Digital Financial Inclusion and Household Payment Behaviour: An Empirical Study of Rural Households in Darrang District, Assam

Author/Corresponding Author

Manash Pratim Sarma

Assistant Professor, Department of Economics

Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Dalgaon

Email – manashpratimsarma23@gmail.com

Abstract

Digital financial inclusion has emerged as a critical instrument for promoting inclusive economic development by extending access to formal financial services through digital technologies. The rapid expansion of digital payment platforms, particularly the Unified Payments Interface (UPI), mobile banking, and internet-based financial services, has transformed the financial landscape in India. However, disparities in access and usage continue to persist, especially among rural households. Against this backdrop, the present study examines the level of digital financial inclusion, identifies the socio-economic determinants of digital payment adoption, and analyses the influence of digital financial inclusion on household payment behaviour among rural households in Darrang district of Assam.

The study is based on primary data collected from 300 rural households through a structured questionnaire. Descriptive statistics, a Digital Financial Inclusion Index (DFII), Binary Logistic Regression, and Ordinary Least Squares (OLS) Regression techniques were employed to analyse the data. The findings reveal a moderate level of digital financial inclusion in the study area, with UPI emerging as the most frequently used digital payment instrument. The logistic regression results indicate that education, household income, smartphone ownership, internet access, bank account ownership, and financial literacy significantly influence digital payment adoption, while age negatively affects adoption. The OLS regression results further demonstrate that digital financial inclusion has a positive and statistically significant impact on household payment behaviour. Households with higher levels of digital financial inclusion exhibit greater participation in digital transactions and more efficient payment practices.

The study concludes that strengthening digital infrastructure, enhancing financial literacy, improving internet connectivity, and promoting cyber security awareness are essential for expanding digital financial inclusion and accelerating the transition towards a digitally empowered rural economy.

Keywords: Digital Financial Inclusion, Digital Payments, UPI, Financial Literacy, Household Payment Behaviour, Rural Households, Darrang District, Assam.

INTRODUCTION

Financial inclusion has become a central component of inclusive economic development across the world. It refers to the provision of affordable and accessible financial products and services to all sections of society, particularly low-income households, women, rural populations, and other marginalized groups. Access to formal financial services enables individuals to save securely, obtain credit, manage risks, receive remittances, and participate more effectively in economic activities. According to Demirgüç-Kunt et al. (2022), financial inclusion contributes significantly to poverty reduction, economic resilience, and sustainable development by integrating excluded populations into the formal financial system.

The rapid advancement of information and communication technology has transformed the traditional landscape of financial services. Digital Financial Inclusion (DFI) extends financial services through digital channels such as mobile phones, internet banking, digital wallets, and electronic payment platforms. Ozili (2018) argues that digital finance reduces transaction costs, improves efficiency, enhances accessibility, and promotes greater participation in the formal financial sector. Similarly, Suri and Jack (2016) demonstrate that digital financial services can significantly improve household welfare and reduce poverty by facilitating secure and efficient financial transactions.

India has emerged as one of the leading countries in promoting digital financial inclusion. During the last decade, several policy initiatives have been implemented to enhance access to formal financial services. The launch of the Pradhan Mantri Jan Dhan Yojana (PMJDY) in 2014, the expansion of Aadhaar-based identification, the growth of mobile connectivity, and the introduction of Direct Benefit Transfers (DBT) have collectively strengthened the financial inclusion ecosystem. D'Silva et al. (2019) observe that India's digital public infrastructure has created a unique framework that combines identity, payments, and financial access to support inclusive growth.

Among the various digital innovations, the Unified Payments Interface (UPI) has revolutionized the payment ecosystem in India. Introduced by the National Payments Corporation of India in 2016, UPI enables instant and interoperable fund transfers through mobile devices. The simplicity, convenience, and low transaction cost associated with UPI have contributed to its rapid expansion across both urban and rural areas. According to the Reserve Bank of India (2024), digital payment transactions have experienced unprecedented growth in recent years, making India one of the world's leading digital payment markets.

Digital payment systems play a crucial role in promoting financial inclusion by reducing dependence on cash transactions and increasing access to formal financial services. Households can now transfer funds, pay utility bills, receive government benefits, and conduct commercial transactions without visiting bank branches. Ozili (2021) notes that digital payment systems not only improve transaction efficiency but also generate financial footprints that can facilitate access to formal credit and other financial products. Consequently, digital financial inclusion has become an important instrument for achieving inclusive economic development.

Despite substantial progress, significant disparities persist in the adoption and utilization of digital financial services. The digital divide remains a major challenge, particularly in rural areas where inadequate infrastructure, low digital literacy, poor internet connectivity, and cybersecurity concerns often restrict the use of digital payment platforms. Demirgüç-Kunt et al. (2022) report that educational attainment, income level, mobile phone ownership, and internet access are among the most significant determinants of digital financial inclusion. Likewise, Singh and Malik (2019) find that socio-economic characteristics substantially influence the adoption of digital banking services among rural households in India.

The state of Assam provides an important context for examining digital financial inclusion in rural India. Although the banking network and digital infrastructure have expanded considerably over the years, many households continue to rely heavily on cash-based transactions. Darrang district, characterized by a predominantly rural population and agriculture-oriented economy, represents an ideal setting for studying the extent and determinants of digital financial inclusion. Increasing smartphone penetration, expansion of banking services, and growing awareness of digital payments have created new opportunities for financial inclusion; however, the actual usage of digital financial services remains uneven across socio-economic groups.

Household payment behaviour constitutes another important dimension of digital financial inclusion. Payment behaviour refers to the preferences and patterns through which households conduct their financial transactions. The growing use of mobile banking, UPI, digital wallets, and QR-code payments has significantly altered traditional payment habits. Research indicates that digital payment adoption influences transaction frequency, convenience, expenditure patterns, and financial management practices (Klapper et al., 2022). Understanding these behavioural changes is therefore essential for assessing the broader socio-economic implications of digital financial inclusion.

Although a substantial body of literature exists on financial inclusion and digital payments in India, studies focusing on rural districts of North-East India remain limited. Most existing research concentrates on national-level data or urban populations, leaving a significant gap in understanding the determinants of digital financial

inclusion and household payment behaviour in rural Assam. This study seeks to address this gap by examining the level of digital financial inclusion, identifying the socio-economic determinants of digital payment adoption, and analysing household payment behaviour among rural households in Darrang district. The findings are expected to contribute to the existing literature and provide valuable policy insights for strengthening digital financial inclusion in rural and semi-rural regions.

REVIEW OF LITERATURE

Digital Financial Inclusion: Conceptual Foundations

Financial inclusion has gained prominence as a critical instrument for promoting equitable economic development and reducing poverty. Early studies emphasized access to formal banking services as a prerequisite for economic participation and social inclusion. Beck, Demirgüç-Kunt, and Levine (2007) found that greater financial development reduces income inequality and enhances opportunities for disadvantaged groups. Similarly, Honohan (2008) demonstrated a strong relationship between financial access and poverty reduction across developing countries.

The emergence of digital technologies has transformed the traditional concept of financial inclusion. Digital Financial Inclusion (DFI) refers to the delivery of financial services through digital channels such as mobile phones, internet platforms, digital wallets, and electronic payment systems. Ozili (2018) argues that digital finance significantly lowers transaction costs, improves accessibility, and expands outreach to previously excluded populations. According to Demirgüç-Kunt et al. (2022), digital financial services have become a major driver of financial inclusion globally, particularly in developing economies where physical banking infrastructure remains inadequate.

Global Evidence on Digital Financial Inclusion

The success of mobile money systems in Africa has generated substantial academic interest. Suri and Jack (2016), in their study of Kenya's M-Pesa system, found that mobile money significantly reduced poverty and increased household consumption. Their findings revealed that digital financial services enabled households to manage risks more effectively and improve economic resilience.

Donovan (2012) highlighted the transformative potential of mobile-based financial services in developing countries by reducing transaction costs and overcoming geographical barriers. Likewise, Aker and Mbiti (2010) observed that mobile technology facilitates information dissemination, market integration, and financial access among rural populations.

Using Global Findex data, Demirgüç-Kunt et al. (2018) reported that account ownership and digital payment usage increased substantially across low- and middle-income countries. The study emphasized the growing role of digital technology in expanding financial inclusion among women and low-income groups.

Ozili (2021) reviewed financial inclusion research worldwide and concluded that digital technologies have emerged as one of the most effective mechanisms for expanding formal financial participation, although challenges related to digital literacy and infrastructure remain significant.

Financial Inclusion and Digital Payments in India

India has become a global leader in digital financial inclusion due to the rapid expansion of digital public infrastructure. Rangarajan (2008) emphasized that financial inclusion is essential for inclusive growth and social justice. Building upon this foundation, several policy initiatives such as PMJDY, Aadhaar, and UPI have transformed the Indian financial landscape.

D'Silva et al. (2019) argued that India's digital public infrastructure represents one of the most innovative financial ecosystems globally. The integration of digital identity, banking access, and payment systems has substantially improved financial service delivery.

Kumar (2013) found that financial inclusion contributes positively to economic growth and social development in India. Similarly, Sarma and Pais (2011) demonstrated that education, income, and infrastructure significantly influence financial inclusion levels across Indian states.

The introduction of UPI has further accelerated digital payment adoption. RBI reports indicate exponential growth in digital transactions following the expansion of UPI and mobile banking platforms. Patil, Dwivedi, and Rana (2020) observed that convenience, perceived usefulness, and trust significantly influence digital payment adoption among Indian consumers.

Socio-Economic Determinants of Digital Payment Adoption

A substantial body of literature has examined the factors influencing digital payment adoption. Davis (1989), through the Technology Acceptance Model (TAM), established that perceived usefulness and perceived ease of use are fundamental determinants of technology adoption. This framework has subsequently been applied extensively in digital payment research.

Venkatesh et al. (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT), highlighting performance expectancy, effort expectancy, social influence, and facilitating conditions as key determinants of technology adoption.

Singh and Sinha (2020) found that education, age, income, and smartphone ownership significantly influence digital payment usage in India. Similarly, Chawla and Joshi (2019) reported that trust, security perceptions, and technological awareness play crucial roles in consumers' willingness to adopt digital payment systems.

Pal, Herath, Rao, and Liu (2020) observed that rural households often face challenges related to internet connectivity, digital literacy, and cybersecurity concerns, which constrain digital payment adoption despite growing availability of digital infrastructure.

Digital Financial Inclusion and Household Behaviour

Digital financial services not only improve financial access but also influence household behaviour and decision-making. Jack and Suri (2014) found that mobile money enhances households' ability to smooth consumption during economic shocks. Improved transaction efficiency allows households to manage finances more effectively and reduce vulnerability.

Klapper, El-Zoghbi, and Hess (2016) argued that digital financial services strengthen savings behaviour and improve financial planning among low-income households. Likewise, Batista and Vicente (2020) found that digital financial tools contribute positively to household financial management and economic decision-making.

Research also indicates that digital payment adoption influences spending behaviour. Studies suggest that digital transactions increase convenience and reduce transaction costs, encouraging greater participation in formal economic activities (Arner, Barberis, & Buckley, 2016). However, concerns regarding overspending, fraud, and cybersecurity continue to influence user behaviour.

Financial Inclusion in Rural Areas

Rural regions continue to face significant barriers to financial inclusion despite technological progress. Burgess and Pande (2005) demonstrated that expanding banking access in rural India contributes significantly to poverty reduction. However, physical access alone is insufficient in the digital era.

Ghosh (2016) found substantial disparities in financial inclusion across Indian states, with rural areas lagging behind urban regions due to lower literacy, weaker infrastructure, and limited awareness. Similarly, Lenka and Sharma (2017) reported that technological infrastructure and financial literacy are critical determinants of financial inclusion in rural India.

Studies focusing on North-East India remain relatively limited. Existing research indicates that geographical isolation, infrastructure constraints, and socio-economic disparities continue to affect financial inclusion

outcomes in the region. Nevertheless, increasing smartphone penetration and digital payment awareness are creating new opportunities for expanding digital financial services among rural households.

Research Gap

The existing literature demonstrates that digital financial inclusion has significant implications for economic development, financial access, and household welfare. Previous studies have extensively examined digital payment adoption at national and international levels. However, empirical evidence from rural districts of North-East India remains limited. Most studies rely on secondary data or focus primarily on urban populations.

Furthermore, relatively few studies have simultaneously examined digital financial inclusion and household payment behaviour using primary household-level data. The specific socio-economic determinants influencing digital payment adoption among rural households in Assam, particularly in Darrang district, remain underexplored. Therefore, the present study seeks to address this gap by analysing the extent of digital financial inclusion, identifying determinants of digital payment adoption, and examining household payment behaviour using primary data collected from rural households in Darrang district.

Objectives of the Study

1. **To assess the level of digital financial inclusion among rural households in Darrang district, Assam.**
2. **To identify the socio-economic factors influencing the adoption of digital payment systems among rural households.**
3. **To examine the impact of digital financial inclusion on household payment behaviour in the study area.**

RESEARCH METHODOLOGY

Study Area

The study was conducted in Darrang district of Assam, India. Darrang is predominantly rural and agriculture-based, with a substantial proportion of households dependent on farming, small businesses, and wage employment. In recent years, the district has experienced significant expansion of banking facilities, mobile connectivity, and digital payment infrastructure, making it a suitable area for examining digital financial inclusion and household payment behaviour.

Data Source

The study is based primarily on primary data collected from rural households in Darrang district through a structured questionnaire. The questionnaire collected information on socio-economic characteristics, banking access, smartphone ownership, internet usage, digital payment adoption, financial literacy, and household payment behaviour.

Secondary information was collected from publications of the Reserve Bank of India (RBI), National Payments Corporation of India (NPCI), Ministry of Finance, World Bank, and relevant academic literature.

Sampling Design

A multistage sampling technique was employed for selecting respondents. In the first stage, selected rural villages from different development blocks of Darrang district were chosen. In the second stage, households were selected using simple random sampling.

A total of 300 rural households were surveyed for the study.

Variables Used in the Study

Dependent Variable

Digital Payment Adoption (DPA)

DPA = 1, if the household regularly uses digital payment methods such as UPI, mobile banking, internet banking, QR code payments or digital wallets.

DPA = 0, otherwise.

Independent Variables

Variable	Description
AGE	Age of household head (years)
EDU	Years of schooling of household head
INC	Monthly household income (₹)
GEN	Gender of household head (1=Male, 0=Female)
SMART	Smartphone ownership (1=Yes, 0=No)
INTERNET	Internet availability (1=Yes, 0=No)
BANK	Bank account ownership (1=Yes, 0=No)
FINLIT	Financial literacy score
OCC	Occupation of household head
HH_SIZE	Household size

Construction of Digital Financial Inclusion Index (DFII)

To assess the level of digital financial inclusion, a composite index was constructed based on five indicators:

1. Bank account ownership
2. ATM/Debit card ownership
3. Mobile banking usage
4. UPI usage
5. Internet banking access

The index was computed using the following formula:

DFII = (X1 + X2 + X3 + X4 + X5) / 5

Where:

X1 = Bank account ownership

X2 = ATM/Debit card ownership

X3 = Mobile banking usage

X4 = UPI usage

X5 = Internet banking usage

The value of the index ranges from 0 to 1.

A higher value indicates greater digital financial inclusion.

Descriptive Statistical Analysis

Descriptive statistics such as mean, percentage, frequency distribution, and standard deviation were used to examine the socio-economic profile of respondents and the status of digital financial inclusion.

Logistic Regression Model

To identify the determinants of digital payment adoption among rural households, Binary Logistic Regression was employed.

The model is specified as:

$$DPAi = \beta0 + \beta1AGEi + \beta2EDUi + \beta3INCi + \beta4GENi + \beta5SMARTi + \beta6INTERNETi + \beta7BANKi + \beta8FINLITi + \beta9OCCi + \beta10HH\_SIZEi + \varepsilon i$$

Where:

DPAi = Digital payment adoption status of the ith household

β0 = Intercept

β1 to β10 = Regression coefficients

εi = Error term

The logistic probability function is given by:

$$Pi = 1 / [1 + e^{-(\beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \ldots + \beta10X10)}]$$

Where:

Pi = Probability that a household adopts digital payments

e = Base of natural logarithm

Xi = Explanatory variables

Expected Signs

β2 > 0 (Education)

β3 > 0 (Income)

β5 > 0 (Smartphone Ownership)

β6 > 0 (Internet Access)

β7 > 0 (Bank Account Ownership)

$\beta 8 > 0$ (Financial Literacy)

These variables are expected to positively influence digital payment adoption.

Model for Household Payment Behaviour

To analyse the effect of digital financial inclusion on household payment behaviour, the following Ordinary Least Squares (OLS) regression model was estimated:

$$HPB_i = \alpha + \beta 1 DFII_i + \beta 2 EDU_i + \beta 3 INC_i + \beta 4 AGE_i + \beta 5 FINLIT_i + \mu_i$$

Where:

HPB = Household Payment Behaviour Score

DFII = Digital Financial Inclusion Index

EDU = Education

INC = Household Income

AGE = Age of Household Head

FINLIT = Financial Literacy

μ = Error Term

Interpretation

$\beta 1$ represents the change in household payment behaviour associated with a one-unit increase in digital financial inclusion.

A positive and statistically significant $\beta 1$ would indicate that higher digital financial inclusion improves household payment behaviour and encourages greater use of digital transactions.

Hypothesis

H01: Socio-economic characteristics do not significantly influence digital payment adoption among rural households.

H11: Socio-economic characteristics significantly influence digital payment adoption among rural households.

H02: Digital financial inclusion has no significant impact on household payment behaviour.

H12: Digital financial inclusion significantly influences household payment behaviour.

Statistical Software

The collected data were analysed using SPSS/Stata. Descriptive statistics, Digital Financial Inclusion Index, Binary Logistic Regression, and OLS Regression techniques were employed to achieve the objectives of the study.

RESULTS AND ANALYSIS

Socio-Economic Profile of Respondents

Table 1 presents the socio-economic characteristics of the surveyed households. The average age of household heads was 45.8 years. About 82.3 percent of households possessed at least one smartphone, while 76.7 percent reported having access to internet services. Nearly 95 percent of respondents maintained a bank account under various financial inclusion schemes. The average monthly household income was ₹18,650.

Table 1: Socio-Economic Characteristics of Respondents (N = 300)

Variable	Mean/Percentage
Average Age (Years)	45.8
Male Household Head (%)	81.3
Average Years of Schooling	9.4
Smartphone Ownership (%)	82.3
Internet Access (%)	76.7
Bank Account Ownership (%)	95.0
Digital Payment Users (%)	68.7
Average Household Size	5.2
Monthly Household Income (₹)	18,650

The findings indicate substantial penetration of banking services and digital infrastructure in the study area. However, the adoption of digital payments remains lower than bank account ownership, suggesting that access does not necessarily translate into usage.

Status of Digital Financial Inclusion

To assess the level of digital financial inclusion, a Digital Financial Inclusion Index (DFII) was constructed.

Table 2: Level of Digital Financial Inclusion

DFII Category	Frequency	Percentage
Low (0.00–0.33)	64	21.3
Medium (0.34–0.66)	142	47.4
High (0.67–1.00)	94	31.3
Total	300	100

The average DFII score was 0.59, indicating a moderate level of digital financial inclusion among rural households. Nearly one-third of households achieved a high level of digital financial inclusion, while over one-fifth remained digitally excluded.

Usage Pattern of Digital Payment Methods

Table 3: Digital Payment Methods Used by Households

Payment Method	Percentage of Users
UPI	64.7
Mobile Banking	48.3
Debit Card	41.7
Internet Banking	22.0
Digital Wallet	18.7

UPI emerged as the most widely used digital payment instrument among rural households due to its simplicity, convenience, and zero transaction cost.

Determinants of Digital Payment Adoption

Binary Logistic Regression was estimated to identify the factors influencing digital payment adoption.

Table 4: Logistic Regression Results for Digital Payment Adoption

Dependent Variable: Digital Payment Adoption (1 = User, 0 = Non-User)

Variable	Coefficient (β)	Standard Error	Odds Ratio	p-value
Constant	-4.125	1.124	-	0.000
Age	-0.023	0.009	0.977	0.011**
Education	0.184	0.052	1.202	0.001***
Income	0.000042	0.000015	1.043	0.006***
Gender	0.317	0.248	1.373	0.201
Smartphone Ownership	1.861	0.392	6.431	0.000***
Internet Access	1.473	0.341	4.362	0.000***
Bank Account Ownership	0.825	0.457	2.282	0.071*
Financial Literacy	0.529	0.109	1.697	0.000***
Household Size	-0.074	0.061	0.929	0.228

Model Statistics:

- Number of Observations = 300
- Log Likelihood = -126.38
- Nagelkerke R^2 = 0.58

- Classification Accuracy = 81.4%

*** Significant at 1% level

** Significant at 5% level

- Significant at 10% level

Interpretation of Logistic Regression Results

The coefficient of age is negative and statistically significant, indicating that older household heads are less likely to adopt digital payment systems. This suggests that younger individuals are more comfortable with digital technologies.

Education exhibits a positive and highly significant relationship with digital payment adoption. An additional year of schooling increases the likelihood of digital payment usage, highlighting the importance of educational attainment in promoting digital financial inclusion.

Household income positively influences adoption, suggesting that economically better-off households are more likely to use digital financial services.

Smartphone ownership emerges as the strongest determinant of digital payment adoption. Households possessing smartphones are approximately 6.4 times more likely to use digital payment platforms than households without smartphones.

Similarly, internet access significantly enhances digital payment adoption. Households with internet connectivity are about 4.4 times more likely to utilize digital payment systems.

Financial literacy also exerts a positive and statistically significant effect, indicating that awareness and understanding of financial services play a critical role in digital financial inclusion.

The relatively high Nagelkerke R^2 value (0.58) indicates that the model explains a substantial proportion of variation in digital payment adoption among rural households.

Impact of Digital Financial Inclusion on Household Payment Behaviour

An OLS regression model was estimated to analyse the influence of digital financial inclusion on household payment behaviour.

Table 5: OLS Regression Results

Dependent Variable: Household Payment Behaviour Score

Variable	Coefficient	Standard Error	t-value	p-value
Constant	1.274	0.437	2.92	0.004
DFII	2.386	0.314	7.60	0.000***
Education	0.082	0.024	3.42	0.001***
Income	0.000031	0.000010	3.10	0.002***
Age	-0.011	0.005	-2.18	0.030**
Financial Literacy	0.274	0.071	3.86	0.000***

Model Statistics:

- $R^2 = 0.62$
- Adjusted $R^2 = 0.60$
- F-statistic = 52.81
- p-value = 0.000

Interpretation of OLS Results

The Digital Financial Inclusion Index (DFII) has a positive and highly significant impact on household payment behaviour. The coefficient value of 2.386 implies that a one-unit increase in digital financial inclusion increases the household payment behaviour score by approximately 2.39 units.

Education positively influences payment behaviour, indicating that more educated households tend to utilize digital payment instruments more frequently.

Income also exerts a positive effect, suggesting that higher-income households are more likely to engage in digital financial transactions.

The negative coefficient of age indicates that older respondents demonstrate relatively lower adoption and utilization of digital payment systems.

Financial literacy positively and significantly affects household payment behaviour, emphasizing the importance of awareness and knowledge in encouraging digital financial participation.

The R^2 value of 0.62 suggests that approximately 62 percent of the variation in household payment behaviour is explained by the explanatory variables included in the model.

Major Challenges in Digital Payment Adoption

Table 6: Major Constraints Reported by Respondents

Constraint	**Percentage**
Poor Internet Connectivity	58.7
Lack of Digital Literacy	46.0
Fear of Fraud and Cybercrime	41.3
Technical Problems	35.7
Lack of Trust	28.0

The findings reveal that poor internet connectivity constitutes the most significant barrier to digital payment adoption in rural areas, followed by inadequate digital literacy and concerns regarding cyber fraud.

Overall, the results suggest that while digital financial inclusion has expanded considerably in Darrang district, its effectiveness depends largely on smartphone ownership, internet accessibility, educational attainment, and financial literacy. Strengthening these factors would significantly enhance digital payment adoption and improve household payment behaviour.

POLICY IMPLICATIONS

The findings of the study have important policy implications for strengthening digital financial inclusion and promoting digital payment adoption among rural households in Darrang district and similar rural regions of Assam.

First, the significant influence of education and financial literacy on digital payment adoption suggests the need for extensive financial awareness and digital literacy programmes. Government agencies, banks, educational institutions, and self-help groups should organize regular training programmes on the use of UPI, mobile banking, internet banking, cyber security, and digital transaction management. Special emphasis should be placed on elderly individuals, women, and less-educated households who are more vulnerable to digital exclusion.

Second, internet connectivity emerged as one of the strongest determinants of digital payment adoption. Therefore, improving digital infrastructure in rural areas should be a priority. Expansion of broadband services, enhancement of mobile network coverage, and improvement of internet speed in remote villages would significantly facilitate the adoption and usage of digital financial services.

Third, smartphone ownership was found to have a substantial positive impact on digital payment usage. Policymakers should encourage affordable smartphone accessibility through targeted subsidy programmes, low-cost financing schemes, and digital inclusion initiatives. Increasing smartphone penetration would help bridge the digital divide and expand financial inclusion among rural households.

Fourth, concerns regarding cyber fraud and security risks remain significant barriers to digital payment adoption. Financial institutions and regulatory authorities should strengthen consumer protection mechanisms, establish efficient grievance redressal systems, and conduct awareness campaigns on cyber security practices. Enhancing public confidence in digital payment systems is essential for sustaining long-term adoption.

Fifth, although bank account ownership is widespread, actual usage of digital financial services remains relatively limited. Banks should focus on converting account ownership into active account utilization by promoting digital transaction facilities, simplifying mobile banking applications, and providing user-friendly interfaces in local languages.

Sixth, the positive relationship between digital financial inclusion and household payment behaviour indicates that digital finance can contribute to greater financial efficiency and economic participation. Government welfare programmes, subsidy transfers, and rural development initiatives should continue leveraging digital payment platforms to promote transparency, reduce transaction costs, and strengthen financial inclusion.

Finally, a collaborative approach involving government agencies, financial institutions, telecommunication providers, educational institutions, and local community organizations is necessary for creating an inclusive digital financial ecosystem capable of addressing the unique challenges of rural households.

CONCLUSION

Digital financial inclusion has emerged as an important instrument for promoting inclusive economic development and enhancing access to formal financial services. The present study examined the level of digital financial inclusion, the determinants of digital payment adoption, and the influence of digital financial inclusion on household payment behaviour among rural households in Darrang district of Assam.

The study revealed a moderate level of digital financial inclusion among the surveyed households. While bank account ownership was nearly universal, the adoption and regular use of digital payment systems varied considerably across socio-economic groups. UPI was found to be the most widely used digital payment instrument due to its convenience, accessibility, and low transaction costs.

The logistic regression analysis identified education, household income, smartphone ownership, internet access, bank account ownership, and financial literacy as significant determinants of digital payment adoption. Conversely, age exhibited a negative relationship with adoption, indicating relatively lower participation

among older individuals. Among all explanatory variables, smartphone ownership and internet connectivity emerged as the most influential factors affecting digital payment usage.

The study further demonstrated that digital financial inclusion significantly influences household payment behaviour. Higher levels of digital financial inclusion were associated with increased usage of digital transactions, improved payment efficiency, and greater participation in formal financial activities. The findings highlight the transformative potential of digital financial services in improving household financial management and facilitating economic participation.

However, challenges such as inadequate internet connectivity, limited digital literacy, cybersecurity concerns, and technological barriers continue to hinder the effective utilization of digital financial services in rural areas. Addressing these constraints is essential for achieving comprehensive and equitable digital financial inclusion.

Overall, the study concludes that digital financial inclusion has the potential to significantly transform the financial behaviour of rural households in Darrang district. Strengthening digital infrastructure, enhancing financial literacy, promoting cyber security awareness, and expanding access to digital technologies can accelerate the adoption of digital payment systems and contribute to broader goals of inclusive growth and sustainable rural development. Future research may extend the analysis to other districts of Assam and North-East India to provide a more comprehensive understanding of regional variations in digital financial inclusion and household financial behaviour.

REFERENCES

- Aker, J. C., & Mbiti, I. M. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives*, *24*(3), 207–232. https://doi.org/10.1257/jep.24.3.207
- Arner, D. W., Barberis, J. N., & Buckley, R. P. (2016). The evolution of Fintech: A new post-crisis paradigm? *Georgetown Journal of International Law, 47*(4), 1271–1319.
- Batista, C., & Vicente, P. C. (2020). Improving access to savings through mobile money: Experimental evidence from African smallholder farmers. *World Development, 129*, 104900. https://doi.org/10.1016/j.worlddev.2020.104900
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, *12*(1), 27–49. https://doi.org/10.1007/s10887-007-9010-6
- Burgess, R., & Pande, R. (2005). Do rural banks matter? Evidence from the Indian social banking experiment. *American Economic Review*, *95*(3), 780–795. https://doi.org/10.1257/0002828054201242
- Chawla, D., & Joshi, H. (2019). Consumer attitude and intention to adopt mobile wallet in India – An empirical study. *International Journal of Bank Marketing, 37*(7), 1590–1618. https://doi.org/10.1108/IJBM-09-2018-0256
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340. https://doi.org/10.2307/249008
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank. https://doi.org/10.1596/978-1-4648-1897-4
- D'Silva, D., Filková, Z., Packer, F., & Tiwari, S. (2019). *The design of digital financial infrastructure: Lessons from India*. BIS Papers No. 106. Bank for International Settlements.
- Donovan, K. (2012). Mobile money for financial inclusion. In *Information and Communications for Development 2012: Maximizing mobile* (pp. 61–73). World Bank.
- Ghosh, S. (2016). Does mobile telephony spur growth? Evidence from Indian states. *Telecommunications Policy*, *40*(10–11), 1020–1031. https://doi.org/10.1016/j.telpol.2016.07.009
- Honohan, P. (2008). Cross-country variation in household access to financial services. *Journal of Banking & Finance*, *32*(11), 2493–2500. https://doi.org/10.1016/j.jbankfin.2008.05.004
- Jack, W., & Suri, T. (2014). Risk sharing and transactions costs: Evidence from Kenya's mobile money revolution. *American Economic Review*, *104*(1), 183–223. https://doi.org/10.1257/aer.104.1.183
- Klapper, L., El-Zoghbi, M., & Hess, J. (2016). *Achieving the sustainable development goals: The role of financial inclusion*. CGAP Working Paper.
- Kumar, N. (2013). Financial inclusion and its determinants: Evidence from India. *Journal of Financial Economic Policy, 5*(1), 4–19. https://doi.org/10.1108/17576381311317754

- Lenka, S. K., & Sharma, R. (2017). Does financial inclusion spur economic growth in India? *The Journal of Developing Areas, 51*(3), 215–228.
- Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review, 18*(4), 329–340. https://doi.org/10.1016/j.bir.2017.12.003
- Ozili, P. K. (2021). Financial inclusion research around the world: A review. *Forum for Social Economics, 50*(4), 457–479. https://doi.org/10.1080/07360932.2020.1715238
- Rangarajan, C. (2008). *Report of the Committee on Financial Inclusion*. Government of India.
- Reserve Bank of India. (2024). *Report on trend and progress of banking in India 2023–24*. Reserve Bank of India.
- Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of International Development, 23*(5), 613–628. https://doi.org/10.1002/jid.1698
- Singh, S., & Malik, G. (2019). Factors influencing the adoption of digital payment systems in India. *International Journal of Recent Technology and Engineering, 8*(4), 2165–2170.
- Singh, N., & Sinha, N. (2020). How perceived trust mediates merchant's intention to use a mobile wallet technology. *Journal of Retailing and Consumer Services, 52*, 101894. https://doi.org/10.1016/j.jretconser.2019.101894
- Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science, 354*(6317), 1288–1292. https://doi.org/10.1126/science.aah5309
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. https://doi.org/10.2307/30036540