society (ABL and KDA) statements to oppose the expansion and analytical commentary that places this debate among Ladakh's governance debate with the Centre under Article 371.

Limitations

The lack of primary fieldwork activity in this study is its main constraint. While the statutory provisions serve to give formal authority, they alone do not provide any sense of how this authority is enacted in everyday practices at the panchayat level, and how or whether this is felt as autonomy and centralisation at the grassroots. Performance data in Scheme is the same, as it shows overall performance, but it does not necessarily reveal particular institutional factors that may be causing it, such as delays in approvals, fund-flow constraints, or planning exclusion. In cases where this documentary evidence is not available, this study uses

administrative minutes from review meetings and civil society statements as a partial substitute for this ground-level perspective, and the conclusions presented below should not be interpreted as a claim about subjective experience of those implementing decentralisation in Ladakh. Further research with the primary interviews of the Halqa Panchayat representatives and the block level officials as suggested in the complementary work of this author would usefully enrich the present analysis.

Findings

Rural Development Scheme Performance in Ladakh

This is the first major finding that Panchayati Raj Institutions do not only have an electoral or representative role, but are part of the wider rural development processes of Ladakh.Among the key responsibilities of the Rural Development and Panchayati Raj Department is poverty alleviation, rural infrastructure and implementation of rural development programmes. It officially mentions MGNREGA, rural connectivity, public library, parks, community facilities, irrigation systems, waste-management facilities etc development activities at the village level. While some indicators of rural development in Ladakh are promising, others are problematic, as shown by government review data for the time that has elapsed since the Union Territory was formed. Due to the tough topography of the region, as per the latest review of Jal Jeevan Mission, Ladakh had achieved about 75 percent water connection coverage in households, which placed the Union Territory at position 16th among all States and Union Territories in the country. Four out of the total 31 blocks, Saspol and Thiksey (Leh) and Drass and Bhimbat (Kargil) had attained the 90 percent household coverage while Lungnak block in Zanskar sub-division of Kargil became the first block to reach the goal of ‘Har Ghar Nal Se Jal’ in Ladakh. As per PMGSY, in Union Territory of Ladakh, 195 km of road has been constructed and black-topped with expenditure of about Rs 149 crore and about Rs 50 crore has been approved by the Government of India for release. By the time this was happening, Ladakh had already been granted a 500-kms target under PMGSY-III, earmarked for consolidation and upgradation of basic all-weather connectivity targets, which are being connected to markets, hospitals and higher secondary schools, and whose Detailed Project Reports have already been submitted for technical appraisal and are worth an estimated Rs 500 crore.

The labour budget approved under MGNREGA till May 2026 in Kargil was 0.11 lakh person-days and in Leh, it was 0.07 lakh person-days, while the actual work done in Kargil was

0.53 lakh person-days and in Leh, it was 0.004 lakh person-days, making a total of around 0.54 lakh person-days in the Union Territory till then. The documentary evidence thus indicates that the functions of PRIs in Ladakh go beyond representation, to participation in the delivery and implementation of rural development programmes.

PRIs and Social and Community Development

Within its rural development activities, the Rural Development Department identifies different areas including sanitation, waste management, public facilities, livelihood development and social security. The creation of infrastructure for solid waste management and the Vibrant Village Programme are also subjects of recent departmental reviews, as well as the Swachh Bharat Mission (Grameen), PM Awaas Yojana-Gramin, and National Rural Livelihoods Mission, and watershed development. This is a sign of the multipartite nature of the developmental role of PRIs. Development in Ladakh, thus, cannot be equated with road building or the creation of employment schemes, but is instead a process of rural development. It includes livelihoods, housing, sanitation, water and waste management, infrastructure and social development.

Capacity Building as a Component of PRI Strengthening

There has also been significant focus on institutional capacity in the documentary evidence.BDOs, Panchayat Inspectors, Panchayat Secretaries and Panchayat Accounts Assistants participated in the 2026 Panchayat Development Plan training which centered on planning, monitoring, resource utilization and convergence. Training programmes to the Panchayat Accounts Assistants and Exposure programme for women Sarpanches are also recorded in the Rural Development Department. This implies that the administration is aware of the fact that merely the soundness of institutions through elections does not make Panchayati Raj effective – they also need knowledge and administration.

Continuity and Institutional Renewal

The last finding relates to the ongoing process of institutionalization of Panchayati Raj in Ladakh.The Rural Development Department's records show that a draft schedule was issued for revision of electoral rolls for PRIs in the Union Territory. It is pertinent because a major element of representative local government is the process of regular elections.The PRI system in Ladakh is not a fixed system but a continuously developing one in view of the electoral process and ongoing training, planning and strengthening in administration.

Discussion

The results of the present study suggest that the contribution of Panchayat Raj Institutions (PRIs) can not be limited to the improvement of village level implementation of the development programmes. The documentary and statutory evidence suggests that the multi-tiered structure of governance that enables the functioning of Panchayats includes the Union Territory administration, the Rural Development and Panchayati Raj Department, the Block Development Councils and the Ladakh Autonomous Hill Development Councils (LAHDCs). A unique aspect of the Ladakh arrangement is the nature of the relationship between the district-level Council and Panchayati Raj is not just a result of administrative practice, but also influenced by statutory requirements related to district-level planning and development. This renders the Ladakh situation analytically different from a traditional view of decentralisation where the principal relationship explored is that between the state's political administration and the elected local governments. LAHDC has an important role in district level development planning, as shown in the statutory evidence. The Council has been duly recognized as the District Planning and Development Board and official records have clearly mentioned the role of the Council in the implementation of the relevant provisions along with the Panchayati Raj system. This institutional arrangement implies that in Ladakh, development planning in rural areas is not exclusively done by the Panchayats. Instead, Panchayats are part of a larger system where authority is shared at the various levels of institutions.

This is crucial in the understanding of the meaning of decentralisation in Ladakh. Decentralisation does not necessarily involve every lower level institution having power over all aspects of development. Rather, authority can be fragmented with each tier of government or institution responsible for various planning, coordinating, implementing monitoring functions. It does not necessarily mean, therefore, that the existence of an elected district-level Council is sufficient to warrant the existence of fully autonomous village-level local government. The findings thus indicate that Ladakh is a multi-level decentralisation where autonomy has to be considered not only in relation to the administration of the state/UT but also in the institutional arrangement between LAHDC and PRIs.

Conclusion and Policy Implications

The results show that the Panchayati Raj Institutions hold an important place in the structure of rural development of Ladakh. The evidence also suggests, however, that there is a significant

difference between participation in development and autonomous control over development. The evidence shows that PRIs play a role in multiple aspects of rural development.

They are working in programmes associated with:

- employment generation;
- rural infrastructure;
- sanitation;
- housing;
- livelihoods;
- water;
- waste management;
- local planning; and
- community development.

Hence, PRIs cannot be simply called a political representative.They play a crucial role as institutional links between the rural development programmes and the local communities.The Rural Development Department itself narrates its work to include poverty alleviation, rural infrastructure and MGNREGA and its programme structure has a wide range of rural development interventions.

This is not an abstract issue, but a question of the day-to-day life of Ladakh, as the debates surrounding the proposed extension of the LAHDC for 2026 reveal, and a question this paper's institutional analysis argues should be studied more carefully, rather than completely overlooked, at the panchayat level.

References

Amarjeet Singh, (2022). *Autonomy and democratic governance in Northeast India*. Taylor & Francis.

(Greater Kashmir 20 September 2018).

https://ladakh.gov.in/rural-development-panchayati-raj-department/

Jha, S. (2000) 'Fiscal Decentralization in India: Strengths, Limitations and Prospects for Panchayati Raj Institutions,' Background Paper No. 2, World Bank Unpublished Overview of Rural Decentralization in India, Volume 3.

The Ladakh Autonomous Hill Development Councils Act, 1997

Mansuri Ghazala and Vijayendra Rao(2013) Localizing Development: Does Participation work? (Washington D.C World Bank)

Osmaston, H., & Tribute, A. (1994). Ladakh Studies. *Ladakh Studies*, *7*.

Sarma, A; Chakravarty, D. (2018). Evolution of the Panchayati Raj in India. In: Integrating the Third Tier in the Indian Federal System

Sharif, M., & Singh, R. K. (2025). Contemporary politics in Ladakh: contestations and identity construction. Social Identities, 31(4), 476–489. https://doi.org/10.1080/13504630.2025.2465366

Reach Ladakh, Wikipedia, J&K Panchayati Raj Act 1989

Competency-Based Civil Service Reforms and Future-Ready Governance

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Civil services across the globe are undergoing a paradigm shift from rule-based, hierarchical administration toward outcome-oriented, competency-driven governance. The paper discusses the conceptual foundations, comparative practices and policy implications of competency-based civil service reforms as a pathway to future-ready governance. Drawing on secondary literature, government reports and international policy documents, the paper traces the trajectory of public administration from the Weberian bureaucratic model, to New Public Management and to competency-based human resource frameworks that privilege knowledge, skills, attitudes and behavioral attributes over seniority and generalist orientation. This transition is set against the broader discourse of future-ready governance, defined by digital transformation, citizen-centricity, adaptive policymaking and cross-sectoral collaboration. A comparative review of reform experiences in the United Kingdom, Singapore and India (notably India's Mission Karmayogi and the National Program for Civil Services Capacity Building) illustrates how competency mapping, role-based training and continuous-learning ecosystems are institutionalized to build a future-ready bureaucracy.

The analysis reveals important structural and cultural barriers to competency-based reform such as rigid seniority norms, disconnected training architectures, resistance to performance-linked assessment and non-integration of technology in human resource management. The paper argues that competency-based reforms, if embedded in an institutional architecture that links recruitment, training, deployment and performance management, can enhance administrative agility, capacity for innovation and trust in public institutions. The paper also argues that future-ready governance calls for not just technical upskilling but a fundamental recalibration of civil service values toward adaptability, ethical judgment and collaborative problem solving. The paper concludes with policy recommendations for institutionalising competency frameworks, strengthening capacity-building infrastructure, and aligning civil service reform with long-term national development goals. The findings contribute to ongoing scholarly and V policy debates on public-sector human resource modernisation and offer an analytical framework for evaluating competency-based reform trajectories across developing and developed administrative systems.

Keywords: competency-based reform; civil service; public administration; future-ready governance; capacity building; Mission Karmayogi

Introduction

Public bureaucracies worldwide are being asked to do more with less, faster, and more transparently, amid disruptive technological change, demographic shifts, geopolitical uncertainty, and rising citizen expectations, a condition frequently described through the lens of volatility, uncertainty, complexity, and ambiguity[1]. Climate shocks, pandemics, rapid automation, and the diffusion of artificial intelligence have compressed the time available for governments to design and deliver effective responses, exposing the limitations of administrative systems built for a more stable and predictable era. The traditional Weberian model of civil service[2], characterised by rule-bound hierarchy, generalist career civil servants, and seniority-based progression, has long provided predictability, neutrality, and continuity of administration. However, it has faced growing criticism for its inflexibility in addressing complex, cross-cutting policy challenges like climate change, public health emergencies, and digital transformation, which demand specialized knowledge, cross-departmental coordination, and fast iteration that a purely seniority-based generalist cadre is not always best placed to offer (Weber, 1947; Hood, 1991).

In response to these pressures governments in both developed and developing economies have started to reorient civil service human resource management to the concept of competency, broadly defined as the combination of knowledge, skills, abilities and behavioral attributes needed for effective performance in a given role (Horton, 2000). This shift, commonly termed competency-based civil service reform[3], seeks to move recruitment, training, deployment, and performance evaluation away from generalist, tenure-based criteria toward role-specific, evidence-informed competency frameworks. Rather than assuming that a successful generalist administrator can be transplanted into any position within government,

[1] VUCA is an acronym for Volatile, Uncertain, Complex, and Ambiguous, a term originating in military strategic literature and later adopted in management and public administration to describe rapidly changing operating environments.

[2] The Weberian model of bureaucracy refers to Max Weber's ideal-type of rational-legal administration, characterised by hierarchical authority, rule-based decision-making, division of labour, and appointment and promotion based on qualification and seniority

[3] Competency-based approaches to public sector human resource management draw on models originally developed in private-sector organisational psychology, notably McClelland's (1973) work on identifying competencies rather than traditional aptitude or intelligence measures as predictors of job performance, later popularised in management practice by Boyatzis (1982).

competency-based reform starts from the premise that different roles demand different, identifiable combinations of technical knowledge, behavioural attributes, and leadership capability, and that human resource systems should be designed to recognise, cultivate, and reward these combinations explicitly.

Parallel to this administrative reorientation is the emergence of the discourse on future-ready governance[1], a normative and practical framework describing governance systems capable of anticipating, adapting to, and shaping change rather than merely reacting to it (OECD, 2017; World Bank, 2016). Future-ready governance is associated with attributes such as digital-by-design service delivery, agile and evidence-informed policymaking, collaborative and networked governance arrangements, institutionalised foresight capacity, and a public workforce equipped with future-oriented skills, including digital literacy, systems thinking, and adaptive leadership. Although the two literatures, one centred on public sector human resource management and the other on broader governance transformation, have developed largely in parallel, this paper contends that they are conceptually and practically inseparable: the institutional capacities associated with future-ready governance cannot be realised without a civil service workforce whose competencies are deliberately aligned with those capacities. The convergence of these two trends, competency-based human resource reform and the aspiration toward future-ready governance, forms the central problematic of this paper.

This paper asks two interrelated questions. First, how do competency-based civil service reforms contribute to building future-ready governance systems? Secondly, what institutional, cultural and technological factors determine the success or failure of such reforms across different administrative contexts? To address these questions, the paper conducts a conceptual and comparative analysis based on academic literature, international policy reports and government documents, with particular focus on reform initiatives in the United Kingdom, Singapore and India. The choice of these three cases is deliberate. The United Kingdom represents a mature Westminster-style civil service that has iteratively refined its competency architecture over more than a decade. Singapore represents a compact, high-capacity administrative state that has integrated civil service competency development within a broader national skills strategy. India represents a large, federal, historically generalist civil service

[1] The term is used here interchangeably with related formulations in the literature, such as "government of the future" and "21st-century governance," which describe similar shifts toward anticipatory, adaptive, and digitally enabled public administration.

undertaking one of the most ambitious competency-based reform programmes attempted anywhere in the world[1]. Together, these cases illustrate both the convergence of global reform logics and the contextual variation in how such logics are institutionalised.

The paper is organised as follows. Section 2 reviews the theoretical literature on civil service reform and competency-based human resource management, tracing the evolution from traditional public administration through New Public Management to digital-era and competency-based approaches. Section 3 develops a conceptual framework of competency-based civil service reform, distinguishing categories of competency and describing the human resource lifecycle through which competency frameworks are typically operationalised. Section 4 examines the dimensions of future-ready governance and their relationship to workforce competency. Section 5 provides a comparative review of international reform practices in the United Kingdom and Singapore. Section 6 discusses India's Mission Karmayogi[2] as an illustrative case of large-scale, federal-level competency reform. Section 7 discusses the major structural and cultural challenges that condition the success of competency-based reform. Section 8 discusses the wider implications of the analysis for governance theory and practice. Section 9 presents policy recommendations and Section 10 concludes with a summary of findings and directions for future research.

2. Literature Review

The literature on civil service reform can be broadly categorized into three overlapping paradigms: the traditional public administration model, New Public Management and post-New Public Management approaches oriented toward public value, networked governance and digital-era administration. The traditional model, based on Weber's (1947) theory of rational-legal authority[3], privileges impartiality, rule-following and career stability, and remains the institutional bedrock of most modern civil services, including those of India, the United

[1] This refers to Mission Karmayogi, formally the National Programme for Civil Services Capacity Building (NPCSCB), approved by the Union Cabinet of India on 2 September 2020 under the Ministry of Personnel, Public Grievances and Pensions, which seeks to shift India's civil service human resource management from a rule-based to a role-based, competency-driven model.

[2] Mission Karmayogi, formally the National Programme for Civil Services Capacity Building (NPCSCB), is delivered through the Integrated Government Online Training (iGOT-Karmayogi) digital platform and overseen by the Capacity Building Commission, established under the Department of Personnel and Training, Government of India

[3] Weber, M. (1947). The Theory of Social and Economic Organization (A. M. Henderson & T. Parsons, Trans.). New York: The Free Press. This English translation, edited by Talcott Parsons, is the standard citation for Weber's typology of legal, traditional, and charismatic authority, originally published in German as part of Wirtschaft und Gesellschaft (1922).

Kingdom and much of the Commonwealth. Under this model, legitimacy derives from adherence to formal procedure rather than from individual discretion, and career progression is organized primarily around seniority and generalist competence rather than specialized, role-specific capability.

The dominant reform doctrine of the 1980s was New Public Management, which advocated the adoption of private-sector management practices, output-based performance measurement, and market-type mechanisms in government (Hood, 1991)[1]. Hood's influential typology identified a set of doctrines common to this wave of reform, including the disaggregation of large bureaucracies into smaller, more manageable units, the emphasis on explicit standards and performance measures, and the shift from input controls to output controls. While New Public Management brought about increased efficiency and accountability in a number of jurisdictions, scholars have pointed to its limitations, including the fragmentation of service delivery across disaggregated agencies, the decline of a unified public service ethos, and the difficulty of managing complex, cross-boundary issues that cannot be managed by a single agency alone (Lodge & Hood, 2012). Lodge and Hood (2012) also argue that fiscal austerity placed additional pressures on public service bargains—the implicit and explicit bargains between civil servants and the state over pay, security, and conduct—resulting in a renewed interest in governance models that could balance efficiency with resilience and coherence.

These criticisms set the stage for what Dunleavy et al. (2006) termed digital-era governance, an approach emphasising reintegration of fragmented functions, holistic and needs-based service design, and the digitisation of administrative processes as central levers of reform. Digital-era governance[2] scholarship anticipated many of the concerns that later animate the future-ready governance discourse, particularly the argument that digitisation is not merely a technical add-on to existing bureaucratic structures but a force capable of reshaping organisational boundaries, service design, and citizen relationships with the state. This literature nonetheless devoted comparatively less attention to the specific human resource and workforce competency implications of such transformation, a gap that the competency-based reform literature has sought to address.

[1] Hood, C. (1991). A Public Management for All Seasons? Public Administration, 69(1), 3–19.
[2] Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New Public Management Is Dead—Long Live Digital-Era Governance. Journal of Public Administration Research and Theory, 16(3), 467–494.

The competency movement itself originated in industrial and organisational psychology. McClelland's (1973) seminal argument that behavioural competencies, rather than traditional intelligence or aptitude tests, better predict job performance provided the intellectual foundation for competency-based human resource practices across both private and public sectors[1]. Boyatzis (1982) extended this work by developing systematic models linking managerial competencies such as goal orientation, use of influence, and self-confidence, to organisational effectiveness, offering practitioners a replicable methodology for identifying the competencies associated with superior performance in specific roles. These ideas migrated into the public sector from the 1990s onward, as governments sought more rigorous, evidence-based methods for recruitment, training, and performance appraisal. Horton (2000) traces this migration in the British civil service, arguing that competency frameworks offered a language through which generalist administrative traditions could be reconciled with the growing demand for specialist and managerial capability, while also cautioning that competency frameworks can be misapplied if reduced to bureaucratic checklists disconnected from genuine behavioural assessment.

International organisations have since consolidated competency-based approaches into broader civil service capacity-building agendas. The OECD (2017) documents how member states have developed structured competency frameworks spanning core, managerial, and technical competencies, and links these frameworks to strategic human resource planning, workforce forecasting, and leadership development pipelines. The OECD further observes that many governments now use competency frameworks not only for individual assessment but as a strategic planning tool, allowing human resource departments to identify capability gaps across the civil service as a whole and to target recruitment and training investment accordingly. The World Bank (2016)[2], situates competency development within the wider agenda of digital government, arguing that digital dividends, the broader development benefits expected from digital technology, can only be realised where public institutions possess the human capital to design, procure, and manage digital systems responsibly. Absent this human capital, the World Bank argues, investment in digital infrastructure risks producing underused or poorly governed systems that fail to translate into improved service delivery.

[1] McClelland, D. C. (1973). Testing for Competence Rather Than for "Intelligence." American Psychologist, 28(1), 1–14.

[2] World Bank. (2016). World Development Report 2016: Digital Dividends. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-0671-1

The United Nations Department of Economic and Social Affairs similarly emphasises institutional and human capacity as a precondition for effective digital government, noting in its biennial e-government survey that countries with stronger human capital indices tend to also perform more strongly on measures of online service provision and digital government development (UNDESA, 2020)[1]. Collectively, this literature suggests that competency-based reform is not a discrete technical exercise but an institutional strategy connecting human resource management to broader governance transformation, a connection that remains under-theorised in the context of developing-country civil services, and which this paper seeks to address through a comparative and conceptual lens rather than a single-country case study.

3. Conceptual Framework: Competency-Based Civil Service Reform

Competency-based civil service reform can be understood as a systemic realignment of human resource management functions, namely recruitment, training, deployment, performance appraisal, and promotion, around explicitly defined competencies rather than generalist qualifications, tenure, or seniority alone. Three broad categories of competency are commonly distinguished in the literature and in comparative practice[2]. Core or behavioral competencies are generic attributes expected of all public servants regardless of their specific role or seniority level, for example integrity, communication, accountability and stakeholder orientation. Functional or technical competencies refer to the knowledge and skills specific to a domain that are required to perform particular roles, such as financial management, data analytics, regulatory expertise or procurement. The competencies required for leadership or management roles, that is supervisory and strategic roles, such as decision making under uncertainty, stakeholder management, delegation and change leadership. Most modern competency frameworks combine these three categories in one model, with different weightings according to seniority level and functional specialization.

These categories are usually operationalized through a competency mapping exercise. This exercise involves analyzing each position or role within the civil service to determine the specific combination of competencies that are required for effective performance. This process

[1] United Nations Department of Economic and Social Affairs. (2020). United Nations E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development. New York: United Nations.

[2] This threefold categorisation is consistent with comparative analysis of competency frameworks across OECD member states; see OECD (2017), Skills for a High Performing Civil Service, OECD Public Governance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9789264280724-en.

typically draws on structured job analysis techniques, including interviews with high-performing incumbents, review of role descriptions and benchmarking against comparable roles in other jurisdictions or sectors. India's Mission Karmayogi has formalised this process through the Framework of Roles, Activities and Competencies[1], which seeks to map every civil service position to the competencies required to perform it, creating a structured basis for subsequent training design and career planning. Similarly, the United Kingdom's Success Profiles framework evaluates candidates against behaviours, strengths, experience, ability, and technical criteria, replacing an earlier framework built around a single list of core competencies (UK Cabinet Office, 2018), on the grounds that a single generic competency list could not adequately differentiate between the highly varied roles within a large and diverse civil service.

A defining feature of competency-based reform is the attempt to create continuity across the human resource lifecycle. Competencies identified at the recruitment stage inform the design of training curricula; training outcomes inform deployment and postings decisions; and performance against defined competencies feeds back into promotion and career development decisions, closing the loop between capability development and career progression. This lifecycle approach distinguishes competency-based reform from earlier, more piecemeal training interventions, which often operated independently of recruitment and promotion systems, resulting in training that was disconnected from the actual capability requirements of subsequent postings. In principle, a fully integrated competency-based system would ensure that an official's training record, competency assessment scores, and career trajectory are all visible within a single human resource information system, enabling data-driven workforce planning at scale.

However, as several scholars caution, the technical sophistication of competency frameworks does not automatically translate into improved governance outcomes; much depends on how frameworks are embedded within organisational culture, incentive structures, and leadership commitment (Horton, 2000; OECD, 2017)[2]. A well-designed competency framework implemented without corresponding changes to promotion criteria, for instance,

[1] This threefold categorisation is consistent with comparative analysis of competency frameworks across OECD member states; see OECD (2017), Skills for a High Performing Civil Service, OECD Public Governance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9789264280724-en.

[2] The OECD report identifies leadership commitment and management capability as decisive factors determining whether investments in civil service skills translate into actual performance gains, in a dedicated concluding section titled "Leadership commitment and management capability: The ultimate keys to success" (OECD, 2017, p. 106).

may generate extensive training records without any discernible change in how postings or promotions are actually decided, reducing the framework to a symbolic rather than substantive reform. This observation motivates the distinction, developed further in Section 8, between the technical architecture of competency-based reform and the institutional and cultural conditions required for that architecture to generate genuine governance improvements.

4. Future-Ready Governance

Concept and Dimensions Future-ready governance is best understood not as a single reform model, but as a composite of institutional capacities that allow governments to anticipate change, absorb shocks and continuously adapt policies and services. Drawing on the literature reviewed above, at least six interrelated dimensions can be identified, each of which has direct implications for the competencies required of the civil service workforce.

First, digital transformation and data-driven decision-making means the integration of digital infrastructure, interoperable data systems, and analytics capability into policymaking and service delivery (World Bank, 2016; UNDESA, 2020). This dimension demands civil servants who not only possess basic digital knowledge but also the analytical capability to make sense of data, question its limits, and turn insights into policy design. Second, agility and adaptive policy design[1] refers to the capacity of institutions to design, test, and iteratively revise policy interventions rather than working only with long planning cycles; this requires officials comfortable with experimentation, piloting, and structured learning from failure, competencies that differ markedly from the risk-averse, procedure-compliant orientation traditionally rewarded in rule-based bureaucracies.

Thirdly, citizen-centricity and co-production refer to governance arrangements where citizens are seen as active participants in the design and delivery of public services rather than passive recipients of pre-determined offerings. This dimension requires competencies in participatory design, communication, and empathy that have historically received limited emphasis in generalist administrative training. Fourth, collaborative and networked governance refers to the ability of government agencies to work across organisational boundaries, and with private and civil-society actors, to address problems that no single institution can resolve alone

[1] The OECD's Observatory of Public Sector Innovation describes this orientation as "anticipatory governance," defined as the systematic integration of strategic foresight, experimentation, and innovation into policy decisions, requiring civil servants to develop new capabilities in working with uncertainty and complexity.

(Dunleavy et al., 2006)[1]; this requires competencies in negotiation, partnership management, and systems thinking that extend well beyond the traditional hierarchical chain of command.

Fifth, anticipatory governance refers to institutionalised foresight capacities that allow governments to identify emerging risks and opportunities before they fully materialise, requiring officials trained in scenario planning, horizon scanning, and strategic risk assessment[2]. Sixth, and most directly relevant to this paper, a future-ready workforce refers to public servants equipped not only with technical digital skills but with adaptive, ethical, and collaborative capabilities suited to complex governance environments. This sixth dimension is, in a sense, a precondition for the other five: without a workforce possessing the requisite competencies, investments in digital infrastructure, agile processes, participatory mechanisms, cross-agency partnerships, and foresight units are unlikely to be fully realised in practice.

These dimensions are mutually reinforcing rather than independent. Digital systems, for instance, are of limited value without personnel capable of using them responsibly and creatively, and anticipatory governance mechanisms require officials trained in foresight and systems thinking rather than narrow procedural compliance. Citizen-centric service design similarly depends on frontline officials who possess both the technical skill to redesign processes and the behavioural disposition to prioritise user experience over administrative convenience. It is this interdependence between institutional capacity and human capacity that makes competency-based civil service reform a fundamental, though not sufficient, condition for future-ready governance[3]. This proposition is further explored in the comparative cases in the next sections.

5. Comparative International Practices

A comparative analysis of reform trajectories of the United Kingdom and Singapore, as well as the more detailed case of India separately presented in Section 6, illustrates both the convergence and the contextual variation in competency-based civil service reform across the different administrative traditions and levels of state capacity[4].

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[1] Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New Public Management is dead—Long Live Digital Era Governance. Journal of Public Administration Research and Theory, 16(3), 467–494.

[2] Fuerth, L. (2009). Anticipatory Governance: Practical Ideas for the Twenty-First Century. National Strategy Forum Review, 18(1), 29–34.

[3] OECD. (2017). Skills for a High Performing Civil Service. OECD Public Governance Reviews, OECD Publishing.

[4] Painter, M., & Peters, B. G. (Eds.). (2010). Tradition and Public Administration. Palgrave Macmillan.

5.1 United Kingdom

In the early 2010s the United Kingdom developed a formal Civil Service Competency Framework which outlines what is expected in terms of performance in relation to specific behavioral competencies and which cuts across grades from the most junior administrative grades to the senior civil service. This framework sought to provide a common language for recruitment, appraisal, and development across a large and functionally diverse civil service, reducing reliance on the more informal, reputation-based assessments that had historically shaped career progression. From 2018, this framework was replaced by Success Profiles, a more flexible model assessing candidates and post-holders against behaviours, strengths, experience, ability, and technical expertise, reflecting a recognition that a single competency list could not adequately capture the diversity of civil service roles, ranging from policy analysis to frontline service delivery to highly specialised technical and digital functions (UK Cabinet Office, 2018)[1].

The UK reform experience underscores an important lesson for competency-based reform more broadly: competency frameworks require periodic revision to remain relevant to evolving role requirements and to avoid becoming a rigid, checklist-driven exercise disconnected from genuine assessment of capability. The transition from a single competency framework to the more differentiated Success Profiles model also illustrates a broader trend, visible across several of the cases examined in this paper, toward greater customisation of competency assessment according to role type, seniority, and functional specialisation, rather than reliance on a uniform framework applied identically across an entire civil service[2].

5.2 Singapore

Singapore's public service has embedded competency development within a broader national lifelong-learning ecosystem, reflecting the country's wider strategic emphasis on human capital as a core source of national competitiveness. The Skills Future movement, launched in 2015, extends structured opportunities and funding support for continuous skills upgrading to citizens, including public officers, reflecting a whole-of-nation approach to workforce future-readiness rather than treating civil service capacity building as a separate, siloed exercise. Singapore's Public Service Division has correspondingly developed leadership and core-

[1] UK Cabinet Office. (2018). Success Profiles: Overview. GOV.UK.
[2] Markson, T. (2026). Civil service recruitment: Success profiles to be scrapped. Civil Service World.

competency frameworks that link training, deployment, and succession planning for public officers, with an explicit emphasis on adaptive leadership and digital capability as the public service anticipates emerging governance challenges, including an ageing population, climate vulnerability, and rapid technological change[1].

The Singapore case illustrates the value of situating civil service competency reform within a wider national human capital strategy, rather than treating it as an isolated personnel management exercise confined to the public sector. By linking public service training infrastructure to a national skills ecosystem that also serves private sector workers, Singapore has been able to achieve economies of scale in training provision while reinforcing a shared national narrative around continuous learning as a civic and professional expectation, rather than an occasional, compliance-driven requirement imposed on public servants alone[2].

5.3 Comparative Observations

Across the United Kingdom and Singapore cases, and anticipating the Indian case examined in the following section, three common patterns emerge. First, competency frameworks are increasingly role-based rather than grade-based, reflecting recognition that generic, seniority-linked training is insufficient for specialised governance functions that demand distinct technical and behavioral profiles. Second, digital learning platforms are being used to scale training delivery beyond what traditional residential training academies can offer, making it possible to deliver more frequent, modular and role-specific learning interventions than was previously possible within constrained training budgets and facilities. Third, reform is most effective where competency frameworks are explicitly linked to career progression and leadership development, rather than being a stand-alone training initiative disconnected from promotion and deployment decisions[3] (OECD, 2017). Where this linkage is weak or absent there is a risk of competency frameworks becoming a parallel bureaucratic process, generating data and documentation without materially changing the way in which postings, promotions or performance ratings are actually determined within the civil service.

[1] Neo, B. S., & Chen, G. (2007). Dynamic Governance: Embedding Culture, Capabilities and Change in Singapore. World Scientific.

[2] World Economic Forum. (2025). Singapore's data-driven approach to build a skills-first economy. World Forum Agenda.

[3] OECD. (2017). Skills for a High Performing Civil Service. OECD Public Governance Reviews, OECD Publishing.

6. The Indian Context: Mission Karmayogi and the Reform Trajectory

India's civil service reform trajectory is a particularly instructive example of competency-based reform being pursued at a national scale in a large, federal and historically generalist administrative system. The intellectual base for this shift can be traced to the Second Administrative Reforms Commission[1], whose tenth report, titled Refurbishing of Personnel Administration: Scaling New Heights, recommended a move toward structured competency mapping, performance-linked training and merit-based career progression within the Indian civil services (Government of India, 2008)[2]. The Commission's recommendations reflected a growing recognition within India's policy establishment that the generalist, seniority-based career model inherited from the colonial and early post-independence administrative tradition was increasingly mismatched with the specialized and technical demands of contemporary economic and social policy.

This trajectory culminated more than a decade later in the launch of Mission Karmayogi in September 2020, formally titled the National Programme for Civil Services Capacity Building. The programme explicitly seeks to shift civil service human resource management from a rules-based approach, oriented around seniority and generalist postings, to a roles-based approach oriented around the competencies required for specific positions (Government of India, 2020). This reframing is significant: rather than treating training as a periodic, largely generic activity layered on top of an otherwise unchanged personnel system, Mission Karmayogi seeks to make competency the organising principle of the entire human resource architecture, from recruitment through to senior leadership postings.

Central to this shift is the Framework of Roles, Activities and Competencies, which aims to map civil service positions to the behavioural, functional, and domain competencies required to perform them effectively, providing a structured basis for both individual development plans and institution-wide workforce planning. The programme is supported by the iGOT Karmayogi digital platform[3], an integrated online training infrastructure intended to deliver role-specific, on-demand learning content at scale across central government ministries

[1] The Second Administrative Reforms Commission was constituted by the Government of India in 2005 to prepare a detailed blueprint for revamping public administration, submitting fifteen reports between 2006 and 2009.

[2] Government of India. (2008). Refurbishing of Personnel Administration - Scaling New Heights. Tenth Report of the Second Administrative Reforms Commission, Department of Administrative Reforms and Public Grievances (DARPG).

[3] iGOT Karmayogi is the integrated Government Online Training digital platform launched under Mission Karmayogi to deliver role-based, on-demand learning content to civil servants across the Government of India.

and, progressively, state governments, addressing one of the principal constraints identified in earlier reform efforts, namely the limited physical and institutional capacity of traditional, residential civil service training academies to deliver training at the scale required by a civil service employing millions of personnel.

Mission Karmayogi is complemented by a Capacity Building Commission, mandated to harmonise training standards across the numerous central training institutions that had historically operated with limited coordination, and by continued policy debate over lateral entry of domain specialists into government, intended to supplement traditional generalist cadres with specialised expertise in areas such as economic policy, technology, and infrastructure management. The introduction of lateral entry reflects a further dimension of competency-based thinking: rather than assuming that all specialised expertise required by government can be developed internally through training alone, lateral entry[1] treats external recruitment of domain experts as a complementary mechanism for closing specific competency gaps that internal training pipelines cannot address within a reasonable timeframe.

Taken together, these initiatives represent one of the most ambitious attempts globally to institutionalise competency-based reform within a large, historically generalist civil service tradition, spanning a workforce considerably larger than that of most other countries pursuing similar reforms. However, as with other large-scale reforms, effective implementation depends on sustained political commitment across successive governments, robust monitoring mechanisms capable of tracking training uptake and competency outcomes at scale, and genuine linkage between training completion, competency assessment, and career outcomes, linkages that remain in relatively early stages of institutionalisation and will require continued evaluation as the programme matures[2]. The Indian case therefore offers both a model of ambition for other large federal systems and a caution regarding the length of time and sustained institutional effort required to move from the announcement of a competency-based reform programme to its full embedding within everyday personnel decisions.

[1] Lateral entry refers to the induction of domain experts from outside the traditional civil service cadres directly into mid- and senior-level government positions, on the basis of specialised knowledge and experience.

[2] Press Information Bureau (PIB). (2026). Mission Karmayogi on boards 1.69 crore users; mandatory iGOT course completion to impact civil service APARs from 2025-26.

7. Challenges and Barriers to Competency-Based Reform

Despite growing consensus on the desirability of competency-based reform, several structural and cultural barriers condition its effective implementation across the cases examined in this paper and in the wider comparative literature. First, entrenched seniority norms within generalist civil service cadres often create resistance to competency-based deployment and promotion, particularly where such systems are perceived as threatening established career expectations built up over decades of service under a seniority-based model. Officials who have invested years of service anticipating promotion through established seniority channels may reasonably view a sudden shift to competency-based assessment as introducing uncertainty into career progression, generating institutional resistance that is rational from an individual perspective even where it constrains organisational reform[1].

Second, training architectures in many jurisdictions remain fragmented across multiple institutions with inconsistent curricula, making it difficult to deliver coherent, competency-aligned training at scale. This fragmentation often reflects historical patterns of institutional growth, in which specialised training academies were established incrementally to serve particular cadres or functions, without a unifying framework linking their curricula to a common set of civil-service-wide competency standards. Third, performance appraisal systems in many civil services continue to rely on subjective, hierarchy-based assessments rather than validated, competency-linked evaluation instruments, weakening the link between training investment and career outcomes and undermining the credibility of competency frameworks among the very officials they are intended to develop[2].

Fourth, the digital divide, both across regions and across generations of civil servants, can limit the reach and effectiveness of technology-enabled training platforms, particularly in federal systems where sub-national administrative capacity, connectivity infrastructure, and digital familiarity vary considerably between more and less developed regions. A digital learning platform designed with urban, well-connected users in mind may inadvertently widen rather than narrow capability gaps if deployed without complementary investment in connectivity and digital literacy support for officials in less-resourced localities. Fifth, there are legitimate methodological concerns regarding the validity and reliability of competency

[1] Research Gate. (2025). Balancing Seniority and Merit in Local Government: Evaluating the Effects of Seniority-Based Promotion Systems.

[2] Press Information Bureau (PIB). (2026). National Standards for Civil Service Training Institutions 2.0. Government of India, Ministry of Personnel, Public Grievances & Pensions PIB.

assessment instruments; poorly designed assessments risk reducing competency-based reform to a compliance exercise, in which officials complete prescribed training modules or assessments primarily to satisfy administrative requirements, rather than a genuine capability-building process that produces measurable improvements in on-the-job performance[1].

Finally, data protection and privacy considerations arise as governments increasingly collect and analyse detailed workforce data, including training records, assessment scores, and performance ratings, to support competency mapping and human resource analytics. This growing reliance on workforce data requires robust governance safeguards, clear rules on data access and retention, and transparent communication with civil servants regarding how such data will be used, in order to maintain employee trust in these systems and to avoid the perception that competency data may be used punitively rather than developmentally[2].

8. Discussion

The analysis presented above suggests that competency-based civil service reform is a necessary, though not sufficient, condition for future-ready governance. Competency frameworks provide the technical infrastructure for aligning recruitment, training, and deployment with the capabilities required for effective governance in complex, fast-changing environments, and in this sense, they represent an important advance over generalist, seniority-based human resource systems that lack any explicit mechanism for identifying or addressing capability gaps. However, the comparative evidence indicates that the success of such frameworks depends heavily on their integration within a coherent institutional architecture, one that connects competency assessment to genuine career consequences, sustains investment in training infrastructure over multiple budget cycles[3], and is supported by leadership commitment at the highest levels of government, sustained across changes in political administration.

Equally important is a cultural dimension that technical competency frameworks alone cannot address: future-ready governance requires a recalibration of civil service values toward adaptability, ethical judgment, and collaborative problem-solving, alongside the more easily

[1] OECD. (2024). Developing Skills for Digital Government: A review of good practices. OECD Directorate for Employment, Labour and Social Affairs OECD.

[2] The Path to Becoming a Data-Driven Public Sector. OECD Digital Government Studies, OECD Publishing.

[3] Berman, E. M., Bowman, J. S., West, J. P., & Van Wart, M. R. (2021). Human Resource Management in Public Service: Paradoxes, Processes, and Problems. CQ Press.

measured technical and digital skills. Civil services that treat competency reform purely as a training or certification exercise risk missing this deeper cultural transformation, producing officials who are technically proficient, in the sense of having completed prescribed training modules and assessments, but insufficiently adaptive to genuinely novel governance challenges that fall outside the scope of any predefined competency checklist[1]. This distinction between formally certified competency and genuinely adaptive capability is critical: the former can be measured relatively easily through training completion rates and assessment scores, while the latter can only be inferred indirectly, through indicators such as policy responsiveness, innovation in service delivery, and the capacity of institutions to learn from failure.

This suggests that future research and policy design should pay closer attention to the interaction between formal competency frameworks and informal organisational culture, leadership behaviour, and incentive structures within civil services. A competency framework introduced into an organisational culture that continues to reward risk-averse, procedure-compliant behaviour is unlikely to produce the adaptive, innovative workforce that future-ready governance requires, regardless of how technically sophisticated the framework itself may be. Conversely, an organisational culture that genuinely rewards initiative, learning from failure, and cross-functional collaboration is likely to reinforce and accelerate the intended effects of a well-designed competency framework[2].This interaction between formal structure and informal culture, largely absent from the technical human resource management literature on competency frameworks, represents an important area for further theoretical development and empirical investigation, and is central to explaining why broadly similar competency frameworks appear to produce quite different outcomes across the comparative cases examined in this paper.

9. Policy Recommendations

Based on the preceding analysis, five policy recommendations are proposed for governments seeking to advance competency-based reform as a pathway to future-ready governance.

First, competency frameworks should be institutionalised through statutory or regulatory instruments, rather than administrative circulars alone, to ensure continuity across

[1] Artificial Intelligence and digital transformation: competencies for civil servants. UNESCO Open Access Publishing UNESCO.

[2] Christensen, T., Lægreid, P., Rovik, K. A., & Rykkja, L. H. (2020). Organization Theory and the Public Sector: Instrument, Culture and Myth. Routledge.

changes in political leadership and to provide officials with a stable, predictable basis for career planning under the new system. Statutory backing also provides a stronger legal foundation for linking competency assessment outcomes to consequential personnel decisions, reducing the risk that such linkages are challenged or reversed as an informal administrative practice.

Second, competency assessment should be explicitly and transparently linked to recruitment, postings, and promotion decisions, so that training investment translates into meaningful career consequences and sustained motivation for civil servants to engage seriously with capacity-building programmes, rather than treating them as an optional or peripheral activity. Transparency in how competency assessment feeds into these decisions is particularly important for maintaining civil servant trust in the fairness of the system, especially during the transition from a purely seniority-based model.

Third, governments should develop integrated digital learning ecosystems that can provide role-specific training at scale while also providing equal access to the training content across regions and levels of seniority, so as not to further accentuate existing digital divides between well-resourced and less well-resourced parts of the civil service. This will require additional investment in connectivity infrastructure and online literacy support, especially for officials working in remote or under-resourced areas, beyond the investment in training content itself.

Fourth, independent or semi-autonomous bodies should be charged with periodically reviewing and updating competency frameworks, through rigorous job analysis and international benchmarking. This will help to ensure that frameworks do not become static or disconnected from evolving governance needs, as technology, policy priorities and citizen expectations continue to change. Such bodies can also play a valuable role in independently validating the reliability and fairness of competency assessment instruments, addressing one of the methodological concerns identified in Section 7.

Fifth, capacity-building programmes should explicitly incorporate foresight, ethics, and collaborative governance modules alongside technical and digital skills training, reflecting the broader cultural transformation that future-ready governance demands and directly addressing the distinction, developed in Section 8, between formally certified competency and genuinely adaptive governance capability. The fact that these modules are being incorporated into mainstream training curricula, rather than optional or elective content, suggests that adaptive

and ethical capability is seen as core to civil service performance as more easily measurable technical competencies.

10. Conclusion

This paper has examined the relationship between competency-based civil service reforms and the broader aspiration toward future-ready governance. Drawing on comparative evidence from the United Kingdom, Singapore, and India, the paper has shown that competency-based reform represents a significant and largely convergent global trend in public sector human resource management, moving civil services away from generalist, seniority-based systems toward role-specific, evidence-informed frameworks linking recruitment, training, deployment, and performance management. Across the cases examined, this trend is visible in the progressive refinement of competency frameworks, the growing use of digital platforms to scale training delivery, and, in the more advanced cases, the explicit linkage of competency assessment to career progression.

At the same time, the analysis has highlighted that technical competency frameworks alone cannot deliver future-ready governance; their effectiveness depends on institutional integration, sustained leadership commitment, and a parallel cultural shift toward adaptability, ethical judgment, and collaborative problem-solving within the civil service. India's Mission Karmayogi represents a particularly ambitious attempt to operationalise this agenda at national scale, within one of the largest and most administratively complex federal systems in the world, and its implementation experience will offer valuable lessons for other large, federal administrative systems pursuing similar reforms in the years ahead.

Future research should focus on the empirical evaluation of competency-based reform outcomes, particularly the extent to which such reforms translate into measurable improvements in service delivery, policy agility, and public trust, thereby closing the gap between the technical architecture of competency frameworks and the substantive governance outcomes they are intended to achieve. Longitudinal studies tracking cohorts of officials through competency-based recruitment, training, and promotion processes would be particularly valuable in this regard, as would comparative studies examining why broadly similar competency frameworks appear to generate different outcomes across jurisdictions with differing organisational cultures. Ultimately, the capacity of governments to build future-ready institutions will depend not only on the sophistication of the competency frameworks they

design, but on their willingness to embed those frameworks within a wider culture of continuous learning, ethical leadership, and genuine accountability for governance outcomes.

References:

1. Boyatzis, R. E. (1982). The competent manager: A model for effective performance. Wiley.
2. Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New public management is dead—long live digital-era governance. Journal of Public Administration Research and Theory, 16(3), 467–494.
3. Government of India, Department of Administrative Reforms and Public Grievances. (2008). Refurbishing of personnel administration: Scaling new heights (10th Report of the Second Administrative Reforms Commission). Government of India.
4. Government of India, Department of Personnel and Training. (2020). Mission Karmayogi: National Programme for Civil Services Capacity Building. Government of India.
5. Hood, C. (1991). A public management for all seasons? Public Administration, 69(1), 3–19.
6. Horton, S. (2000). Introduction: The competency movement, its origins and impact on the public sector. International Journal of Public Sector Management, 13(4), 306–318.
7. Lodge, M., & Hood, C. (2012). Into an age of multiple austerities? Public management and public service bargains across OECD countries. Governance, 25(1), 79–101.
8. McClelland, D. C. (1973). Testing for competence rather than for "intelligence". American Psychologist, 28(1), 1–14.
9. OECD. (2017). Skills for a high performing civil service. OECD Publishing.
10. UK Cabinet Office. (2018). Success profiles: Civil service recruitment guidance. UK Government.
11. UNDESA. (2020). United Nations e-government survey 2020: Digital government in the decade of action for sustainable development. United Nations.
12. Weber, M. (1947). The theory of social and economic organization (A. M. Henderson & T. Parsons, Trans.). Free Press.
13. World Bank. (2016). World development report 2016: Digital dividends. World Bank.

From Rules-Based to Roles-Based Governance: Evaluating the Effectiveness of Mission Karmayogi in Building Future-Ready Competencies among Civil Servants

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Mission Karmayogi, the National Programme for Civil Services Capacity Building, in its original conception, was meant to replace the old colonial, rule-based approach to personnel administration with a role-based, activity-based, competence-based approach. It is based on the indigenous Framework of Roles, Activities and Competencies, a national digital learning platform, iGOT Karmayogi, a special purpose vehicle for platform and a specialist Capacity Building Commission, launched on 2 September 2020. The programme has achieved a scale of the kind not seen among comparable civil service learning programmes – about 1.7 crore users, over five and a half thousand competency-based courses, and over seven crore course enrollments, six years after it started. Scale, however, does not equate to capability and the scholarly record is limited, descriptive and philosophically rather than evaluative. While there have been published explorations of its normative underpinnings and its approach to the rules-to-roles transition it is yet to be systematically evaluated whether the transition it promises is evident in the deployment, the appraisal and the learning outcomes of Indian civil servants.

This paper aims to fill in this void. It builds up the programme's unspoken theory of change, assesses, based on available public evidence, whether behavioural, functional or domain competencies are being developed and applied, and identifies institutional barriers to transition. The design is qualitative-dominant through exploratory multilateral evaluation brief and structured synthesis and documentary analysis of parliamentary replies and official press communication and the Department related Parliamentary Standing Committee on Personnel, Public Grievances, Law and Justice 160th report, in addition to exploratory multilateral evaluation brief, and structured synthesis of 2022 – 2026 scholarship on

competency-based public human resource management. The results indicate that while there is evidence of real progress in participation, the provision of multilingual content and the spread of competency vocabulary, there are also four clear remaining challenges: the definition of activity indicators is not uniform across official sources; achievement of completion and on-the-job performance is poor; there is incomplete linking between role mapping and personnel decisions; and institutional absorption is uneven, with capital expenditure utilisation around 15 per cent and weak coverage in both populous and north-eastern states. The paper concludes that Mission Karmayogi has till now developed a learning system and not an actual competency based HR system and outlines the changes in measurement, institutions and accountability that are required to bridge this gap.

Keywords: Mission Karmayogi; competency-based human resource management; civil service capacity building; roles-based governance; iGOT Karmayogi; administrative reform in India

1. Introduction

The rule has primacy over the role is one of the most enduring features of the Indian public administration. The combination of recruitment by a common competitive examination, generalist career progression, and seniority-weighted promotion and decision making based on a file system yielded a cadre that was based on rank in a rule-governed hierarchy rather than on proven competence in a specific job. Comparative theorising about South Asian bureaucratic regimes views this legacy as an officer regime characterised by high levels of officer privileges and limited policy impacts, enabled by colonial traditions and office-holding arrangements that shield officers from policy outcomes (Mumtaz & Nakray, 2025). There have been longstanding debates about the need for generalist mobility and specialised knowledge in the present day's policy field in the Indian Administrative Service (Veeresha, 2022), and about high-performing officers that has pointed out that where officers have shown high performance, it is largely dependent on self-directed learning and reputation (Pati & Kakani, 2022).

The difference between rules-based and roles-based administration is more than just a slogan - it’s more of an analytical distinction. A rules-based personnel system assigns persons to posts, and then rules govern those persons; a roles-based system first defines what a post requires in terms of roles, and then the development, selection and deployment of persons is related to that. This shift is referred to as the competency turn in public human resource

management internationally, where knowledge, skills, attitudes and behaviours are used as an organising currency of personnel decision-making in place of qualification and tenure (Belényesi & Dobos, 2022). The turn involves a critique of rule density, but an astute one: modern scholarship has distinguished between those rules that do not promote any purpose and simply consume the organisational resources, and those that could be burdensome but institutionally necessary (Campbell et al., 2022); and it is demonstrated that when officials experience a rule as legitimate, this depends on how it is appraised in relation to their role identities (Davis & Pandey, 2023). Therefore, about the reduction rules, it is not the same as the role building.

In 2020, the Government of India approved Mission Karmayogi, which is the institutional solution to this challenge and is now called the National Programme for Civil Services Capacity Building. It aims to shift the focus of personnel management from rules to roles, by mapping each civil service role to a Framework of Roles, Activities and Competencies, and by providing competency-based learning products via a national digital platform. The architecture is unprecedented in the training reform and involves a Prime Minister's Human Resources Council for strategic leadership, a Capacity Building Commission to coordinate standards in training institutions, a special purpose vehicle to run the platform, and Annual Capacity Building Plans to disaggregate capacities into ministry-based plans. The programme has a clear normative dimension and is named after the idea of skilled and disinterested action in the Bhagavad Gita, and defines the civil servant as a professional with ethical motivation, instead of a functionary who merely follows instructions (Tiwary, 2024). It is seen as an important experience in institutionalising capacity development in a very large and fragmented public employment system by a multilateral review (Asian Development Bank, 2025).

It is an evidential stance, however, that is weak in important ways. Nearly all the published literature on the programme is conceptual and descriptive. The early prospective treatment evaluation predicted benefits but did not see them (Panda, 2021); the most thoughtful treatment based on its competency architecture was in the health policy arena, not public administration (Tiwary, 2024); and most rigorous applications of the competency architecture are also in the health policy field (Dixon et al., 2024; Bariya et al., 2026). There is no assessment to be found which thinks about the causal statement of the programme on whether competency development on this scale is leading to the roles-based personnel practice. But the

general literature cautions to never presume so, as there is limited and conditional evidence that training is a pathway to governance reform (Birch, 2024) and elsewhere competency-based management does not work at implementation (de Araújo et al., 2022).

There are three questions that are asked in this paper. What is Mission Karmayogi's theory of change and how is it defensible in the light of the existing literature? What is the published evidence regarding onboarding and competency mapping and building of behavioural, functional and domain competencies? What institutional or measurement conditions hinder the change from a learning system to a roles-based human resource system? The aim of the objectives is as follows: To reconstruct and appraise the logic of the programme, to evaluate the programme critically not celebratorily, and to draw implications for capacity building in large developing-country bureaucracies.

2. Literature Review

2.1 Competency-based human resource management in the public sector

If it is possible to explicitly state the observable attributes that differentiate successful performance in a role, then these attributes can be measured, can be developed and can be used as the basis for selection, deployment, appraisal and reward – the simple proposition of competency based human resource management has demanding preconditions. In the public service sectors, the idea has been both alluring and challenging. It has been argued that the low adoption of competency-based approaches in civil services in Europe is not due to any conceptual uncertainty but to the question of credible measurement, on one hand, and to the lack of interpretation divergence between the training institutions and the employing departments, on the other hand, according to Belényesi and Dobos (2022). De Araújo et al. (2022) investigated six federal organisations with competency management programmes as part of a national personnel development strategy, and determined that structural factors related to the organisations and departments were more significant than strategic or political factors, and that the most important enabler was the human resource unit's capacity to lead the structural change rather than the complexity of the program. In Indonesia local government, a similar result can be seen, in which Wardiyanto et al. (2024) have identified this gap between training and practice as due to decontextualised pedagogy, disjointed technology integration, and cultural stagnancy. The diagnosis is that the problem is not of convergence (articulation) but of coupling with personnel decisions.

2.2 Rules-based and roles-based administration

The contrast between rule-bound and role-oriented administration has a long history but, in more recent writing, this is complicated. However, three decades into managerial reform, performance and strategic management have not infiltrate rule of law administrations deeply, as less than one-fifth of German municipalities have adopted the main elements of performance and strategic management, and practice is highly variable (Weiss, 2025). Studies regarding rule density are also challenging the notion that rules are necessarily constraints on capability: Campbell et al. (2022) find that the traditions of ‘red tape' and ‘administrative burden’ evoke different kinds of actors and mechanisms, and Davis and Pandey (2023) suggest that the same rule can be legitimate for one official, while another views it as waste. The settlement does not come from a roll-up of a set of role definitions onto an unchanging rule structure; it requires both rule structure and roles to be settled and the discretionary space in which competencies are exercised must be the focus of settlement.

2.3 Global and Indian experience in capacity building

Public sector training does not always lead to building governance capacity, and evidence to support this is more ambiguous than the policy documents suggest. The findings in Birch (2024) indicate that training is consistently found to have an effect on knowledge, sometimes on behaviour and only when combined with a change in incentives, supervision and organisational routine on institutional performance. There is related comparative research on personnel systems that also shows a positive link between meritocratic appointment, impartiality and professionalism, and improved government performance and reduced corruption (Oliveira et al., 2023). Thus, capability is not only a skill of the individual, but also of institutional arrangement. The same applies to the cross-national analysis, which puts bureaucratic quality in the connection between policy formulation and implementation, and demonstrates that the burden-capacity gap is systematically related to this connection (Fernández-i-Marín et al., 2023). The facts in India are consistent: senior officers' performance is much more dependent on inter-departmental coordination, financial sufficiency and the reliability of subordinates than on their own resources (Pati & Kakani, 2022), and the research on state capacity focuses on the organisational culture and professional identity of the official, with the argument that reform ideas often fail because they are not taken into the daily life of the frontline official (Aiyar, 2024).

2.4 Mission Karmayogi in the literature, 2022–2026

In this context, the Mission Karmayogi literature is very limited. The main peer-reviewed account is that of Tiwary (2024), who interprets the programme as a shift from rule-governed governance to one that is more flexible and role-based and is driven by an ethic of excellence in action; it does not evaluate outcomes. The prospective evaluation is provided by Panda (2021) before the data of implementation. Indirect is the most severe of the engagements. Dixon et al. (2024) developed a competency framework of health technology assessment in India under its four levels of proficiency and three categories: behavioural, functional and domain-specific, and reported on its portability, along with some of the limitations it faced in terms of sectoral specificity. Bariya et al. (2026) took it one step further, creating and testing a digital health competency framework for frontline health workers in Uttar Pradesh, based on the same role-to-competency mapping. These studies are significant as they are the only published cases where the architecture has been operationalised and tested. The digital learning literature provides the other half: Koddebusch et al. (2024) identify design principles for public sector online platforms, including protected learning space, domain focus and senior sponsorship whereas Matei and Dinca (2022) note that such trainings can only be sustained if they are part of institutional routine. The development of artificial intelligence further increases the urgency, as essential skills have now expanded to data governance and algorithmic accountability (Belényesi, 2025) and automated decision support poses issues of transparency that training based on rules can't resolve (Cetina Presuel & Martínez Sierra, 2024).

3. Conceptual Framework

Here, the framework used consists of four causal links in Mission Karmayogi and conditions are mentioned on which each link depends. Firstly, the policy intent is translated into a role architecture; roles are calibrated against a Framework of Roles, Activities and Competencies; which provides a behavioural, functional and domain-specific specification for each role. Secondly, the second transforms that specification into learning supply with competency-based products uploaded onto the national platform and via the Annual Capacity Building Plans that prioritise the department. The third makes learning supply into competency acquisition, which is not dependent on availability, but on engagement, relevance, supervisory endorsement and protected learning time. The fourth and most importantly, what separates a competency-based human resource system from a training programme, is the translation of acquired competency

into a roles-based personnel practice (posting, appraising, promoting and succession planning based on demonstrated competency).

There are three conditions that moderate the chain. Departments and state administrations can host the process at all or not, depending on their institutional absorption capacity, and there are reasons to believe that competency reforms most often fail here (de Araújo et al., 2022). Measurement regime can make it difficult to see whether the system is active or attainment; if only enrolment and completion are measured, the weakest link is measured. The extent to which someone has reason to view competency as important is a matter of incentive alignment and it is clear from the literature when using performance management in public environments, there are competing goals and rule density (Hill & Plimmer, 2024). The framework is completed with a feedback loop to narrow the gap between specification and practice: evidence of competency use should be used to make changes to the role architecture. Table 1 shows an overview of the framework and indicators used to evaluate each link.

Table 1. Analytical framework for evaluating the rules-to-roles transition

Link	Mechanism	Observable indicator	Enabling condition
1. Role architecture	Calibration of posts to roles, activities and competencies	Coverage of role mapping; Annual Capacity Building Plans prepared	Departmental HR capability; Commission reach
2. Learning supply	Competency-based products and curated pathways	Course volume; language coverage; role-linked curation	Content governance; institutional partnerships
3. Competency acquisition	Engagement with and completion of relevant learning	Enrolment, completion and proficiency assessment	Protected time; supervisory endorsement; digital access
4. Roles-based practice	Use of competency evidence in personnel decisions	Posting, appraisal and promotion linked to competency	Incentive alignment; procedural change

Source: Author, synthesised from Belényesi and Dobos (2022), de Araújo et al. (2022) and Birch (2024).

4. Methodology

This study is a documentary study with a theory-dominant approach. This is not a choice of method of interpretation, but the state of the evidence. At present, independent researchers cannot access individual learning records and there is no public micro-dataset that correlates these with posting or appraisal outcomes; a quantitative assessment of the core claim of the programme is not yet possible. The only thing that can be done rigorously is to gather the entire body of publicly reported programme data and read it against a stated analytical context, and assess the inferences it will and will not sustain.

There are three bodies of material. The first sets are official and parliamentary documents, such as the press information on the pillars of the programme, the structure of the institutions and the statistical data on the platform (Press Information Bureau, 2024, 2026a, 2026b), along with the figures presented before the Lok Sabha in August 2026 regarding enrolment and completion of the programme, and registration (Asian News International, 2026). The second is a multilateral institution's evaluative account from an implementation perspective (Asian Development Bank, 2025). The third type of literature is peer-reviewed articles from 2022 to 2026 on public sector digital learning, public human resource management, and administrative capacity which were obtained from systematic searches from Scopus-indexed and Crossref-registered sources and showed relevance to the four links of the framework.

The analysis was carried out in three phases. Programme data were first presented as a time series from the National Learning Week in October 2024 to the parliamentary disclosures in 2026 to differentiate growth from restatement and highlight the variations in categories reported. The documentary content was then deductively coded to the four links and three moderating conditions, and each empirical claim coded to the strongest link that it could support. Lastly, a disconfirmation check was performed: each positive inference was rechecked against the corpus for any contradictory evidence, and each mentioned metric was followed up in the operationalization traces. It needs to be said outright that there are two drawbacks. There is no individual level outcome data for this link, and official statistics are self-reported and cannot be independently audited. The constraints are, however, reduced by triangulation between official, legislative, multilateral and scholarly sources.

5. Findings and Discussion

5.1 Participation and onboarding

Mission Karmayogi has done an amazing work on the measures taken by it. There were approximately 1.6 crore completions of formal courses on the iGOT Karmayogi, which provided more than 1,400 courses and some 45 lakh employees were registered during the National Learning Week in October 2024 (Press Information Bureau, 2024). By early 2026 it had registered 1.48 crore users, more than 4,200 courses, of which 829 courses were in Hindi and 546 in other Indian languages in 23 languages and 28 states/UTs with Karmayogi Bharat and the Capacity Building Commission (Press Information Bureau, 2026a). The statistics

released before Parliament in August 2026 show there are approximately 1.7 crore users, over 5,600 courses of which 218 are related to artificial intelligence and new technologies, 7.3 crore enrolments, 3.35 crore courses completed and 30 states and union territories are covered (Asian News International, 2026). The path is given in Table 2.

Table 2. Reported iGOT Karmayogi indicators at three observation points

Indicator	October 2024	Early 2026	August 2026
Registered users	About 45 lakh	About 1.48 crore	About 1.70 crore
Courses available	Over 1,400	Over 4,200	Over 5,600
Course completions	About 1.6 crore	Reported as over 7 crore	About 3.35 crore
Course enrolments	Not reported	Not reported	About 7.3 crore
States/UTs with memoranda	Not reported	28	30

Sources: Press Information Bureau (2024, 2026a); Asian News International (2026). Categories reproduced as reported.

Three features merit stress prior to this record is qualified. This level of onboarding across all union ministries and almost every state administration, has no clear parallel in a similar jurisdiction. The investment is not tokenistic, but seeks to make language accessible. Additionally, the fast growth of content about new technologies suggests that the pipeline is aligned with the changing demand for competencies, which is exactly what the literature about future-readiness says is needed (Belényesi, 2025).

5.2 What the metrics can and cannot establish

What's challenging is that almost all of them are activity measures and are not consistently defined in official sources. The figure of more than seven crore course completions reported in early 2026 is again mentioned in the parliamentary reply in August with more than 14 crore completion certificates, which is 4 times the figure of course completions mentioned in the reply (Press Information Bureau, 2026a; Asian News International, 2026). Whatever the cause, the headline figures are not based on consistent operational definitions and the implied completion rate ranges between about 46 per cent and almost one depending on the combination used. This is not a material, but a presentational weakness of a programme that has, as its sixth pillar, monitoring and evaluation. The broader literature calls for caution: completion is a poor indicator of ability in large-scale online learning, and protected learning space, domain focus and senior sponsorship are designed in in the public sector, supporting engagement.

5.3 Behavioural, functional and domain competencies

The two studies that have tested the programme provide the best evidence on its effectiveness; the most exportable contribution is the tripartite competency taxonomy. Dixon et al. (2024) developed a HTA framework within its categories and four levels of proficiency and determined that the framework is workable but can be limiting for sectoral specificity. Similarly, Bariya et al. (2026) mapped the same mapping exercise with the frontline health workers in Uttar Pradesh, where there was a statistically significant improvement in knowledge scores for auxiliary nurse midwives after conducting the sessions by the instructors, but the baseline scores for community health activists were found to be very low (below 40 per cent). Two conclusions follow. When completed, the architecture is clearly effective, with mapped roles, aligned content, delivered instruction and measured assessment, which add up to gains. However, such completion is uncommon, as the factors which led to those outcomes, namely face to face instruction, a validated assessment instrument and institutional embedding are not consequences of platform access. This is consistent with the findings that training is very effective at enhancing knowledge and less effective at enhancing institutional performance unless there are complementary factors in place (Birch, 2024) and suggests that the less measurable element of the current system is behavioural competencies which will not be assessed by an online module.

5.4 How far has the roles-based shift travelled?

The fourth link is the least supported and the thinnest. The programme sees a form of role-based curation in the design of learning pathways – some are widely recommended courses; other learning pathways are centrally curated role-based learning; and other learning pathways are from the Ministry, based on annual capacity building plans; and other learning pathways are self-selected study (Press Information Bureau, 2024); and the current phase holds the promise of deeper integration of role-based frameworks with AI tools to generate a learning pathway from the official documents (Press Information Bureau, 2026b). Although it is a true step forward in the organisation of learning, it is not yet proof that competency is now consequential for personnel decisions. There is no evidence published that posting, empanelment, promotion or appraisal now depends on competency evidence from the programme and the electronic human resource management pillar that would enable this linkage is not fully realised. As predicted in the literature, the implementation of competency systems ends up at the coupling stage because this is where they clash with existing rules and

interests (de Araújo et al., 2022) and the implementation of public sector performance management is already affected by conflicting objectives and rule overload (Hill & Plimmer, 2024). What has been created is a very big learning system on top of a personnel system that's still pretty rule-based.

5.5 Institutional and fiscal constraints

This is focused by independent legislative scrutiny. According to the 160th report of the Department related Parliamentary Standing Committee, the scheme has been allocated approximately 42 per cent of the ministry's scheme allocation, but it has used only 69.96 per cent of the scheme's revenue provision and 15.09 per cent of the scheme's capital provision, and the capital allocation for 2026–27 has been cut down to a nominal level from ₹125.35 crore (PSC, 2026). The committee also noted that it is not yet expanded to several states, including Uttar Pradesh and other parts of the north-east; that the faculty of the main national training institute has not been filled and its staff is not in-depth in digital governance, artificial intelligence and climate policy; and that vacancies in one all-India cadre are near a quarter of the sanctioned strength. It recommended that there be more monitoring to make sure that the expenditure results in governance outcomes. The observations correspond to the moderating conditions of the framework: institutional absorption is not even; the institutions supposed to underpin the competency system are also under-resourced; and low capex indicates that the competency system's systems infrastructure is not being constructed at the pace of its digital front end.

5.6 Critical evaluation

There is evidence to support a differentiated judgement. Mission Karmayogi has developed a national learning infrastructure, codified and popularised a language of competency in an incredibly decentralised employment landscape, and developed a transferable role-mapping methodology that has been adopted and endorsed by experts. Based on experience with other designs, these are the most difficult aspects of the design problem to execute. It has yet to prove that it creates competencies that are verifiably developed, that the competencies change administrative behaviours, or that they guide decisions such that the roles-based claim would be true. The learning layer is built first and fastest, with the institutional, measurement and incentive layers still to come – hence the gap. The neo-Weberian notion that managerial instruments percolate into rule-of-law administration slowly (Weiss, 2025) and the Indian

experience that reform ideas take root when incorporated in organisational culture (Aiyar, 2024) both suggest that one should not read the statistics and figures found on platforms as capability.

6. Implications

Theoretically the case contributes to the competency-implementation literature in three ways. In the case of a large developing-country bureaucracy, it's not framework articulation at the national level or learning supply through digital public infrastructure, but it is the coupling of competency evidence to persons' authority. This reinforces the conclusion that organisational and departmental aspects are more relevant than strategic and political aspects in the implementation of competency (de Araújo et al., 2022), and also includes a scale dimension: in the case of a centrally determined role architecture and localised authority over personnel in ministries, states and cadre controlling authorities, coupling is a challenge of federal coordination rather than human resource design. Additionally, the case illustrates how competency frameworks can have lateral value, even where the vertical use chain is not complete: the Framework of Roles, Activities and Competencies has proven to have value in its sectoral workforce as a design standard without first being used for personnel (Dixon et al., 2024; Bariya et al., 2026). Finally, measurement regimes are not only descriptive, but also constitutive, that is, a system of measurement of enrolments will produce enrolments.

Four priorities for policy follow. Measurement should focus on proficiency, rather than participation; standardised measurement definitions should be published across formal sources; criterion-referenced measurement should be used for functional and domain competencies, and simulation or supervisor rating should be used for behavioural competencies which are not measurable when completed online. Coupling should be explicit and incremental, starting with a limited number of consequential choices, such as specialised postings and empanelment for technical roles, where competency evidence is given a clear and defined weight and gradually as assessment credibility is built. Instead of complementing, the institutional capacity must be built before it is relied upon – extending the Commission to the remaining large and north-eastern states, and filling faculty vacancies at national and state training institutions are prerequisites – and the current practice of capital under-utilisation is counterproductive (PSC, 2026). Evaluation results should also be released, via anonymised micro-data which can be made available to independent researchers, under appropriate safeguards, to allow effects on

behaviour and performance to be estimated rather than asserted. Blended delivery should be the norm for behavioural and leadership competency trainings as there is only evidence of measured gain in instructor-led delivery with assessment in India (Bariya et al., 2026).

7. Conclusion and Way Forward

Mission Karmayogi is not necessarily a training scheme that has gone out of hand but more of a currency shift from a position in a rule structure to capability in a role in the Indian administration. Considering that aim, the programme's first six years have provided the tools and the language for the transition, but not the transition itself. The reality is that there is a platform implemented by approximately 1.7 lakh officials, and content in 23 languages, and a competency taxonomy strong enough for specialists to build on, and an institutional structure throughout the union and in nearly all the states. The shortfall is also true: activity is still measured, and definitions are not consistent; no published evidence of learning changing administrative behaviour; and decision making about personnel is still based on seniority and procedure.

It's not about expansion; it's about completion. Role calibration, learning, assessment, and personnel decision-making must be a closed loop in the programme's theory of change; at the moment, the assessment and decision-making stages are not necessarily closed, evidenced by incentives for officials. Closing it demands reform of the measurement system; it demands a defensible connection between competency evidence and a set of personnel decisions; it demands investment in the institutions that must be the system; and it demands an evaluation system that allows independent evaluation of effects. This does not detract from the programme's overall philosophy that the right ambition of public service is the skilled and the ethical act (Tiwary, 2024). Only that this be made auditable it insists. It remains to be seen whether Mission Karmayogi is a transition from rules to roles, or an unusually elaborate iteration of a rules-based regime, as governments determine which things to measure, and which things to let the measurement determine.

References

Aiyar, Y. (2024). *Lessons in state capacity from Delhi's schools*. Oxford University Press. https://doi.org/10.1093/9780198922667.001.0001

Asian Development Bank. (2025). *Building a future-resilient public sector workforce in India: The Mission Karmayogi experience*. Asian Development Bank. https://doi.org/10.22617/BRF250554-2

Asian News International. (2026, August 5). *Over 1.7 crore users registered on iGOT Karmayogi platform: Union Minister*. https://aninews.in/news/national/general-news/over-17-crore-users-registered-on-igot-karmayogi-platform-union-minister20260805232136/

Bariya, C., Burad, H., Keshav, R., Arul, S., Jhadav, U., Vishwanath, P., Patil, G., & Adapa, K. (2026). Strengthening digital competencies in India's health workforce: Development and feasibility evaluation of a digital health competency framework for frontline healthcare workers in Uttar Pradesh. *Oxford Open Digital Health, 4*, oqag009. https://doi.org/10.1093/oodh/oqag009

Belényesi, E. (2025). Public service in the age of AI: Institutional strategies for future-ready skill development. In *Proceedings of the Central and Eastern European eDem and eGov Days 2025*. Association for Computing Machinery. https://doi.org/10.1145/3773002.3773648

Belényesi, E., & Dobos, Á. (2022). Competency-based human resource management in the public service from educational perspective. *Pro Publico Bono – Magyar Közigazgatás, 10*(4), 20–41. https://doi.org/10.32575/ppb.2022.4.2

Birch, A. (2024). *The effectiveness of training in building capacity for governance reform* (K4D Helpdesk Report). Institute of Development Studies. https://doi.org/10.19088/K4DD.2024.010

Campbell, J. W., Pandey, S. K., & Arnesen, L. (2022). The ontology, origin, and impact of divisive public sector rules: A meta-narrative review of the red tape and administrative burden literatures. *Public Administration Review, 83*(2), 296–315. https://doi.org/10.1111/puar.13527

Cetina Presuel, R., & Martínez Sierra, J. M. (2024). The adoption of artificial intelligence in bureaucratic decision-making: A Weberian perspective. *Digital Government: Research and Practice, 5*(1), 1–20. https://doi.org/10.1145/3609861

Davis, R. S., & Pandey, S. K. (2023). 'Feeling out' the rules: A psychological process theory of red tape. *Public Administration Review, 84*(6), 1038–1051. https://doi.org/10.1111/puar.13750

de Araújo, M. L., Menezes, P. P. M., & Demo, G. (2022). Challenges in implementing competency-based management in the Brazilian public sector: An integrated model. *Sustainability, 14*(22), 14755. https://doi.org/10.3390/su142214755

Department-related Parliamentary Standing Committee on Personnel, Public Grievances, Law and Justice [PSC]. (2026). *One hundred sixtieth report on Demands for Grants (2026–27) of the Ministry of Personnel, Public Grievances and Pensions*. Rajya Sabha Secretariat, Parliament of India.

Dixon, S., Tyagi, K., Singh, M., Kar, S. S., Bagepally, B. S., Prinja, S., Booth, A., Carroll, C., Sohail, A., & Mehndiratta, A. (2024). Development of a competency framework for health technology assessment in India. *BMJ Evidence-Based Medicine, 30*(Suppl 2), s43–s47. https://doi.org/10.1136/bmjebm-2023-112488

Fernández-i-Marín, X., Knill, C., Steinbacher, C., & Steinebach, Y. (2023). Bureaucratic quality and the gap between implementation burden and administrative capacities. *American Political Science Review, 118*(3), 1240–1260. https://doi.org/10.1017/S0003055423001090

Hill, K., & Plimmer, G. (2024). Employee performance management: The impact of competing goals, red tape, and PSM. *Public Personnel Management, 53*(3), 458–485. https://doi.org/10.1177/00910260241231371

Koddebusch, M., Halsbenning, S., & Becker, J. (2024). Design principles for MOOC platforms: A public sector perspective. *Transforming Government: People, Process and Policy, 19*(1), 1–21. https://doi.org/10.1108/TG-05-2023-0065

Matei, A., & Dinca, D. V. (2022). Future online learning for public administration. *Sustainability, 14*(18), 11540. https://doi.org/10.3390/su141811540

Mumtaz, Z., & Nakray, K. (2025). Toward a theorization of ideal type bureaucratic regimes: A comparative perspective from India and Pakistan. *Administrative Theory & Praxis, 47*(1), 66–94. https://doi.org/10.1080/10841806.2025.2452677

Oliveira, E., Abner, G., Lee, S., Suzuki, K., Hur, H., & Perry, J. L. (2023). What does the evidence tell us about merit principles and government performance? *Public Administration, 102*(2), 668–690. https://doi.org/10.1111/padm.12945

Panda, P. K. (2021). Perspective evaluation of Mission Karmayogi scheme in India. *Jaipuria International Journal of Management Research, 7*(1). https://doi.org/10.22552/jijmr/2021/v7/i1/209141

Pati, S. P., & Kakani, R. K. (2022). Explaining high performance among Indian Administrative Service (IAS) officers: A job demands-resources perspective. *Review of Public Personnel Administration, 43*(2), 288–308. https://doi.org/10.1177/0734371X211062481

Press Information Bureau. (2024, October). *Karmayogi Saptah and Mission Karmayogi* [Press note]. Government of India. https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=153370&ModuleId=3

Press Information Bureau. (2026a). *Parliament question: iGOT Karmayogi platform* [Press release]. Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2223638

Press Information Bureau. (2026b, February). *Mission Karmayogi showcases AI-enabled capacity building of civil servants at India AI Impact Summit 2026* [Press release]. Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2228692

Tiwary, M. K. (2024). Exploring the deep philosophical roots of Mission Karmayogi. *Indian Journal of Public Administration, 71*(1), 187–189. https://doi.org/10.1177/00195561241284843

Veeresha, N. (2022). Decentralisation, Indian Administrative Service (IAS) and governance: A review article. *Indian Journal of Public Administration, 68*(1), 123–129. https://doi.org/10.1177/00195561211072338

Wardiyanto, B., Setijaningrum, E., Samad, S., & Kandar, A. H. (2024). Mending the mismatch of minds and mandates: Reimagining competency-centric public service delivery in Bojonegoro Regency, Indonesia. *Cogent Business & Management, 12*(1), 2442538. https://doi.org/10.1080/23311975.2024.2442538

Weiss, J. (2025). Is bureaucracy ironclad after all? Prevalence and variances of performance- and strategy-oriented management in German local governments. *International Review of Administrative Sciences, 91*(2), 293–309. https://doi.org/10.1177/00208523241268140

Leading with Empathy and Insight: The Role of Emotional Intelligence in Effective Administration

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Administration as a rule-based, structure-based, and rational calculation subject has been taught for a long time. But the work of administrators, whether in the district collectorate, a municipal corporation, a university registry, or a corporate office, is overwhelmingly relational, even though the systems are different. Administrators convince, comfort, compromise, settle disagreements among citizens and colleagues, and carry away citizens' and colleagues' frustrations. In this paper, the importance of emotional intelligence (EI) defined as the ability to perceive, understand, utilize, and manage emotions within oneself and others, is discussed in relation to effective management. The paper combines the ability model of Mayer and Salovey, the competency model of Goleman, and the trait approach of Petrides to review the meta-analytic evidence concerning the link between EI and job performance, transformational leadership, job satisfaction, and organisational commitment. It then moves on to public administration, focusing on the concept of emotional labour, which emphasizes the emotional requirements of frontline and supervisory staff. Special focus is given to the Indian context, covering the attitude and aptitude aspects of the civil services examination; the competency-building reforms under Mission Karmayogi, part of the National Programme for Civil Services Capacity Building; and the ongoing problems of redressing citizen complaints.

The secondary data have been gathered and presented in six tables on EI models, meta-analytic effect sizes, competencies aligned with administrative tasks, scope of public complaints lodging, outcomes of EI trainings, and the institutional framework for public complaints and behavioural capacity building in India. Moderate positive relationships between EI and administrative effectiveness are found across all analyses, with the strongest positive relationships found with leadership and employee attitudes, while there is robust evidence that EI can be developed through structured training. It also warns against overemphasizing the importance of EI, such as measurement issues and overlap with personality issues, as well as the possibility of emotional manipulation. The paper ends with recommendations for recruitment, training, performance appraisal, and organisational

culture, both of which say that empathy and insight should be institutionalised and not be left to individual temperament.

Keywords: emotional intelligence, public administration, leadership, empathy, emotional labour, Mission Karmayogi, organisational effectiveness, civil service capacity building

1. Introduction

Rationality was the basis of the classical traditions of administrative thought. Weber's ideal-type bureaucracy valued impersonality, hierarchy and conformity to rules, as did the scientific management movement, which saw the organisation as a machine to be optimized. In this bequest, emotion was granted the status of noise, something to be avoided in the management of affairs due to its ability to generate biases, favouritism and irrationality. While most of the 20th century public administration was content with this assertion, the human relations school that had begun with the Hawthorne studies demonstrated that human relations, feelings, morale affect the actual operation of the work.

The rationalist interpretation was set on a shivering halt by the late 1900's. Salovey and Mayer (1990) coined the term emotional intelligence to refer to a collection of skills that individuals possess to track their emotions, to distinguish between them and to act upon the information. Goleman's (1995) best-selling book took the concept out of psychology and suggested that emotional competencies might be as important as or more important than traditional intelligence in determining job success. Goleman's original claims were subsequently found to have been exaggerated, but his insight stood the test of time. Organisations are social systems, and emotion is read, managed and mobilised, in part, to ensure the success of those who lead them.

The consequences for administration are significant. Administrators don't work alone very often. They organize teams, manage conflicts and negotiate amongst various factions, and they deliver unwelcome news and interact with citizens who are anxious, angry, or desperate. Guy, Newman and Mastracci (2008) claimed such relational work is a form of emotional labour – that is, the process of managing one's own emotions and those of others as a key component of the work – which has been deliberately understated in public personnel systems. No one would ever refer to the emotional skills of a revenue officer resolving a land dispute, a nurse superintendent dealing with a grieving family, and a school headmaster in a post-incident with parents.

The questions have significant bearing in India. The administrative state is at citizens' most susceptible points: when they apply for welfare benefits, register land, file police complaints, land them in hospital, or receive a diagnosis at the hospital. Various reports from the Second Administrative Reforms Commission (2009) have cited the lack of approachability and interest on the part of officials. In 2013, the Union Public Service Commission added a paper on Ethics, Integrity and Aptitude to the civil services main examination (Mains), and emotional intelligence is mentioned in the syllabus of the paper. In 2013, the Union Public Service Commission added a new paper on Ethics, Integrity and Aptitude to the civil services main examination (Mains), and emotional intelligence is listed explicitly in the syllabus of the paper. Mission Karmayogi (2020) marked another transition from the traditional capacity building based on rules to role-based capacity building and reinforced the need to complement functional and domain skills with behavioural ones.

In this paper, I will explore three questions. Let's explore the first question first: What is emotional intelligence? Second, what is the evidence from the field on associations between EI and outcomes that are relevant to administrative effectiveness, such as leadership, performance, job attitudes, and service quality? Thirdly, what are the ways to make emotional intelligence a part of administrative systems, specifically in India? The paper is based on secondary data from peer-reviewed meta-analyses, official documents, and published studies, which have been presented in data tables with sources. It ends with a discussion of contrasting the promise of EI with any legitimate criticisms and makes practice recommendations.

2. Conceptual Framework: Models of Emotional Intelligence

Emotional intelligence is not a single construct but a family of related ideas. Scholars broadly distinguish three streams: ability models, which treat EI as a form of intelligence measured through performance tests; trait models, which treat EI as a constellation of emotional self-perceptions located within personality; and mixed or competency models, which combine emotional abilities with motivational and social skills associated with effective performance (Ashkanasy & Daus, 2005; Petrides & Furnham, 2001). Table 1 summarises the principal models.

Table 1: Principal Models of Emotional Intelligence

Model	Key proponents	Conception of EI	Core dimensions	Typical measure
Ability model	Mayer & Salovey (1997)	A cognitive ability to process emotional information	Perceiving emotions; using emotions to facilitate thought; understanding emotions; managing emotions	Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)
Competency (mixed) model	Goleman (1998); Boyatzis, Goleman & Rhee (2000)	Learned capabilities that produce outstanding performance at work	Self-awareness; self-management; social awareness; relationship management	Emotional and Social Competency Inventory (ESCI)
Emotional-social intelligence (mixed) model	Bar-On (1997, 2006)	Interrelated emotional and social competencies, skills and facilitators	Intrapersonal; interpersonal; stress management; adaptability; general mood	Emotional Quotient Inventory (EQ-i)
Trait model	Petrides & Furnham (2001)	Emotional self-perceptions at the lower levels of personality hierarchies	Well-being; self-control; emotionality; sociability (15 facets)	Trait Emotional Intelligence Questionnaire (TEIQue)
Workplace self-report model	Wong & Law (2002)	Ability-based dimensions assessed by self-report, designed for organisational research	Self-emotion appraisal; others' emotion appraisal; use of emotion; regulation of emotion	Wong and Law Emotional Intelligence Scale (WLEIS)

Source: Compiled by the author from Mayer and Salovey (1997), Goleman (1998), Boyatzis et al. (2000), Bar-On (2006), Petrides and Furnham (2001) and Wong and Law (2002).

The ability model is the most rigorous in psychometric terms. By asking respondents to identify emotions in faces, predict how emotions change, or select effective emotion-management strategies, the MSCEIT avoids the self-enhancement bias of questionnaires. From an administrative perspective, its lack is that having information on how to feel does not mean having the will to do it when it is needed.

The impact on management practice has been the greatest for Goleman's competency model. It is neatly divided into four clusters that correspond to administrative work. When an officer becomes aware that he or she is getting irritated, this self-awareness enables him/her to take time to self-reflect and redefine what his/her priorities are. Self-management helps to maintain calm during crisis, integrity when needed. Social awareness, empathy and organisational awareness allow administrators to read people and the informal politics of institutions. Relationship management includes teamwork and developing others, conflict

management, and influence. Some critics have remarked that the model encompasses an array of nice things about a leader, and so risks being a laundry list (Locke, 2005).

The trait approach is a helpful middle ground. It is willing to take self-reported EI as measures of personality-like dispositions and examines them in that way. Within the scope of this paper, the term EI is used in an inclusive sense as: the ability to perceive, understand, use, and regulate one's own and others' emotions, and the evidence examined below is reported by measurement stream as far as possible. This is important because the size of the effect varies widely from one stream to another, with implications for the selection and evaluation of staff within administrative organisations.

3. Review of Literature: Emotional Intelligence, Leadership and Performance

Since the hype of the 1990s, the empirical research on EI in the organisation has come a long way. Popular writing at the outset claimed emotional skills were responsible for the vast majority of the difference between effective and ineffective leaders. These numbers were seldom subject to review. The more reliable indicator is the body of meta-analyses which combine the results from dozens of independent samples and correct for measurement error. The main findings are presented in Table 2.

Table 2: Meta-Analytic Evidence on Emotional Intelligence and Work Outcomes

Outcome	Meta-analysis	Samples (k)	Participants (N)	Corrected correlation (ρ)
Job performance (ability, self-report and mixed EI streams)	O'Boyle et al. (2011)	—	—	0.24 to 0.30
Job performance (overall EI)	Doğru (2022)	68	23,269	0.30
Organisational citizenship behaviour	Doğru (2022)	43	12,779	0.36
Job satisfaction	Doğru (2022)	74	19,869	0.29
Organisational commitment	Doğru (2022)	37	7,865	0.26
Job stress	Doğru (2022)	31	14,377	−0.43
Transformational leadership (same-source ratings)	Harms & Credé (2010)	62 (total)	—	0.59
Transformational leadership (different-source ratings)	Harms & Credé (2010)	62 (total)	—	0.12

Source: Compiled by the author from O'Boyle et al. (2011, p. 788), Doğru (2022, Tables 3–7) and Harms and Credé (2010, p. 5). Note: ρ is the correlation corrected for measurement unreliability. O'Boyle et al. report a range across the three EI streams; for Harms and Credé, k is the total number of independent samples in the meta-analysis.

3.1 Emotional Intelligence and Job Performance

O'Boyle, Humphrey, Pollack, Hawver and Story (2011) classified studies into the three streams described earlier and found corrected correlations with job performance ranging from 0.24 to 0.30. Most importantly, the self-report and mixed streams had incremental validity above and beyond cognitive ability and the Big Five personality traits, suggesting that EI accounted for variance in performance that was not accounted for by cognitive ability or personality. All three streams were found to have significant relative importance as shown by dominance analysis. A more recent synthesis by Doğru (2022) of studies published from 1990 until 2020 arrived at a similar overall estimate of 0.30.

An important qualification was added by Joseph and Newman's (2010) earlier integrative meta-analysis: the EI–performance relationship is stronger in jobs with high emotional labour requirements, where workers are expected to show or hide emotions frequently as part of their job responsibilities. This is especially significant in the administration field where much of the job is the management of conflict and public expectations, and the management of people.

3.2. Emotional Intelligence and Leadership

The connection between EI and transformational leadership, which is most related to motivating people to buy into a shared vision, has been extensively explored. Harms and Credé (2010) conducted a study of 62 independent samples and discovered a dramatic contrast. The corrected correlation was 0.59 when the same person rated both EI and leadership. If ratings were obtained from different sources, e.g., self-rated EI and employee ratings of leadership, it dropped to 0.12. Validities of trait measures were higher than the ability measures. This outcome is important because much of the apparent relationship between EI and leadership is due to common-method bias. It doesn't imply there is no connection; it's just smaller than the advocates propose.

Building on this, Miao, Humphrey and Qian (2018) explored the case of followers, and confirmed that leader EI has positive links with followers' task performance and citizenship behaviours across cultures. For administrators, the implication is that EI operates less as a personal asset than as a relational resource that shapes the climate in which others work.

3.3 Emotional Intelligence and Employee Attitudes

The strongest and most consistent associations concern attitudes and well-being. Doğru (2022) reports a corrected correlation of 0.36 between EI and organisational citizenship behaviour, 0.29 with job satisfaction and 0.26 with organisational commitment. The largest effect is the negative relationship with job stress ($\rho = -0.43$). Moderator analysis showed that the EI–commitment link was stronger for managers ($\rho = 0.32$) than for non-managerial staff ($\rho = 0.24$), while links with performance and stress were stronger among non-managerial employees. The patterns indicate that EI shields frontline workers from strain and managers from leaving the organisation. In Miao, Humphrey and Qian's (2017) meta-analysis of EI and work attitudes, they came to similar results.

All of the evidence leads to a sensible conclusion. EI has been identified as a moderate and stable predictor of outcomes that are important to administrative effectiveness. Although not as significant as its early advocates suggested, it paves the way and provides explanatory value in addition to intelligence and personality, and is most pronounced in roles that are most emotionally demanding, which are the ones that typify public service.

4. Emotional Intelligence in Public Administration

4.1 Emotional Labour and the Public Servant

Emotional labour is a term coined by Hochschild (1983), who studied flight attendants who manage their emotions to allow them to be felt by others. Public administration scholars took the concept and concluded that "there are emotional pressures in government work. Guy, Newman and Mastracci (2008) noted that caseworkers, dispatchers and correctional officers have to be calm, compassionate or authoritative in the way they act, despite what they are feeling. These are skilled labourers, they said, but they have not been recognised in the classifications and pay for their jobs.

Another lens is provided by Lipsky's (1980) description of street-level bureaucracy. But, policymaking under chronic resource conditions can leave frontline officials with great discretion, and interactions between frontline officials and citizens can make the difference between a fair and non-arbitrary experience of the policy. A high emotional intelligence officer can better identify distress, defuse and de-escalate conflict, and convey decision-making in a manner that maintains the citizen's dignity even when the decision is no.

These propositions are supported by empirical research in Government. Emotional intelligence was linked to more positive work outcomes and workers' coping with perceived organisational politics in Israeli public employees (Vigoda-Gadot & Meisler, 2010). Levitats and Vigoda-Gadot (2020) created a multilevel model that demonstrated that the emotional engagement of civil servants was influenced by individual EI and the emotional climate of their units, and that this emotional engagement was related to service outcomes. The results are in line with those of Joseph and Newman which stated that EI is most important in jobs with high emotional labour requirements.

4.2 Mapping EI Competencies to Administrative Functions

The practical value of EI becomes clearer when its components are linked to specific administrative tasks. Table 3 maps the four clusters of the competency model to core functions of administration.

Table 3: Emotional Intelligence Competencies Mapped to Administrative Functions

EI cluster	Constituent competencies	Administrative function	Illustrative application
Self-awareness	Emotional self-awareness; accurate self-assessment	Decision-making under pressure	A district collector recognises personal frustration before responding to a flood-relief complaint.
Self-management	Emotional self-control; adaptability; achievement orientation; integrity	Crisis management; ethical conduct	A health official remains composed and transparent during an outbreak briefing.
Social awareness	Empathy; organisational awareness; service orientation	Citizen interface; policy implementation	A welfare officer identifies why eligible beneficiaries avoid enrolment
Relationship management	Influence; conflict management; teamwork; coaching and mentoring; inspirational leadership	Staff supervision; inter-departmental coordination; stakeholder negotiation	A municipal commissioner mediates between traders and residents over a road-widening project.

Source: Constructed by the author based on the competency framework of Boyatzis, Goleman and Rhee (2000) and Goleman (1998), applied to administrative functions discussed in Guy et al. (2008).

The mapping shows that EI is not confined to leadership positions. Social awareness and self-management are central to the citizen interface, which in India is overwhelmingly staffed by clerks, revenue inspectors, police constables, nurses and teachers rather than senior officers.

4.3 The Indian Context: Scale of the Citizen Interface

The scale of the citizen interface in India makes emotional competence a structural concern rather than a matter of individual style. The Centralised Public Grievance Redress and Monitoring System (CPGRAMS), administered by the Department of Administrative Reforms

and Public Grievances (DARPG), offers one measurable window into this interface. Table 4 presents recent figures.

Table 4: Scale of Public Grievance Handling through CPGRAMS, India

Indicator	Value	Reference period
Grievances received on CPGRAMS	More than 24 lakh (2.4 million)	Calendar year 2024
Share of grievances disposed	98 per cent	Calendar year 2024
Average disposal time (all grievances)	12 days	Calendar year 2024
Grievances received	More than 20 lakh (2 million)	January to November 2025
Registered Grievance Redressal Officers (GROs)	More than 1.1 lakh (110,000)	2025
Average disposal time, Central Ministries	22 days in 2022; 15 days in 2025	2022 to 2025
Citizens providing feedback	More than 10.7 lakh (1.07 million)	2025

Source: National Informatics Centre (2024) for 2024 figures; Department of Administrative Reforms and Public Grievances (2025), CPGRAMS Annual Report 2025, as summarised in The Policy Edge (2025).

These figures show substantial gains in speed. Speed, however, is not the same as satisfaction. A grievance can be closed quickly with a formulaic reply that leaves the citizen feeling unheard. Recognising this, DARPG developed a model curriculum with the Administrative Staff College of India (ASCI), Hyderabad, in 2025 to train Grievance Redressal Officers in behavioural skills and the Karmayogi competency framework, to ensure that grievances are handled with sensitivity as well as accountability (The Policy Edge, 2025). This is an explicit institutional acknowledgement that the quality of grievance redressal depends on emotional and relational competence, not only on process efficiency.

The Indian civil service has also formally recognised EI at the point of entry. Since 2013, the Union Public Service Commission's General Studies Paper IV (Ethics, Integrity and Aptitude) has included emotional intelligence, its concepts and its uses in administration and governance. Aspirants must therefore study EI, although a written examination can test knowledge about emotions far more easily than the ability to manage them.

5. Developing Emotional Intelligence in Administrators

5.1 Can Emotional Intelligence Be Trained?

If emotional intelligence were a fixed endowment, its administrative relevance would be limited to selection. The evidence indicates otherwise. Table 5 summarises the principal syntheses of EI training research.

Table 5: Meta-Analytic Evidence on Emotional Intelligence Training

Study	Studies included	Design	Principal finding
Hodzic et al. (2018)	28 interventions (N = 1,986)	Treatment–control and pre–post	Moderate improvement in EI; gains largely retained at follow-up
Mattingly & Kraiger (2019)	58 published and unpublished studies	Pre–post and treatment–control	Moderate positive training effect regardless of design; robust across gender and across ability and mixed measures; larger effects in published studies
Mehler et al. (2024)	50 workplace studies (primary analysis)	Pre–post change; treatment–control subset	Emotional competencies (EI, empathy, emotion regulation) improved at work; some effect persisted more than three months after training.

Source: Compiled by the author from Hodzic et al. (2018), Mattingly and Kraiger (2019) and Mehler et al. (2024). Sample details for Hodzic et al. are reported in subsequent reviews of the training literature.

Three conclusions follow. First, training produces moderate and reasonably durable gains. Second, gains appear across different measurement approaches, which reduces the concern that they merely reflect participants learning to answer questionnaires more favourably. Third, Mehler et al. (2024) examined differences by profession, including managers, teachers and health professionals, and the workplace focus of their review makes it especially relevant to public organisations. Mattingly and Kraiger (2019) also note that training design matters: programmes involving practice, feedback and active learning tend to outperform lectures alone.

For administrative training institutes, this implies a shift in pedagogy. EI cannot be taught effectively as a syllabus topic to be memorised. It is better developed through role-play of difficult citizen encounters, structured reflection on real cases, 360-degree feedback and coaching, spaced over time rather than compressed into a single session.

5.2 The Indian Institutional Framework

India has built a substantial institutional architecture for behavioural capacity building in the civil service. Table 6 summarises its main components.

Table 6: Institutional Framework for Behavioural Competency Development in Indian Public Administration

Component	Year	Relevance to emotional intelligence	Key figures
UPSC Civil Services Main Examination, General Studies Paper IV (Ethics, Integrity and Aptitude)	2013	EI concepts and their application in administration are part of the syllabus.	Compulsory for all candidates

Component	Year	Relevance to emotional intelligence	Key figures
National Programme for Civil Services Capacity Building (Mission Karmayogi)	Approved 2 September 2020	Shift from rule-based to role-based capacity building; behavioural competencies alongside functional and domain competencies	—
iGOT Karmayogi digital learning platform	Scaled from 2023	Courses aligned to the Karmayogi Competency Model	About 3 lakh users (January 2023); 1 crore (May 2025); over 1.7 crore (August 2026)
iGOT course catalogue	2025	Includes behavioural and soft-skill modules	Over 2,400 courses in 16 languages from 200+ providers (May 2025)
Karmayogi Saptah (National Learning Week)	October 2024	Large-scale learning drive for civil servants	Over 32 lakh course completions
Annual iGOT learning linked to Annual Performance Appraisal Reports (APAR)	From reporting year 2025–26	Links competency development to career management	Applies to all Central Government employees and All India Services officers
Sevottam model curriculum for Grievance Redressal Officers, with ASCI Hyderabad	2025	Behavioural skills training for officials handling citizen grievances	Over 1.1 lakh registered GROs

Source: Compiled by the author from Press Information Bureau (2020, 2025), ANI (2026), The Policy Edge (2025) and the UPSC Civil Services Examination syllabus.

This framework is impressive in reach. Mission Karmayogi's emphasis on role-based competencies creates, in principle, a place for emotional intelligence in how officials are trained, posted, and assessed. The linking of iGOT learning to APARs from 2025–26 gives capacity building a direct connection to career management. The ASCI curriculum for grievance officers is a targeted intervention at the most emotionally demanding point of the citizen interface.

Two cautions are warranted. First, the evidence in Table 5 suggests that self-paced digital modules alone are unlikely to build emotional skills; practice, feedback and supervised application matter. Course completions are not an indicator of behaviour change. Secondly, the evidence of the effectiveness of behavioural training in Indian public administration is limited. This could be assessed with pre- and post-training EI measures, and with citizen satisfaction and grievance recurrence measures, to determine whether the country's investment is improving counter behaviour.

6. Discussion: Promise, Limits and Critiques

Evidence reviewed provides a definite, but limited claim. There is moderate and consistent evidence of a link between emotional intelligence and performance, citizenship behaviour, job satisfaction, commitment and lower stress. It is particularly significant in jobs involving high levels of emotional labour, and can be trained and nurtured. These findings are worthy of institutional consideration for administration, a relational activity by nature, and frequently public. A number of limitations, however, should be noted.

Validity of measurement and construct. The three streams of EI research are based on different concepts. Self-report and mixed measures are highly correlated with personality traits like emotional stability, extraversion and conscientiousness. Locke (2005) suggested that the concept is so general it loses its significance, and Antonakis, Ashkanasy and Dasborough (2009) questioned whether EI in leadership is needed when intelligence and personality are taken into consideration. Part of this criticism is addressed by the incremental validity reported by O'Boyle et al. (2011), but administrators in designing selection systems must not depend on any one EI instrument.

Common-method inflation. The difference between same-source (0.59) and different-source (0.12) correlations found in Harms and Credé (2010) is a warning. Any study that involves the administrator's self-ratings of his or her own EI and self-ratings of his or her own leadership will overestimate the relationship. Multi-source designs with both supervisor, peer, subordinate and citizen ratings should be used in future studies in Indian public administration.

The negative side of EQ. Emotional skills are value-neutral tools. Kilduff, Chiaburu and Menges (2010) found that emotionally intelligent people have the skills to conceal their intentions and further their own agenda. Côté et al. (2011) discovered that, when considering moral identity, emotion-regulation knowledge increased both prosocial behaviour and deviant behaviour. In administration, a good reader of faces, but one who is lacking in integrity, is able to handle citizens, colleagues or a political ruler. This is why conceptually, the UPSC's decision to include emotional intelligence and ethics/ integrity together in the same question paper is justified: EI should be based on public service values.

Emotional labour and burnout. EI can be promoted without employees knowing it and not be rewarded or recognised. Emotional labour is mainly done by women and by frontline workers and is not well acknowledged in terms of pay or promotion criteria (Guy et al., 2008). Having staff remind themselves to be more empathetic when caseloads increase might lead to

staff being exhausted, not better served. Such a conclusion that EI promotes less stress in children should not be interpreted as a license to assume that the individual is responsible for their own systemic overload.

The context of structure and culture. Indian culture is very hierarchical, and respecting seniority may hinder the candid and forthright expression of emotion, dissent and feedback that is essential to EI-oriented leadership. Rigid procedures, inadequate staff, and pressure from political lines will limit the role of an empathetic district officer. Emotional intelligence is a necessary but not sufficient element to complement but not replace sound systems and appropriate resources and accountability.

Evidence gaps. The overwhelming majority of the evidence from the meta-analysis is from private-sector and Western samples. While there are also studies in the public sector, these tend to be small-scale, cross-sectional, and self-reported. Mission Karmayogi (MK) has grown rapidly, and can now begin to produce more robust evidence through evaluation designs that are embedded in programme implementation.

These critiques do not detract from the argument for emotional intelligence in administration. They clarify it. In EI, understanding the resource is most useful when it is seen as one tool among a number of tools, and the value of that tool is dependent on the ethical commitments of the individual who is using the tool, and the institutional factors that are operating within which EI is being utilized.

7. Recommendations

The analysis suggests six practical measures for strengthening emotional intelligence in administrative systems, with particular reference to India.

1. **Integrate EI into competency frameworks and appraisal.** Behavioural competencies such as empathy, composure and conflict management should be defined with observable indicators within the Karmayogi Competency Model and assessed through multi-source feedback, not self-assessment alone, as part of APARs.
2. **Redesign training pedagogy.** Civil services training institutes and state administrative training institutes should complement iGOT modules with experiential sessions: role-play of difficult citizen encounters, case-based reflection, coaching and spaced follow-up.

3. **Prioritise the frontline.** Training investment should reach revenue, police, health, education and welfare staff who handle the majority of citizen contact, extending the ASCI model for grievance officers to other high-contact roles.
4. **Anchor EI in ethics.** EI training should be delivered alongside public service values and integrity education, so that emotional skills are directed toward service rather than manipulation.
5. **Recognise and support emotional labour.** Organisations should monitor workload and burnout, provide debriefing and counselling after traumatic incidents, and acknowledge emotional labour in job design and rewards.
6. **Build the evidence base.** There is a need to have independent assessments on behavioural training and the achievement of measurable outcomes like citizen satisfaction, recurrence of grievances, employee well-being to be commissioned by Mission Karmayogi and DARPG.

8. Conclusion

This paper started with the classical opinion that emotion is noise in the mechanism of administration. All of the evidence suggests otherwise. Numerous studies spanning tens of thousands of employees demonstrate that emotional intelligence is positively related to job performance ($\rho \approx 0.24$ to 0.30), organisational citizenship behaviour (0.36), job satisfaction (0.29) and organisational commitment (0.26), and negatively related to job stress (-0.43). Its relationship to leadership is real, albeit less than what is often reported, after taking into account common method bias. Training results in moderate and long-term improvements, particularly if it includes practice and feedback.

These findings are important for public administration, as the state is experienced by citizens through their encounters with the state officials. India's grievance system has been able to process more than two million complaints per year with increasingly shorter disposal times and Mission Karmayogi has registered more than 1.7 crore officials on a common learning platform. These are important "big things". Quality comes next: that the official at the counter can listen, understand, and respond fairly and respectfully.

So it is not a "soft" complement to hard administration skills to lead by empathy and insight. It is one of the reasons for the legitimacy of administration in a democracy. However, no one can carry this weight alone, and it's not emotional intelligence. It needs to be based on

ethical commitment, have sufficient resources, and be placed within institutions that value the emotional work of public service. In situations like these, an emotionally intelligent administration is a feasible route to governing efficiently and humanely.

References

ANI. (2026, August 5). *Over 1.7 crore users registered on iGOT Karmayogi platform: Union Minister*. https://aninews.in/news/national/general-news/over-17-crore-users-registered-on-igot-karmayogi-platform-union-minister20260805232136/

Antonakis, J., Ashkanasy, N. M., & Dasborough, M. T. (2009). Does leadership need emotional intelligence? *The Leadership Quarterly, 20*(2), 247–261. https://doi.org/10.1016/j.leaqua.2009.01.006

Ashkanasy, N. M., & Daus, C. S. (2005). Rumors of the death of emotional intelligence in organizational behavior are vastly exaggerated. *Journal of Organizational Behavior, 26*(4), 441–452. https://doi.org/10.1002/job.320

Bar-On, R. (1997). *The Emotional Quotient Inventory (EQ-i): Technical manual*. Multi-Health Systems.

Bar-On, R. (2006). The Bar-On model of emotional-social intelligence (ESI). *Psicothema, 18*(Suppl.), 13–25.

Boyatzis, R. E., Goleman, D., & Rhee, K. S. (2000). Clustering competence in emotional intelligence: Insights from the Emotional Competence Inventory. In R. Bar-On & J. D. A. Parker (Eds.), *The handbook of emotional intelligence* (pp. 343–362). Jossey-Bass.

Côté, S., DeCelles, K. A., McCarthy, J. M., Van Kleef, G. A., & Hideg, I. (2011). The Jekyll and Hyde of emotional intelligence: Emotion-regulation knowledge facilitates both prosocial and interpersonally deviant behavior. *Psychological Science, 22*(8), 1073–1080. https://doi.org/10.1177/0956797611416251

Department of Administrative Reforms and Public Grievances. (2025). *CPGRAMS annual report 2025*. Government of India. https://darpg.gov.in/sites/default/files/CPGRAMS_Annual_Report_2025_0.pdf

Doğru, Ç. (2022). A meta-analysis of the relationships between emotional intelligence and employee outcomes. *Frontiers in Psychology, 13*, Article 611348. https://doi.org/10.3389/fpsyg.2022.611348

Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. Bantam Books.

Goleman, D. (1998). *Working with emotional intelligence*. Bantam Books.

Guy, M. E., Newman, M. A., & Mastracci, S. H. (2008). *Emotional labor: Putting the service in public service*. M. E. Sharpe.

Harms, P. D., & Credé, M. (2010). Emotional intelligence and transformational and transactional leadership: A meta-analysis. *Journal of Leadership & Organizational Studies, 17*(1), 5–17. https://doi.org/10.1177/1548051809350894

Hochschild, A. R. (1983). *The managed heart: Commercialization of human feeling*. University of California Press.

Hodzic, S., Scharfen, J., Ripoll, P., Holling, H., & Zenasni, F. (2018). How efficient are emotional intelligence trainings: A meta-analysis. *Emotion Review, 10*(2), 138–148. https://doi.org/10.1177/1754073917708613

Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology, 95*(1), 54–78. https://doi.org/10.1037/a0017286

Kilduff, M., Chiaburu, D. S., & Menges, J. I. (2010). Strategic use of emotional intelligence in organizational settings: Exploring the dark side. *Research in Organizational Behavior, 30*, 129–152. https://doi.org/10.1016/j.riob.2010.10.002

Levitats, Z., & Vigoda-Gadot, E. (2020). Emotionally engaged civil servants: Toward a multilevel theory and multisource analysis in public administration. *Review of Public Personnel Administration, 40*(3), 426–446.

Lipsky, M. (1980). *Street-level bureaucracy: Dilemmas of the individual in public services*. Russell Sage Foundation.

Locke, E. A. (2005). Why emotional intelligence is an invalid concept. *Journal of Organizational Behavior, 26*(4), 425–431. https://doi.org/10.1002/job.318

Mattingly, V., & Kraiger, K. (2019). Can emotional intelligence be trained? A meta-analytical investigation. *Human Resource Management Review, 29*(2), 140–155. https://doi.org/10.1016/j.hrmr.2018.03.002

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. J. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3–31). Basic Books.

Mehler, M., Balint, E., Gralla, M., Pößnecker, T., Gast, M., Hölzer, M., Kösters, M., & Gündel, H. (2024). Training emotional competencies at the workplace: A systematic review and metaanalysis. *BMC Psychology, 12*, Article 718. https://doi.org/10.1186/s40359-024-02198-3

Miao, C., Humphrey, R. H., & Qian, S. (2017). A meta-analysis of emotional intelligence and work attitudes. *Journal of Occupational and Organizational Psychology, 90*(2), 177–202. https://doi.org/10.1111/joop.12167

Miao, C., Humphrey, R. H., & Qian, S. (2018). A cross-cultural meta-analysis of how leader emotional intelligence influences subordinate task performance and organizational citizenship behavior. *Journal of World Business, 53*(4), 463–474. https://doi.org/10.1016/j.jwb.2018.01.003

National Informatics Centre. (2024, December 31). *In 2024, more than 24 lakh grievances were received on CPGRAMS portal* [Post]. X. https://x.com/NICMeity/status/1874032899286327451

O'Boyle, E. H., Jr., Humphrey, R. H., Pollack, J. M., Hawver, T. H., & Story, P. A. (2011). The relation between emotional intelligence and job performance: A meta-analysis. *Journal of Organizational Behavior, 32*(5), 788–818. https://doi.org/10.1002/job.714

Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality, 15*(6), 425–448. https://doi.org/10.1002/per.416

Press Information Bureau. (2020, September 2). *Cabinet approves National Programme for Civil Services Capacity Building (NPCSCB) – "Mission Karmayogi"*. Government of India.

Press Information Bureau. (2025, May 21). *iGOT Karmayogi crosses landmark of 1 crore registered users*. Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2130180

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*(3), 185–211. https://doi.org/10.2190/DUGG-P24E-52WK-6CDG

Second Administrative Reforms Commission. (2009). *Citizen-centric administration: The heart of governance* (Twelfth Report). Government of India.

The Policy Edge. (2025, December 26). *CPGRAMS annual report 2025: Advancing citizen-centric responsive governance*. https://www.policyedge.in/p/cpgrams-annual-report-2025-advancing

Union Public Service Commission. (n.d.). *Civil services (main) examination: General Studies Paper IV – Ethics, integrity and aptitude* [Syllabus]. Government of India.

Vigoda-Gadot, E., & Meisler, G. (2010). Emotions in management and the management of emotions: The impact of emotional intelligence and organizational politics on public sector employees. *Public Administration Review, 70*(1), 72–86. https://doi.org/10.1111/j.1540-6210.2009.02112.x

Wong, C.-S., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *The Leadership Quarterly, 13*(3), 243–274. https://doi.org/10.1016/S1048-9843(02)00099-1

Implementation of the Right to Information Act: Strengthening Transparency, Accountability and Citizen-Centric Governance

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The Right to Information (RTI) Act, 2005 is one of the most significant legislative measures introduced in India to strengthen transparency, accountability and citizen participation in public administration. The Act provides citizens with a legal mechanism to obtain information held by public authorities and thereby promotes informed participation in democratic governance. Access to official information reduces the gap between citizens and the state, enables public scrutiny of administrative decisions, and creates opportunities to identify irregularities, delays and misuse of public resources. The Department of Personnel and Training describes the objectives of the RTI framework in terms of empowering citizens, promoting transparency and accountability, containing corruption and strengthening democratic governance.

This paper examines the implementation of the Right to Information Act with particular emphasis on transparency, administrative accountability and citizen-centric governance. It discusses the historical and constitutional foundations of the right to information, the major provisions of the RTI Act, institutional mechanisms, proactive disclosure, the role of Public Information Officers and Information Commissions, and the relationship between RTI and good governance. The paper also examines major implementation challenges, including lack of awareness, delays, inadequate record management, digital exclusion, administrative resistance, misuse of exemptions, and difficulties faced by information seekers.

Particular attention is given to the relevance of RTI in Telangana, where effective access to government information can contribute to accountable delivery of welfare programmes, local development, education, employment, public services and rural development. The paper argues that RTI should not be treated merely as an application-based information-disclosure mechanism. It should be integrated with proactive disclosure, digital governance, citizen participation, grievance redressal and institutional accountability. Strengthening Section 4 disclosures, improving record management, increasing public

awareness, protecting information seekers, strengthening Information Commissions and using technology can make RTI more effective. The paper concludes that meaningful implementation of RTI is essential for transforming citizens from passive recipients of government services into informed participants in democratic governance.

Keywords: Right to Information, Transparency, Accountability, Citizen-Centric Governance, Good Governance, Public Administration, RTI Act 2005, Telangana, Democracy, Public Policy.

Introduction

Democracy is not limited to periodic elections. A democratic system requires continuous interaction between citizens and public institutions. Citizens must have the ability to understand government policies, examine public expenditure, question administrative decisions and participate meaningfully in governance. In this context, access to information is an essential condition for democratic citizenship.

For a long period, government administration in India was influenced by a culture of secrecy. Official information was frequently treated as the property of the administration rather than as a resource belonging to the public. Such a culture could create an information gap between government institutions and citizens. When citizens do not have access to information about decisions, budgets, procedures and public programmes, it becomes difficult for them to exercise effective oversight.

The Right to Information Act, 2005 represented a major change in this relationship. It established a statutory framework through which citizens can seek information from public authorities. The Department of Personnel and Training states that the basic objectives of the RTI framework include empowering citizens, promoting transparency and accountability, containing corruption and making democracy work more effectively for the people.

Right to Information

The RTI Act therefore has significance beyond the simple disclosure of government documents. It can strengthen the relationship between citizens and the state. A citizen who can obtain information about a government programme can understand eligibility conditions, expenditure, selection procedures and implementation. Information can therefore become a tool through which citizens monitor public institutions.

The RTI Act is also closely connected with the broader concept of good governance. Good governance requires transparency, accountability, participation, responsiveness, effectiveness and rule of law. Without access to information, many of these principles remain difficult to operationalise.

The present paper examines the implementation of RTI from this broader governance perspective. It focuses on three central dimensions: transparency, accountability and citizen-centric governance.

Historical and Constitutional Foundations of the Right to Information

The right to information developed in India through a combination of constitutional interpretation, judicial decisions and democratic movements.

Although the Constitution of India does not originally contain a separate fundamental right explicitly titled "Right to Information", the Supreme Court has connected access to information with the freedoms guaranteed under Article 19(1)(a). The freedom of speech and expression has been interpreted to include the right to receive information necessary for meaningful expression and participation in democratic life.

The judiciary played an important role in establishing the principle that citizens have a right to know about matters concerning public affairs. Decisions such as State of Uttar Pradesh v. Raj Narain and S.P. Gupta v. Union of India contributed to the development of the constitutional principle of openness in governance.

The demand for Information also emerged strongly from grassroots movements. The Mazdoor Kisan Shakti Sangathan (MKSS) in Rajasthan played an important role in demonstrating how access to official records could help rural workers and citizens examine public expenditure and development programmes. Public hearings and social audits demonstrated that government records could become instruments of community accountability.

These developments created a wider social and political demand for a statutory right to information. The Right to Information Act, 2005 subsequently established a comprehensive legal framework.

The Right to Information Act, 2005

The Right to Information Act, 2005 provides citizens with a statutory mechanism to obtain information from public authorities. The official RTI framework provides access to the Act, rules, information about Information Commissions and related government resources.

The Act is based on an important democratic principle: public authorities exercise power and manage public resources on behalf of citizens, and citizens therefore require access to relevant information to hold those authorities accountable.

The Act covers Information held by or under the control of public authorities, subject to the exemptions specified in the legislation. The framework also establishes procedures for filing requests, responding to applications and pursuing appeals where information is denied or not provided appropriately.

The RTI system broadly involves:

- Citizens seeking information.
- Public Information Officers responding to requests.
- First Appellate Authorities examining appeals.
- Central or State Information Commissions dealing with second appeals and complaints.
- Public authorities undertaking proactive disclosure and maintaining records.
- The Act therefore creates both a citizen's information right and an administrative responsibility to facilitate access to information.

Objectives of the RTI Act

The major objectives of the RTI framework can be understood as follows.

- Promoting transparency
- Transparency means openness in governmental decision-making. Citizens should be able to understand how decisions are made, how public money is spent and how public programmes are implemented.
- Strengthening accountability
- Information allows citizens to compare government commitments with actual implementation. If an authority promises a public service but does not deliver it, relevant records can help citizens question the gap.

Controlling corruption

RTI does not automatically eliminate corruption. However, the possibility that administrative records may be examined by citizens can act as an important accountability mechanism.

- Empowering citizens

- Information can strengthen the capacity of citizens to understand their rights and access government services.

Improving administration

- RTI can encourage government departments to maintain accurate records, follow procedures and respond more carefully to citizens.
  - Strengthening democracy
  - An informed citizen is better positioned to participate in democratic decision-making. The official RTI portal similarly emphasises the role of informed citizens in keeping a watch over governance institutions.

RTI and Transparency in Public Administration

Transparency is one of the central principles of democratic administration. A transparent government does not necessarily disclose every piece of information without restriction, but it provides citizens with access to information subject to legitimate legal exemptions.

The Importance of transparency can be understood through several areas.

- Public expenditure
- Citizens may seek information concerning expenditure on development programmes, infrastructure projects, welfare schemes and local government activities. Such information can help citizens understand whether public resources are being utilised according to approved purposes.
- Recruitment and employment
- Information regarding recruitment procedures, selection criteria, vacancies and administrative decisions can promote fairness and public confidence, subject to applicable legal exemptions and privacy protections.

Welfare programmes

Beneficiaries of welfare schemes may need information about eligibility, selection, sanction orders, payments and implementation. RTI can help reduce uncertainty concerning the functioning of welfare administration.

- Local development

– At the local level, information regarding roads, drinking water, sanitation, public buildings, community assets and development expenditure can enable citizens to monitor public works.

Administrative decisions

Government decisions affect citizens in numerous ways. Access to relevant records can help citizens understand the basis of decisions and identify procedural deficiencies.

Thus, transparency through RTI can reduce information asymmetry between public institutions and ordinary citizen

Transparency and accountability are closely connected but not identical.

Transparency makes information available. Accountability requires an institution or official to explain and justify actions and, where necessary, face corrective measures.

RTI contributes to accountability by enabling citizens, civil society organisations, journalists and researchers to examine government records.

For example, if a citizen suspects that a public service has been delayed, the person can seek relevant information concerning the status of the application, applicable procedure, movement of the file and responsible authority, subject to the provisions of the Act.

Similarly, in development programmes, information can help citizens understand whether sanctioned works were completed, what expenditure was incurred and what administrative decisions were taken.

RTI therefore creates a documentary basis for accountability.

However, RTI alone cannot replace disciplinary mechanisms, audits, vigilance institutions, grievance redressal systems or courts. Its major contribution is that it can provide information needed to activate these accountability mechanisms.

RTI and Citizen-Centric Governance

Citizen-centric governance places citizens at the centre of public administration. Instead of viewing citizens merely as beneficiaries or recipients of government services, it treats them as rights-bearing participants.

RTI supports this approach in several ways.

First, it gives citizens a formal mechanism to interact with public authorities.

Second, it enables citizens to understand government procedures.

Third, it can help citizens identify delays or deficiencies in service delivery.

Fourth, it can strengthen participation in local governance.

Fifth, it can improve public confidence when authorities respond effectively and transparently.

Citizen-centric governance therefore requires more than providing information after receiving applications. Public authorities should proactively provide information in accessible formats so that citizens do not have to file RTI applications for routine information.

Section 4 and Proactive Disclosure

One of the most important aspects of the RTI framework is proactive disclosure.

If government departments regularly publish important information, citizens may not need to file individual RTI applications.

Proactive disclosure can include information concerning:

1. Functions of public authorities
2. Organisational structure
3. Duties of officers
4. Decision-making procedures
5. Rules and regulations
6. Budgetary information
7. Subsidies and beneficiaries
8. Public programmes
9. Contact details of responsible officers
10. Relevant records and decisions.

The Department of Personnel and Training has issued guidance concerning implementation of suo motu disclosures and emphasised the importance of making information available through official websites in a user-friendly manner.

Department of Personnel and Training

Effective implementation of Section 4 can therefore reduce the burden on both citizens and Public Information Officers.

1. Institutional Mechanisms under RTI

The effectiveness of RTI depends considerably on institutional mechanisms.

- Public Information Officers

– Public Information Officers are central to implementation. They receive RTI applications and facilitate access to information in accordance with the Act.

The effectiveness of the system depends on their knowledge of the law, record-management practices and ability to coordinate with relevant sections of the department.

Regular training is therefore important.

– First Appellate Authority

– Where an applicant does not receive an appropriate response, the first appellate mechanism provides an opportunity for administrative review.

Information Commissions

Central and State Information Commissions are important institutions for the enforcement of the RTI framework. They hear appeals and complaints within their statutory jurisdiction.

The effectiveness of Information Commissions depends upon adequate institutional capacity, timely disposal of cases, accessibility and public confidence.

RTI and Good Governance

Good governance involves several interconnected principles:

- Transparency
- Accountability
- Participation
- Responsiveness
- Effectiveness
- Equity
- Rule of law

Consensus orientation.

RTI contributes particularly strongly to transparency, accountability and participation.

An informed citizen can participate more effectively in public affairs. Access to information can also strengthen social accountability mechanisms such as public hearings, social audits and community monitoring.

RTI is therefore not simply an administrative law. It is also an instrument of democratic governance.

RTI and Reduction of Information Asymmetry

Information asymmetry occurs when one side possesses significantly more information than another.

In the relationship between citizens and government institutions, public authorities naturally possess large amounts of administrative information. Citizens may not know:

- How decisions are taken;
- Why applications are delayed;
- What rules apply;
- How public funds are allocated;
- Who is responsible for particular services;
- What decisions have been made.
- RTI can reduce this information gap.
- When information becomes accessible, citizens can make better decisions and ask more precise questions. This can improve the quality of public participation.

RTI and Social Inclusion

- The benefits of RTI are particularly important for socially and economically disadvantaged citizens.
- Poor households, rural communities, workers, pensioners, students and beneficiaries of welfare programmes may face difficulties in understanding administrative procedures.
- Information can help them understand:
- Eligibility requirements;
- Application procedures;
- Status of applications;
- Government schemes;
- Public services;
- Administrative responsibilities.
- However, social inclusion requires that information itself be accessible. Simply uploading documents on a website is not sufficient if citizens lack digital access or literacy.

- Therefore, RTI implementation should combine digital information systems with offline access, local-language communication and assistance mechanisms.

RTI in the Context of Telangana

Telangana provides an important context for studying citizen-centric governance because government programmes operate through multiple levels of administration, including state departments, districts, mandals and local institutions.

In Telangana, citizens interact with government institutions regarding education, agriculture, welfare programmes, pensions, employment, rural development, land administration, public health, municipal services and other areas.

RTI can support accountability in these sectors.

For example, citizens may seek information concerning the implementation of development programmes, public expenditure, administrative procedures or the status of applications, subject to statutory exemptions.

The Importance of RTI is especially visible at the district and local levels because citizens often experience the state primarily through local administrative institutions.

RTI and Rural Citizens

Rural citizens may experience greater information barriers because of distance from administrative offices, limited digital access and lack of awareness of government procedures.

The effectiveness of RTI In rural areas therefore depends on:

- Awareness campaigns.
- Availability of local-language information.
- Assistance in drafting applications.
- Accessible public offices.
- Digital and non-digital application mechanisms.
- Timely responses.
- Effective appeals.
- RTI awareness can also be integrated into local governance programmes and community-level awareness initiatives.

RTI and Education

- Education is another important area where transparency matters.
- Citizens may require information concerning public education infrastructure, school facilities, implementation of educational programmes, recruitment procedures, expenditure and administrative policies.
- Greater transparency can help improve community participation in education.
- School-level governance also benefits when parents and community members have access to appropriate information about programmes and facilities.
- However, requests involving personal information must be handled according to the applicable exemptions and privacy safeguards.

RTI and Digital Governance

- Digital governance has transformed the manner in which citizens access government information.
- Government websites, online portals, electronic records and digital disclosure mechanisms can significantly improve accessibility.
- The official RTI portal itself provides a central gateway to information concerning RTI procedures, authorities and related resources.
- Right to Information
- Digital governance can reduce:
- Travel costs;
- Paperwork;
- Information delays;
- Dependence on intermediaries;
- Physical barriers to access.
- However, digitalisation can also create new forms of exclusion.
- Citizens without smartphones, internet connectivity, digital literacy or knowledge of online procedures may be disadvantaged.
- Therefore, digital RTI should supplement rather than completely replace accessible offline mechanisms.

Major Challenges in the Implementation of RTI

Despite the importance of the RTI Act, implementation faces several challenges.

- Lack of awareness
- Many citizens remain unaware of their right to information and the procedures for using it.

Awareness programmes should therefore be conducted regularly at district, rural and local levels.

- Delays
- Timely response is essential because delayed information can reduce its practical value.

Administrative mechanisms must therefore ensure effective monitoring of RTI applications and appeals.

Poor record management

Information cannot be disclosed efficiently if records are poorly maintained.

Modern record-management systems are therefore essential.

- Administrative resistance
- In some situations, officials may continue to view information disclosure through a traditional secrecy-oriented administrative culture.

Training and institutional sensitisation are necessary to change this culture.

Excessive dependence on applications

If departments do not implement proactive disclosure effectively, citizens may be required to file RTI applications even for routine information.

This increases the workload of PIOs and citizens.

- Digital divide
- Digital platforms are useful but cannot alone solve the problem of information access.

Complexity of information

Even when information is technically disclosed, it may be difficult for ordinary citizens to understand.

Information should therefore be presented in clear, simple and accessible formats.

- Awareness of exemptions
- The RTI Act contains exemptions intended to protect legitimate public interests, privacy and other sensitive information. These provisions require careful and legally appropriate application.

A balance must therefore be maintained between transparency and legitimate confidentiality.

RTI, Privacy and Responsible Disclosure

- Transparency must coexist with privacy.
- Modern governance involves large quantities of personal information. Citizens' personal data cannot simply be disclosed without considering statutory protections.
- The RTI framework therefore requires careful balancing between the public interest in disclosure and legitimate privacy interests.
- This is particularly important in the digital era, where government databases may contain sensitive personal information.
- A responsible RTI regime should therefore promote maximum transparency concerning public decisions and public resources while protecting legitimate individual privacy.

RTI and Anti-Corruption

- Corruption often survives where information is difficult to access.
- RTI can contribute to anti-corruption efforts by making government records available for public scrutiny.
- For example, information relating to expenditure, contracts, public works and administrative decisions may help identify inconsistencies or irregularities.
- However, RTI should not be described as an independent anti-corruption agency. Its strength lies in enabling citizens and institutions to obtain information that can subsequently be used for accountability.
- RTI is therefore best understood as an enabling instrument for social accountability.

RTI and Participatory Democracy

- Democratic participation does not end with voting.
- Citizens can participate through:
- Public consultations;

- Local governance institutions;
- Social audits;
- Community organisations;
- Civil society groups;
- Public hearings;
- Policy discussions;
- Monitoring of public services.
- Information is necessary for meaningful participation in each of these activities.
- An uninformed citizen may participate formally but cannot effectively evaluate government performance.
- Thus, RTI helps convert democratic participation from symbolic involvement into informed participation.

Role of Civil Society and Media

- Civil society organisations and media have played important roles in spreading awareness about RTI.
- Civil society organisations can assist citizens in understanding application procedures, conducting awareness programmes and using information for community monitoring.
- Journalists can use publicly available information to investigate administrative issues and inform the public.
- However, responsible use of RTI information is important. Information should be verified and presented accurately rather than used merely to generate controversy.

RTI and Administrative Reform

- RTI should be considered part of broader administrative reform.
- Effective RTI implementation requires:
- Better record management;
- Digitalisation;
- Administrative training;
- Proactive disclosure;
- Clear responsibility;

- Monitoring;
- Grievance redressal;
- Citizen feedback.
- The DoPT's official materials also emphasise training, accessible disclosure and improvements in record and information systems as important aspects of RTI implementation.
- Department of Personnel and Training
- Therefore, RTI should be integrated into the everyday culture of public administration rather than treated as a separate legal obligation.

1. Policy Recommendations

The following measures can strengthen RTI implementation.

- Strengthen proactive disclosure
- Government departments should regularly update websites and public information systems.
- Increase public awareness
- Awareness programmes should be conducted through schools, colleges, civil society organisations, local governments and community institutions.

Strengthen RTI training

PIOs and other administrative personnel should receive periodic training on RTI procedures, exemptions, record management and citizen communication.

- Improve record management
- Departments should maintain systematic physical and electronic records.

Promote local-language access

Information should be made available in languages easily understood by citizens.

- Strengthen digital accessibility
- Online systems should be simple, mobile-friendly and accessible to citizens with different levels of digital literacy.

Provide assistance to disadvantaged citizens

Citizens who have difficulty preparing applications should receive appropriate procedural assistance.

- Strengthen Information Commissions
- Information Commissions require adequate institutional capacity for timely disposal of appeals and complaints.

Link RTI with grievance redressal

Where an RTI application reveals a service-delivery problem, citizens should be able to access appropriate grievance-redressal mechanisms.

- Promote an open-government culture
- Officials should view transparency as a normal component of democratic administration rather than as an exception.

RTI and the Future of Citizen-Centric Governance

- The future of RTI will depend considerably on the transformation of public administration.
- Artificial intelligence, digital records, open data, electronic governance and automated service-delivery systems are changing how citizens interact with government.
- These technologies can make information more accessible, but they also create new questions concerning data protection, algorithmic decision-making and digital transparency.
- Future RTI implementation should therefore address emerging areas such as:
- Digital government records;
- Algorithmic decision-making;
- Public-sector databases;
- Open government data;
- Digital service delivery;
- Cybersecurity;
- Data protection;
- Artificial intelligence in administration.
- Citizen-centric governance in the future will require not only access to traditional records but also meaningful transparency regarding digital systems that influence public decisions.

- RTI and Sustainable Development
- Transparency and accountability are also connected with sustainable development.
- Development programmes require public resources and institutional capacity. When citizens can monitor implementation, the possibility of inefficiency and misuse may be reduced.
- RTI can therefore indirectly support development objectives by improving governance.
- Transparent institutions can strengthen public trust, improve programme implementation and encourage citizen participation.
- This is particularly relevant to the National Seminar theme of economic growth, sustainable development and public policy, which identifies governance reforms, accountability, citizen-centric governance and evidence-based policymaking as important areas of discussion.
- Dr. MCR HRD IT – National Seminar Broucher.pdf
- Findings of the Study
- The study identifies the following major findings:
- RTI is a major instrument of democratic accountability.
- It creates a legal mechanism through which citizens can seek information from public authorities.
- Transparency is the foundation of accountable governance.
- Without access to relevant information, citizens cannot effectively monitor public institutions.
- RTI strengthens citizen participation.
- Information enables citizens to participate in governance with greater knowledge and confidence.
- Proactive disclosure is essential.
- Citizens should not be required to submit RTI applications for routine information that can be disclosed voluntarily.
- Institutional capacity affects implementation.
- PIOs, appellate authorities and Information Commissions require adequate training and administrative support.

- Digital governance creates both opportunities and challenges.
- Technology can improve access but may exclude citizens lacking digital resources.
- RTI is particularly relevant to welfare and local development.
- Access to information can help citizens understand the implementation of public programmes.
- RTI should be integrated with broader governance reforms.
- Information access should be connected with grievance redressal, social audits, citizen participation and administrative reform.

Conclusion

The Right to Information Act, 2005 represents a significant transformation in India's democratic and administrative system. It has changed the relationship between citizens and public authorities by establishing a legal framework for accessing information held by government institutions.

The importance of RTI extends beyond the provision of documents. It promotes a culture of transparency and provides citizens with an instrument for questioning administrative decisions. It can strengthen accountability, support public participation, improve trust and contribute to citizen-centric governance.

However, the effectiveness of RTI depends on the quality of implementation. A strong legal framework alone cannot guarantee transparency. Effective implementation requires awareness among citizens, trained Public Information Officers, systematic record management, proactive disclosure, accessible digital platforms and efficient appellate institutions.

The future of RTI should therefore focus on moving from reactive disclosure to proactive transparency. Government departments should routinely publish information that citizens need to understand public policies, programmes and expenditure.

In Telangana, RTI has considerable potential to strengthen citizen-centric governance at the district and local levels. Citizens interact directly with government institutions in areas such as education, welfare, rural development, public services and local administration. Improving access to information in these areas can strengthen participation and accountability.

RTI should also be integrated with digital governance. Technology can reduce barriers to information access, but digital inclusion must remain a priority so that rural and disadvantaged citizens are not excluded.

Ultimately, the effectiveness of RTI depends not only on citizens' willingness to ask questions but also on the willingness of public institutions to provide information openly and responsibly. Transparency should become an integral part of administrative culture.

A mature democracy requires informed citizens and accountable institutions. The Right to Information Act provides an important foundation for achieving this objective. Its effective implementation can help transform governance from a system centred primarily on administrative authority into a system centred on citizens, participation, transparency, accountability and public trust.

References

1. Central Information Commission. Right to Information Act, 2005 and related resources. Government of India.
2. Department of Personnel and Training. (2005). The Right to Information Act, 2005. Ministry of Personnel, Public Grievances and Pensions, Government of India.
3. Government of India. (2006). Second Administrative Reforms Commission: Right to Information—Master Key to Good Governance. Government of India.
4. Government of India. (2013). Guidelines for implementation of suo motu disclosure.
5. Government of India. (2023). Compendium of instructions on Right to Information. Department of Personnel and Training.
6. Jain, P. C. (2010). Right to Information and Good Governance. Deep & Deep Publications.
7. Mander, H., & Joshi, A. (1999). The movement for right to information in India: People's power for the control of corruption. Commonwealth Human Rights Initiative.
8. Menon, N. (Ed.). (2007). Sexuality, gender and rights: Exploring theory and practice in South and Southeast Asia. Zubaan.
9. Naib, S. (2013). The Right to Information Act, 2005. Oxford University Press.
10. RaaG & Samya Centre for Equity Studies. (2018). Report on assessment of information commissions and implementation of RTI in India.
11. Shourie, A. (2005). The parliamentary system. Rupa Publications.
12. Supreme Court of India. (1975). State of Uttar Pradesh v. Raj Narain, 4 SCC 428.
13. Supreme Court of India. (1981). S.P. Gupta v. Union of India, Supp. SCC 87.

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