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An Empirical Study on the Impact of Digital Payments on Financial Inclusion in Bihar

Dr. Ashwani Kumar Jha

Ph.D., Commerce and Business Administration

Lalit Narayan

Mithila University, Kameshwaranagar Darbhanga, Bihar, India.

Email - ashwanisir1986@gmail.com

ABSTRACT

The rapid expansion of digital payment systems has significantly transformed the financial ecosystem in India, with important implications for financial inclusion, particularly in economically less developed states like Bihar. The present paper empirically examines the effect of Internet of Thing on financial inclusion in terms of adoption, usage and socio-economic factors in Bihar. Data The paper uses primary data collected through structured questionnaires from selected rural and urban areas and Secondary Data which is taken from report of RBI, NPCI and World Bank. The survey that makes up the index gauges financial inclusion, not simply penetration of bank accounts. The findings of the study imply that use of digital transactions and especially UPI and AEPS enhance both account usage and E-Payment transaction effectiveness. But with hurdles including low digital literacy, poor infrastructure and trust issues in place, full financial inclusion remains a long way away. The reorientation of these policy measures is required to facilitate inclusive DFS development in Bihar.

Keywords: *Digital Payments, Financial Inclusion, Bihar, Digital Literacy.*

I. Introduction

The rapid growth of digital payment systems has brought about a major transformation the financial landscape of India, offering new opportunities to promote financial inclusion, particularly among economically and socially marginalized populations. Despite the evil practices adopted that we feel having taken away the necessity for notes through the digital payment instruments of UPI and mobile wallet and AEPS[1] and debit cards it has lured hold on what proved practical from day to day. In states such as Bihar, where a majority of the population resides in rural areas and relies on traditional informal financial systems mobile based payments are seen to provide a key mechanism for bridging the informal Vs formal divide *(National Payments Corporation of India [NPCI], 2024).*

[1] Abdurahman, M. (2023). *An empirical analysis of electronic payment system (EPS) among banking customers in Kerala* (Doctoral dissertation, Post Graduate and Research Department of Commerce, Mar Thoma College Chungathara).

Financial inclusion is not just about having bank accounts, it means regular usage of the products such as savings, credit, insurance and transferring government benefits. While the state did step in with programme including the Pradhan Mantri Jan Dhan Yojana, most of these accounts are dormant due to challenges like low digital literacy and low internet penetration along with the lack of trust on digital platforms. In light of this, it is important to do a reality-check on contribution of digital payments towards enhancing financial inclusion. In this context, the present empirical study examines how digital payment is being accepted and integrated for promoting financial inclusion activities in Bihar and tries to understand what factors enable or restrict the acceptance of technological innovations. The results may be important to inform policy makers, bankers and digital service providers for broad and sustainable development in financial sector (Balakrishnan., 2015).

1.1 Growth of Digital Payments in Bihar

In recent years, Bihar has witnessed a steady growth in digital payment systems, driven by government initiatives, banking sector expansion, and the increasing penetration of mobile phones and internet services. Many of these were ardent supporters of the 'cashless economy' and with the increasing penetration of services like Unified Payments Interface (UPI), mobile banking apps, Aadhaar Enabled Payment System (AEPS), debit cards, and even mobile wallet, have changed lives for millions in Telangana. Government programs to popularize direct benefit transfers (DBT), digital subsidies and cashless transactions have helped educate people about such transaction modes, especially among rural households, daily wage earners, and welfare beneficiaries *(Reserve Bank of India [RBI], 2024)*. Expansion of bank branches, banking correspondents, and common service centres in rural areas has also facilitated this shift by offering last mile connectivity. From small traders, saving groups, to local service providers- all are embracing digital as a mode for payments to make transactions more efficient and transparent. However, growth is lags are uneven as urban areas have larger adoption rates than rural areas. Digital literacy, low smartphone prices, and networks in rural areas also determine how much it is used. Yet the increasing use of digital payments in Bihar is an important step towards a more inclusive and formal financial environment *(Sharan & Dale, 2019).*

1.2 Financial Inclusion beyond Account Ownership

Financial inclusion is no longer viewed merely as the opening of bank accounts; rather, it emphasizes the effective and continuous use of formal financial services that enhance individuals' economic security and participation in the financial system. In the state of Bihar, a few interventions have been made for opening "JAN-DHAN" type bank accounts but many of these are dormant or under-utilised. This reflects the gap between account ownership and account usage, and true financial inclusion.

Real financial inclusion would be the extent of use of banking, desire to save, access to formal credit and insurance cover, existence of pensions funds, and smooth Government benefit transference in the form direct benefit transfer. Digital payments solutions can help close this gap by acting as a catalyst for account use, driving the curve toward usefulness and value creation, and accumulating digital history that can be leveraged at the back end to introduce credit. But obstacles like low levels of financial literacy and digital skills, unfamiliarity with financial products and lack of trust are preventing broader inclusion. This is why it's important to look beyond ownership of accounts when measuring financial inclusion and identify the promise of digital payments in both empowering people and building financial resilience, as well as promoting economic growth for all in Bihar.

1.3 Challenges and Need for Empirical Assessment

Low Digital Literacy: Poor level of digital literacy is one of the biggest challenges for optimal use of digital financial payment systems in the state. A lot of people especially in rural India have no idea what is smartphone, what are mobile apps and how to do online transactions. Majority of users are observed ignorant even in basic things like, PIN security consideration and navigating inside app or error handling regarding Transaction failure. So generally, people use shop keepers or banking correspondent to do the digital transaction. This reliance limits monetary independence, and opportunity for abuse. And there is potentially missed opportunity for digital payments to support financial inclusion in cases where digital literacy is low.

Inadequate Internet and Infrastructure: The State's digital transaction platforms too are being challenged considering poor internet connectivity and inadequate support systems. Wobbly phones, slow internet and frequent power cuts are par for the course in many rural areas and some semi-urban spots. The time delay of not receiving confirmation and loss of money caused by these technical problems can make the use of electronic payment unpleasantness, non-repetitive. The inability to access smartphones and the cost of data is also a brake for low-income families using it. Digital payment systems are meant to be agile payments, There is also simultaneous use-case of easy-to-use acting as a back-up but infra-structure challenges make it very slow to load and transact. The digital infrastructure must also be developed to ensure equal access to the digital financial services throughout the state.

Trust and Cyber Security Concerns: Phasing · Cesur Trustworthiness problem in the digital payment systems is analogous with the mythic thrust of this function practicable however metered to time of their penetration disappearance. The main concerns for the vast majority of people are scams, fraudulent offers and the prospect of their personal or banking details being stolen. Reports of phasing, scam calls and misinformation have also conspired to exacerbate fears, especially among first-time users or the elderly. Lack of Consumer Protection Along with Grievance Redressal System is another negative factor for not relying on digital platforms. When their transactions go awry, people are not provided with enough information to report problems or to fix them, and stagnate back into cash. "People only use Bitcoin if they feel included. Trust and financial inclusion World Reimagined Trust is the foundation of financial inclusion (Sahay et al., 2025).

Socio-Economic and Regional Disparities: Socio-Economic & Regional Distribution of Digital Payment Utilization in Bihar. A statistically significant socio-economic and regional variation present in the use of digital payments among people of Bihar. Moreover, digital payments are higher in urban settings and well -to-do, rather than rural and slum. Amongst such people, there are mainly women, informal sector workers and other marginalised groups trying to cope with lesser phone ownership, financial autonomy or use of digital technologies. Such inequities, in turn, manifest themselves at levels of disparate financial digital inclusion and who benefits from digital payments.

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Interventions should be in place that take into account gender, income, education and location disparity if digital financial expansion is to be inclusive and equitable.

Need for Empirical Assessment: · While the digitisation of payments for development programmes is gearing up quickly, there is critical need to generate empirical evidence on real impact of such initiatives on financial inclusion in Bihar. Even programs attitude's locations policies study findings. These could be experimental studies (with primary data) which evaluate patterns of drug use, change in behaviour and inclusion impact through the digital payments. Data like this is key for closing the gap between what policymakers may strive to do and how policy gets implemented in actual practice. Evidence-based process can be useful for policymakers and the business (banks or Fintech) in order to develop such digital finance system that is more efficient, inclusive and sustainable (Jaiswal & Singh 2023).

II. Related Reviews

Balakrishnan (2015). analysed different payment systems in use in India and its place vis-à-vis certain developed and emerging economies (including BRICS countries) prevalent across the world. Second, it examined the current state of financial inclusion in India and several DPPs that have been considered to facilitate greater adoption of electronic payment products, while also considering how these measures could foster greater financial inclusion.

Ratne et.al, (2015). emerged as one of the key pillars of inclusive and sustainable development, particularly in economically and socially backward states such as Bihar. The Govt of Bihar, with support from the Government of India (GoI), had introduced several women-oriented programmes during the last two decades to increase female participation in education, employment, enterprise, health, and governance. The paper analysed the position of women in economic and social empowerment in Bihar through government intervention programme including SHG for Jeevika, Mukhyamantri Kanyaa Utthan Yojna, Mahila Samakhya, reservation for Women in Panchayati Raj Institution etc., and Financial Inclusion. Based on secondary data, policy notes, and trend analysis, it identified that the enhanced women's participation had led to increased household income, better social score card and empowered grass-roots governance. The paper concluded by proposing a policy agenda to further support women-led development in Bihar.

Ravi et.al, (2015). recommended that the Government of India should promote financial savings among poor households through innovative product designs tailored to their specific needs. It also recommended inclusion of the indigenous and grassroot based financial institutions such as registered chit funds, postal network in its National Planning Matrix to increase coverage & effectiveness. It also recommended running a pilot on innovative insurance products and scaling up successful ones. It also highlighted promoting technology-led solutions to lower the cost of operations for small-ticket financial instruments and innovate in the management practices of financial institutions to ensure that financial inclusion is sustainable and robust. The paper concluded by stressing that financial literacy education and awareness efforts must be enhanced in order to better equip the consumer to use of financially instruments effectively and protect against dubious intermediaries.

Sinha (2016) viewed as having far-reaching outcomes that could help large sections of the population emerge from conditions of acute poverty. There was an overall agreement that financial inclusion offered formal identity, access to payment systems and deposit insurance, in addition to a full suite of financial services. It was widely known that the ultimate goal of financial inclusion was to extend the coverage of formal financial system with a view to covering lower strata of society. In the backdrop of increasing importance to extend the reach of financial inclusion, article made an endeavour to know as to how bank networks (PSBs and private banks) had helped in mainstreaming unbanked population. The article also attempted to find out the steps initiated by Indian banking system in attaining the goal of financial inclusion with the help of new financial products, bank branch expansion, awareness programmes as well as other related efforts.

Ghosh (2017). investigated the impact of the Mahatma Gandhi National Rural Employment Guarantee Scheme on financial inclusion. the programme's rollout across multiple districts and while controlling for non-random program placement the study found an improvement in financial access was improved by MGNREGS. This result held up in univariate testing and multivariate regression that controlled for multiple district- and household-specific covariates. But then evidence was less guaranteed when financial services usage was analysed, although a differential effect emerged in districts with more women. The predicted magnitudes were in such large scales that public works programmes could potentially have a positive effect on financial inclusion.

Yadav (2017). noted that there had been a rapid growth in mobile technology worldwide and highlighted that, in the Indian context, this growth had provided benefits accruing to both sets of customers and service providers. On the demand-side perspective quite a few policy makers saw mobile technology as a vehicle of financial inclusion for individuals that are not served by bank accounts. On the supply side, it was noted that mobile technology made it possible for banking and regulated financial institutions to provide a variety of services at low prices to a large group of customers, especially the poor and people living in rural areas. The survey explored the determinants of individuals' intention to adopt mobile wallets among Indian consumers. The data were gathered from the sample of 350 respondents selected randomly from the eastern, western, northern, and southern parts of the country through structured questionnaire covering close-ended type as well as open-ended questions that pertain to attitudes toward mobile wallets and behavioural intentions to use them. Simple statistical tool and logistic regression analysis were used for data examination and interpretation with SPSS version 16.0. Six factors were adopted for analysis according to the literature. Findings show that only perceived usefulness was found to determine statistically future intention to adopt/use mobile wallets. Perceived usefulness also had a positive impact on adoption intentions. The model had an 85.1% accuracy in predicting whether or not participants were adopters/users (correctly classified 96.5% of the respondents as adopter/user and 35.4 % as nonadopter/user).

Gupta et.al, (2018). described as an emerging paradigm of inclusive economic growth, which was considered achievable only through appropriate mechanisms that channelized resources from the top to the bottom. Financial inclusion was depicted as something new and exciting, an innovative tool to imbue whole sections of the population with banking habits and a stake in other financial services.

The paper was a conceptual paper and secondary sources including peer reviewed research papers on financial inclusion were drawn upon. Existing literature was analyzed and appraised by using the R-Studio software. The results revealed that financial inclusion was highly related to banking development, empowerment, economic growth, and some other aspects of inclusive development.

Lalremruati et.al, (2018). examine the depth of financial inclusion among food and grocery shop owners in Aizawl, the capital of Mizoram, one of the eight states in North East India. The research aimed to assess the level of financial inclusion among these shopkeepers, analyse their challenges and make recommendations on how best to promote financial inclusion. The survey found that 97.33% of the population were financially included. However, predominant constraints faced by food and grocery shop owners in availing banking services were perceived to be preference for cash-based transaction, low levels of income and assets, absence of financial literacy as commanding reasons followed by attitude of bank personnel, non-availability of bank in the area and complexities involved in opening a bank account. The financial inclusion was low among the Aizawl food and grocery shopkeepers though a higher percentage of them have access to bank account, adequate space to keep their financial record or ambika gruhuday is not only reason sufficed for all related aspects.

Sheikh et.al, (2019) identified as one of the most prominent developments in the finance industry, and it was viewed as being largely dependent on the infrastructure of the telecom sector. Therefore, this study endeavoured to analyse the effects of financial system inclusion on technology expansion in telecom sector for given nine years periods from 2008 to 2017 and vice versa. The progress of telecom technology was gauged by number of mobile subscribers and the expansion in financial inclusion was measured through bank account holders based on data obtained from official websites of Ministry of Communications and CMIE respectively. Johansen Fisher co-integration procedure was used to analyse the long run relationship, and the VECM determined what drives or leads where in the FinTech–TechFin nexus by treating each variable one as dependent and other as independent, alternately. The findings showed a long-run relationship between the two variables in the sample period. It was also observed that technological expansion had a causative effect on financial inclusion in the long run and short term; but also, financial inclusion did have an impact on technology growth only in the long run.

Sharan et.al, (2019). Economic empowerment of women, particularly rural women, was regarded as playing a significant role in alleviating several constraints imposed by tradition and society. The first stage of the inter-temporal and inter-spatial comparison found a strong relation between greater gender equality and increased economic development. The goal of financial inclusion was to provide credit. The Government of India had recognized this and given primacy to financial inclusion and that civil society had been undertaking similar initiatives. The paper analysed a joint venture by Hand in Hand India, the Department for International Development (DFID) and Small Industries Development Bank of India (SIDBI) to strengthen more than 50,000 women in Madhya Pradesh using a multi-strategic approach concentrated on capacity building to enable the effective use of credit support. The financial literacy training packages led to an improvement in women's capabilities on financial planning and fund handling, thus indirectly contributing towards self-identity construction. The focus was integrating gender into all projects to create more value addition. To facilitate women's participation in the change process, there were attempts to include men and key community members as agents of transformation. The empirical evidence provided in the paper shows that the empowerment of rural women made them able to decide for their financial and social betterment.

Kulkarni et.al, (2020) affordable banking services to the bottom of the pyramid, with particular emphasis on rural women in India. It listed abode, gender discrimination, no official papers, financially illiteracy and complicated banking systems and charges and low-income family as the main reasons for low financial inclusion. The research paper also shed light on the other players involved such as financial regulatory mechanism, government's intervention, the role of not-for-profit organisations and community-based self-help groups, microfinance institutions, and collaborative efforts of industry participation through corporate social responsibility (CSR) initiatives. The research also examined the CSR involvement of small and medium enterprises (SMEs) and the extent to which this has facilitated rural Indian women's inclusion into the financial mainstream. The study also examined the impacts on important parameters such as bank accounts opened, deposit growth, KYC simplification norms, engagement of business correspondents and Direct Benefit Transfer (DBT) brought in by Pradhan Mantri Jan Dhan Yojana. The results do show evidence of micro-women entrepreneurs growing, increased skill levels for girls that use SME services, greater level of financial and employment stability as well improved living conditions post-SME participation.

Maji et.al, (2020). observed to have brought the digital economy to the forefront as a key driver of growth and development in the contemporary information age. According to the theory, the digital economy was seen as being supported by spill-over effects that fostered economic growth, brought down non-accelerating inflation rite of unemployment (NAIRU), reconciled short-run trade-offs between inflation and unemployment, assisted in new product innovation and quality improvement, muted business cycles since it helped make full use of capacity at times of shortage, tamed corruption. The move to a digital economy was, however, revealed as being reliant on financial and digital literacy in the knowledge economy. The literature reviewed showed a lack of research that was focused on several roles of financial and digital literacy in the framework of the digital economy. In this context, the paper made a small effort to understand where Indian states stand in terms of DEI infrastructure by building up a DEI Index and looking its movement during 2014-2017. The relationship between sub-components of the DEI Index: Access to and use of digital economy infrastructure, financial literacy, and digital literacy the study also investigated the relationship between these dimensions using Canonical Correlation Analysis (CCA). It was found that Punjab, Kerala, Tamil Nadu, and Karnataka always performed good according to DEI during the study duration and Bihar, Assam, Odisha Uttar Pradesh, and Madhya Pradesh were categorised as having performed poor in all periods. Nonetheless, significant enhancements in DEI were witnessed in Himachal Pradesh, Jammu and Kashmir, Gujarat, and the North Eastern states. Results of CCA indicated that DEI Index and Skill Index, which consists of the two variables financial and digital literacy, are highly correlated. Also, the empirical findings indicated that digital literacy was more important to DEI Index than financial literacy.

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Siddiqui et.al, (2021). identified as a major policy concern for governments worldwide, particularly in developing countries. There have been a number of efforts made by the RBI in this regard, with financial inclusion in India as its main goal, such as increasing the coverage bank-accounts. India has witnessed an explosive growth in the mobile phone, and this was seen as an opportunity to take the banking services at a larger scale across the nation. But the research stressed that opening bank accounts was not enough, as other dimensions which include awareness, ability in using financial services and service use were also discovered to be significant. The analysis touched on a number of dimensions and underscored the pivotal role of the telecom industry in its support for development and metamorphosis of the banking sector. The results revealed that there was a positive and significant relationship between telecommunications development and financial inclusion, as well as vice versa showing the existence of causal relationship among telecommunication and financial inclusion across states with varying levels of development. While the impact of telecom on financial inclusion was relatively stronger, the reverse effect was also found to be significant. Results from the study indicated a necessity for joint and mutual cooperation between telecom services and banking sector. The research also found that collaboration between telecommunications providers and banks could drive financial inclusion and be beneficial for both industries.

Gautam et.al, (2021). found to have introduced a new a model of development for the agricultural sector. To study the consequences of digitization on the farmers in India we analysed the implications of digitalization with secondary data for 2018–2020, supporting it on digitalization framing. The panel analysis was performed to investigate the digitalization transfer toward Indian farmers. The study demonstrated that digitalization significantly enhanced farmers’ income and that the implementation of e-practices had an impact in enhancing agricultural sector and overall economic development.

Chavan et.al, (2022). analysed the prevailing state of financial inclusion in rural India using secondary data sources. It looked at all the four services, as defined by Reserve Bank of India including bank deposits, bank credit, digital and other payment systems and insurance services. According to the National Strategy, financial inclusion was not only about access to and use of formal services but affordability of such services. The study stated that while the penetration of bank deposit in rural India has increased significantly to reach near universal levels, usage of deposit accounts for withdrawals or payments remained low. Bank credit was recognized as the weakest segment of financial inclusion in rural areas and penetration continued to be low for asset-poor rural households and less banked regions. In this case the financial inclusion drive led the banks to grow very fast in geographical areas, especially in under-banked eastern and central regions which were mobilized to collect deposits; however, it was not matched by an extended growth of credit provision in those areas. Among the asset-poor rural households the study found that access was not only a problem but cost of credit was also a big issue, because they relied on micro-finance institutions and self-help groups. Insurance services were additionally poorly accessed by households in rural areas. Insurance penetration, defined as premium payments relative to income, was 3.8 per cent in India in 2019 and even lower at 1.7 per cent in rural areas.

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Pradhan et.al, (2022). assessed the variation of financial inclusion and its determinants across Indian states, categorized by income groups and across regional areas over two distinct periods corresponding to the UPA (2011–2012) and NDA (2018–2019) political regimes. With a CV of the financial inclusion index rising from 0.893 (periods one and two) to 0.910 (between periods two and three). Of the six main geographical regions, southern region was the most financially-included and north-eastern the least in both times. It is noteworthy that both Gujarat (western India) and Jammu–Kashmir exhibited the highest level of improvement in financial inclusion between 2011–2012 and 2018—2019. Results from the Tobit regression model indicated that GSDP per capita, factory count, and the ease of business operations had substantial positive influences in promoting finance inclusion for the year 2011–2012. By 2018–2019 it was in addition found that per capital energy consumption, the extent of national highways and the railway route length represent statistically significant determinants of financial inclusion. This trend may have been prevented by the focus on infrastructure and power sector development in NDA regime, the study said. The results emphasized the role of such policies for advancing financial inclusion, especially in deprived areas.

Jaiswal et.al, (2023). examined factors which drive adoption of UPI at state level in India along with its influence on various digitalization outcomes such as financial inclusion, e-commerce uptake, and development of digital ecosystem. The report detailed how the UPI, a digital transaction system, put venerable systems to rest by knocking at its most heart pulling their rope for the good and developing everyone's access fair on its way letting them share supremo's privileges. We received insights on regional disparities and root obstacles of digital payment systems such as UPI at state level to facilitate extent for DFS. It further suggested government, FIs and businesses policy steps to make UPI popular in state and pan India level for adopting digitalisation for the overall development. The research concluded with the proposal of enlarging network of branches in lower GDP brackets for regional development and after highlighting transaction variations between high-GDP and low-GDP categories. Collectively, this cross-state investigation contributed to understanding the vibrant UPI penetration and digitalization in India provided opportunities to explore the subtle relationship between payment technology, finance, and socio-economic development in one of the world's largest and fastest growing digital payment networks.

Thiruma et.al, (2023). The research paper examined the extent to which financial inclusion efforts in rural India correspond with the United Nations SDGs, focusing particularly on the rural agricultural population and low-income households below the poverty line The paper quantified the extent to which the socioeconomic status of these divergent categories in India would be ameliorated by such bandwagon as well as of financial inclusion initiative role, performance etc., for betterment on livelihood scores: Heterogeneous people in India FIs &rural areas Goal-1, poverty. A key aspect of this trajectory was ECOM's adoption of the JAM model. Jan Dhan–Aadhaar–Mobile (JAM) JAM trinity was projected as a government of India programme with three elements: transfer of money directly into bank account, making people use their bank accounts and prevent misuse; identity number that can be authenticated to receive subsidies entitlements and other benefits in a transparent and portable manner; paying benefits into the destination's account directly at the right place time.

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Dey et.al, (2024). explored the realm of financial inclusion in Bihar, examining its current status and the multifaceted challenges it faced. Not empty numbers, the paper also accounted for income dynamics, employment-patterns and migration flows of Bihar's society and how these have contributed towards its economy. And with the Bihar being one of the most populous states in India, it's economic structure also developed according to that. The study used an embedded design to explore the current financial landscape, policies and socio-economic factors of inclusion. Based in a narrative review of the mixed methods and analytical methodologies, it explored government policies and strategies for economic inequality. And it explored the social and economic impact of greater access to finance - lessons that policy makers, financial service providers and development organisations can draw on. In analyzing financial infrastructure in the Bihar context, this paper aimed to provide policy implications for interventions which could promote inclusive and sustainable economic growth that is relevant and adaptative in nature. A validating study suggested the inclusion of observation to monitor attention and concentration, participation in activities and success with financial inclusion to paint a comprehensive picture of Bihar's fiscal situation. Saina's speculative objective would be to provide lessons learned on the implementation of entered based interventions, and community participation as life realities in addition to measurable output and outcome on expanded financial services access and poverty reduction impact. That would provide policymakers and others with something against which to gauge progress — and the work that remains to be done as markets mature and become more efficient.

Jha et.al, (2024). examined levels of awareness, determinants of awareness, and the effects of actual usage of fintech services on the advancement of financial inclusion initiatives targeting the urban poor in disadvantaged geographic areas. The data was collected among a cross section of 100 population residing in urban slums of Uttarakhand and Partial Least Squares Structural Equation Modelling (PLS-SEM) had applied for analysis. The overall level of awareness was moderate to low-moderate but only for the digital modes of payment it was reported as very high. There were two most powerful predictors of awareness - income and education. Finally, fintech emerged as an enabling technology by which it significantly heightened the vigour with which urban slumdwellers engaged in financial inclusion.

SAHAY et.al, (2025). designed to explore the growing digital gender divide and what it might mean for financial inclusion and empowerment of women in rural India, focusing on state (Bihar) featuring high levels of restrictions on women's use of technology via social norms as well as infrastructural barriers. It explored how MFIs facilitate overcoming the gendered digital divide through improved awareness of digital financial literacy, mobile banking featurization and participation in digitized business by women. Based on a mixed-method design, 720 women respondents were interviewed in the three study districts of Bihar to complement qualitative data with both Data were obtained from both primary and secondary sources from the reports/several publications available 2024 NABARD, JEEViKA 2024 to evaluate MFIs' role in digital empowerment of women. The results showed a strong positive change in digital skills of women, self-efficacy, and economic independence after MFI focused interventions, supported by group learning and peer-mentoring. The multiple regression analysis showed that both digital skills training, MFI membership length and educational level could

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significantly forecast digital adoption ($p < 0.05$). Yet, some recurring obstacles were noticed, such as the low penetration of smartphones among residents, the cultural reluctance, and the lack of knowledge in protection on line. The research ended by asserting that microfinance can play an important role in the promotion of digital inclusion, if it incorporates gender-sensitive technology focused literacy programmes and promotes community-oriented technology integration. It also underscored the importance of concerted policy from MFIs, fintech's and governments to create an enabling environment where rural women can thrive as digitally enabled economic agents.

Ma, T. (2025). Informality had traditionally been viewed as a barrier to financial inclusion. This paper has presented a different view, categorizing informality in terms of labour, living and financial practices, and defining financial inclusion as universal access to and utilization of the entire continuum of formal services. Field evidence from Kolkata indicated that though labour and housing informality constraints broad-based financial inclusion, financial informality which included diverse informal practices acting complementarily to, supplementary to or alternately developmental or illicit in nature to formal practices, had more nuanced implications for FI. The work introduced a typology (substitutive, supplementary, developmental, and illegal) for classification of informal financial practices. Of these, developmental informality, which allowed for a stepping-stone process of transition into formal financial systems, disrupted the conventional understanding that informality was necessarily an obstacle to financial inclusion.

III. Major Findings from Literature Study

Author(s) & Year	Focus of the Study	Methodology / Data Used	Key Findings
Balakrishnan (2015)	Role of payment systems in economic growth and financial inclusion	Comparative review of Indian payment systems vis-à-vis developed & BRICS economies; secondary data	Electronic payments significantly contribute to economic growth and financial inclusion; DPPs enhance adoption and inclusion
Ratne & Kumar (2015)	Women empowerment through financial inclusion in Bihar	Secondary data, policy review, trend analysis	Government programmes (JEEViKA, Kanyaa Utthan, SHGs, PRI reservation) improved income, governance participation, and social empowerment
Ravi & Gakhar (2015)	Financial savings and inclusion among poor households	Policy analysis and conceptual review	Innovative savings products, indigenous institutions, financial literacy, and tech-led solutions are critical for sustainable inclusion
Sinha (2016)	Role of banking system in mainstreaming unbanked population	Descriptive analysis of PSBs & private banks	Bank expansion, financial products and awareness initiatives supported inclusion, but coverage gaps remained

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Ghosh (2017)	Impact of MGNREGS on financial inclusion	Household-level data; univariate & multivariate regression	Public employment programmes positively influence financial access, especially in women-dominant districts
Yadav (2017)	Adoption of mobile wallets in India	Survey (n=350); logistic regression (SPSS)	Perceived usefulness was the strongest determinant of mobile wallet adoption; model accuracy 85.1%
Gupta et al. (2018)	Financial inclusion as a driver of inclusive growth	Conceptual analysis using secondary literature (R-Studio)	Financial inclusion strongly linked with banking development, empowerment and economic growth
Lalremruati & Fanai (2018)	Financial inclusion among shop owners in Mizoram	Primary survey	High bank account access, but low usage due to cash preference, low literacy, and institutional barriers
Sheikh et al. (2019)	FinTech–TechFin relationship	Time-series data; Johansen co-integration & VECM	Telecom expansion drives financial inclusion in short and long run; inclusion affects tech growth long-term
Sharan & Dale (2019)	Women's economic empowerment via financial inclusion	Empirical case study (MP women groups)	Financial literacy and credit access enhanced self-identity, autonomy, and decision-making power
Kulkarni & Hundekar (2020)	Financial inclusion of rural women	Secondary data; CSR & SME analysis	PMJDY, DBT, SHGs and CSR initiatives improved banking access, income stability and living conditions
Maji & Laha (2020)	Digital economy and financial literacy	DEI Index; Canonical Correlation Analysis	Digital literacy more critical than financial literacy; Bihar and UP lagged while southern states performed better
Siddiqui & Siddiqui (2021)	Telecom development and financial inclusion	State-level data analysis	Strong bidirectional relationship between telecom growth and financial inclusion
Gautam et al. (2021)	Digitalization in agriculture	Panel data analysis (2018–2020)	Digital adoption enhanced farmers' income and agricultural productivity
Chavan & Kamra (2022)	Financial inclusion in rural India	Secondary RBI data	Deposit penetration high, but usage, credit access and insurance coverage remained weak

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Pradhan & Sharma (2022)	Regional and political determinants of FI	Financial Inclusion Index; Tobit regression	Infrastructure, energy consumption and ease of business significantly influence inclusion
Jaiswal & Singh (2023)	UPI adoption and digitalization	Inter-state comparative analysis	UPI transformed digital payments; regional inequality persists, requiring targeted policy
Thiruma Valavan (2023)	FI and SDGs in rural India	Conceptual & policy analysis	JAM trinity critical for poverty reduction, subsidy delivery and livelihood enhancement
Dey et al. (2024)	Financial inclusion architecture in Bihar	Narrative review & mixed-method synthesis	Migration, income patterns, and policy design shape Bihar's inclusion outcomes
Jha & Dangwal (2024)	FinTech awareness among urban poor	Survey (n=100); PLS-SEM	Income and education drive fintech awareness; digital payments most widely adopted
Sahay et al. (2025)	Digital gender divide & MFIs in Bihar	Mixed-method study (n=720)	MFIs significantly improved women's digital skills, self-efficacy, and economic independence
Ma (2025)	Informality and financial inclusion	Field evidence from Kolkata	Developmental informality can act as a stepping-stone to formal financial systems

IV. Digital Payments and Financial Inclusion

Digital payment systems in India have experienced rapid growth over the last decade, largely driven by policy support, technological innovation, and increased smartphone penetration. The RBI has also reported a significant increase in infrastructure and usage associated with digital payments, with the Digital Payments Index (RBI-DPI) rising from 377.46[2] in March 2022 to 465.33 by September 2024 indicating high digitization levels within payment systems (Reserve Bank of India [RBI], 2024). This trend also indicates that the penetration of digital transactions is growing in urban as well as in rural pockets. UPI has been the one single biggest growth driver for digital payments. Data from the National Payments Corporation of India (NPCI)[3] show that UPI contributes over 80 percent of the share in digital payment transactions by volume, indicative it is as a significant policy lever for financial inclusion (National Payments Corporation of India [NPCI], 2024). DBT payments linked with digital payments are also believed to have improved transparency and 'cut down fiscal leakages' in the delivery of welfare schemes particularly targeted at the poor (Government of India,

[2] Ghosh, P. Effects of Contactless Payments on Retail Business in New Normal: A Study Based on Kolkata. *Accounting, Management and Economics*, 409.

[3] Cook, W., & Raman, A. (2019). National Payments Corporation of India and the remaking of payments in India. *Consultative Group to Assist the Poor Working Paper*.

2023). Nationwide there has been progress but regional differences remain. Bihar's digital transactions per capita[4] are much lower than the developed states, which is primarily attributed to infrastructural and low-level digital literacy (World Bank, 2022). These alternate sources of data highlight the necessity for a state variation study on digital payments and financial inclusion in Bihar.

V. Significance of the Study

The present study holds significant academic, policy, and practical relevance in the context of India's ongoing digital transformation and efforts toward inclusive economic development. First, it adds to the literature on digital payments and financial inclusion by presenting empirical results from Bihar a region less studied, than many others despite its huge population and developmental problems. The concentration of extreme differences in wealth and lifestyle, along with relatively low consistency between people across all socio-economic classes, makes available-based studies such as the one presented here all the more important for selling into or distributing in these very volatile and dynamic markets. Second, this article is also expected to offer some valuable guidelines for policymakers and agencies in assessing the efficacy of digital payment programs or financial inclusion. Evidence-based viewpoints can illuminate and finesse strategies around digital literacy, infrastructure development, consumer protections – all to make the practical implementation and impact of inclusion measures more effective. Third, banks, fintech firms and financial service providers will benefit from the practical implications of this study by identifying the drivers of digital payment adoption and usage. This information can support these institutions in building user friendly and responsible digital financial products. Lastly, the paper has contributions for social development studies by showing how digital payments can empower marginalised communities through improved access to formal financial services and openness and commercial activity in Bihar.

VI. Scope of the Study

The scope of the present study is confined to examining the impact of digital payment systems on financial inclusion within the state of Bihar. The focus of the study is a sample of rural and urban districts to reveal inter-regional variations in the penetration of digital payment channels for financial inclusion. It is primarily on adults who have bank or credit accounts and might be digital payment system users. Key digital payment forms considered in the research include UPI, mobile wallets, AEPS, debit cards and mobile banking or internet banking. The focus is narrowed down to the possible consequence of rollout of such digital payment instruments on critical indicatives like use of bank account, savings behaviour, access formal credit; participation in insurance and pension scheme and gain through direct benefit transfers. Socioeconomic variables including age, sex, education, income, occupation and place of residence are also explored to determine how the effects differ across population subgroups. The study is grounded on cross-sectional data for a period of time and does not try to report long-term or panel changes. Rather, it focuses on analysis and empirical evidence that can open the black box toward regional rather than national outcomes.

[4] Prakash, J. (2025). Digital Infrastructure Development and Economic Growth Outcomes: Technology-Driven Regional Transformation in Bihar. *ldealistic Journal of Advanced Research in Progressive Spectrums (IJARPS) eISSN–2583-6986*, *4*(11), 82-92.

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VII. Findings, Conclusion and Future Scope

Findings of the Study: The empirical analysis reveals that digital payment systems have made a positive contribution to financial inclusion in Bihar, particularly in terms of increasing the active use of bank accounts. Most of these people said they were doing transactions for regular expenses like money transfers, bill payments or withdrawing government benefits through UPI and AEPS. But while digital payment users had a higher rate of transaction than non-users, they also did so less in comparison to transactions interfaced with the formal banking system. The study has revealed that digitisation is making DBT cheaper and free of corruption. Digital payments have enhanced efficiency and transparency in cash transfers while diminishing reliance on intermediaries, the report says. But access to formal credit or insurance through digital services remains low and appears less deep than wide. Adoption was positively related to digital literacy, owning a smartphone and internet access. There is also a major rural–urban and gender divide, where women and the rural population are more hindered in terms of access, knowledge, and trust. Cyber fraud and mint-and-burn mishaps were cited as the biggest obstacles to its use outside these shores.

Conclusion: The study concludes that digital payments play an important role in advancing financial inclusion in Bihar by promoting regular use of bank accounts and facilitating access to basic financial services. Those of varying socioeconomic status are deriving wildly disparate windfalls, despite policies and technologies that have succeeded in strengthening digital payment infrastructure. Financial inclusion in Bihar is no more about account ownership but is stymied by the lack of infrastructure, low digital proficiency and trust deficit. How can digital payments be harnessed as an effective tool for inclusive growth Effectively leveraging the use of digital payments also require to further strengthen other complimentary initiatives such as awareness building, infrastructure provisioning and consumer protection. Simply put, digital payments may be a necessary, but not sufficient path for the state to take toward financial inclusion.

Future Scope of the Study: The present study opens several avenues for future research. Longitudinal studies can be conducted to assess the long-term impact of digital payments on financial behaviour, savings, and credit access. Follow-up with district or community studies in future research that can help capture these variations at a micro level of adoption and inclusion. There is also scope for benchmarking the best practices and policy influence through similar studies between Bihar and other states. Finally, future work could also examine the potential impact of technological advances such as digital lending platforms, fintech innovations and artificial intelligence on financial inclusion. For example, interviewing users and analysing case studies would help contribute an understanding of end users' experiences on trust relatedness as well as its evolving behaviours in adopting digital payment.

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