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DIGITAL TRANSFORMATION AND ITS CONTRIBUTION TO INDIA'S ECONOMIC DEVELOPMENT

An Analytical Study of Growth, Financial Inclusion and Emerging Opportunities

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ABSTRACT

Digital transformation is reshaping India's economic activity through digital payments, internet connectivity and online platforms. This study examines its contribution to economic development, with particular attention to financial inclusion, enterprise activity and the rural–urban digital divide. It uses secondary data from the Ministry of Electronics and Information Technology, the Reserve Bank of India, the National Payments Corporation of India, the Telecom Regulatory Authority of India and the Ministry of Statistics and Programme Implementation. Descriptive trend analysis and percentage-point comparisons are used to examine changes across indicators.

The estimates place the digital economy at 11.74 per cent of national income in 2022–23. UPI recorded 24,161.69 crore transactions in 2025–26, while India's internet subscriber base reached 1,092.79 million in March 2026. Enterprise-level adoption, however, remains uneven: internet use for entrepreneurial purposes stood at 31.06 per cent among rural unincorporated establishments and 48.94 per cent among urban establishments in ASUSE 2025, a gap of 17.88 percentage points. These patterns point to the expanding role of digital infrastructure in payments and business operations, alongside persistent differences in access and adoption. Digital platforms may lower transaction costs, improve access to market information and facilitate financial service delivery; the extent of these gains depends on connectivity, affordability, digital literacy and trust. The study argues that digital transformation can support more inclusive economic development when policy efforts address these constraints, particularly among rural households and informal enterprises.

Index Terms— Digital Economy, Financial Inclusion, UPI, Unincorporated Enterprises, Rural–Urban Digital Divide, India.

1. INTRODUCTION

The expansion of digital public infrastructure has become an important feature of India's economic development. The spread of internet services, mobile applications, digital payment systems and online platforms has changed the way individuals, businesses and government institutions carry out economic activities. What was once largely associated with the information technology sector now has a much wider presence in banking, agriculture, trade, education, healthcare and public administration. Digital technology is increasingly linked with the functioning of markets, the delivery of services and the participation of people in economic activity.

Digital transformation involves more than the introduction of computers or internet facilities. It refers to the use of digital technologies to improve existing processes, develop new services and create more efficient ways of conducting economic and administrative activities. In India, the Digital India programme, launched in 2015, provided an important policy framework for this expansion. Initiatives such as Aadhaar-based services, the Unified Payments Interface (UPI), Direct Benefit Transfer (DBT), BharatNet and online government platforms have contributed to the development of digital infrastructure and the wider availability of electronic services.

The growth of digital payments illustrates the practical impact of this change. UPI has made money transfers easier for individuals, traders and small businesses, while QR-code payments have become increasingly common in local commercial transactions. According to the Reserve Bank of India, UPI accounted for nearly 86 per cent of retail payment transaction volume in 2025–26 (RBI, 2026).. Digital technology is also influencing business operations. Enterprises increasingly use online platforms for advertising, receiving orders, maintaining accounts and communicating with customers. In agriculture, mobile-based services provide access to information on weather, crop prices, cultivation practices and government programmes. These developments are relevant to small enterprises and rural producers, for whom access to information and markets remains an important economic concern.

The expansion of digital activities has also influenced employment and skill requirements. New opportunities have emerged in digital services, financial technology, online commerce and technology-based business operations. At the same time, automation and changing workplace practices are placing greater importance on digital skills and vocational training. Workers and small enterprises without adequate access to technology or training may find it difficult to benefit from these changes. Differences in internet connectivity, the affordability of devices, digital literacy and access to electricity further affect the extent to which people can participate. Online financial fraud, cybersecurity risks and concerns over personal data also remain important issues.

The economic significance of this transformation is reflected in estimates published by the Indian Council for Research on International Economic Relations (ICRIER) . A study prepared for the Ministry of Electronics and Information Technology (MeitY) estimated that India's digital economy accounted for 11.74 per cent of national income in 2022–23 (Mishra et al., 2025). This estimate highlights the growing place of digital activities in the national economy. However, the expansion of digital infrastructure and transactions alone does not establish how far these developments have improved productivity, employment, business performance or access to economic opportunities.

The present study examines the contribution of digital transformation to India's economic development, with particular attention to digital infrastructure, financial inclusion, enterprise adoption and emerging opportunities across different sectors. It also considers the constraints that influence the distribution of these benefits, including differences between rural and urban areas. The central concern is not simply how rapidly digital services are expanding, but whether their growth is translating into broader economic participation and more inclusive development.

2. REVIEW OF LITERATURE

Mishra et al. (2025), in their report Estimation and Measurement of India's Digital Economy, examined how digital activities contribute to national income and employment. Drawing on an approach informed by the OECD framework, the study extended the measurement of the digital economy beyond conventional information technology activities to include digital components within traditional sectors such as trade, banking and education. Its contribution lies in providing a broader framework for measuring digital economic activity and understanding its place within India's overall economic structure.

The Reserve Bank of India (2026), in its Annual Report 2025–26, examined developments in payment and settlement systems, with particular attention to the expansion of digital payments. The report discussed the growing role of UPI, the development of payment infrastructure and the importance of security measures to protect users against digital fraud. These aspects are relevant to the present study because the economic contribution of digital payments depends not only on their wider adoption but also on the reliability and security of the systems through which transactions take place.

Infrastructure remains an important condition for the wider adoption of digital services. The Telecom Regulatory Authority of India (2026), in The Indian Telecom Services Yearly Performance Indicators 2025–26, presented information on internet subscriptions, broadband services and connectivity across rural and urban areas. Its data provide a basis for examining the expansion of India's digital infrastructure and identifying differences in access between geographical regions. The report is particularly useful for understanding the infrastructure conditions that influence participation in the digital economy.

The adoption of digital technology by smaller businesses is addressed in the Ministry of Statistics and Programme Implementation's Annual Survey of Unincorporated Sector Enterprises (ASUSE) 2025. The survey provides information on internet use for entrepreneurial purposes and other characteristics of unincorporated establishments engaged in manufacturing, trade and other services. Its findings are relevant to the present study because they help assess the extent to which digital practices are reaching smaller enterprises, an important segment of India's non-agricultural economy (MoSPI, 2026a).

The Periodic Labour Force Survey Annual Report 2025, published by MoSPI (2026b), provides information on employment conditions, unemployment and vocational training. Its findings offer a broader

picture of the labour market in which technological changes are taking place. Although the survey does not directly measure the employment effects of digitalisation, its information on vocational and technical training is useful for considering the importance of skill development and workers' ability to respond to changing occupational requirements.

Government initiatives have also played an important role in the development of India's digital infrastructure. The Digital India programme, launched in 2015, placed emphasis on digital infrastructure, the electronic delivery of government services and the digital empowerment of citizens (Government of India, 2015). These objectives connect digital development with public administration and wider economic participation. Access to online government services, information and digital facilities is particularly relevant to people living in geographically distant areas.

The reviewed publications provide useful evidence on different aspects of India's digital transformation, including its measurement, payment systems, infrastructure, enterprise adoption and labour-market conditions. However, these dimensions are generally examined through separate institutional reports and statistical indicators. There is scope for a broader descriptive analysis that considers their relationship with financial inclusion, enterprise development and the distribution of economic opportunities, while recognising the differences in their definitions and reporting periods. The present study attempts to address this need through an examination of available secondary data, with particular attention to rural–urban differences.

2.1 Research Gap

Existing studies and institutional reports provide considerable information on India's digital economy, including digital payments, internet connectivity, enterprise adoption and employment. However, these aspects are generally examined separately, using different statistical sources, definitions and reference periods. As a result, it is difficult to obtain a combined picture of how digital infrastructure, financial services and technology adoption are developing alongside one another.

There is scope for a descriptive analysis that brings these dimensions together while distinguishing estimates of the digital economy's direct contribution from broader indicators of digital access and adoption. The present study addresses this need by examining published evidence relating to digital payments, internet connectivity, enterprise activity, employment and public-service delivery. Particular attention is given to rural–urban differences and the conditions that influence wider participation in the digital economy.

3. OBJECTIVES OF THE STUDY

The main objectives of the study are:

- To examine the development of digital transformation in India since the introduction of the Digital India programme.
- To analyse the estimated contribution of digital economic activities to national income and employment.
- To examine the growth of digital payment systems and their role in financial transactions and financial inclusion.
- To assess the adoption of digital technology among small and unincorporated enterprises and its implications for business activities.
- To study the opportunities and constraints associated with digitalisation in agriculture, industry, trade and entrepreneurship.
- To examine employment-related developments and the growing importance of skills in an increasingly digital economy.
- To identify the major challenges affecting inclusive participation in the digital economy and suggest appropriate policy measures.

4. RESEARCH METHODOLOGY

The study follows a descriptive and analytical research approach to examine the contribution of digital transformation to India's economic development. It is based entirely on secondary data collected from published reports, official statistics and policy documents issued by government institutions and recognised research organizations.

The principal sources of information include Estimation and Measurement of India's Digital Economy, prepared by the Indian Council for Research on International Economic Relations (ICRIER) for the Ministry of Electronics and Information Technology (MeitY); the Reserve Bank of India's Annual Report 2025–26; the Telecom Regulatory Authority of India's Indian Telecom Services Yearly Performance Indicators 2025–26; the Ministry of Statistics and Programme Implementation's (MoSPI) Annual Survey of Unincorporated

Sector Enterprises (ASUSE) 2025; and the Periodic Labour Force Survey Annual Report 2025. Relevant government publications on the Digital India programme and digital public-service delivery are also considered.

The broad period covered by the study is 2015–2026, corresponding to the period following the launch of the Digital India programme. However, the statistical observations used in the analysis relate to different reference periods. The estimate of the digital economy's contribution to national income relates to 2022–23. UPI transactions are examined on a financial-year basis. TRAI data compare internet subscriptions at the end of March 2025 and March 2026. The ASUSE comparison covers October 2023–September 2024 and January–December 2025, while the PLFS observations relate to calendar year 2025. These differences in reference periods are taken into account when interpreting the findings.

The analysis uses percentage changes, comparisons between survey periods, trend analysis and interpretation of published statistical estimates. Tables and charts are used to present the major developments in digital payments, internet connectivity, enterprise adoption and the estimated size of the digital economy. Rural–urban comparisons are included wherever the available data permit. The study does not involve primary data collection, regression analysis or causal estimation. Its findings are therefore interpreted as evidence of observed trends and developments rather than proof of direct causal relationships.

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4.1 Limitations of the Study

The study is based on secondary data, and the statistical definitions, coverage and reference periods differ across the institutions that publish the information. Consequently, the indicators used are not directly interchangeable. Internet subscriptions, for example, represent connections rather than unique individual users, while the volume of digital transactions indicates the use of payment systems and does not directly measure their contribution to national income.

The ASUSE data cover unincorporated non-agricultural establishments engaged in manufacturing, trade and other services, excluding construction. Their findings should therefore not be generalised to all enterprises in India. Similarly, the PLFS indicators describe broader labour-market conditions and cannot be attributed exclusively to digital transformation. Differences in survey periods also require caution when comparing the reported figures.

The study does not use primary surveys, enterprise-level productivity estimates or econometric methods to isolate the effects of digital adoption. It therefore identifies patterns, comparisons and relationships in the available evidence but does not claim that digitalisation alone caused the observed changes in income, employment or business activity. These limitations are considered while drawing conclusions and suggesting policy measures.

5. DIGITAL TRANSFORMATION IN THE INDIAN ECONOMY

Digital transformation has become an increasingly important part of India's economic development. What was once largely associated with the information technology industry now influences a much wider range of activities, including banking, agriculture, manufacturing, trade, education and public administration. The spread of mobile communication, internet connectivity and digital platforms has changed how people obtain information, make payments, access services and conduct business.

The significance of this change lies not simply in the availability of new technology but in the way it influences economic activities and relationships. Digital systems have created additional opportunities for businesses to reach customers, for individuals to access financial services and for government institutions to deliver public services. At the same time, differences in connectivity, affordability and digital skills continue to affect the extent to which these opportunities are available across the country. The following subsections examine the major areas in which digital technology is contributing to changes in the Indian economy.

5.1 Digital Infrastructure and Economic Development

Digital infrastructure forms the basic foundation on which the digital economy operates. Internet connectivity, mobile networks, broadband facilities, data centres and digital payment systems enable individuals, businesses and government institutions to communicate and exchange information. The availability of these facilities has become increasingly important as economic and administrative activities move towards online platforms.

The Digital India programme, launched in 2015 (Government of India, 2015), gave considerable importance to expanding digital infrastructure and improving citizens' access to government services. BharatNet is one of the major initiatives in this direction, with the objective of extending broadband connectivity to rural areas. Alongside these public initiatives, the expansion of mobile internet services has brought a growing range of digital facilities within the reach of households and businesses.

The economic importance of digital infrastructure can be seen in the reduction of geographical barriers to communication and access to information. A small trader, for instance, can communicate with suppliers, receive customer orders and make payments without depending entirely on physical transactions. Similarly,

educational institutions and government agencies can use online platforms to reach people beyond their immediate locations. These changes can improve the efficiency of economic and administrative activities.

However, the availability of internet connections alone does not guarantee equal access to digital opportunities. Differences in network quality, service costs and access to suitable devices remain important concerns, particularly in rural and remote areas. Digital infrastructure contributes more effectively to development when connectivity is reliable, affordable and accessible to different sections of society.

5.2 Digital Payments and Financial Inclusion

The expansion of digital payments has brought a noticeable change in India's financial transactions. Earlier, cash played a dominant role in many everyday exchanges, particularly in small shops and local markets. The introduction and expansion of mobile-based payment facilities have provided an additional method of transferring money and settling payments. Among these developments, the Unified Payments Interface (UPI) has emerged as an important part of India's digital payment system (RBI, 2026).

UPI enables users to transfer money directly between bank accounts through mobile applications. Its simple transaction process and the increasing use of QR codes have made digital payments accessible to a wide range of businesses, including small retailers, street vendors and local service providers. For many of these businesses, accepting digital payments does not require the same type of arrangements associated with conventional card-based payment facilities.

The contribution of digital payments extends beyond convenience. Electronic transactions create records that can help businesses monitor their receipts and payments. They also provide customers with additional ways to conduct financial transactions without carrying cash. For small enterprises, maintaining transaction records may assist in understanding business activity and establishing a clearer financial history.

Digital payments have also strengthened the infrastructure supporting financial inclusion. However, access to a digital payment facility should not automatically be treated as complete financial inclusion. Access to savings, credit, insurance and other financial services remains equally important. Concerns relating to failed transactions, fraud, digital awareness and grievance redressal also need attention. The long-term contribution of digital payments will depend on whether people can use these facilities safely and with confidence.

5.3 Digital Transformation in Agriculture

Agriculture provides an important area in which digital technology can improve access to information and support decision-making. Farmers often have to make production-related decisions under uncertain conditions, particularly with regard to weather, crop prices, availability of inputs and market demand. Mobile-based information services and online platforms offer additional ways of obtaining information relevant to these decisions.

Digital services can provide farmers with weather updates, cultivation guidance, market prices and information about government assistance. Initiatives such as the Electronic National Agriculture Market (e-NAM) seek to improve market linkages by providing an online trading platform for agricultural commodities. Similarly, PM-KISAN uses digital infrastructure to facilitate the transfer of financial assistance to eligible farmer families. These initiatives illustrate how technology is being incorporated into agricultural marketing and the delivery of public support.

Technology is also being used in areas such as irrigation management, agricultural record-keeping and the delivery of government services. These developments have the potential to make certain agricultural operations more informed and efficient. However, the benefits depend on the accuracy of the information provided and its relevance to local agricultural conditions.

The adoption of digital services is not equally easy for all farmers. Small and marginal farmers may encounter difficulties because of limited internet access, the cost of smartphones and differences in digital literacy. Language barriers and the complexity of some online services can create further problems. Digital facilities should therefore work alongside agricultural extension services and local support systems. Technology can improve the flow of agricultural information, but it cannot replace the need for practical guidance and institutional assistance at the village level.

5.4 Digitalisation of Industry and Business

Digitalisation is gradually changing the way businesses organise their operations and manage resources. Computerised accounting, digital inventory management, online communication and electronic record-keeping have become useful tools for enterprises of different sizes. In larger industries, digital systems can also assist in production planning, quality monitoring and the coordination of supply chains.

These changes have economic significance because business operations increasingly depend on timely information and coordination. Digital records can make it easier to monitor stock, track orders and maintain

communication with suppliers and customers. In manufacturing, the use of computer-based systems can improve the coordination of production activities and help businesses identify operational difficulties.

The extent of digital adoption, however, differs considerably between large enterprises and smaller businesses. Established companies are generally better placed to invest in specialised software, equipment and technical personnel. Smaller enterprises often have to consider the cost of installation, maintenance and employee training before introducing new systems. These expenses can slow the adoption of digital technologies, even when businesses recognise their usefulness.

Cybersecurity and the protection of business information have also become important concerns. As more business activities are conducted electronically, enterprises must pay greater attention to the security of their records and transactions. The contribution of digitalisation to industrial development therefore depends not only on access to technology but also on the capacity of businesses to use and manage it effectively.

5.5 E-Commerce and Entrepreneurship

The growth of e-commerce has widened the ways in which goods and services are marketed and sold in India. Online marketplaces allow businesses to display their products to customers beyond their immediate geographical areas. Consumers, in turn, can compare products, examine available information and place orders without visiting physical shops. This has introduced additional market opportunities, particularly for businesses seeking to expand their customer base.

Digital platforms have also created new possibilities for entrepreneurship. Activities such as online education, digital marketing, software development, content creation and other technology-based services can now be undertaken through internet-based platforms. Individuals with appropriate skills can offer certain services to customers in different locations without establishing conventional business premises. Digital tools have consequently reduced some of the initial barriers associated with reaching customers and promoting products.

The spread of e-commerce does not mean that all businesses benefit equally. Sellers may face competition from established platforms, delivery-related expenses, platform charges and difficulties in building customer confidence. Small businesses also need to understand online marketing, digital payments and customer service if they are to maintain a presence in digital markets.

The growing use of the internet by unincorporated enterprises is particularly relevant in this context. The Annual Survey of Unincorporated Sector Enterprises (ASUSE) provides an important statistical basis for examining this development (MoSPI, 2026a). Its findings help assess the extent to which smaller establishments are incorporating internet-based activities into their business operations. The implications of these changes are considered further in the results and discussion section.

5.6 Digital Transformation and Employment Generation

Digital transformation influences employment in two related ways: it creates demand for new types of work and changes the skills required in existing occupations. The expansion of information technology, financial technology, online commerce and digital services has increased the importance of occupations involving computer applications, data management, digital communication and technical support.

Online platforms have also widened opportunities for freelancers and independent service providers. Digital marketing, graphic design, online teaching, software services and content development are examples of activities through which individuals can provide services to clients in different locations. These developments have introduced additional forms of employment and self-employment, although the availability of such opportunities depends on skills, experience and access to digital platforms.

At the same time, technological changes can affect the nature of existing jobs. Automation and computer-based systems may reduce the need for certain routine tasks, while increasing the importance of technical knowledge and the ability to work with digital tools. Consequently, the benefits of digital transformation in employment cannot be judged only by the creation of new occupations. Changes in the quality of work, the skills required and the accessibility of employment opportunities also deserve attention.

Skill development is therefore an important part of the relationship between technology and employment. Workers need opportunities to acquire practical knowledge and adapt to changing workplace requirements. Vocational education, technical training and continuous learning can help people respond to these changes. Without adequate opportunities for skill development, the benefits of technological progress may remain concentrated among workers and businesses that already possess the necessary capabilities.

5.7 Digitalisation and Government Service Delivery

The use of digital technology in public administration has introduced new ways for citizens to interact with government institutions. Government websites and online portals allow people to obtain information, submit applications and access selected services without depending entirely on physical visits to

government offices. These arrangements can reduce paperwork, improve communication and make certain administrative processes more convenient.

Direct Benefit Transfer (DBT) is an important example of digital technology being used in the delivery of public assistance. Through this system, eligible beneficiaries receive financial assistance directly into their bank accounts. Digital identity, banking facilities and electronic records form part of the infrastructure supporting such transfers. These arrangements can improve the delivery process, although their effectiveness also depends on accurate beneficiary records and accessible banking services.

Digital platforms are also used in the delivery of certificates, tax-related services and other administrative facilities. The ability to submit applications and check their progress online can save time for citizens and reduce some of the administrative burden on government offices. For public institutions, electronic records can assist in maintaining information and coordinating service delivery.

Nevertheless, digital governance must take account of citizens who cannot independently access online services. Limited connectivity, lack of suitable devices, language difficulties and inadequate digital awareness may prevent some people from using government portals. Assisted service centres and support through local administrative institutions therefore remain necessary. The purpose of digital governance should be to make public services easier to access, not to make access dependent entirely on a person's ability to use digital technology.

Across these seven domains, digital transformation has reshaped financial transactions, business operations, market access, employment patterns and public service delivery. Its contribution to India's economic development, however, is not uniform across sectors or population groups. Differences in infrastructure, affordability, technological skills and institutional capacity continue to influence the extent of these changes. Examining the available statistical evidence is therefore essential to understanding how far digital transformation has contributed to economic development and where its benefits remain limited.

6. CHALLENGES OF DIGITAL TRANSFORMATION IN INDIA

The expansion of digital technology has created new opportunities for economic activity in India, but access to these opportunities remains uneven. While some sections of society have become increasingly comfortable with online transactions, digital business operations and electronic services, others continue to face difficulties in using them. The reasons are not limited to the availability of technology. Income differences, geographical conditions, educational background and the ability to use digital services also influence the extent to which people can benefit from the digital economy.

One of the major concerns is the digital divide between rural and urban areas. Differences in internet connectivity, access to smartphones and the affordability of digital services affect people's ability to participate in online activities. TRAI's March 2026 data show that rural internet tele-density stood at 48.31 per cent, compared with 126.80 per cent in urban areas (TRAI, 2026). Tele-density is calculated using subscriptions in relation to population and may exceed 100 per cent because an individual can have more than one connection. It therefore does not represent the proportion of unique individuals using the internet. Even with this qualification, the difference between rural and urban areas points to an uneven distribution of internet subscriptions. Such disparities can limit the ability of rural households and businesses to benefit from online education, digital financial services and market opportunities.

The ability to use digital technology is another concern. Having access to a smartphone or internet connection does not necessarily mean that a person can independently use online services. Some users may find it difficult to operate banking applications, complete electronic applications or understand the instructions provided on digital platforms. The risk of falling victim to fraudulent messages and misleading online information adds to these difficulties. Digital literacy programmes therefore need to go beyond introducing people to technology. They should also help users develop the practical skills required to access services, recognise online risks and understand the safe use of digital platforms.

The increasing use of electronic transactions has also brought financial fraud and payment security into greater focus. Digital payment facilities have made financial transactions more convenient, but fraudulent payments and unauthorised transactions can result in financial losses and weaken public confidence. Such incidents may have a greater impact on individuals and small businesses that have limited financial resources or inadequate knowledge of complaint procedures. Financial institutions and payment service providers need to maintain effective security arrangements and provide accessible channels for reporting suspicious transactions. Timely complaint resolution and effective grievance-redressal mechanisms are equally necessary. Public confidence in digital payments depends not only on convenience but also on the protection available when a transaction goes wrong.

Beyond user-level literacy, physical and network infrastructure remains a practical bottleneck in several parts of the country. Poor mobile coverage, slow internet speeds and interruptions in electricity supply can affect the regular use of online services. These difficulties are particularly significant in remote villages, where households, educational institutions and small businesses may depend on limited connectivity. Even when digital facilities are introduced, their usefulness remains restricted if users cannot access them consistently. Expanding connectivity is therefore only one part of the requirement; maintaining service quality and ensuring affordability are equally necessary.

Small businesses face a different set of difficulties in adopting digital technology. Although online payments, electronic accounting and digital marketing can improve business operations, their adoption involves costs relating to equipment, software, maintenance and employee training. Smaller enterprises may not have the financial resources or technical knowledge available to larger companies. They may also find it difficult to assess the terms and conditions of online marketplaces and other digital platforms. These constraints can prevent businesses from making full use of the opportunities offered by digitalisation. Affordable technological solutions, practical training and suitable financial support can help smaller enterprises participate more effectively in the digital economy.

Changes in technology also create difficulties in the labour market. The introduction of automation and computer-based systems may reduce the need for certain routine activities, while creating demand for workers with different technical and digital skills. The ability to adjust to these changes varies among workers. Those with limited access to education and training may find it more difficult to move into new forms of employment. This makes skill development an important part of India's digital transition. Educational institutions, employers and government agencies need to provide opportunities for workers to acquire new skills and update their existing knowledge as workplace requirements change.

Data privacy and consumer protection have become increasingly relevant as more personal and financial activities take place online. Digital platforms collect and process information relating to identity, financial transactions and individual preferences. The Digital Personal Data Protection Act, 2023 provides a legislative framework for the processing of digital personal data in India. Its implementation and applicable rules are important considerations in ensuring responsible data handling and protecting individual rights (Government of India, 2023). In addition to legal safeguards, transparency in data collection, clarity in platform terms and accountability in the use of personal information are necessary to maintain public trust. Consumers should be able to understand how their information is collected and used, as well as the safeguards available to them.

The challenges discussed above show that the progress of digital transformation cannot be assessed solely through the expansion of internet connections, digital payments or online platforms. Its wider economic contribution also depends on whether people and businesses can access these facilities at reasonable cost, use them effectively and trust the systems through which they operate. Addressing infrastructure gaps, improving digital literacy, strengthening consumer protection and supporting workers and smaller enterprises will be essential if the benefits of digital transformation are to reach a wider section of the Indian population.

7. RESULTS AND DISCUSSION

This section examines the contribution of digital transformation to the Indian economy through selected indicators relating to digital payments, internet connectivity, enterprise adoption, economic output and employment. The analysis draws on statistical information published by the Reserve Bank of India (RBI), the Telecom Regulatory Authority of India (TRAI), the Ministry of Statistics and Programme Implementation (MoSPI), and the Indian Council for Research on International Economic Relations (ICRIER). These sources cover different reporting periods and use different measurement approaches. Their findings are therefore considered separately before drawing broader conclusions about the economic significance of digital transformation.

Note on Data Sources and Comparability: UPI transaction volumes reported in lakh have been converted into crore by dividing the figures by 100. TRAI internet subscriber figures refer to subscriptions and should not be interpreted as the number of unique individual users. The ASUSE 2023–24 survey covers October 2023 to September 2024, whereas ASUSE 2025 covers January to December 2025; comparisons between the two therefore relate to different survey periods. The ICRIER estimate of a 13.42 per cent digital-economy share for 2024–25 is a projection reported in the study, not an independently verified actual figure.

7.1 Growth of Digital Payment Transactions

The expansion of digital payment systems is one of the most visible outcomes of India's digital transformation. The Unified Payments Interface (UPI) has become an important part of everyday financial transactions, enabling individuals and businesses to transfer money through mobile applications and other

digital platforms. Its increasing use reflects the growing acceptance of electronic payment facilities across the country.

RBI data indicate that UPI transaction volume increased from 13,112.95 crore transactions in 2023–24 to 18,586.60 crore in 2024–25. It rose further to 24,161.69 crore transactions in 2025–26. The value of transactions also increased during this period, from ₹200.0 lakh crore in 2023–24 to ₹260.6 lakh crore in 2024–25 and ₹314.2 lakh crore in 2025–26.

Table 1. UPI transaction growth in India, 2023–24 to 2025–26
Source: Reserve Bank of India, Annual Report 2025–26, Table IX.1.

Financial year	Transaction volume (crore)	Transaction value (₹ lakh crore)
2023–24	13,112.95	200.0
2024–25	18,586.60	260.6
2025–26	24,161.69	314.2

The increase in both volume and value points to the growing role of UPI in retail payments. The RBI also reported that UPI accounted for nearly 86 per cent of total retail payment transaction volume in 2025–26, with annual volume growth of approximately 30 per cent. This indicates the extent to which digital payments have become integrated into routine economic exchanges.

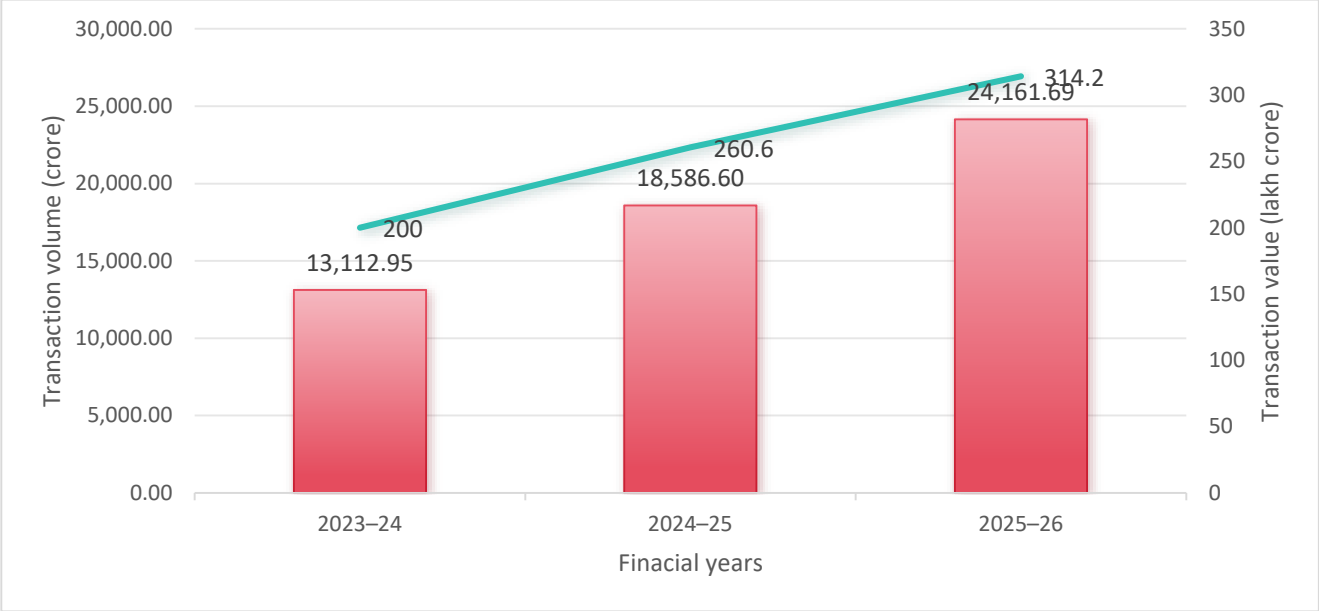

Figure 1. Growth of UPI transaction volume and value in India, 2023–24 to 2025–26
Source: RBI, Annual Report 2025–26.

The growth of UPI has reduced dependence on cash for many transactions and made electronic payments more accessible to individuals and small businesses. However, transaction volume and value should not be treated as direct measures of GDP, investment or income. They indicate the extent of payment-system usage rather than the total value of new economic activity generated by digitalisation.

7.2 Expansion of Internet Connectivity

Internet connectivity provides the basic infrastructure required for participation in the digital economy. It supports online banking, electronic payments, e-commerce, communication, education and access to government services. The expansion of internet subscriptions in both rural and urban India has therefore created a wider base for digital participation.

TRAI data show that total internet subscribers increased from 969.10 million in March 2025 to 1,092.79 million in March 2026. Rural subscribers rose from 407.69 million to 440.87 million, while urban subscribers increased from 561.42 million to 651.93 million during the same period.

Table 2. Internet subscribers in rural and urban India

Area	March 2025 (million)	March 2026 (million)	Annual change
Rural	407.69	440.87	8.14%
Urban	561.42	651.93	16.12%
Total	969.10	1,092.79	12.76%

Source: TRAI, The Indian Telecom Services Yearly Performance Indicators 2025–26.

The figures indicate that internet connectivity continued to expand across the country, although urban growth was considerably higher than rural growth. The increase in rural subscriptions is encouraging because internet access can connect people in remote areas with banking facilities, educational resources, markets and public services. Nevertheless, the difference in growth rates suggests that geographical inequalities in digital access have not disappeared.

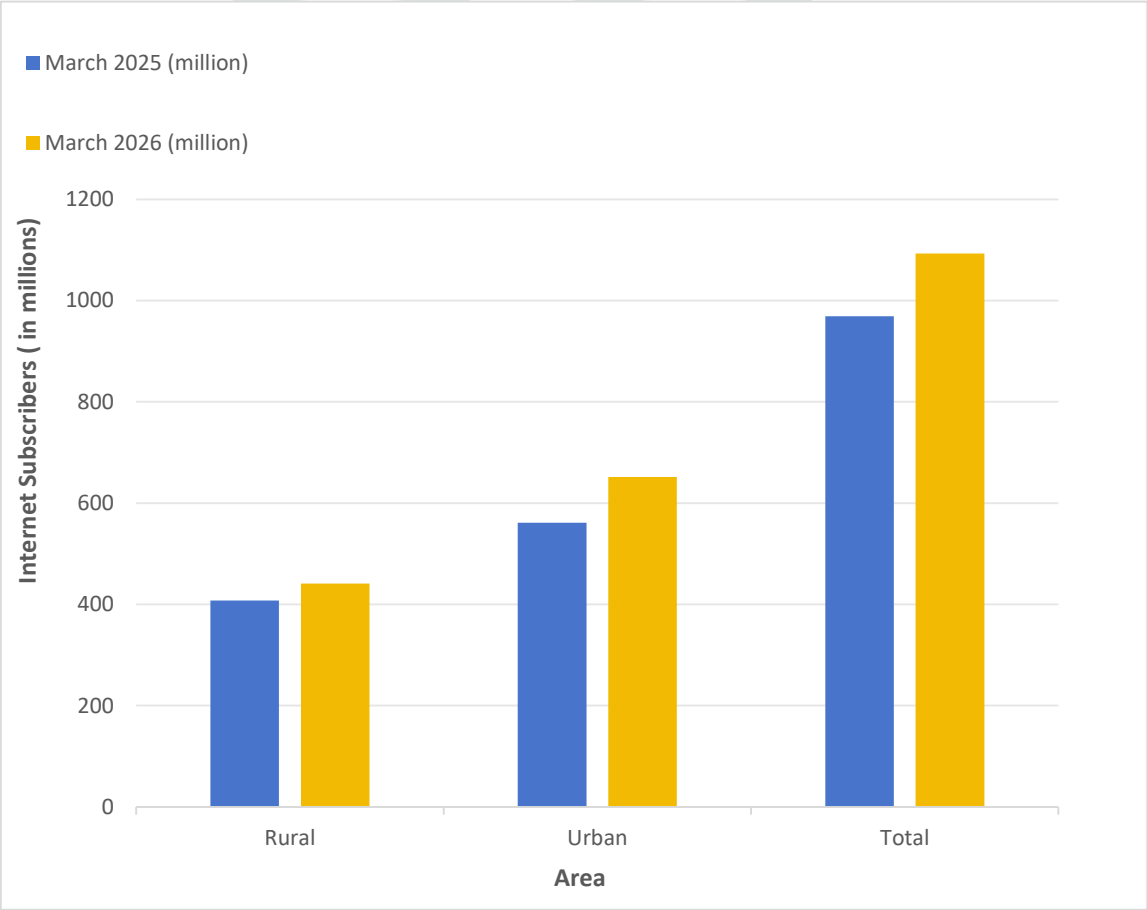

Figure 2. Rural and urban internet subscribers in India, March 2025 and March 2026
Source: TRAI Yearly Performance Indicators 2025–26.

Subscriber figures represent connections rather than unique individuals. A person may have more than one connection, and the data do not necessarily reveal whether users have reliable service, affordable data or the skills required to use online facilities. Consequently, the expansion of subscriptions should be considered an indicator of connectivity rather than complete digital inclusion.

7.3 Digital Adoption among Unincorporated Enterprises

Digital transformation is also influencing the operations of small businesses and unincorporated enterprises. Internet access can help these establishments communicate with customers, identify suppliers, receive payments, advertise products and reach markets beyond their immediate localities. The Annual Survey of Unincorporated Sector Enterprises (ASUSE) provides useful evidence of the extent to which such establishments are adopting internet-based activities.

According to MoSPI data, the share of establishments using the internet for entrepreneurial purposes increased from 26.68 per cent in ASUSE 2023–24 to 39.37 per cent in ASUSE 2025. Rural adoption rose from 17.94 per cent to 31.06 per cent, while the urban share increased from 37.01 per cent to 48.94 per cent.

Table 3. Internet use for entrepreneurial purposes among unincorporated establishments

Area	ASUSE 2023–24	ASUSE 2025	Change (percentage points)
Rural	17.94%	31.06%	13.12
Urban	37.01%	48.94%	11.93
All India	26.68%	39.37%	12.69

Source: MoSPI, ASUSE 2025 Detailed Results, May 2026.

The increase across all three categories indicates a wider adoption of internet-based business activities. Rural establishments recorded a slightly larger increase in percentage-point terms than urban establishments. Even so, the urban adoption rate remained higher in ASUSE 2025, showing that differences in digital business participation continue to exist.

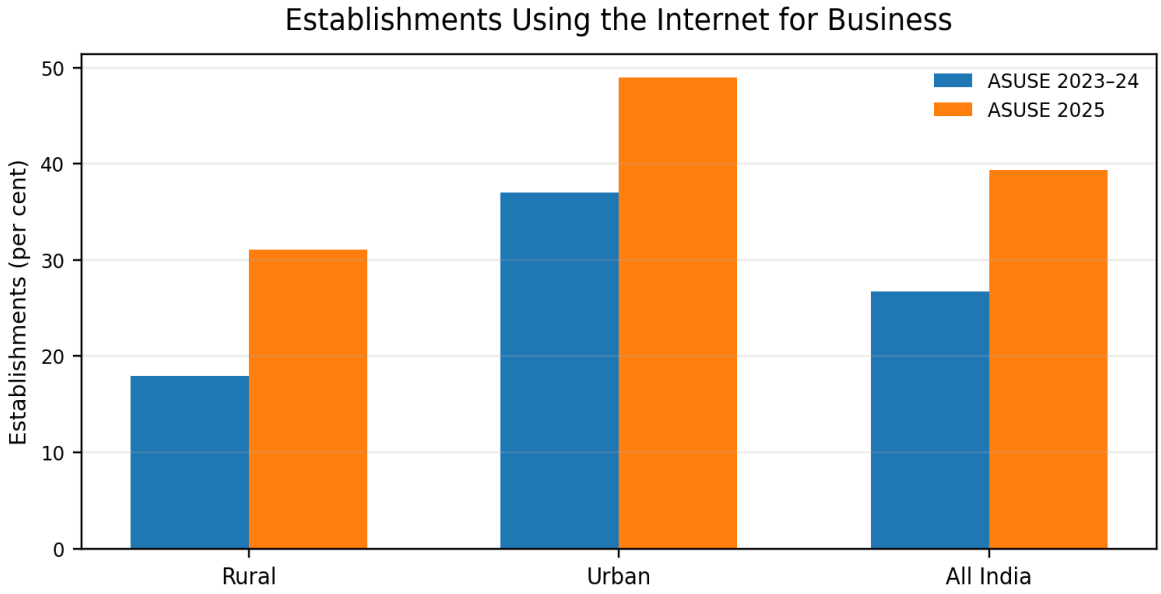

Figure 3. Internet use for entrepreneurial purposes among unincorporated establishments
Source: MoSPI, ASUSE 2023–24 and ASUSE 2025.

Internet use can improve business communication, market access and payment convenience. However, the adoption of internet facilities does not necessarily mean that an establishment uses advanced digital technologies or has achieved higher profitability. The figures provide evidence of increased digital participation, but the extent of its effect on business performance requires separate assessment.

7.4 Size and Employment Contribution of the Digital Economy

The growing importance of digital activities is also reflected in estimates of their contribution to national output. A report prepared by ICRIER, titled Estimation and Measurement of India's Digital Economy, provides an assessment of the digital economy using an expanded measurement framework informed by international approaches and adapted to the Indian context.

According to the report, the digital economy accounted for 11.74 per cent of India's national income in 2022–23. Its gross value added was estimated at ₹28.94 lakh crore, while its gross domestic product was estimated at ₹31.64 lakh crore. The report also estimated that approximately 14.67 million workers were directly associated with the digital economy, representing about 2.55 per cent of the estimated workforce.

Table 4. Estimated contribution of India's digital economy

Indicator	Estimate
Share of national income (2022–23)	11.74%
Digital economy GVA	₹28.94 lakh crore
Digital economy GDP	₹31.64 lakh crore

Estimated direct employment	14.67 million workers
Share of estimated workforce	2.55%

Source: Mishra et al. (2025), ICRIER, Estimation and Measurement of India's Digital Economy.

The estimates indicate that digital activities have acquired a substantial position in the Indian economy. The difference between the estimated output share of 11.74 per cent and employment share of 2.55 per cent is particularly noteworthy. It suggests that the measured digital economy accounts for a larger proportion of output than of total employment. However, this difference alone should not be treated as a direct measure of labour productivity because the two shares are based on different denominators and a specific measurement framework.

The report projected that the digital economy's share would rise to 13.42 per cent by 2024–25 and approach one-fifth of national income by 2030. These figures are projections made in the report and should not be presented as subsequently observed outcomes. They nevertheless indicate the expected importance of digital activities in India's economic structure.

7.5 Enterprise Growth and the Wider Business Environment

Unincorporated enterprises form a substantial part of India's non-agricultural economic activity and provide livelihoods to a large number of workers. Their performance is important when assessing whether digital transformation is reaching smaller business establishments beyond the organised corporate sector.

ASUSE results show that the number of unincorporated non-agricultural establishments increased from approximately 7.34 crore in ASUSE 2023–24 to 7.92 crore in ASUSE 2025. The number of workers was estimated at 12.81 crore in ASUSE 2025. The survey also reported growth of 6.18 per cent in the number of workers and 10.87 per cent in gross value added at current prices.

Table 5. Selected indicators of the unincorporated non-agricultural sector

Indicator	Reported change or estimate
Establishments in ASUSE 2023–24	7.34 crore
Establishments in ASUSE 2025	7.92 crore
Approximate growth in establishments	7.97%
Workers in ASUSE 2025	12.81 crore
Growth in workers	6.18%
Growth in GVA at current prices	10.87%

Source: MoSPI, ASUSE 2025 Detailed Results, May 2026. Establishment growth calculated from the reported figures.

The increase in the number of establishments and workers reflects the continuing importance of the unincorporated sector in economic activity and employment. The reported growth in GVA also indicates an increase in the sector's value of production. Since the GVA growth rate is measured at current prices, it includes the influence of price changes and should not be interpreted as real growth.

The expansion of internet adoption among these establishments, discussed in Section 7.3, provides additional evidence of their growing engagement with digital facilities. However, the increase in enterprise numbers, employment, GVA and internet usage occurred over the same broad period; this does not establish that digital adoption alone caused the growth in the sector. Other factors, including demand conditions, investment, prices and government initiatives, may also have influenced these changes.

7.6 Employment and Skill Requirements

The estimated employment contribution of 14.67 million workers provides an indication of the direct employment associated with the digital economy in 2022–23. However, the influence of digital technology on employment extends beyond occupations classified within the digital economy. Workers in banking, manufacturing, retail, education and other services increasingly use digital tools as part of their regular activities.

Broader labour-market indicators provide additional context for examining these changes. The PLFS Annual Report 2025 reported that the proportion of workers in regular wage or salaried employment increased from 22.4 per cent in 2024 to 23.6 per cent in 2025. Youth unemployment among persons aged 15–29 declined from 10.3 per cent to 9.9 per cent during the same period (MoSPI, 2026b).

The survey also reported that 4.2 per cent of persons aged 15–59 had received or were receiving formal vocational or technical training. Among those aged 15–29, the proportion was 5.0 per cent (MoSPI, 2026b).

These figures cover vocational and technical training in general and should not be interpreted as measures of digital skills alone. Nevertheless, they highlight the importance of strengthening training opportunities as technological requirements change.

The changing nature of work raises questions about the skills required in the labour market. Businesses increasingly depend on workers who can use digital applications, manage electronic records and operate technology-based systems. At the same time, automation may reduce the demand for certain routine activities. The extent to which digital transformation creates better employment opportunities will therefore depend on the availability of suitable training, the quality of new jobs and the ability of workers to adapt to changing occupational requirements.

7.7 Overall Interpretation

The findings presented in this section reveal a gradual but significant expansion of digital activity across different parts of the Indian economy. The growth of UPI transactions reflects the increasing use of electronic payment facilities in everyday financial exchanges. The rise in internet subscriptions indicates an expanding base for digital participation, although differences between rural and urban areas remain. Similarly, the ASUSE results show that internet use among unincorporated establishments has increased, suggesting that digital business practices are becoming more common among smaller enterprises.

Considered together, these indicators show that digital transformation is no longer confined to the information technology sector but has become relevant to financial services, business operations and several other areas of economic activity. The ICRIER estimates provide a broader indication of the economic importance of digital activities, while the enterprise and employment statistics help explain the wider environment in which these changes are taking place.

At the same time, the evidence needs to be interpreted within the limitations of the available indicators. UPI transactions measure the use of a payment system, internet subscriptions measure connections, ASUSE records selected characteristics of unincorporated establishments, and ICRIER estimates the size of the digital economy using a specific measurement framework. These indicators are complementary, but they are not interchangeable. Nor do they establish that digitalisation alone is responsible for the observed changes in economic output or employment.

The findings indicate that digital transformation is making an increasingly important contribution to India's economic development, while also highlighting the importance of infrastructure, skills, institutional support and wider access. The extent to which these developments translate into sustained and inclusive economic gains will depend on how effectively the remaining constraints are addressed.

8.MAJOR FINDINGS OF THE STUDY

- The analysis of digital transformation in India brings out the following major findings:
- Growing contribution to national income: Digital activities have acquired a considerable place in the Indian economy. According to the ICRIER estimate, the digital economy contributed 11.74 per cent of national income in 2022–23, with an estimated GVA of ₹28.94 lakh crore and GDP of ₹31.64 lakh crore.
- Wider use of digital payments: UPI has become an important part of everyday financial transactions. Its transaction volume increased from 13,112.95 crore in 2023–24 to 24,161.69 crore in 2025–26. By 2025–26, it accounted for nearly 86 per cent of retail payment transaction volume, reflecting the growing acceptance of digital payment methods.
- Expansion of internet connectivity: Internet access has continued to grow in both rural and urban areas. TRAI recorded 1,092.79 million internet subscribers in March 2026, comprising 440.87 million rural and 651.93 million urban subscribers. The higher number of urban subscribers points to the continuing difference in connectivity between the two areas.
- Increasing digital participation among small enterprises: The use of the internet for business-related activities has risen among unincorporated establishments. ASUSE data show an increase in the all-India share from 26.68 per cent in 2023–24 to 39.37 per cent in 2025. However, adoption remained higher in urban establishments (48.94 per cent) than in rural establishments (31.06 per cent), indicating that smaller businesses do not have equal levels of digital participation.
- Employment contribution and the need for skills: The digital economy was estimated to provide direct employment to 14.67 million workers in 2022–23. At the same time, PLFS data indicate that formal vocational or technical training remains limited, covering 4.2 per cent of persons aged 15–59 and 5.0 per cent of those aged 15–29. This highlights the need to strengthen skill development as the use of technology spreads across occupations.

- Greater scope for market access and public services: Digital platforms have created additional ways for businesses to reach customers, receive payments and exchange information. Digital systems have also made several government services and financial facilities more accessible. Their effectiveness, however, depends on reliable connectivity, ease of use and public confidence in these services.
- Uneven distribution of digital benefits: The expansion of digital infrastructure has not removed all barriers to participation. Differences in affordability, connectivity, digital literacy and technical skills continue to affect people's ability to benefit from digital services. Cybersecurity concerns and difficulties in accessing support also remain important challenges, particularly for vulnerable users and smaller enterprises.

9.SUGGESTIONS AND POLICY IMPLICATIONS

The findings of the study indicate that digital transformation has created new opportunities for economic activity in India, although its benefits remain uneven across regions, enterprises and sections of society. Addressing the constraints identified in the preceding sections requires attention not only to digital infrastructure but also to skills, affordability, cybersecurity and the quality of digital services. The following suggestions may help strengthen the contribution of digital transformation to inclusive economic development.

i. **Improve digital infrastructure in underserved areas:** Greater attention should be given to expanding reliable broadband and mobile connectivity in rural areas and other underserved locations. Improvements in network quality, electricity supply and last-mile connectivity are necessary to ensure that individuals and businesses can use digital services consistently.

ii. **Promote practical digital literacy:** Digital literacy programmes should focus on the skills people need in everyday life, including online banking, digital payments, government portals and basic business applications. Training in regional languages, particularly through local institutions and community-level programmes, can make these services easier to understand and use. Awareness of online fraud and safe digital practices should also form part of such initiatives.

iii. **Support smaller enterprises in adopting digital tools:** Small businesses and unincorporated enterprises may benefit from affordable digital solutions for accounting, inventory management, online marketing and payment collection. Along with access to suitable technology, they need practical training, technical guidance and appropriate financial support. Such assistance can help smaller enterprises adopt digital systems without placing an excessive burden on their operating costs.

iv. **Improve the usefulness of digital services in agriculture:** Digital agricultural platforms should provide timely and locally relevant information on weather conditions, market prices, cultivation practices and government schemes. Information should be available in regional languages and supported by agricultural extension centres so that farmers who have limited digital experience can also benefit from these services.

v. **Strengthen vocational and technology-related education:** Greater emphasis should be placed on practical digital skills in educational and vocational training programmes. PLFS findings indicate that formal vocational or technical training covers only 4.2 per cent of persons aged 15–59. This limited coverage underlines the need to widen access to training in computer applications, data handling, digital communication and technology-enabled business operations. Greater interaction between educational institutions and employers could also help align training with changing workplace requirements.

vi. **Strengthen cybersecurity and consumer protection:** Banks, digital payment providers and online service platforms should maintain effective security systems and provide accessible channels for reporting suspicious transactions and resolving complaints. Timely grievance redressal, including through the Reserve Bank of India's Integrated Ombudsman framework where applicable, is important for maintaining public confidence in digital financial services. The effective implementation of the Digital Personal Data Protection Act, 2023, and the applicable rules and safeguards should also receive attention to strengthen the protection of personal information.

vii. **Make government services easier to access:** Digital public services should be designed around the needs of ordinary users. Simple application procedures, regional-language interfaces and clear instructions can reduce difficulties in accessing online services. Assisted service centres and alternative support arrangements should remain available for people who lack devices, connectivity or the skills required to complete digital procedures independently.

viii. **Encourage innovation and entrepreneurship:** Policies supporting digital entrepreneurship should provide access to finance, mentoring, technical infrastructure and wider markets. Smaller businesses and emerging entrepreneurs should also be able to participate in digital marketplaces on fair and

transparent terms. These measures can help broaden the economic opportunities created by digital platforms and encourage innovation across different sectors.

The success of these measures will depend on how effectively infrastructure development is combined with affordability, skills, institutional support and public trust. A more inclusive approach can help ensure that digital transformation contributes not only to economic expansion but also to wider participation in India's development process.

10.CONCLUSION

Digital transformation has become an important part of India's economic development. The spread of internet connectivity, mobile technology, digital payment systems and online platforms has influenced the way individuals, enterprises and government institutions carry out their activities. Its impact is no longer confined to the information technology sector; digital applications are increasingly used in banking, trade, manufacturing, agriculture and public administration.

The evidence examined in this study points to the expanding role of digital activities in the Indian economy. The ICRIER study estimated that the digital economy accounted for 11.74 per cent of national income in 2022–23. RBI data recorded a substantial increase in UPI transactions, while TRAI reported 1,092.79 million internet subscriptions by March 2026. The ASUSE 2025 results also indicated wider use of the internet for entrepreneurial activities among unincorporated establishments. Considered together, these indicators reflect the growing presence of digital technology in financial transactions, enterprise operations and the broader economic system.

Digital platforms have widened opportunities for businesses to reach markets, access information and use financial services. They have also supported changes in public-service delivery and created new requirements for skills in the labour market. However, access to these opportunities remains uneven. Differences in connectivity, affordability and digital literacy, along with cybersecurity risks and concerns over personal data, continue to influence the extent to which people and enterprises can participate in the digital economy.

An important limitation of the study is that the statistical indicators used to examine digital transformation measure different aspects of the process. They provide evidence of expanding connectivity, payment activity and enterprise adoption, but do not establish that digitalisation alone has caused economic growth or employment changes. These outcomes are also influenced by investment, education, infrastructure, institutional conditions and market demand. Further research using enterprise-level information, regional comparisons and primary surveys would help examine the relationship between digital adoption, productivity, income and employment more closely.

India's next stage of digital development will depend not simply on the expansion of technology, but on how effectively its benefits reach different sections of society. Reliable infrastructure, relevant skills, support for smaller enterprises, secure digital systems and accessible public services are all important to this process. Digital transformation can make a lasting contribution to India's economic development when technological progress is accompanied by wider opportunities for participation and the ability of people and businesses to use digital services effectively.

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