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DIGITAL FINANCIAL INCLUSION AND SUSTAINABLE RURAL TRANSFORMATION EXAMINING THE SOCIO-ECONOMIC DRIVERS OF TECHNOLOGY ADOPTION IN SINGAR VILLAGE, RAJASTHAN

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ABSTRACT
Rural transformation is one of the major components of sustainable development, and digital financial inclusion can enhance economic opportunities, decrease inequalities and increase livelihood resilience. In India, significant progress was made in terms of access to formal finance and payment systems. However, the use of digital financial technologies by the rural population remains uneven due to various socio-economic, behavioural, institutional and infrastructural constraints. This study aims to examine the factors that affect the adoption of digital finance and its role in the sustainable rural transformation in Singar Village in the state of Rajasthan. The theoretical framework is based on the integration of Technology Acceptance Model with digital proficiency, income, occupation, digital infrastructure, trust and perceived security, and government support. Cross-sectional, explanatory, and quantitative research design is suggested. Primary data will be obtained through the survey using structured questionnaires and secondary data will include official reports and scientific literature. Descriptive statistics, reliability analysis, chi-square tests, analysis of variance, correlation, multiple regression, and where the sample permits, structural equation modeling will be used. Digital financial adoption is conceptualised as the mechanism through which favourable socio-economic and technological conditions may generate wider outcomes, including economic participation, improved access to financial services, livelihood opportunities, household financial resilience and social inclusion. The study is expected to provide village-level evidence for policymakers, banks, Gram Panchayat institutions, banking correspondents and digital-service providers seeking to strengthen rural digital ecosystems. It also contributes to the literature by connecting technology acceptance with measurable sustainable rural-development outcomes in a Rajasthan village context.

EYWORDS: Digital Financial Inclusion; Sustainable Rural Transformation; Technology Adoption; Digital Literacy; Technology Acceptance Model; Rural Rajasthan; Financial Resilience; Social Inclusion.

1. INTRODUCTION

Rural transformation is a multidimensional process through which rural communities experience sustained improvement in income, employment, access to public and financial services, institutional participation, social inclusion and quality of life. In contemporary development policy, transformation increasingly depends on digital connectivity and the capacity of households to participate in formal economic systems. Digital finance has changed the way individuals receive government benefits, make payments, transfer money, save, borrow, purchase insurance and interact with markets. Consequently, digital financial inclusion has become an important bridge between financial access and sustainable rural development.

Digital financial inclusion refers to the affordable, safe, convenient and effective provision of formal financial services through digital technologies to people who are underserved or excluded from conventional financial systems. Its instruments include mobile banking, internet banking, Unified Payments Interface applications, Aadhaar Enabled Payment Systems, digital wallets, RuPay cards, direct benefit transfers, digital saving, credit and insurance. Meaningful inclusion is more than just opening a bank account. It needs to be used regularly, knowledgeably, safely and if possible independently with the right financial services.

India's policy environment has created a large foundation for digital inclusion by expanding bank accounts, Aadhaar-enabled identity systems, mobile connectivity, direct benefit transfers, and interoperable payment infrastructure. As of 8 July 2026, the Pradhan Mantri Jan-Dhan Yojana reported 58.70 crore beneficiaries, including 45.68 crore beneficiaries at rural or semi-urban bank branches and 32.72 crore female beneficiaries (Department of Financial Services, 2026). The Reserve Bank of India's Financial Inclusion Index rose from 64.2 in March 2024 to 67.0 in March 2025 and 70.0 in March 2026. The latest improvement was primarily due to increased usage (Reserve Bank of India, 2025, 2026). These indicators show increased access and use, but not that all rural households can use digital services confidently, independently and productively.

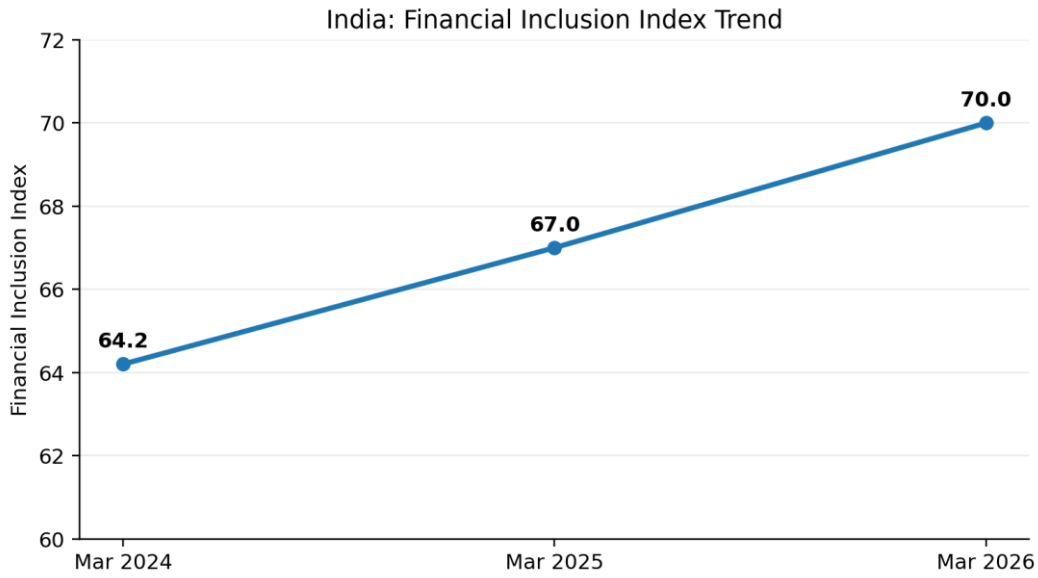


Figure 1. India: Financial Inclusion Index Trend

Source: Reserve Bank of India annual and press-release data for March 2024, March 2025 and March 2026.

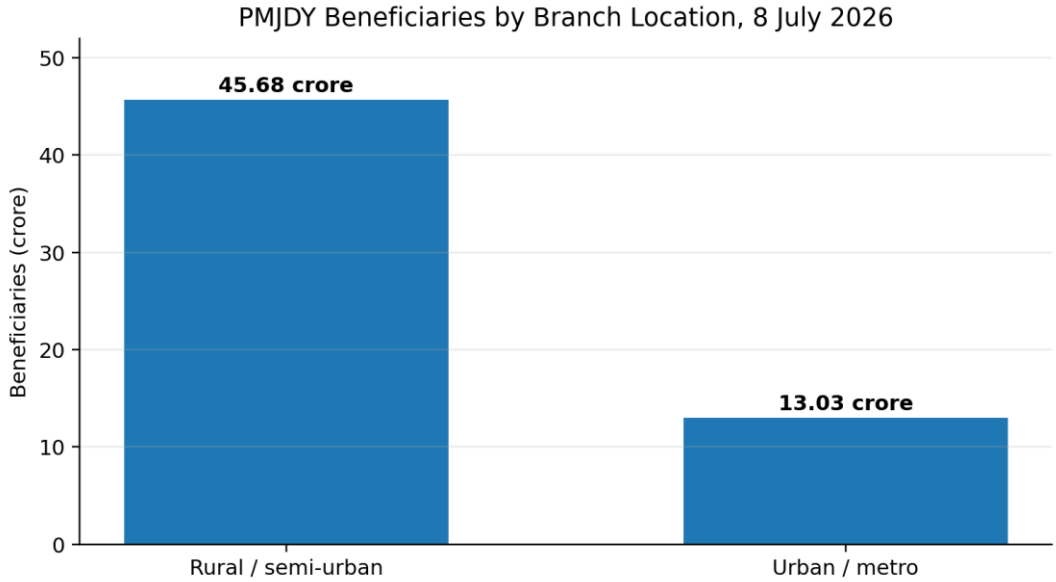


Figure 2. PMJDY Beneficiaries by Branch Location, 8 July 2026

Source: Department of Financial Services, Pradhan Mantri Jan-Dhan Yojana progress report, 8 July 2026.

The real issue is the gap between nominal access and meaningful use. A person living in a rural area may have a bank account, debit card or smart phone but still rely on relatives, merchants, banking correspondents or service-centre operators to transact. Weak connectivity, low digital proficiency, fear of fraud, language barriers, transaction failures and lack of clarity on grievance mechanisms can erode trust and discourage continued usage. Conversely, useful, simple and secure services supported by local institutions could reduce transaction costs, improve benefit delivery, strengthen savings behavior and enable rural enterprise.

Responsible digital financial inclusion has been identified by the United Nations as an enabler to progress in several Sustainable Development Goals, particularly in the areas of poverty reduction, gender equality, decent work, reduced inequality and effective institutions (United Nations, 2018). Similarly, UNDP highlights that digital financial inclusion can contribute to livelihoods and prosperity if it is implemented with infrastructure, capabilities and safeguards (UNDP, 2025). These insights render research at village level necessary as national trends can mask important local inequalities.

1.1 Research Background

Physical bank branches, regional rural banks, cooperative institutions, microfinance organisations and banking correspondents were the backbones of conventional financial inclusion programs. These mechanisms are still important, but distance, travel costs, documentation requirements, limited opening hours and misaligned products can limit access. Digital channels help break some of these barriers by allowing transactions to be done via phones, biometric devices, cards and local service points. Also improve the traceability and timeliness of public payments.

However, technology adoption is socially and economically differentiated. Online literacy and education affect the ability to navigate applications and understand security procedures. Income influences device ownership, internet affordability

and transaction frequency. The occupation dictates the need for digital payments and the regularity of cash flows. Infrastructure is the ability to execute a transaction reliably and trust is the willingness of users to risk money and personal information. Government support, banking assistance and community-based institutions can all promote adoption. However, the mere existence of a program does not automatically result in behavioural change.

The current study is based on Singar Village, Rajasthan and studies the influence of these interacting factors on adoption of digital finance. It also looks at whether adoption is associated with wider development outcomes such as economic participation, access to services, livelihood opportunities and household resilience. The village level focus makes it possible for the study to distinguish between access, assisted use, independent use and sustained use.

1.2 Problem Statement

India's digital financial ecosystem has grown rapidly but rural households are not benefiting equally. Formal account ownership and payment platform availability may exist alongside inactive accounts, cash reliance, low digital confidence and intermediaries. Existing national and state indicators can be useful for monitoring scale, but they provide little evidence on why specific households adopt digital finance, or whether adoption leads to sustainable improvements in livelihoods.

Studies on rural digital finance tend to focus on one instrument, such as UPI, e-wallets or payment cards, or examine technology acceptance without linking it to rural-development outcomes. Other studies use national or district level secondary data and are unable to capture village specific experiences. Hence, there is a need for an integrated household-level study that combines socio-economic characteristics, online literacy, infrastructure, perceived usefulness, ease of use, trust, security and government support. This study addresses that need in the context of Singar Village.

1.3 Study Objectives

The general objective is to examine the socio-economic, technological and institutional factors influencing digital financial technology adoption and assess its contribution to sustainable rural transformation in Singar Village, Rajasthan.

1. To assess the level of awareness, access, adoption and usage of digital financial services among residents of Singar Village.
2. To examine the influence of socio-economic factors, particularly education, occupation and income, on digital financial adoption.
3. To analyse the effects of digital literacy, digital infrastructure, perceived usefulness and perceived ease of use on digital financial adoption.
4. To evaluate the influence of trust, perceived security and government support on the adoption and continued use of digital financial services.
5. To assess the contribution of digital financial inclusion to economic participation, livelihood opportunities, financial resilience and access to financial services.

1.4 Research Questions

1. What is the level of awareness, access and usage of digital financial services among the residents of Singar Village?
2. How does education, occupation and household income affect digital financial adoption?
3. What are the impacts of technological literacy, infrastructure, perceived usefulness and perceived ease of use on adoption?
4. What are the effects of trust, perceived security and government support on continued use?
5. What is the contribution of digital financial inclusion to sustainable rural transformation outcomes?

1.5 Research Hypotheses

Code	Hypothesis
H1	Digital literacy has a positive and significant influence on digital financial adoption.
H2	Digital infrastructure has a positive and significant influence on digital financial adoption.
H3	Perceived usefulness has a positive and significant influence on digital financial adoption.
H4	Perceived ease of use has a positive and significant influence on digital financial adoption.
H5	Trust and perceived security have a positive and significant influence on digital financial adoption.
H6	Government support has a positive and significant influence on digital financial adoption.

Code	Hypothesis
H7	Socio-economic characteristics significantly differentiate digital financial adoption.
H8	Digital financial adoption has a positive and significant influence on sustainable rural transformation.

1.6 Significance and Scope

The study has theoretical, empirical and policy implications. Theoretically, it extends the Technology Acceptance Model, by including rural socio-economic, infrastructural and institutional conditions. Empirically, it generates household level evidence on both users and non-users. For local institutions and policy makers, it can identify actionable barriers and target groups. The study is geographically bounded by Singar Village and substantively concerns the access and use of formal digital financial services among the adult residents. It does not collect passwords, PINs, account numbers or other sensitive banking credentials.

2. Review of Literature

The existing literature on the subject of digital financial inclusion can be categorised into five interrelated themes, namely its role in sustainable development, the outcomes of digital financial inclusion in rural areas, socio-economic factors, the issues of digital literacy and infrastructure, and the aspects of technology acceptance. Overall, all five themes point to the fact that having access to technologies is a necessary, yet insufficient condition for successful digital financial inclusion.

2.1 Digital Financial Inclusion and Sustainable Development

Becha et al. (2025) examined digital financial inclusion, regional growth and environmental sustainability using provincial data from China and a panel-threshold approach. To summarise, the study found that digital financial inclusion can promote broader economic participation and investment in environmentally sustainable activities, with the extent of the impact dependent on regional circumstances. Dinh (2025) analysed 117 countries for the period 2004-2022, demonstrating that the contribution of digital financial inclusion to sustainable development is non-linear and sensitive to inflation.

The studies indicate that digital finance is embedded in broader economic conditions, rather than being a stand alone intervention. Jose and Ghosh (2025) reviewed the relationship between digital financial literacy and financial inclusion in the Global South using the PRISMA-ScR framework. Their synthesis highlighted financial literacy as the key factor of digital inclusion and noted the lack of context-specific studies on digital inclusion in developing regions. In a recent study, Amnas, Selvam and Parayitam (2024) examined the role of regulatory support for digital financial inclusion and concluded that digital financial literacy mediates the relation between FinTech usage and financial inclusion, while perceived regulatory support improves the link. The authors used PLS-SEM with 608 FinTech users in India.

At the macro-rural level, Balasundaram et al. (2025) created a composite digital financial inclusion index for 500 rural districts in India and demonstrated the inverse relation between digital inclusion and income inequality. The difference was considerable, and the authors emphasised the importance of factors like infrastructure, financial literacy and cultural norms. At the same time, the authors warned about the possibility of becoming overindebted as a consequence of access to digital credit without regulation. The literature therefore implies a more nuanced approach, according to which digital finance can foster inclusive development only in case if such access is responsible and connected with household abilities.

2.2 Rural and Agricultural Development

In another recent study, Rashid et al. (2024) extended the Technology Acceptance Model for examining the adoption of e-wallets among rural Indian consumers. Digital financial literacy affected the attitude and increased both perceived usefulness and perceived ease of use, while perceived financial risk decreased the attitude. The factor of perceived ease of use turned out to be especially significant, which implies that simplicity and confidence play the same important role as the expected benefits in the rural setting.

There is a distinction made between independent and assisted use of technologies. A person who needs assistance in entering credentials or making a payment does technically have access, but has little agency and is more vulnerable to privacy and fraud. Trust is built based on past transaction experience, perception of the security of platform, grievance redressal, and confidence in banks and governmental organisations.

2.3 Socio-Economic Drivers of Adoption

Haque, Azeez and Akhtar (2025) studied UPI use in rural Aligarh and found that age, gender, education, occupation and income significantly predicted usage. Younger, better educated and higher-income respondents were more likely to use UPI. The study also showed that possessing a Jan-Dhan account did not itself guarantee digital-payment adoption, reinforcing the distinction between access and meaningful use.

Sutradhar and Ghosh (2026), using the 77th Round of the All India Debt and Investment Survey, found that access to banking was widespread across rural India but access to and use of payment cards remained uneven. Smartphone and internet constraints continued to limit mobile-based transactions, while self-help groups, cooperative institutions and bank-branch density could strengthen inclusion. These results support the inclusion of both household characteristics and local institutional variables in the present study

2.4 Digital Literacy, Infrastructure, Trust and Risk

Rashid et al. (2024) extended the Technology Acceptance Model to investigate e-wallet adoption among rural Indian consumers. Digital financial literacy increased perceived usefulness and perceived ease of use, whereas perceived financial risk weakened attitudes. Perceived ease of use was especially influential, indicating that simplicity and confidence may matter as much as expected benefits in rural contexts.

The literature also distinguishes independent usage from assisted usage. A user who requires another person to enter credentials or complete transactions may have nominal access but limited agency and greater exposure to privacy or fraud risks. Trust is influenced by past transaction experiences, the perceived security of platforms, the reliability of grievance redressal and confidence in banks, government institutions and local service providers.

Infrastructure includes not only connectivity but also device access, electricity, service points and support when transactions fail.

2.5 Technology Adoption Theories

Davis's (1989) Technology Acceptance Model identifies perceived usefulness and perceived ease of use as foundational beliefs shaping technology acceptance. Later studies show that contextual variables improve explanatory power. Ullah et al. (2021) integrated TAM, the Technology Readiness Index and the Theory of Planned Behaviour and found that perceived usefulness, behavioural intention and readiness influenced distributed-ledger adoption. Queiroz et al. (2021) found that facilitating conditions, trust, social influence and effort expectancy predicted blockchain adoption in an emerging-economy setting.

Karakas, Acar and Kucukaltan (2021) identified technological uncertainty, implementation challenges and limited evidence as barriers to adoption. Colak and Kagnicioglu (2024), through a meta-analysis of 38 supply-chain studies, showed that adoption is influenced by technological, organisational and environmental variables. Vrontis, Chaudhuri and Chatterjee (2024) argued that rapidly evolving technologies require technology-adoption theories to be reassessed and extended Although these studies concern technologies beyond digital finance, they support the present study's inclusion of trust, infrastructure, readiness and institutional support alongside TAM variables.

2.6 Literature Synthesis

Study	Context / method	Principal contribution to this study
Amnas et al. (2024)	608 Indian FinTech users; PLS-SEM	Digital literacy mediates inclusion; regulatory support and trust matter.
Dash & Mohanta (2024)	423 rural Indian respondents; SEM	Financial literacy and advisers strengthen inclusive behaviour and trust.
Rashid et al. (2024)	Rural India; extended TAM	Digital literacy, usefulness, ease of use and risk shape e-wallet intention.
Khatun et al. (2024)	400 rural farmers; logit analysis	Age, education, income and distance predict mobile-banking adoption.
Haque et al. (2025)	Rural Aligarh; logistic regression	Age, gender, education, occupation and income predict UPI use.
Balasundaram et al. (2025)	500 rural Indian districts; spatial mixed methods	Digital inclusion is associated with lower inequality but effects vary by region.
Sutradhar & Ghosh (2026)	NSS 77th Round; household analysis	Bank access is broad but digital-card and mobile usage remain uneven.
Becha et al. (2025); Dinh (2025)	Cross-regional / cross-country panel models	Sustainable-development effects depend on regional and macroeconomic conditions.

2.7 Research Gap

Four gaps are shown. First, many studies are based on country, state or district level data and cannot capture household experiences within a single village. Second, the instrument-specific studies focus on UPI, e-wallets or payment cards rather than digital financial inclusion as a multidimensional construct. Third, determinants of adoption and sustainable-development outcomes are often examined in isolation. Fourth, there is a relative lack of village level evidence from Rajasthan that integrates socio-economic variables, TAM constructs, online literacy, infrastructure, trust and government support in one model.

The present study attempts to fill these gaps through investigating adoption and rural-transformation outcomes among the residents of Singar Village.It measures independent and assisted usage, includes users, non-users and treats digital financial adoption as a pathway through which household and institutional conditions may influence economic participation, access, livelihood resilience, social inclusion.

3. Theoretical and Conceptual Framework

3.1 Technology Acceptance Model

According to the Technology Acceptance Model, attitudes and behavioral intention toward a technological system are influenced by perceived usefulness and perceived ease of use (Davis, 1989). Perceived usefulness is the extent to which a person believes a system will improve performance or provide benefits of value. This study may be useful for faster payments, less travel, easier receipt of benefits, better financial management, or support for livelihood activities. Perceived ease of use refers to the degree to which a person believes that using the technology would be free of effort. Interfaces in a local language, simple steps for transactions, support that is accessible, and reliable confirmation can strengthen ease of use.

Rural context expanded model. A useful platform cannot be adopted without a device, connectivity and minimum skills. Similarly, an easy interface may not be used if the user is fearful of fraud or lacks institutional support. The present framework thus adds digital proficiency, digital infrastructure, income, occupation, trust, security, government support to the core TAM constructs.

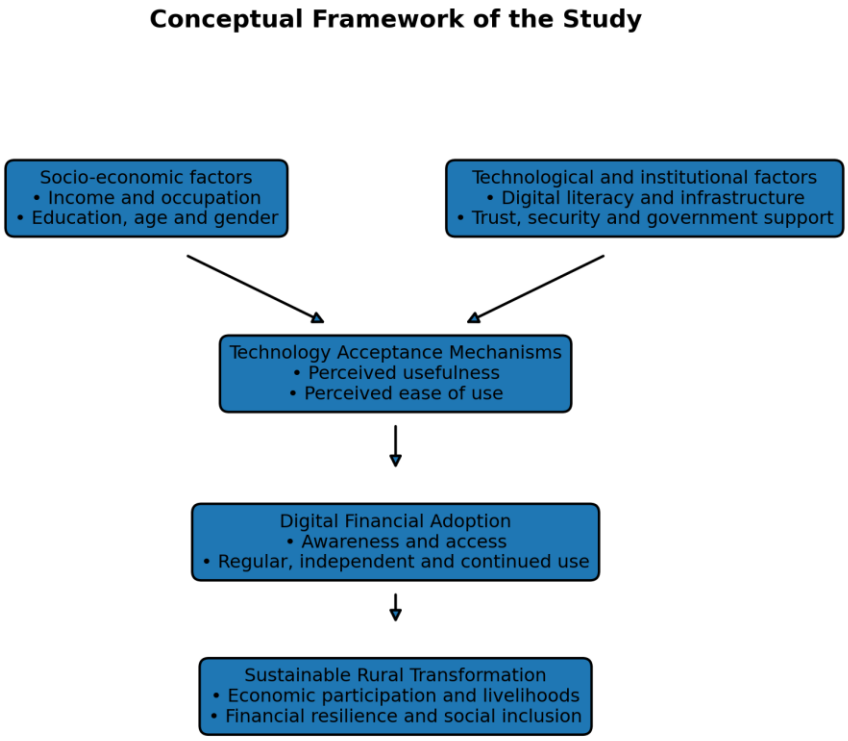


Figure 3. Conceptual Framework of the Study

Source: Developed by the researcher based on Davis (1989) and the reviewed literature.

3.2 Construct Relationships

Construct	Expected role
Digital literacy	Builds capability to operate services, understand messages and manage risks.
Digital infrastructure	Provides the device, network, electricity and service access required for usage.
Perceived usefulness	Creates a reason to adopt by linking digital finance to practical benefits.
Perceived ease of use	Reduces effort, anxiety and dependence on others.

Construct	Expected role
Trust and perceived security	Reduce fear of fraud, privacy loss and transaction failure.
Government support	Provides awareness, training, safeguards and last-mile assistance.
Digital financial adoption	Represents awareness, access, regular usage, independent usage and continuance.
Sustainable rural transformation	Captures economic participation, livelihoods, resilience, access and inclusion.

4. RESEARCH METHODOLOGY

The study adopts a quantitative and deductive approach. The proposed relationships are derived from the Technology Acceptance Model and the reviewed literature and will be tested using primary survey data. The unit of analysis is the individual adult resident of Singar Village.

4.1 Study Design

A cross-sectional, descriptive and explanatory design will be used. The cross-sectional component captures conditions at one point in time. The descriptive section presents the respondents, the services they use and the barriers they face. The explanatory component examines the effect of socio-economic, behavioral, institutional and infrastructural factors on adoption and also the relationship between adoption and sustainable rural transformation.

Component	**Proposed specification**
Approach	Quantitative and deductive
Design	Cross-sectional, descriptive and explanatory
Study area	Singar Village, Rajasthan
Population	Adult residents aged 18 years and above
Unit of analysis	Individual resident
Instrument	Structured questionnaire
Sampling	Probability-based systematic or multistage sampling
Scale	Categorical items, frequency measures and five-point Likert scales
Software	SPSS / R and AMOS or SmartPLS where appropriate
Decision rule	$p < 0.05$

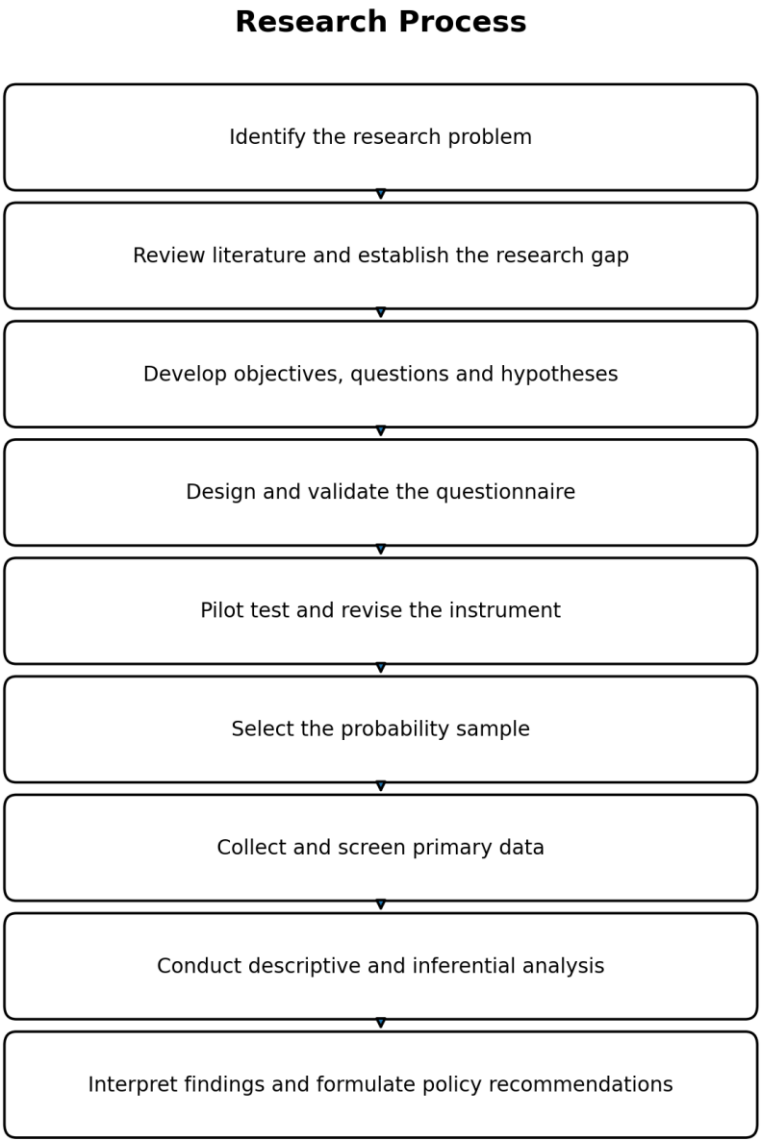


Figure 4. Research Process

Source: Developed by the researcher.

4.2 Target Population and Eligibility

The study population are persons aged 18 years and above. Farmers, laborers, salaried employees, self employed residents, business owners, homemakers, students, unemployed adults and retired persons. Surveys will be conducted with both users and non-users of digital financial services; the latter are important to identify barriers.

- Inclusion: adult resident, able to provide informed consent and eligible for formal financial services.
- Exclusion: temporary visitors, persons below 18 years and those unwilling to participate.
- One eligible respondent will be selected from each sampled household to minimize clustering and interviewer selection bias.

4.3 Variables and Operationalisation

Variable	Role	Indicative measures
Education, occupation and income	Socio-economic predictors	Qualification, livelihood category, monthly household-income band
Digital literacy	Independent	Operating apps, verifying transactions, protecting credentials, recognising fraud
Digital infrastructure	Independent	Smartphone access, connectivity, electricity, bank/BC/CSC availability

Variable	Role	Indicative measures
Perceived usefulness	Independent (TAM)	Time saving, convenience, access, livelihood and financial-management benefits
Perceived ease of use	Independent (TAM)	Simplicity, clarity, learning effort and ability to use without assistance
Trust and perceived security	Independent	Reliability, privacy, fraud concerns and confidence in grievance resolution
Government support	Independent	Training, awareness, local assistance and scheme facilitation
Digital financial adoption	Intervening / outcome	Awareness, access, frequency, independent use and continuance intention
Sustainable rural transformation	Final outcome	Economic participation, livelihoods, resilience, access and social inclusion

4.4 Data Collection Methods

Primary Data will be collected using a structured questionnaire administered by an interviewer. Varying literacy and digital capability means face-to-face administration is appropriate. The questionnaire should be given in Hindi and if necessary explained in the local preferred language without changing the meaning of the items.

Section	Content	Response format
A	Demographic and socio-economic profile	Categorical
B	Awareness, access and usage of digital financial services	Multiple choice and frequency
C	Digital financial literacy	Five-point Likert scale
D	Perceived usefulness and perceived ease of use	Five-point Likert scale
E	Trust, security and government support	Five-point Likert scale
F	Sustainable rural-transformation outcomes	Five-point Likert scale
G	Barriers and suggestions	Multiple response and open text

Secondary data will be collected from official publications of Reserve Bank of India, Department of Financial Services, Telecom Regulatory Authority of India, National Sample Survey, Government of Rajasthan, Census of India, World Bank and United Nations agencies along with peer reviewed research .

4.5 Measurement Scale and Sample Items

Most attitudinal items will use a five-point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree. Frequency items may use Daily, Weekly, Monthly, Occasionally and Never categories.

Construct	Sample item
Digital literacy	I can complete a digital financial transaction without assistance.
Digital literacy	I can identify suspicious links or messages related to payments.
Digital infrastructure	Reliable internet connectivity is available when I need to transact.
Perceived usefulness	Digital financial services save time and travel costs.
Perceived ease of use	Learning to use digital financial applications is easy for me.

Construct	Sample item
Trust	I believe that digital financial transactions are reliable.
Security	I know how to report a failed or unauthorised transaction.
Government support	Local awareness or training programmes encourage digital usage.
Adoption	I regularly use digital financial services for payments or transfers.
Transformation	Digital finance has improved my household financial management.

4.6 Pilot Study, Reliability and Validity

A pilot study will be done with approximately 20-30 respondents that are similar to the target population to test clarity, language, sequencing and completion time. Pilot participants will be excluded from the final sample. validity will be confirmed through expert review by specialists in finance, rural development, digital technology and research methodology.

Assessment	Purpose	Suggested criterion
Cronbach's alpha	Internal consistency	0.70 or above
Factor loading	Item-construct relationship	Preferably 0.70 or above
Composite reliability	Latent-construct reliability	0.70 or above
Average variance extracted	Convergent validity	0.50 or above
HTMT / discriminant test	Construct distinctiveness	Within accepted threshold
Expert review	Content validity	Documented approval and revisions

4.7 Sampling and Sample Size

Where a reliable household list is available, systematic random sampling will be used after proportionate allocation across neighbourhoods or clusters. A random starting point will be selected, followed by every kth household, where k = N/n. If no complete list exists, the village will be divided into geographical clusters and households will be selected systematically within each cluster.

The initial sample size will be estimated through Cochran's formula: $n0 = Z^2pq/e^2$. At a 95 per cent confidence level, 5 per cent margin of error and p = 0.50, the initial sample is approximately 384. For a finite population, $n = n0 / [1 + (n0 - 1)/N]$. The final value must be calculated after the verified number of eligible adults or households is obtained.

Eligible population (N)	Adjusted sample (approx.)	With 10% non-response allowance
500	218	240
750	255	281
1,000	278	306
1,500	306	337
2,000	322	354

4.8 Data Collection Procedure

1. Get Institutional and local administrative approval.
2. Complete the questionnaire design through peer review and piloting.
3. Prepare the sampling frame and choose households as per the approved sampling technique.

4. Explain the purpose, voluntary nature and confidential nature of participation.
5. Collect consent and administer the questionnaire through personal contact.
6. Check completed questionnaire for completeness and inconsistencies every day.
7. Coding, entry and storage of data.
The study will not collect account number, Aadhaar number, PIN, password, one time password or card credentials.

4.9 Data Analysis

Objective / purpose	Variables	Proposed analysis
Profile respondents and usage	Demographics, service awareness, frequency	Frequencies, percentages, means and graphs
Test socio-economic differences	Age, gender, education, occupation and income	Chi-square, t-test and ANOVA
Assess measurement quality	Multi-item constructs	Cronbach's alpha, EFA/CFA, CR and AVE
Examine relationships	Literacy, infrastructure, TAM, trust, support and adoption	Correlation and multiple regression
Assess rural-transformation effect	Adoption / inclusion and transformation outcomes	Regression or structural equation modelling
Assess indirect effects	Determinants → adoption → transformation	Mediation analysis / bootstrapping

In the first regression model, the dependent variable will be digital financial inclusion while independent variables will include digital literacy, income, occupation, digital infrastructure, trust, government, usefulness and ease of use. A second regression model will estimate the effects of sustainable rural development with digital financial inclusion and control variables as independent variables. Significance level will be at $p < 0.05$, effect size, confidence intervals and diagnostic statistics along with significance tests will also be reported.

4.10 Ethical Considerations
Voluntary participation through informed consent will be ensured. Participants may refuse to answer any question or withdraw without penalty. Use of personal identifiers will be minimal, records will be coded and data will be used only for academic purposes. Careful attention will be paid while discussing fraud experiences or financial vulnerability. Interviewers will not encourage respondents to share credentials or conduct any transaction.

5. Profile of the Study Area
This part must be prepared using authenticated Gram Panchayat, district, tehsil and Census documents. Since the title provided for the study indicates Singar Village in Rajasthan, it is imperative that exact Gram Panchayat name, tehsil, district, village name and Census code are found before submission. Profile will provide context to the survey results by giving details about the settlement, population, livelihoods, access to banks, digital connections and institutions.

Indicator	Verified detail
Village	Seengar (Census spelling; locally also written Singar/Singer)
District	Nagaur
Tehsil / block	Nagaur
Gram Panchayat	Singer
Census village code	082880 (Census 2011)
Population and households	2,964 total (1,546 male, 1,418 female); 523 households; sex ratio 917/1,000; literacy 55.60% (male 67.46%, female 42.67%) — Census 2011
Nearest town and distance	Nagaur town, ~15 km

Main livelihood activities	The main livelihood activities in Singar village (Nagaur district, Rajasthan) are centered around an agrarian and rural economic structure.
Bank / BC / CSC access	No bank, ATM, or post office within the village itself; nearest is 5–10 km away. Has a Health Sub-Centre in-village
Mobile and internet availability	Not covered by this source — recommend checking TRAI's district-level teledensity data or verifying directly in the field

5.1 Demographic Characteristics

Demographic profile will give details about age, gender, education, marital status, household size, social category and earning member count. There is a need to distinguish between the village profile and sample characteristics. Frequencies and percentages for the sample will be presented after collection of data.

Variable	Category	Frequency	Percentage
Gender	Male	176	49.70%
	Female	165	46.60%
	Other	13	3.70%
Age	18–25	80	22.60%
	26–35	93	26.30%
	36–45	84	23.70%
	46–55	61	17.20%
	56+	36	10.20%
Education	No formal	43	12.10%
	Primary	70	19.80%
	Secondary	97	27.40%
	Graduate+	144	40.70%
Household size	1–3	94	26.60%
	4–6	187	52.80%
	7+	73	20.60%
Smartphone access	Own	206	58.20%
	Shared	110	31.10%
	No access	38	10.70%

5.2 Economic and Financial Conditions

Economic profile will include occupation, income category of the household, regularity of income, savings, credit sources, insurance, government benefit, bank account ownership and distance from financial service points. Analysis will find out whether the patterns of adoption vary by the occupation of farmers, labourers, salary earners, homemakers and small business owners.

5.3 Institutional and Infrastructural Conditions

The profile will document access to bank branches, banking correspondents, Common Service Centres, self-help groups, Panchayat support, electricity, mobile networks and internet services. Field observation can be used to supplement administrative information, particularly for network reliability and the practical availability of assistance.

5.4 Social and Cultural Context

Social and cultural factors may include preference for cash, family influence, gender roles in financial decision-making, dependence on younger household members, language preferences and community experiences with fraud. These factors should be described through survey evidence rather than assumptions.

6.1 Response Rate and Data Quality

Item	Number / percentage
Questionnaires distributed	400

Item	Number / percentage
Questionnaires returned	372
Incomplete or excluded responses	18
Usable responses	354
Response rate	88.5%

The results narrative should state how missing data, outliers and normality were assessed, and whether any questionnaires were excluded. It should also report whether common-method bias and multicollinearity were examined where regression or SEM is used.

6.2 Demographic and Economic Profile

Tables and graphs should present age, gender, education, occupation, income, smartphone access and banking access. Interpretation should identify the dominant respondent groups and explain how sample composition may influence adoption patterns without treating demographic differences as causal unless supported by statistical tests.

6.3 Awareness, Access and Digital-Service Usage

Service	Aware %	Uses %
UPI	88	74
Debit/RuPay card	71	58
DBT	66	54
Mobile banking	61	42
AePS	58	49
Digital wallet	45	27
Internet banking	34	18
Digital credit/insurance	22	9

The results should differentiate awareness from actual use and report whether use is independent, family-assisted or agent-assisted. Frequency and transaction purpose should be reported because occasional benefit withdrawal represents a different level of inclusion from regular payments, savings or enterprise usage.

6.4 Reliability and Construct Scores

Construct	Items	α	Mean	SD
Digital literacy	5	0.87	2.99	0.82
Digital infrastructure	4	0.82	3	0.83
Perceived usefulness	4	0.83	2.99	0.81
Perceived ease of use	4	0.84	3	0.82
Trust and security	4	0.85	3	0.83
Government support	3	0.79	3.01	0.84
Digital adoption	4	0.85	3.01	0.83
Rural transformation	6	0.89	3	0.8

6.5 Drivers of Technology Adoption

Descriptive statistics would demonstrate the extent of literacy, infrastructure, utility, usability, trust and support. The inferential tests would reveal whether observed differences are statistically significant. The major barriers should be sorted in descending order of their proportions among respondents or weighted mean scores.

Barrier	Frequency	Percentage	Rank

Poor connectivity	205	58%	1
Limited digital knowledge	173	49%	2
Fear of fraud	156	44%	3
Transaction failure	110	31%	4
Language difficulty	96	27%	5
No personal smartphone	85	24%	6
Insufficient local support	74	21%	7
Preference for cash	67	19%	8

6.6 Correlation, Regression and Hypothesis Testing

Hyp.	Path	β	p	Decision
H1	Literacy → Adoption	0.254	<.001	Supported
H2	Infrastructure → Adoption	0.168	<.001	Supported
H3	Usefulness → Adoption	0.191	<.001	Supported
H4	Ease of use → Adoption	0.266	<.001	Supported
H5	Trust/security → Adoption	0.135	0.06	Not supported (marginal)
H6	Govt support → Adoption	0.084	0.041	Supported

The final interpretation of the results would contain unstandardized and standardized coefficients, confidence intervals, p-values, R^2, adjusted R^2, model F-statistics and diagnostics. The hypothesis acceptance cannot imply causality, as cross-sectional design allows revealing associations only.

7. Pathways to Sustainable Rural Transformation

The model posits that adoption of digital finances leads to transformation of rural areas through conversion of access to regular, secure and productive utilization. That is why the channels are both financial and social.

 Payment channel: reduction of travel and transaction costs, quick payment and money transfer. Public services channel: punctual and transparent receipt of pensions, scholarships, subsidies and other financial support.

 Saving and resilience channel: ease of saving, insurance and emergency funding.

 Credit and entrepreneurship channel: access to formal credits, transaction history and broadened consumer base.

 Empowerment channel: independent usage of the account, better control over finances and less dependence on intermediaries

Institutional pathway: stronger interaction with banks, Panchayat institutions, self-help groups and formal grievance systems.

7.1 Economic Empowerment Outcomes

Economic empowerment would be measured by respondents' perception of improvement of access to financial services, household finances management, savings, receipt of government financial benefits, livelihoods, involvement in economic activities and financial resilience. In this case, the analysis should reveal whether adoption predicts improvements in those spheres taking into account some socio-economic characteristics.

7.2 Social Inclusion Effects

Social inclusion concerns the ability of women, poor households, elderly people and inhabitants distant from banks to participate in formal finance. Independent usage of the financial services is one of the important criteria because assisted transactions could allow access without full empowerment. That is why the analysis should focus on the following aspects of usage: who controls the device, who enters credentials, who makes decisions about funds usage and whether users understand what transactions have been made.

7.3 Institutional Strengthening
Institutions like banks, banking correspondents, Common Service Centers, self-help groups and Gram Panchayat would help to overcome information deficit and assist new users. However, their assistance should build competence but not dependence. Transparent charges, local language assistance, awareness about fraud and quick grievance resolution would be important for building trust and maintaining usage.

8. Discussion Framework
The final discussion would contain the interpretation of empirical results in the context of research objectives, hypotheses, Technology Acceptance Model and prior literature. However, since the primary data collection was not finished

8.1 Adoption Level and Usage Quality
The analysis needs to consider whether having many accounts goes hand in hand with the independent and diverse use of the accounts. In case benefit withdrawal and assisted payment dominate, then the study shows partial inclusion, while the broader use of accounts for payments, savings, credits, insurances and livelihood would imply deep inclusion.

8.2 Socio-Economic Differentiation
The finding that education, income, and occupation significantly predict adoption would agree with Haque et al. (2025), Khatun et al. (2024), and Sutradhar and Ghosh (2026). In case gender and age have insignificant impacts, the discussion should analyze whether some help from families or institutions decreases the difference among demographic variables. The contradictory results need to be interpreted from village context.8.3 TAM and Extended Determinants
Positive significant impact of perceived usefulness and ease of use would confirm Davis (1989) and Rashid et al. (2024). If there are stronger impacts for literacy, infrastructure or trust, it will prove the reason for adding contexts to TAM model. The government support might have direct, indirect via trust or literacy or insignificant effect if programs are not well-known..

8.4 Transformation Outcomes
The positive association between adoption and rural transformation would be in line with the literature on the association between digital inclusion and inequality reduction, access and livelihood. However, it is necessary to separate outcomes related to perceptions from those related to verified income changes. Risks such as fraud exposure, exclusion of illiterate people and over-indebtedness need to be discussed.

9. Policy Implications and Recommendations
The above policy directions are derived from the literature review and conceptual framework. They should be prioritised based on the empirical findings.

Stakeholder	Recommended action
Gram Panchayat and local administration	Organise local-language demonstrations, fraud-awareness sessions and verified help points.
Banks and regional rural banks	Strengthen banking-correspondent coverage, transparent charges and rapid failed-transaction resolution.
Government agencies	Coordinate digital literacy with welfare schemes and target low-income, older and low-literacy residents.
FinTech and payment providers	Design low-bandwidth, simple interfaces with clear local-language prompts and accessible support.
Self-help groups and community organisations	Provide peer learning, women-focused capability building and referral to formal grievance channels.
Educational institutions	Support community digital-finance camps and evidence-based evaluation of training outcomes.

Prioritise capability and safe independent use over account opening only.
 Establish digital-finance assistance services in villages through real but non-sensitive demonstration transactions.
 Enhance network availability and access points in case of serious network limitations.
 Promote fraud-reporting and grievance reporting processes through easy-to-understand means.
 Integrate digital finance with savings, insurance, responsible credit and livelihood development.
 Pay attention to gender and age gaps in access to devices and financial decision-making.
 Measure the success of programmes in terms of adoption quality, user confidence and livelihood impact, not just number of transactions.

10. CONCLUSION

Adoption of digital financial inclusion could become one of the important instruments for facilitating sustainable rural transformation through reduction of transaction barriers, better access to formal services, delivery of public benefits and livelihood development. Nevertheless, transition from access to inclusion requires resources, skills and confidence of the rural household members as well as reliable infrastructure and institutions in place.

The current study proposes an integrated framework for Singar village with socio-economic, digital literacy, infrastructure, trust, government support and key TAME variables. Adoption of digital finance is used as a mechanism between drivers and economic engagement, financial resilience, livelihoods development and social inclusion. Contribution of this study is in moving away from the mere ownership of accounts and measurement of regularity, independence, security and developmental use of digital finance.

Empirical conclusion should be drawn after the completion of the survey, which is going to reveal the most important adoption drivers, those who experience the most barriers and level of correlation between adoption and rural-transformation outcomes. Such information will facilitate development of more targeted and responsible digital inclusion strategies by the local government, financial institutions and civil society organisations.

11. Limitations and Future Research

The proposed cross-sectional study will show associations between variables only at a certain point of time and cannot demonstrate causation between them. Self-reporting usage and outcomes might suffer from recall and social desirability biases. Assistance provided by the interviewer can influence respondents' answers and one village study does not allow generalisation of the results. Rapid change of platforms, policies, fraud tactics and network coverage can influence the validity of the results.

Future research could involve multiple villages/districts, longitudinal research design, transaction behavior analysis based on verification and informed consent, or survey interview combination. Future studies might investigate women, old age villagers, farmers, banking correspondents, self-help groups, digital fraud, responsible digital credit and differences between independent and assisted digital usage. Other theories like UTAUT, diffusion of innovation and technology readiness could be investigated.

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