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From Cash to Code: FinTech Adoption, Digital Public Infrastructure, and Economic Inclusion Among Tribal Communities in India

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Research Article

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Abstract

India's Digital Public Infrastructure has widened access to formal finance through Aadhaar, Pradhan Mantri Jan Dhan Yojana, Unified Payments Interface, Aadhaar-enabled Payment System, Direct Benefit Transfer, DigiLocker, and the Account Aggregator framework. This brief research article examines whether the rapid expansion of digital finance has translated into meaningful economic inclusion for tribal communities. The research is descriptive and secondary data based on official statistics from the Reserve Bank of India, National Payments Corporation of India and Pradhan Mantri Jan Dhan Yojana portal. UPI processed 22.72 billion transactions worth around ₹28.92 lakh crore through 731 participating banks in June 2026. As on July 1, 2026, Andhra Pradesh had about 17.20 mn beneficiaries under PMJDY of which about 12.54 mn beneficiaries were linked to rural and semi urban branches. The RBI Financial Inclusion Index at the national level increased from 49.9 in 2019 to 64.2 in 2024. The Digital Payments Index has increased to 445.50 from 153.47. These measures are indicative of the rapid growth of financial access and digital payment infrastructure. But the national and state-level aggregates cannot determine equitable or independent use among the tribal households. Geographic isolation, unreliable connectivity, low smartphone ownership, language barriers, dependence on intermediaries, limited digital literacy, and fear of fraud can prevent account access from becoming autonomous financial participation. The article concludes that tribal financial inclusion should be assessed through access, independent usage, service quality, financial control, credit availability, and livelihood outcomes. Inclusive digitalisation therefore requires stronger last-mile connectivity, multilingual interfaces, accountable banking correspondents, financial literacy, cybersecurity awareness, and tribal-region-specific monitoring.

1. Introduction

India's transition from cash-based transactions to digital finance represents one of the most important structural changes in its contemporary economy. Digital identity, mobile connectivity, interoperable payment systems, simplified bank accounts, biometric authentication, and electronic benefit transfers have created an institutional infrastructure through which citizens can receive, save, transfer, and spend money without depending entirely on conventional bank branches. The Reserve Bank of India (2026) observes that digital transactions have contributed to the broadening and deepening of financial inclusion by reducing physical and administrative barriers to financial-service delivery.

Digital Public Infrastructure refers to interoperable digital systems developed or regulated in the public interest to support identity verification, payments, data exchange, and public-service delivery. India's digital ecosystem broadly melds identity through Aadhaar, payments through Unified Payments Interface and Aadhaar-enabled Payment System, and data sharing mechanisms such as DigiLocker and the Account Aggregator framework (Reserve Bank of India [RBI], 2026). This architecture allows governments, financial institutions, businesses and citizens to interact using standard digital platforms.

At the core of this transformation is the Unified Payments Interface UPI is an instant payment system that enables users to link their bank account with a participating bank to a mobile application and perform interoperable transfers and merchant payments (National Payments Corporation of India [NPCI], 2026b). In June 2026, UPI processed 22,716.07 million transactions worth ₹2,892,138.67 crore with 731 banks live on the system (NPCI, 2026a). These figures demonstrate the exceptional scale and institutional reach of India's real-time digital-payment network.

However, rapid growth in aggregate transaction volume does not automatically establish inclusive digital transformation. While digital systems can lower transaction costs and enhance access to welfare payments, the benefits of such systems are dependent on the availability of reliable electricity, mobile connectivity, device ownership, digital capability, institutional trust and access to grievance-redressal mechanisms. Thus, the RBI (2026) considers financial inclusion to be a multidimensional process involving access, usage and quality and not just account ownership.

This distinction is particularly important for Scheduled Tribe communities. Tribal settlements are frequently located in hilly, forested, and geographically isolated areas where mobile signals, electricity, bank branches, automated teller machines, and banking-correspondent services may be limited or irregular. In such circumstances, an Aadhaar-linked bank account may facilitate receipt of Direct Benefit Transfer payments but may not provide independent access to savings, payments, insurance, institutional credit, or enterprise finance. Digital dependence can also reproduce conventional forms of exclusion. A person may formally possess a bank account while depending on a banking correspondent, merchant, relative, or local intermediary to check the balance, withdraw money, or make a digital transfer. Such assisted access can improve convenience but may also expose users to unauthorised fees, privacy violations, incorrect transfers, fraud, and limited control over financial decisions.

Research on financial inclusion must therefore move beyond measuring the number of accounts or aggregate payment transactions. Meaningful economic inclusion requires the ability to access financial services independently, use them safely, control financial resources, obtain productive credit, manage economic risks, and participate in livelihood and enterprise opportunities. This article examines India's digital-finance expansion through this broader analytical perspective. The study makes three contributions. First, it distinguishes formal access from active usage and sustainable economic inclusion. Second, it brings together recent official evidence on UPI, PMJDY, village-level banking infrastructure, and the RBI Financial Inclusion Index. Third, it identifies policy requirements for translating India's national digital-finance achievements into meaningful financial capability and economic agency among tribal communities.

2. Literature and Analytical Perspective

2.1 Financial inclusion beyond account ownership

Financial inclusion is broader than possession of a bank account. It refers to the availability, affordability, responsible delivery, and effective utilisation of payment, savings, credit, insurance, pension, remittance, and investment services. The RBI (2026) measures financial inclusion through a composite index that incorporates banking, insurance, investment, pension, postal finance, access, usage, and service quality. This multidimensional definition is particularly relevant in evaluating digital finance. Account ownership represents an entry point into the formal financial system, but it does not demonstrate whether the account is active, whether the user independently controls it, or whether it provides access to services beyond welfare transfers and cash withdrawals. Financial inclusion should therefore be evaluated through the depth, regularity, affordability, safety, and developmental usefulness of financial participation.

2.2 Development of India's digital-finance ecosystem

India's digital-finance progress has been substantial. According to the RBI (2026), the number of banking outlets in villages increased from 5.97 lakh in March 2019 to 15.98 lakh in March 2024. During the same period, basic savings bank deposit accounts increased from 57.42 crore to 70.59 crore. These changes mean a large increase in last-mile banking infrastructure and access to basic accounts. The growth in digital payments has been even faster. The RBI Digital Payments Index has moved up to 445.50 in March 2024 from 153.47 in March 2019, which stands as testimony to the phenomenal growth of payment infrastructure, performance, consumer adoption and penetration of digital payments. During this period, the Financial Inclusion Index (FII) rose from 49.9 to 64.2 (RBI, 2026). The change has been driven by the growth of UPI. The platform allows users to make instant transfers and merchant payments through participating banks and applications (NPCI, 2026b). By June 2026, UPI was processing approximately 22.72 billion monthly transactions worth ₹28.92 lakh crore, demonstrating its centrality to India's retail-payment system (NPCI, 2026a).

2.3 The access–usage gap

Although India's financial infrastructure has expanded, access should not be treated as equivalent to sustained utilisation. In 2024, the access component of the RBI Financial Inclusion Index stood at 79.3, while the usage component was lower at 55.5. The quality component stood at 65.8. The 23.8 point gap between access and usage suggests that the growth of financial infrastructure and account ownership has outpaced the consistent and productive use of formal financial services (RBI, 2026). The difference between access and usage is highly relevant in tribal regions. An account may be technically available but practically difficult to use because of distance, irregular banking-correspondent services, biometric-authentication failure, insufficient cash at service points, weak connectivity, language constraints, or lack of confidence in digital platforms. Access can therefore be divided into three levels.

The first is formal access, represented by possession of an Aadhaar number or bank account.

The second is functional access, represented by the ability to receive benefits and conduct transactions.

The third is autonomous access, represented by the user's ability to operate services independently, safely, and with control over financial decisions.

2.4 Financial inclusion in tribal regions

The digitalisation of welfare transfers and basic banking services can benefit remote tribal households by reducing travel to distant branches, lowering transaction expenses, reducing the loss of working days, and improving the speed of remittances and public transfers. Fixed-point banking correspondents have helped in the extension of last-mile banking infrastructure especially where traditional branches are difficult to set up (RBI, 2026). But banking correspondents should not be treated as a complete substitute for independent financial capability. Assisted transactions include cases where the user uses a third party to enter passwords, run applications, check balances or claim welfare benefits. Such dependence can reduce confidentiality and increase exposure to incorrect charges, fraud, and financial exploitation.

Digital inclusion among tribal households must therefore be understood as a progression:

Digital access → independent usage → financial capability → livelihood participation → economic resilience.

This progression recognises that digital payment adoption becomes developmentally important only when it strengthens household control over resources, improves access to productive finance, reduces vulnerability to economic shocks, and expands livelihood opportunities.

3. Materials and Methods

3.1 Research design

The article adopts a descriptive and analytical secondary-data research design. It examines recent national and state-level indicators relating to digital payments, basic banking access, financial infrastructure, and financial inclusion. The study does not claim to measure the household-level impact of FinTech adoption because individual survey observations and validated econometric outputs were not analysed in this brief version.

Secondary-data analysis is appropriate for examining the scale, trajectory, and institutional structure of India's digital-finance transformation. However, national and state-level aggregates cannot determine whether benefits are distributed equally across social groups or whether individual tribal households use digital services independently.

3.2 Data sources

The analysis draws principally on the following official sources:

1. NPCI's UPI product statistics for June 2026;
2. The RBI's National Strategy for Financial Inclusion 2025–2030;
3. PMJDY national and state-wise progress statistics; and
4. Official descriptions of UPI and India's financial-inclusion framework.

The NPCI data were used to measure the number of banks participating in UPI, transaction volume, and transaction value. The RBI data were used to assess changes in village banking outlets, basic savings accounts, the Digital Payments Index, the Financial Inclusion Index, and its access, usage, and quality components. The PMJDY data were used to examine basic banking access in Andhra Pradesh.

3.3 Indicators

Four groups of indicators were examined:

1. **Payment-system expansion**: UPI transaction volume, value, and participating banks.
2. **Basic banking access**: PMJDY beneficiaries, account deposits, and RuPay-card issuance.
3. **Financial inclusion**: RBI Financial Inclusion Index and its access, usage, and quality components.
4. **Last-mile access**: village banking outlets, banking correspondents, digital literacy, cybersecurity, and intermediary dependence.

3.4 Data analysis

The study uses descriptive statistics, proportions, percentage changes, and comparative interpretation. The percentage change was calculated as:

$$\text{Percentage change} = \frac{\text{Final value} - \text{Initial value}}{\text{Initial value}} \times 100.$$

The analysis distinguishes between expansion of digital infrastructure and improvement in broader financial inclusion. It also compares the access and usage components of the Financial Inclusion Index to identify whether the availability of financial services has translated into sustained utilisation.

3.5 Analytical limitations

The proposed survey of 600 households was not included because no anonymised household dataset, coding framework, or validated statistical output was available for this brief article. Consequently, household percentages, regression coefficients, significance levels, gender differences, and causal effects have not been estimated or inferred.

The results should therefore be interpreted as evidence of the expansion of the enabling financial infrastructure rather than direct evidence of household-level livelihood effects. Future research should analyse primary household data before making claims about income, savings, entrepreneurship, women's empowerment, or financial resilience.

4. Results

4.1 Expansion of UPI

Table 1
Selected UPI indicators, June 2026

Indicator	Official figure
Banks live on UPI	731
Transaction volume	22,716.07 million
Transaction value	₹2,892,138.67 crore
Approximate transaction volume	22.72 billion
Approximate transaction value	₹28.92 lakh crore
Note. Compiled from NPCI's UPI product statistics (NPCI, 2026a).	

According to NPCI (2026a), UPI processed 22,716.07 million transactions valued at ₹2,892,138.67 crore in June 2026, while 731 banks were live on the platform. The results demonstrate the exceptional scale of India's digital-payment network and the institutional integration achieved through an interoperable payment system.

UPI has reduced several technological and institutional barriers involved in transferring funds between bank accounts. However, aggregate transaction data do not identify the caste or tribal status, income category, geographical location, gender, or independent capability of individual users. High national transaction volume should therefore not be interpreted as evidence that all social groups participate equally.

4.2 Expansion of PMJDY in Andhra Pradesh

Table 2
PMJDY indicators for Andhra Pradesh, July 1, 2026

Indicator	Number
Rural and semi-urban beneficiaries	12,539,554
Urban and metropolitan beneficiaries	4,659,262
Total beneficiaries	17,198,816
Deposits in beneficiary accounts	₹6,896.86 crore
RuPay cards issued	11,155,790
*Note. Compiled from the Government of India's PMJDY state-wise progress report (*Department of Financial Services, 2026*).*	

The Department of Financial Services (2026) reported that there were approximately 17.20 million PMJDY beneficiaries in Andhra Pradesh as of July 1, 2026. Of these, approximately 12.54 million were

associated with rural and semi-urban branches. Based on these figures, rural and semi-urban beneficiaries accounted for approximately 72.9% of the state's total PMJDY beneficiaries.

The predominance of rural and semi-urban accounts is relevant to tribal financial inclusion because a large proportion of the Scheduled Tribe population resides outside metropolitan areas. Nevertheless, the available state-level data are not disaggregated by social category. They therefore cannot establish how many PMJDY beneficiaries belong to Scheduled Tribe communities or how frequently their accounts are used.

4.3 National development of digital and financial inclusion

Table 3
Selected national financial-inclusion indicators

Indicator	2019	2024
Village banking outlets	5.97 lakh	15.98 lakh
Basic savings bank deposit accounts	57.42 crore	70.59 crore
RBI Digital Payments Index	153.47	445.50
RBI Financial Inclusion Index	49.9	64.2
Access sub-index	67.5	79.3
Usage sub-index	38.7	55.5
Quality sub-index	52.6	65.8
Note. Compiled from the RBI's National Strategy for Financial Inclusion 2025–2030 (RBI, 2026).		

The RBI (2026) reported that village banking outlets increased from 5.97 lakh in March 2019 to 15.98 lakh in March 2024. This represents an increase of approximately 167.7%. The number of basic savings bank accounts rose to 70.59 crore from 57.42 crore, a growth of about 22.9 per cent. The Digital Payments Index has grown from 153.47 in 2019 to 445.50 in 2024 (growth of about 190.3%). The Financial Inclusion Index has grown from 49.9 to 64.2 (growth of about 28.7%) (RBI, 2026). These results show that payment digitalisation expanded considerably faster than the broader measure of financial inclusion.

The access–usage gap remained substantial. In 2024, the access score of 79.3 exceeded the usage score of 55.5 by 23.8 points. Although both components improved between 2019 and 2024, the difference indicates that the availability of accounts and service points does not automatically ensure frequent or effective utilisation.

5. Discussion

India has constructed a broad digital-finance architecture capable of reaching populations historically excluded from conventional banking. PMJDY lowers entry barriers to basic bank accounts, Aadhaar supports identity verification, DBT enables electronic welfare transfers, AePS facilitates biometric banking transactions, and UPI permits instant interoperable payments. These digital systems are considered as the key enablers for the growth and deepening of financial inclusion (RBI, 2026). But the results do show that digital payments have expanded much more rapidly than financial inclusion in general. Digital Payments Index (DPI) has increased by around 190.3% while Financial Inclusion Index has increased 28.7%. This difference suggests that improvements in payment infrastructure and transaction activity should not be treated as equivalent to improvements in savings, credit, insurance, pensions, financial capability, and service quality.

Digital transfers can reduce trips to far-off bank branches, minimise wage losses from travel, improve the timeliness of welfare payments and help migrant workers send remittances to tribal households. Banking correspondents can also deliver elementary services in localities where opening a full-fledged bank branch may be financially or geographically difficult. “Fixed-point banking correspondents have been a great support for last-mile banking outreach”, the RBI (2026) notes.

However, the available evidence supports a cautious interpretation of the claim that digital access has already produced comprehensive economic inclusion. Three major gaps remain.

5.1 Infrastructure gap

Digital financial services depend on electricity, mobile-network availability, internet connectivity, functional devices, biometric systems, and accessible cash-out facilities. Weakness at any point in this chain can interrupt transactions. These constraints are particularly important in hilly and forested tribal regions where infrastructure may be difficult to establish and maintain. The RBI’s strategy for 2025–2030 specifically identifies the need to improve the equity, reach, consistency, and quality of last-mile access. It also proposes incentives for business correspondents operating in rural and hilly areas and measures to strengthen the sustainability of their operations (RBI, 2026).

5.2 Capability gap

Smartphone ownership does not necessarily mean that a person can independently create or protect a UPI PIN, verify the recipient of a payment, detect fraudulent links, recover a failed transaction, or understand digital-credit conditions. Independent capability requires technical skill, financial knowledge, confidence, language accessibility, and awareness of consumer rights.

Financial literacy is consequently an important component of the quality of financial inclusion. The RBI (2026) reports the expansion of financial-literacy programmes delivered through Centres for Financial Literacy, Financial Literacy Centres, regional offices, and other sectoral institutions. However, national programme coverage does not establish whether the content is accessible in tribal languages or adapted to local social and economic conditions.

5.3 Economic-use gap

Payment transactions and DBT receipt do not automatically improve access to productive credit, insurance, enterprise investment, market participation, or livelihood diversification. Digital finance becomes economically meaningful when households use formal financial services to manage risks, build savings, invest in productive activities, and recover from financial shocks.

A distinction must therefore be made between payment inclusion and economic inclusion. Payment inclusion refers to the ability to receive and transfer funds. Economic inclusion involves control over financial resources, access to suitable credit and insurance, participation in markets, livelihood diversification, and improved household resilience.

5.4 Cybersecurity and consumer protection

Cybersecurity is also an inclusion issue because first-generation users may be especially vulnerable to fraudulent calls, phishing links, impersonation, unauthorised withdrawals, and misleading digital-credit products. Fear of fraud can discourage users from adopting digital services even when infrastructure is available.

The RBI's financial-inclusion strategy recognises grievance-redressal systems, financial awareness, consumer training, and citizen financial cyber-fraud reporting as components of a responsible financial ecosystem (RBI, 2026). Practical training should therefore cover PIN and OTP confidentiality, recipient verification, suspicious links, transaction-status checking, fraud reporting, and complaint procedures.

6. Policy Implications

Digital-finance policy in tribal regions should move beyond targets based primarily on the number of bank accounts opened. Performance should be assessed through account activity, transaction independence, service reliability, financial control, access to productive finance, and livelihood outcomes.

Village-level digital-connectivity audits should be undertaken in Scheduled Areas and Integrated Tribal Development Agency regions. The audits should cover availability of mobile networks, reliability of electricity, availability of smartphones, speed of the internet, functionality of biometrics, coverage of banking correspondents and distance to cash-out facilities.

Banking-correspondent availability should be measured through actual service delivery rather than registration alone. Monitoring should include days of operation, cash availability, biometric failure, failed transactions, displayed service charges, complaints, and grievance resolution. The RBI (2026) similarly identifies the strengthening of banking-correspondent operations and their remuneration as important components of equitable last-mile financial inclusion.

Financial-literacy programmes should be delivered through tribal welfare institutions, self-help groups, schools, Gram Sabhas, Common Service Centres, banking correspondents, and trained local youth.

Content should be made available in Telugu and relevant tribal languages through audio, video, pictorial, and demonstration-based formats.

Banks and FinTech providers need to build low-bandwidth applications, voice-assisted navigation, accessible confirmation screens and mechanisms that enable users to verify transactions without intermediaries. Also monitoring systems should be able to distinguish the independent digital use from the transactions assisted by relatives, merchants or banking correspondents.

Tribal financial inclusion should incorporate productive financial services. Responsible use of transaction histories, SHG records, DBT receipts, and livelihood information may improve credit assessment for individuals without conventional collateral or formal credit histories. However, such systems must incorporate informed consent, data minimisation, explainability, privacy protection, human review, and safeguards against automated discrimination.

Official financial-inclusion reporting should provide Scheduled Tribe-disaggregated indicators for active accounts, UPI use, institutional credit, savings, insurance, failed transactions, cyberfraud complaints, and grievance resolution. Without such disaggregation, rapid national growth in digital payments may conceal continuing exclusion within specific geographical and social groups.

7. Conclusion

India has moved decisively from cash-intensive finance towards an integrated digital ecosystem. By June 2026, UPI was processing more than 22.7 billion monthly transactions through 731 participating banks (NPCI, 2026a). PMJDY had extended basic banking access to millions of beneficiaries, while the RBI's indicators showed major improvements in digital payments, village banking outreach, account access, usage, and service quality.

Nevertheless, the transition from cash to code is not complete merely when an account is opened or a payment is digitised. Meaningful inclusion for tribal communities means reliable connectivity, individual control over transactions, digital and financial literacy, affordable credit, appropriate insurance, cyber security, consumer protection and measurable livelihood benefits.

The central policy challenge is therefore no longer limited to connecting tribal households to digital platforms. It is to ensure that households can use those platforms safely, independently, and productively. Digital Public Infrastructure will support sustainable and inclusive development only when technological access is converted into financial capability, economic participation, and household agency.

Declarations

Author Contribution

V. Mallikarjuna Naik conceptualised the study, developed the analytical framework, identified and interpreted the secondary data, and prepared and revised the manuscript.

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Data Availability

The data used in this study are derived from publicly available secondary sources, including government publications, international databases, and official statistical reports cited in the manuscript. These data are available from the respective source organizations and can be accessed through their official websites and publications.

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