

Original Research Paper

Effects of Digital Payment Usage on Financial Performance of Small Retail Businesses in Bangladesh

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Abstract: This study investigates how digital payment adoption and usage intensity influence the financial performance of small retail enterprises in Bangladesh through an integrated Technology Acceptance Model and Resource-Based View framework. A sequential mixed-method design was employed, beginning with twenty-four qualitative interviews followed by a large-scale survey of 879 retailers across Dhaka, Chattogram, and Rajshahi. Analysis using partial least squares structural equation modeling revealed that perceived usefulness ($\beta = 0.31$, $p < 0.001$), trust ($\beta = 0.28$, $p < 0.001$), and perceived ease of use ($\beta = 0.22$, $p < 0.001$) significantly influence usage intensity, which in turn strongly predicts financial performance ($\beta = 0.37$, $p < 0.001$). Information and communication technology readiness exhibits both direct effects on financial performance ($\beta = 0.19$, $p < 0.001$) and moderating effects that amplify the usage-performance relationship. Agent network density significantly influences usage intensity ($\beta = 0.17$, $p < 0.001$). The model explains 46% of the variance in usage intensity and 39% of the variance in financial performance. The findings demonstrate that digital payment systems generate meaningful financial improvements only when merchants use them intensively and possess adequate organizational capabilities.

Keywords: Digital Payment Adoption; Financial Performance; Small Retail; Technology Acceptance Model; Resource-Based View; Bangladesh.

Introduction

Digital payment systems have fundamentally restructured commercial operations across global retail landscapes, fundamentally redefining how small merchants manage financial transactions, control operational liquidity, and engage with increasingly technology-oriented customer bases. Mobile wallet applications, quick response code-based interfaces, point-of-sale terminals, and bank-led electronic payment infrastructures now provide small retailers with capabilities that were historically accessible only to large corporations with substantial financial and technological resources. According to the World Bank (2022), emerging markets have witnessed unprecedented growth in digital payment adoption, with mobile money accounts exceeding one billion globally and transaction values growing at annual rates exceeding twenty percent in several South Asian economies. The GSMA (2023) further documented that small merchants increasingly represent the fastest-growing segment of digital payment users, as they recognize the potential for these tools to expand customer reach, reduce cash handling risks, and improve financial record keeping. Bangladesh represents one of South Asia's fastest-growing digital payment markets, driven by rapid expansion of mobile financial services, nationwide quick response code deployment, and government initiatives promoting cashless retail ecosystems, with nearly ninety percent of enterprises classified as small retail businesses (Bangladesh Bank, 2023).



Despite the remarkable proliferation of digital payment infrastructure and the apparent benefits these systems promise, a fundamental tension exists between technological availability and realized business value that remains inadequately understood in emerging market contexts. The efficiency gains, cost reductions, and revenue enhancements that digital payments theoretically enable do not materialize uniformly across all adopting firms, and in many cases, small retailers continue to rely predominantly on cash transactions despite having access to digital payment tools. This paradox raises critical questions about the conditions under which digital payment adoption translates into meaningful financial performance improvements. While technology providers and policymakers enthusiastically promote adoption as an end in itself, accumulating evidence suggests that adoption without sustained usage intensity may yield minimal business benefits. Merchants frequently report concerns about transaction reliability, settlement delays, customer readiness, and network failures that undermine their confidence in digital systems and limit their willingness to rely on these tools for core business operations. Studies from India, Indonesia, Vietnam, and Sub-Saharan Africa demonstrate that financial benefits vary substantially based on digital literacy, device capacity, agent-network coverage, and ecosystem reliability (Choi & Rho, 2020; Kiplagat & Waweru, 2022). These conditions are particularly relevant in Bangladesh, where digital infrastructure remains uneven across urban and rural areas, and small retailers often face knowledge, trust, and network accessibility barriers that limit effective usage (Sultana & Mahmud, 2023; Islam et al., 2024).

Previous research examining digital payment adoption among small businesses has predominantly focused on identifying determinants of adoption intentions using theoretical frameworks such as the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology. While these studies have generated valuable insights into the psychological and social factors that influence merchants' decisions to begin using digital payments, they have largely overlooked the crucial question of how adoption translates into performance outcomes. Studies by Rahman and Akter (2022) and Islam et al. (2024) examined fintech diffusion patterns in Bangladesh but concentrated primarily on consumer adoption behaviors rather than merchant-level financial impacts. Research from India, Indonesia, and Vietnam has documented positive associations between digital payment usage and business performance, yet these studies typically measured adoption dichotomously and failed to account for usage intensity variations that may explain differential outcomes. The resource-based conditions that enable some firms to extract greater value from digital technologies than others have received even less attention, despite theoretical arguments suggesting that complementary capabilities such as digital skills, device availability, and network access critically moderate technology-performance relationships. Three critical research gaps therefore remain unaddressed in the context of Bangladesh: first, the lack of large-sample, theory-driven empirical studies linking digital payment usage, not merely adoption, to quantifiable financial performance outcomes; second, limited understanding of usage intensity as the mechanism through which adoption creates value; and third, minimal exploration of contextual resource conditions such as information and communication technology readiness and agent network density that may strengthen or weaken the usage-performance relationship.

This investigation addresses these critical gaps by developing and empirically testing an integrated theoretical framework that combines the Technology Acceptance Model's behavioral adoption perspective with the Resource-Based View's capability-oriented explanation of performance heterogeneity. The study moves beyond simple adoption metrics to conceptualize usage intensity as the central mechanism through which digital payments influence financial outcomes, capturing the frequency, breadth, and functional integration of digital transactions in merchants' daily operations. Information and communication technology readiness and agent network density are incorporated as both direct predictors and moderating conditions that shape the strength of usage-performance relationships. A sequential mixed-method design combining twenty-four qualitative interviews with a large-scale survey of eight hundred seventy-nine retailers provides comprehensive evidence for the proposed framework while ensuring contextual relevance through local merchant input. By simultaneously modeling behavioral determinants, usage behavior, resource conditions, and financial outcomes within a unified structure, this research offers one of the most comprehensive assessments to date of the mechanisms through which digital payment systems generate financial value in emerging market retail environments.

Literature Review

Digital Payment Systems and Small Retail Transformation

Digital payment systems have fundamentally transformed commercial transactions across emerging economies, providing small retailers with unprecedented capabilities for managing customer payments, maintaining financial records, and engaging with increasingly technology-oriented consumer populations. Mobile wallet applications, quick response code-based interfaces, point-of-sale devices, and bank-led electronic payment platforms offer advantages that extend far beyond simple transaction processing, including reduced cash handling risks, shortened settlement cycles, automated

record generation, and enhanced financial transparency. These benefits hold particular significance for micro and small retailers who traditionally operate without formal bookkeeping systems and face substantial risks associated with cash management, including theft, counterfeit currency, and human error in manual record keeping.

Suri and Jack (2016), in a long-run study of Kenya's M-PESA system published in *Science*, demonstrated that expanded access to mobile money lifted an estimated two percent of Kenyan households out of extreme poverty and facilitated shifts in occupational choice, underscoring the transformative economic potential of digital payment infrastructure in emerging markets.

Jack and Suri (2014) established that mobile money substantially lowers the transaction costs of transferring funds, enabling households and small enterprises to smooth consumption and share risk more effectively when confronted with economic shocks, a cost-reduction mechanism that is equally relevant to merchants managing daily liquidity.

Beck et al. (2018) showed that the availability of efficient electronic payment instruments expands access to trade credit and supports enterprise development, linking the quality of a country's payment system to firm-level financial outcomes in developing economies.

Ahmed and Chowdhury (2020) documented that Bangladeshi small retailers adopting mobile financial services reported significant improvements in transaction speed and accuracy, reducing the friction that characterizes cash-based exchanges.

Das and Nair (2021) demonstrated that electronic payment adoption among Indian micro-enterprises correlated with reduced administrative burdens and improved liquidity management, allowing owners to devote greater attention to core trading activities.

Karim et al. (2022) confirmed that digital payment tools enable small traders to serve customers more efficiently and maintain better control over daily cash flows, although the extent to which these operational improvements translate into measurable financial performance gains remains contingent upon multiple contextual factors that vary substantially across firms and environments.

Adeoye's (2024) investigation of Nigerian micro-enterprises revealed that digital payment benefits depend critically on merchants' digital literacy levels, device quality, and access to reliable network infrastructure, suggesting that technology availability alone proves insufficient for value creation.

Digital Payment Adoption and Technology Acceptance Model Determinants

The Technology Acceptance Model, originally developed by Davis (1989), has maintained its position as one of the most extensively validated frameworks for explaining technology adoption behaviors across diverse organizational contexts and user populations. Its core proposition that perceived usefulness and perceived ease of use jointly determine users' intentions to adopt and subsequently utilize technological systems has received substantial empirical support in studies examining small and medium enterprise technology adoption.

Venkatesh et al. (2003) integrated eight competing models into the Unified Theory of Acceptance and Use of Technology, identifying performance expectancy, effort expectancy, social influence, and facilitating conditions as core determinants of technology use, constructs that closely parallel the usefulness, ease-of-use, and trust dimensions emphasized in subsequent payment-adoption research.

Dahlberg et al. (2008), in an influential review of mobile payment research, identified consumer perceptions, technological characteristics, and environmental conditions as the principal forces shaping payment-technology acceptance, providing an early organizing framework that continues to guide adoption studies.

Premkumar and Bhattacharjee (2020) demonstrated that perceived usefulness and perceived ease of use strongly predict small retailers' decisions to implement digital payment systems, with usefulness perceptions exerting particularly strong influence in contexts where merchants face competitive pressures to improve customer service.

Roy and Sarker (2021) confirmed that Bangladeshi small business owners who perceived mobile financial services as useful for increasing sales opportunities and reducing transaction processing times exhibited significantly higher adoption rates than those with weaker usefulness perceptions.

Lin et al. (2023) extended these findings by showing that ease of use becomes especially critical in emerging market contexts where digital literacy varies widely across merchant populations, as user-friendly interfaces reduce learning barriers and encourage sustained engagement.

Zhang et al. (2024) reinforced this conclusion through a multi-country study demonstrating that interface simplicity moderates the relationship between adoption intentions and actual usage behavior among small retailers with limited prior technology experience.

Türker et al. (2022) extended the Technology Acceptance Model to quick response code mobile payments in Turkey and found that perceived usefulness and perceived ease of use, augmented by perceived security and compatibility, jointly shaped users' acceptance of code-based payment systems, a configuration directly relevant to merchants whose customers increasingly rely on scan-to-pay interfaces.

Trust has emerged in recent literature as a third critical determinant of digital payment adoption that complements the Technology Acceptance Model's original constructs, particularly in contexts where merchants face substantial concerns about transaction security, system reliability, and dispute resolution mechanisms.

Amin et al. (2020) established that trust in technology providers significantly influences small retailers' willingness to integrate digital payments into core business operations, as perceived risks of fraud or transaction failure can overwhelm usefulness considerations.

Hasan and Karim (2022) documented that Bangladeshi merchants' trust in mobile financial service providers directly affects both initial adoption decisions and continued usage patterns, with trust erosion leading to reduced transaction volumes and increased cash preference.

Islam et al. (2024) reinforced these findings by showing that trust in digital payment infrastructure moderates the relationship between perceived usefulness and actual usage, such that even merchants who recognize potential benefits may limit their digital engagement if confidence in system security remains low.

Osei and Addo's (2021) study of Ghanaian small enterprises confirmed that trust considerations assume heightened importance in environments where regulatory protections for digital transactions remain underdeveloped and where merchants have personally experienced or witnessed payment failures.

Saha et al. (2022), examining first-time mobile payment users in Bangladesh, found that initial trust was shaped by perceived ubiquity, perceived security, and perceived ease of use, and that this initial trust significantly strengthened both perceived usefulness and the intention to use mobile payments, highlighting trust as an antecedent that operates from the earliest stage of the adoption process.

Usage Intensity as a Predictor of Business Performance

Recent scholarship has increasingly emphasized that the financial benefits associated with digital payment adoption depend not merely on whether merchants use these systems but fundamentally on how intensively, frequently, and comprehensively they integrate digital transactions into their business operations.

Mukherjee and Paul (2023) argued that conceptualizing digital payment behavior through usage intensity rather than binary adoption metrics provides substantially greater explanatory power for understanding performance variations across firms, with usage intensity encompassing transaction frequency, the proportion of total sales processed digitally, and the functional breadth of digital payment applications spanning customer transactions, supplier settlements, and administrative functions.

Imran and Hossain (2024) demonstrated that Bangladeshi small retailers exhibiting high usage intensity reported significantly stronger improvements in cash flow visibility and operational efficiency compared to those using digital payments only occasionally for specific transaction types.

Choi and Rho's (2020) investigation of Indonesian small enterprises revealed that digital payment frequency moderates the relationship between adoption and performance outcomes, with merchants processing more than ten digital transactions daily showing substantially greater sales growth than those processing fewer than five daily digital transactions.

Nababan and Putri (2021) confirmed that the share of digitally processed sales, rather than absolute transaction counts, more strongly predicts improvements in working capital cycles and inventory turnover among micro-retailers.

The mechanisms through which usage intensity generates financial performance improvements operate through multiple complementary pathways that reinforce each other as digital payment integration deepens. Frequent digital transactions generate more comprehensive and accurate financial records than occasional usage, enabling merchants to track sales patterns, identify peak trading periods, and make better-informed inventory decisions. Automated record generation reduces the administrative burden associated with manual bookkeeping, while reduced cash handling minimizes theft risks, eliminates losses from counterfeit currency, and lowers the time and transportation costs associated with bank deposits. Widespread digital payment acceptance can also enhance customer satisfaction, encourage repeat visits, and attract new customers who prefer cashless payment options.

Sultana and Mahmud (2023) documented that, despite rising digital payment adoption in Bangladesh, many retailers remain low-frequency users due to limited customer digital readiness, inconsistent network reliability, and perceptions of excessive transaction fees, suggesting that barriers to usage intensity may constrain the realization of potential performance benefits.

Resource-Based View and Digital Capability Conditions

The Resource-Based View, originally articulated by Barney (1991), provides a complementary theoretical lens that addresses the Technology Acceptance Model's limitations in explaining why firms with similar adoption patterns experience divergent performance outcomes. According to Resource-Based View logic, technological tools themselves do not generate competitive advantages; rather, value emerges when firms possess complementary resources and capabilities that enable them to deploy technologies more effectively than competitors. In the context of digital payment systems, complementary resources include information and communication technology readiness, encompassing device availability, internet connectivity reliability, and merchant digital skills, as well as external infrastructure conditions such as agent network density.

Obeng and Boateng (2022) argued that applying Resource-Based View principles to digital technology adoption contexts requires careful specification of the capabilities most likely to enhance technology value creation, positioning information and communication technology readiness as an internal capability dimension and agent network access as an external resource condition.

Joensuu-Salo and Matalamäki (2023), drawing on the resource-based view and its dynamic capabilities extension, demonstrated across Finnish small and medium enterprises that digital capability is positively associated with both firm performance and firm growth, while smaller firms possess weaker digital capability, reinforcing the proposition that complementary digital resources condition the value a firm extracts from technology.

Information and communication technology readiness has emerged as a critical capability factor in studies examining small enterprise digital transformation across multiple emerging markets.

Adeoye (2024) demonstrated that Nigerian micro-enterprises with higher levels of device quality, internet reliability, and proprietor digital skills extracted substantially greater performance benefits from mobile payment adoption than comparable firms with weaker information and communication technology readiness.

Islam et al. (2024) confirmed that Bangladeshi retailers possessing smartphones with adequate processing capabilities and reliable internet connections exhibited significantly higher digital payment usage intensity and reported stronger financial improvements than those operating with basic devices and intermittent connectivity, supporting the Resource-Based View proposition that internal capabilities moderate the relationship between technology access and performance outcomes.

Agent network density represents an external resource condition that critically influences merchants' ability and willingness to rely on digital payments for substantial portions of their business transactions, since agents provide the cash-in and cash-out points through which digital balances are converted to physical currency.

Bhuiyan et al. (2022) documented that Bangladeshi small retailers' perceptions of agent availability significantly affect their digital payment usage patterns, with merchants located in areas served by multiple accessible agents reporting higher transaction frequencies and greater confidence in digital systems.

Osei and Addo (2021) confirmed that agent proximity and reliability moderate the relationship between adoption intentions and actual usage behavior among Ghanaian small enterprises, as merchants who can easily convert digital balances to cash and resolve transaction issues through nearby agents exhibit stronger usage persistence.

Chong and Lee (2019) demonstrated that agent network density influences not only transaction volumes but also the functional breadth of digital payment usage, with merchants in well-served areas more likely to use digital payments for supplier settlements and other business-to-business transactions requiring cash conversion.

Konte and Tetteh (2023), analyzing firm-level data from fourteen sub-Saharan African countries, found that mobile money use alone exerted no robust direct effect on labour productivity, but that its combination with traditional financial services significantly enhanced productivity, illustrating that digital payment tools generate value primarily in the presence of complementary financial and organizational capabilities.

Financial Performance Outcomes of Digital Payment Usage

Empirical evidence regarding the relationship between digital payment usage and small enterprise financial performance has accumulated rapidly across developing economies, with studies reporting generally positive but context-dependent findings that underscore the importance of moderating conditions.

Nababan and Putri (2021) demonstrated that Indonesian micro-retailers adopting digital payments experienced average sales growth of approximately fifteen percent over twelve months, with effects concentrated among firms that achieved digital sales shares exceeding thirty percent of total revenue.

Kiplagat and Waweru (2022) documented that Kenyan small enterprises using mobile money for both customer transactions and supplier payments reported significantly improved working capital cycles and reduced cash flow volatility compared to cash-dependent competitors.

Li and Sun (2021) confirmed that Chinese small retailers integrating digital payments with inventory management systems achieved inventory turnover improvements averaging twenty-three percent, as real-time sales data enabled more responsive restocking decisions.

Lee and Huang's (2019) investigation of Taiwanese small enterprises revealed that digital payment adoption correlated with reduced cash holding costs and lower losses from theft or employee misappropriation, generating average annual savings equivalent to approximately four percent of revenue.

Islam et al. (2018), drawing on Enterprise Survey data from Kenya, Uganda, and Tanzania, found that mobile money use increased firms' investment in fixed assets, with effects most pronounced among smaller and women-owned enterprises, suggesting that payment-system access can relax the financing constraints that limit resource-poor firms.

Not all evidence points uniformly to positive effects, however. Tiwasing et al. (2024), using propensity score matching on a sample of Kenyan businesses, reported that mobile money users were more likely to be product and process innovators than non-users, yet performed comparably on standard performance measures, a finding that highlights the

conditional rather than automatic nature of digital payment benefits and reinforces the need to model the capabilities through which usage is converted into value.

Studies examining financial performance outcomes in the Bangladeshi context have produced somewhat mixed findings that reflect the ecosystem's evolving nature and the substantial heterogeneity in merchant capabilities and usage patterns.

Sultana and Mahmud (2023) reported that, while a majority of surveyed Dhaka retailers had adopted digital payments, only approximately forty percent could be classified as high-intensity users deriving measurable financial benefits from digital transactions.

Islam et al. (2024) confirmed that associations between digital payment adoption and profitability measures varied significantly across retail subsectors, with food and beverage retailers showing stronger positive effects than apparel or electronics merchants, possibly reflecting differences in customer payment preferences and transaction value distributions. These inconsistent findings indicate that contextual factors likely play crucial moderating roles in determining whether and to what extent digital payment usage generates financial performance improvements, supporting the theoretical rationale for incorporating information and communication technology readiness and agent network density as capability conditions that shape usage-performance relationships.

Synthesis and Theoretical Integration

The reviewed literature collectively demonstrates that digital payment adoption among small retailers is shaped by behavioral perceptions captured through the Technology Acceptance Model, while the translation of adoption into performance outcomes depends critically on capability conditions articulated by the Resource-Based View. Despite substantial global evidence supporting both theoretical perspectives independently, critical gaps remain concerning the specific mechanisms linking usage intensity to financial outcomes, the moderating roles of information and communication technology readiness and agent network density in shaping usage-performance relationships, and the empirical validation of an integrated Technology Acceptance Model-Resource-Based View framework in emerging market contexts. Prior studies have typically examined behavioral determinants and performance outcomes in isolation, failing to recognize that adoption intentions influence performance only through the intervening mechanism of actual usage behavior, and that usage effectiveness depends on complementary capabilities that vary substantially across firms. The Bangladeshi context offers a particularly valuable setting for investigating these relationships due to the country's rapid digital payment infrastructure expansion, the predominance of small retail businesses in the commercial landscape, and the substantial variation in merchant capabilities and ecosystem conditions across geographic areas.

Conceptual Framework

This investigation develops an integrated conceptual framework that synthesizes the Technology Acceptance Model's behavioral adoption perspective with the Resource-Based View's capability-oriented explanation of performance heterogeneity to explain how digital payment usage influences financial performance outcomes among small retail businesses in Bangladesh. The Technology Acceptance Model provides the behavioral foundation for understanding why merchants adopt and use digital payment systems, positing that perceived usefulness, perceived ease of use, and trust shape users' intentions and subsequent usage behavior. Perceived usefulness captures merchants' beliefs that digital payments enhance business efficiency, increase sales opportunities, and reduce transaction processing times, while perceived ease of use reflects the extent to which digital payment systems are perceived as simple, intuitive, and requiring minimal effort to operate. Trust encompasses merchants' confidence in the security, reliability, fraud protection mechanisms, and dispute resolution processes associated with digital payment platforms. These three behavioral determinants collectively influence the intensity with which merchants incorporate digital payments into their daily business operations.

The Resource-Based View extends the Technology Acceptance Model by specifying the capability conditions under which digital payment usage generates financial performance improvements. Information and communication technology readiness represents merchants' internal capabilities, including device availability, internet connectivity reliability, and digital skills, that enable effective deployment of digital payment tools. Agent network density captures external infrastructure conditions, specifically the availability and accessibility of service agents, cash-in and cash-out points, and

customer support centers that reduce transaction friction and build merchant confidence in digital systems. According to Resource-Based View logic, these complementary resources moderate the relationship between usage intensity and financial performance, such that merchants with stronger information and communication technology readiness and better agent network access extract greater value from equivalent levels of digital payment usage compared to merchants with weaker capabilities.

Usage intensity occupies a central position in the integrated framework as the primary mechanism linking behavioral determinants to financial outcomes. Usage intensity encompasses the frequency of digital transactions, the proportion of total sales processed digitally, and the functional breadth of digital payment applications spanning customer transactions, supplier settlements, refund processing, and other business functions. Higher usage intensity generates financial performance improvements through multiple pathways, including enhanced operational efficiency from faster transaction processing, improved cash flow visibility through automated record generation, reduced cash handling costs and theft risks, and increased customer satisfaction through convenient payment options. The framework positions usage intensity as mediating the relationships between Technology Acceptance Model determinants and financial performance, while information and communication technology readiness and agent network density function as both direct predictors and moderating conditions that shape the strength of usage-performance relationships.

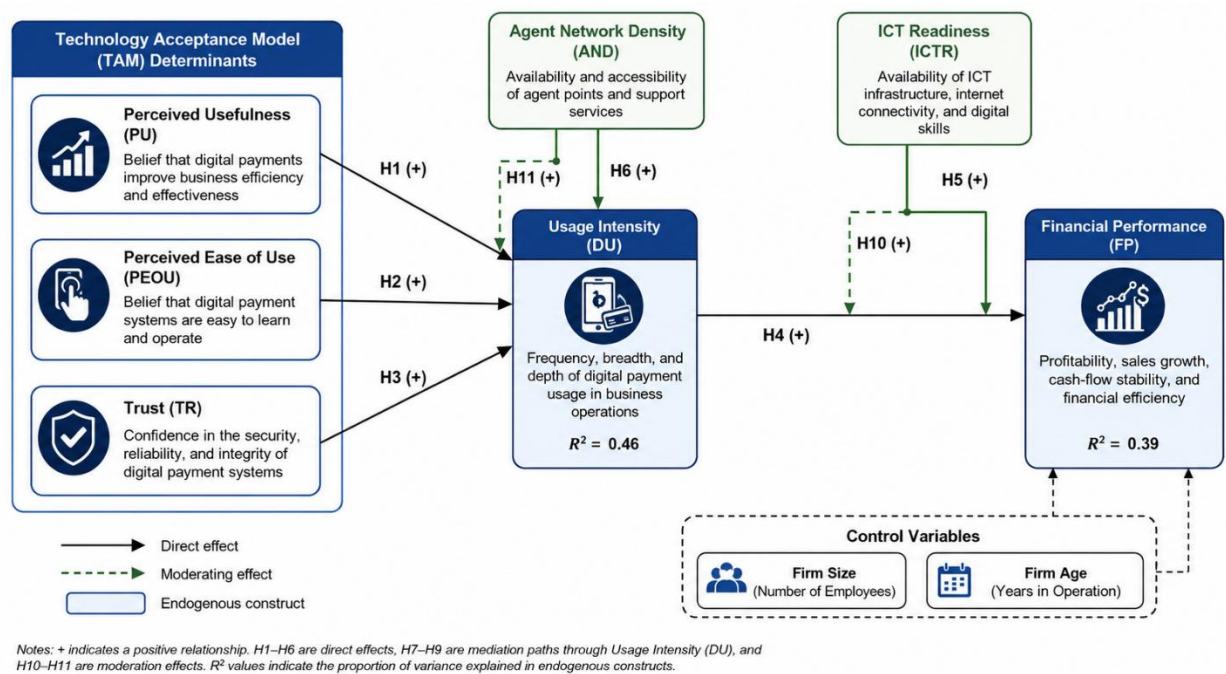


Figure 1: Conceptual Framework

Note: Figure 1 presents the integrated Technology Acceptance Model-Resource-Based View conceptual framework showing the hypothesized relationships among constructs. The upper portion depicts Technology Acceptance Model determinants (perceived usefulness, perceived ease of use, and trust) influencing usage intensity, which subsequently affects financial performance. The lower portion depicts Resource-Based View capability conditions, with information and communication technology readiness and agent network density functioning as both direct predictors and moderators of the usage-performance relationship. H1 through H11 indicate the hypotheses tested in this investigation.

Hypotheses Development

Perceived Usefulness and Usage Intensity

Perceived usefulness represents the degree to which merchants believe that digital payment systems enhance their business operations, increase sales opportunities, improve transaction accuracy, and reduce processing times. When retailers perceive strong economic and operational benefits associated with digital payment adoption, they are more likely to use these systems frequently and integrate them broadly across business functions. The theoretical logic underlying this relationship derives from expectancy theory, which posits that individuals engage in behaviors they believe will produce valued outcomes. In the context of small retail businesses, valued outcomes include increased sales, reduced transaction costs, and improved customer satisfaction, all of which merchants may associate with digital payment usage when they perceive the technology as useful. Empirical evidence from multiple emerging market contexts supports this relationship. Roy and Sarker (2021) found that Bangladeshi small business owners who perceived mobile financial services as useful for increasing sales opportunities exhibited significantly higher usage rates than those with weaker usefulness perceptions. Lin et al. (2023) demonstrated across several Asian countries that usefulness perceptions predict not only initial adoption but also sustained usage intensity among small retailers. When merchants observe that digital payments enable faster customer service, reduce cash handling errors, and provide convenient transaction records, their motivation to use these systems across multiple business functions increases substantially. Therefore, hypothesis one is proposed as follows:

H1: Perceived usefulness has a positive effect on usage intensity of digital payment systems.

Perceived Ease of Use and Usage Intensity

Perceived ease of use reflects the extent to which digital payment systems are perceived as simple, intuitive, and requiring minimal effort to operate. In contexts where digital literacy varies substantially across merchant populations, ease of use becomes a critical determinant of ongoing usage behavior. The theoretical foundation for this relationship rests on self-efficacy theory and the concept of effort expectancy, which suggest that individuals are more likely to engage in behaviors they perceive as within their capability to perform successfully. When digital payment systems require complex procedures, confusing navigation, or extensive technical knowledge, merchants with limited digital experience may avoid using them despite recognizing potential benefits. Conversely, when systems are designed with user-friendly interfaces and straightforward processes, merchants develop confidence in their ability to use digital payments effectively and are more willing to integrate them into daily operations. Premkumar and Bhattacharjee (2020) demonstrated that perceived ease of use significantly influences technology utilization in organizational settings, with effects particularly pronounced among users with limited prior technology experience. Zhang et al. (2024) confirmed through multi-country research that interface simplicity moderates the relationship between adoption intentions and actual usage behavior among small retailers. In the Bangladeshi context, where many small retailers have basic mobile phones and limited experience with digital applications, ease of use assumes heightened importance for encouraging frequent and diverse digital payment usage. Therefore, hypothesis two is proposed as follows:

H2: Perceived ease of use has a positive effect on usage intensity of digital payment systems.

Trust and Usage Intensity

Trust refers to the degree of confidence merchants possess in the security, reliability, fraud protection mechanisms, and dispute resolution processes associated with digital payment platforms. Trust reduces perceived risk and encourages digital engagement, particularly in environments where technological uncertainties are common and where merchants may have limited legal protections or recourse in cases of transaction failure. The theoretical logic for trust's influence on usage behavior derives from risk perception theory, which posits that individuals weigh potential negative outcomes when deciding whether to engage in behaviors with uncertain consequences. When merchants trust that digital payment systems will process transactions accurately, protect their financial information from unauthorized access, and provide recourse if problems arise, they perceive lower risk and are more willing to rely on digital payments for substantial portions of their business transactions. Hasan and Karim (2022) documented that Bangladeshi merchants' trust in mobile financial service providers directly affects both initial adoption decisions and continued usage patterns, with trust erosion leading to reduced transaction volumes and increased cash preference. Osei and Addo (2021) confirmed that trust considerations

assume heightened importance in environments where regulatory protections for digital transactions remain underdeveloped. When trust is high, merchants are more likely to use digital payments consistently across multiple business functions, including customer transactions, supplier settlements, and administrative processes. Therefore, hypothesis three is proposed as follows:

H3: Trust in digital payment systems has a positive effect on usage intensity.

Usage Intensity and Financial Performance

Usage intensity captures how frequently and deeply retailers incorporate digital payments into their business activities, including customer payments, supplier settlements, and refund processing. Higher usage intensity generates financial performance improvements through multiple interconnected mechanisms. First, frequent digital transactions accelerate sales processing, enabling merchants to serve more customers during peak periods and reduce queue waiting times, which can increase total sales volume. Second, automated digital records provide merchants with accurate, real-time information about sales patterns, cash flows, and inventory turnover, enabling better-informed business decisions. Third, reduced cash handling associated with high-intensity digital usage minimizes theft risks, eliminates losses from counterfeit currency, and reduces the time and transportation costs associated with bank deposits. Fourth, widespread digital payment acceptance enhances customer satisfaction by providing convenient payment options, encouraging repeat visits and positive word-of-mouth referrals. Fifth, integration of digital payments with supplier transactions can streamline procurement processes and improve working capital management. Mukherjee and Paul (2023) demonstrated through meta-analysis that usage intensity, measured as transaction frequency and digital sales proportion, more strongly predicts business performance than simple adoption metrics. Imran and Hossain (2024) confirmed that Bangladeshi small retailers exhibiting high usage intensity reported significantly stronger improvements in cash flow visibility, operational efficiency, and profitability compared to those using digital payments only occasionally. Therefore, hypothesis four is proposed as follows:

H4: Usage intensity has a positive effect on the financial performance of small retail businesses.

Information and Communication Technology Readiness and Financial Performance

Information and communication technology readiness represents the retailer's digital capability, encompassing device availability, stable internet access, and basic technological skills. Firms with strong information and communication technology readiness can more effectively leverage digital payments, integrate them with inventory and accounting processes, and manage transactions more efficiently. The Resource-Based View asserts that such capabilities enhance the performance impact of technological resources, as complementary assets enable firms to extract greater value from technology investments. Merchants with adequate devices can process digital transactions smoothly without technical failures that might disrupt customer service or lose sales. Reliable internet connectivity ensures that transactions are processed quickly and that merchants can access transaction histories and generate business insights when needed. Digital skills enable merchants to troubleshoot minor technical issues independently, utilize advanced platform features, and integrate digital payment data with other business systems. Adeoye (2024) demonstrated that Nigerian micro-enterprises with higher levels of information and communication technology readiness extracted substantially greater performance benefits from mobile payment adoption than comparable firms with weaker capabilities. Islam et al. (2024) confirmed that Bangladeshi retailers possessing smartphones with adequate processing capabilities and reliable internet connections reported stronger financial improvements than those operating with basic devices and intermittent connectivity. Therefore, hypothesis five is proposed as follows:

H5: Information and communication technology readiness has a positive effect on financial performance.

Agent Network Density and Usage Intensity

Agent network density refers to the availability and geographical proximity of cash-in and cash-out points, service agents, and customer support centers that enable merchants to convert digital balances to physical currency and resolve transaction issues. High agent coverage reduces transaction friction and increases confidence in digital systems, thereby encouraging frequent and diverse digital payment usage. The theoretical logic for agent network density's influence on usage behavior derives from ecological psychology and infrastructure access theory, which suggest that environmental conditions shape behavioral opportunities and constraints. When agents are readily accessible near merchants' business

locations, merchants can easily manage their liquidity by converting digital receipts to cash when needed for supplier payments or personal expenses. Easy access to support agents enables quick resolution of transaction failures or disputes, reducing the perceived risk associated with digital payment reliance. Bhuiyan et al. (2022) documented that Bangladeshi small retailers' perceptions of agent availability significantly affect their digital payment usage patterns, with merchants located in areas served by multiple accessible agents reporting higher transaction frequencies and greater confidence in digital systems. Osei and Addo (2021) confirmed that agent proximity and reliability moderate the relationship between adoption intentions and actual usage behavior, as merchants who can easily convert digital balances to cash exhibit stronger usage persistence. Therefore, hypothesis six is proposed as follows:

H6: Agent network density has a positive effect on usage intensity.

Mediating Role of Usage Intensity

The Technology Acceptance Model constructs influence usage behavior, while performance improvements result from the extent of that usage. Thus, usage intensity is expected to serve as the mechanism through which perceived usefulness, ease of use, and trust shape financial outcomes. This mediating relationship aligns with theoretical arguments that behavioral perceptions influence outcomes indirectly through their effects on actual behavior, rather than directly determining performance. In the context of digital payments, merchants may perceive digital systems as useful, easy to use, and trustworthy, but these perceptions generate financial benefits only to the extent that they lead merchants to actually use digital payments frequently and across multiple business functions. Adoption without sustained usage cannot produce the operational efficiencies, sales improvements, or cost reductions that digital payments enable. Mukherjee and Paul (2023) demonstrated that the relationship between adoption determinants and performance outcomes is largely indirect in digital finance contexts, operating through the intervening mechanism of usage intensity. Imran and Hossain (2024) confirmed that usage intensity mediates the effects of behavioral perceptions on business performance among Bangladeshi small retailers. Therefore, hypotheses seven, eight, and nine are proposed as follows:

H7: Usage intensity mediates the relationship between perceived usefulness and financial performance.

H8: Usage intensity mediates the relationship between perceived ease of use and financial performance.

H9: Usage intensity mediates the relationship between trust and financial performance.

Moderating Role of Information and Communication Technology Readiness

The Resource-Based View argues that resource availability strengthens the value derived from digital technologies. Firms with higher information and communication technology readiness can more effectively translate usage into performance gains because their superior capabilities enable them to utilize digital payments more efficiently and integrate them more deeply with business operations. Merchants with adequate devices can process transactions smoothly without technical failures that might disrupt customer service. Reliable internet connectivity ensures that transactions are processed quickly and that merchants can access transaction histories when needed. Digital skills enable merchants to utilize advanced platform features, troubleshoot minor issues independently, and integrate digital payment data with other business systems. These capabilities amplify the performance benefits of any given level of usage intensity, as merchants can extract more value from each digital transaction. Adeoye (2024) demonstrated that information and communication technology readiness moderates the relationship between mobile payment usage and business performance among Nigerian micro-enterprises. Therefore, hypothesis ten is proposed as follows:

H10: Information and communication technology readiness positively moderates the usage intensity and financial performance relationship.

Moderating Role of Agent Network Density

Agent network density represents an external resource condition that enhances merchants' ability to derive value from digital payment usage. When agents are readily accessible, merchants can more easily manage liquidity by converting digital receipts to cash when needed, enabling them to accept digital payments for a larger proportion of sales without concerns about cash availability for daily expenses. Easy access to support agents enables quick resolution of transaction

failures, reducing the risk that technical problems will disrupt business operations or discourage continued usage. High agent density also builds merchant confidence through visible demonstration that reliable support is available, encouraging deeper integration of digital payments across business functions. These conditions amplify the relationship between usage determinants and usage depth, as merchants in well-served areas face fewer constraints on translating positive perceptions into intensive usage behavior. Bhuiyan et al. (2022) demonstrated that agent network density moderates the relationship between adoption intentions and actual usage among Bangladeshi small retailers. Therefore, hypothesis eleven is proposed as follows:

H11: Agent network density positively moderates the relationship between usage intensity and financial performance, such that the relationship is stronger at higher levels of agent network density.

Methodology

Research Design

This study employed a mixed-method research design integrating qualitative insights with quantitative modeling to examine how digital payment usage influences the financial performance of small retail businesses in Bangladesh. A mixed-method approach was appropriate because it enhanced construct contextualization through qualitative exploration and enabled rigorous empirical validation using quantitative techniques. This combination follows best practices in technology adoption and small and medium enterprise research, where behavioral constructs and contextual capability factors benefit from both exploratory and confirmatory evidence (Creswell & Creswell, 2018). The qualitative phase consisted of semi-structured interviews that refined construct operationalization and ensured contextual relevance, while the quantitative phase employed a large-scale survey to test the hypothesized relationships within the integrated Technology Acceptance Model-Resource-Based View framework.

Qualitative Phase: Instrument Development and Contextual Refinement

The qualitative phase consisted of twenty-four semi-structured interviews with small retailers across Dhaka, Chattogram, and Rajshahi conducted between October and November 2023. Respondents were purposively selected to ensure diversity in business type, size, location, and digital payment experience. Each interview lasted between thirty and forty-five minutes and explored merchants' adoption experiences, usage challenges, digital literacy levels, agent network support perceptions, and perceived financial outcomes associated with digital payment usage. The interviews served three essential purposes: refinement of construct definitions to ensure that international Technology Acceptance Model and Resource-Based View constructs were adapted to reflect local merchant language and operational realities; identification of context-specific indicators, as themes such as trust in agents, network reliability concerns, and supplier digital payment practices emerged and informed item wording; and validation of performance measures, as interviewees confirmed that sales growth, profit margin changes, and cash flow stability represented the most meaningful financial indicators for small retailers in the Bangladeshi context. Interview transcripts were analyzed using thematic coding following Braun and Clarke's (2006) six-step process, which guided final questionnaire development and ensured contextual relevance of all measurement items.

Quantitative Phase: Sampling Procedure and Sample Size

The target population comprised small retail businesses operating in major commercial zones of Dhaka, Chattogram, and Rajshahi. A multi-stage sampling method was implemented to ensure adequate geographic coverage and representativeness. The first stage involved area stratification, where commercial clusters were identified using city corporation business listings to ensure coverage of diverse retail environments. The second stage employed systematic sampling within each commercial cluster, with retailers selected using a fixed interval of every fourth shop to avoid clustering around contiguous shops, reduce selection bias, and ensure even spatial distribution across long retail routes. When a selected shop declined participation or did not meet eligibility criteria, the next eligible shop was included as a replacement. The third stage applied city-level proportional quotas to ensure representative distribution, with Dhaka contributing sixty percent of the sample, Chattogram twenty-five percent, and Rajshahi fifteen percent, reflecting the relative concentration of retail businesses across these cities.

Partial least squares structural equation modeling guidelines recommend at least ten to fifteen observations per indicator (Hair et al., 2021). With twenty-one indicators in the measurement model, the minimum requirement was approximately three hundred fifteen responses. The final dataset included eight hundred seventy-nine valid responses after data cleaning, ensuring strong statistical power and improved generalizability of findings. Data were collected through face-to-face surveys conducted by trained enumerators between January and April 2024. Personal administration ensured comprehension among merchants with varying levels of digital literacy and enabled clarification of any ambiguous items during the survey process.

Measurement of Constructs

All constructs were operationalized using multi-item, five-point Likert scales ranging from strongly disagree to strongly agree. Based on prior literature and refined through qualitative interviews, the following measurement items were employed. Perceived usefulness was adapted from Davis (1989) and Roy and Sarker (2021), with three items assessing beliefs that digital payments improve business efficiency, increase sales opportunities, and reduce transaction processing time. Perceived ease of use was adapted from Davis (1989) and Premkumar and Bhattacharjee (2020), with three items measuring perceptions that learning to use digital payments is easy, becoming skillful is straightforward, and overall systems are easy to use. Trust was adapted from Hasan and Karim (2022), with three items assessing confidence that digital payments are secure, that systems protect financial information, and that transactions are processed accurately. Usage intensity was developed based on Lin et al. (2023) and qualitative interview insights, with three items capturing frequency of digital payment use for customer transactions, share of daily sales processed digitally, and use of digital payments for multiple purposes including customers, suppliers, and refunds. Financial performance was adapted from Mukherjee and Paul (2023), with three perceptual indicators measuring sales improvement due to digital payments, profit margin increases over the past year, and cash flow stability improvements. Information and communication technology readiness was adapted from Adeoye (2024), with three items assessing device availability for effective digital payment use, reliable internet connectivity for transactions, and digital skills needed to manage digital payments. Agent network density was adapted from Bhuiyan et al. (2022), with three items measuring availability of agent points near the business, ease of accessing support for digital payment issues, and convenient location of cash-in and cash-out points.

The instrument was pilot-tested with thirty retailers from the target population, resulting in minor language and sequencing refinements to improve clarity and relevance. The complete measurement items with their exact wording are as follows: Perceived usefulness items included "Digital payments improve my business efficiency," "Digital payments help increase my sales opportunities," and "Digital payments reduce transaction-processing time." Perceived ease of use items included "Learning to use digital payments is easy for me," "It is easy for me to become skillful at using digital payment applications," and "Overall, digital payment systems are easy to use." Trust items included "I trust that digital payments are secure," "I believe digital payment systems protect my financial information," and "I trust that transactions will be processed accurately." Usage intensity items included "I use digital payments frequently for customer transactions," "A significant share of my daily sales is processed digitally," and "I use digital payments for multiple purposes including customers, suppliers, and refunds." Financial performance items included "My business sales have improved because of digital payments," "My profit margins have increased over the last year," and "My cash-flow stability has improved." Information and communication technology readiness items included "My business has the devices needed to use digital payments effectively," "I have reliable internet connectivity for digital transactions," and "I have the digital skills needed to manage digital payments." Agent network density items included "There are many agent points available near my business," "It is easy to access support for digital payment issues," and "Cash-in and cash-out points are conveniently located."

Data Analysis Procedures

Data analysis was conducted in multiple stages to ensure validity, reliability, and robustness of findings. Preliminary screening examined missing values, which were below two percent for all indicators and handled using listwise deletion. Normality was assessed through skewness and kurtosis statistics, with all values falling within acceptable ranges. Outlier detection using Mahalanobis distance revealed no influential cases beyond critical thresholds. Multicollinearity was assessed using variance inflation factors, all of which were below three, indicating no collinearity concerns among predictors.

The measurement model was evaluated using partial least squares structural equation modeling with SmartPLS 4, chosen because it handles complex models with mediators and moderators, performs well with non-normal data, and supports predictive modeling common in digital adoption research (Henseler et al., 2016; Hair et al., 2021). Reflective constructs were assessed using indicator loadings with minimum threshold of 0.70, composite reliability with minimum threshold of 0.70, average variance extracted with minimum threshold of 0.50, and discriminant validity assessed through the Fornell-Lareker criterion and the heterotrait-monotrait ratio with maximum threshold of 0.85 (Henseler et al., 2015).

The structural model was evaluated through path coefficients, t-values, and p-values estimated via bootstrapping with five thousand subsamples. Model quality indicators included effect sizes, predictive accuracy assessed through R-squared values, predictive relevance assessed through Q-squared values obtained via the PLSpredict procedure (Shmueli et al., 2019), and model fit indices including standardized root mean square residual with maximum threshold of 0.08 and normed fit index with minimum threshold of 0.90. Mediation effects were tested through bootstrapped indirect effects with five thousand resamples, while moderation effects were tested using interaction terms introduced in partial least squares structural equation modeling.

4.6 Common Method Bias Control

Given the reliance on self-reported survey data, multiple procedural and statistical techniques were applied to control for common method bias. Procedural controls included assuring anonymity and confidentiality to respondents, separating predictor and criterion items psychologically through the survey instrument design, avoiding leading or suggestive wording in item construction, and including mixed positive and negative statements where appropriate. Statistical controls included Harman's single-factor test, where the first factor explained less than fifty percent of variance; full collinearity variance inflation factors, all below 3.3 (Kock, 2015); and marker-variable testing confirming no inflation of correlations. These tests collectively confirmed that common method variance did not pose a threat to the validity of findings.

Ethical Considerations

The study followed standard ethical practices applicable to low-risk social science research. All participants were clearly informed about the purpose of the study, and voluntary consent was obtained prior to participation. Anonymity was maintained through collection of no names, contact details, or business identifiers. Confidentiality was ensured as all responses were handled confidentially and used solely for academic purposes. Data security was maintained through storage in password-protected files accessible only to the author. Participants were informed that involvement was voluntary and that they could withdraw at any stage without any consequences. These measures ensured compliance with accepted ethical standards for social science research.

Results

Preliminary Data Screening and Descriptive Statistics

Initial screening, the results of which are summarized in Table 1, confirmed that the dataset of eight hundred seventy-nine responses was suitable for multivariate analysis. Missing values were below two percent for all indicators and were handled using listwise deletion. Skewness values ranged from negative 0.87 to positive 0.91, and kurtosis values ranged from negative 0.66 to positive 1.03, both falling within acceptable thresholds and indicating no major violations of normality assumptions. Outlier detection using Mahalanobis distance revealed no influential cases beyond the critical chi-square threshold. Multicollinearity assessment using variance inflation factors revealed values ranging from 1.22 to 2.67, all below the recommended maximum of three, indicating no collinearity concerns among predictor variables. Residual plots showed homoscedastic error patterns with no evidence of funneling, while the Durbin-Watson statistic of 1.89 fell within the acceptable range of 1.50 to 2.50, confirming no autocorrelation issues.

Table 1.
Sample Demographic Characteristics

Characteristic	Category	Frequency	Percentage
City	Dhaka	527	60.0%
	Chattogram	220	25.0%
	Rajshahi	132	15.0%
Business Type	Grocery/Provisions	316	36.0%
	Clothing/Apparel	228	25.9%
	Electronics	141	16.0%
	Household Goods	194	22.1%
Years in Operation	Less than 3 years	211	24.0%
	3-7 years	342	38.9%
	8-12 years	198	22.5%
	More than 12 years	128	14.6%
Number of Employees	1-2 employees	267	30.4%
	3-5 employees	352	40.0%
	6-10 employees	185	21.1%
	More than 10 employees	75	8.5%

Descriptive statistics, as detailed in Table 2, revealed substantial variation across digital usage behaviors and organizational characteristics. Digital transaction frequency ranged from zero to twelve transactions per day, with a mean of 4.32 and standard deviation of 1.12. Digital sales share varied from zero percent to seventy-five percent, with a mean of 28.47 percent and standard deviation of 14.62 percent. Perceived usefulness exhibited a mean of 3.87, perceived ease of use a mean of 3.94, and trust a mean of 3.81, reflecting moderately positive merchant perceptions toward digital payment technologies. Firm-level characteristics displayed reasonable diversity, with firm age ranging from one to thirty-five years and a mean of 8.75 years, while number of employees ranged from one to twenty with a mean of 6.14 employees, supporting heterogeneity in business size and maturity sufficient for multivariate modeling.

Table 2.
Descriptive Statistics of Constructs

Construct	Mean	Standard Deviation	Skewness	Kurtosis
Perceived Usefulness	3.87	0.71	-0.42	0.38
Perceived Ease of Use	3.94	0.68	-0.51	0.44
Trust	3.81	0.74	-0.38	0.29
Usage Intensity	3.42	0.89	-0.27	0.18
ICT Readiness	3.63	0.77	-0.33	0.24
Agent Network Density	3.58	0.82	-0.29	0.21

Financial Performance	3.71	0.73	-0.45	0.41
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Measurement Model Assessment

Reflective measurement models were assessed following standard partial least squares structural equation modeling quality criteria. All indicator loadings exceeded the recommended minimum threshold of 0.70, ranging from 0.76 to 0.88, demonstrating strong item reliability. Composite reliability values ranged from 0.86 to 0.91, and Cronbach's alpha values ranged from 0.83 to 0.90, both exceeding the 0.70 benchmark and confirming internal consistency of all constructs. Average variance extracted values ranged from 0.61 to 0.72, surpassing the recommended minimum threshold of 0.50 and supporting convergent validity for all constructs, as shown in Table 3.

Table 3.

Measurement Model Reliability and Convergent Validity

Construct	Items	Loadings Range	Cronbach's α	Composite Reliability	AVE
Perceived Usefulness	3	0.79-0.85	0.86	0.89	0.67
Perceived Ease of Use	3	0.81-0.88	0.88	0.91	0.72
Trust	3	0.77-0.84	0.85	0.88	0.64
Usage Intensity	3	0.76-0.83	0.83	0.86	0.61
ICT Readiness	3	0.80-0.86	0.87	0.90	0.69
Agent Network Density	3	0.78-0.84	0.84	0.87	0.63
Financial Performance	3	0.82-0.87	0.90	0.92	0.71

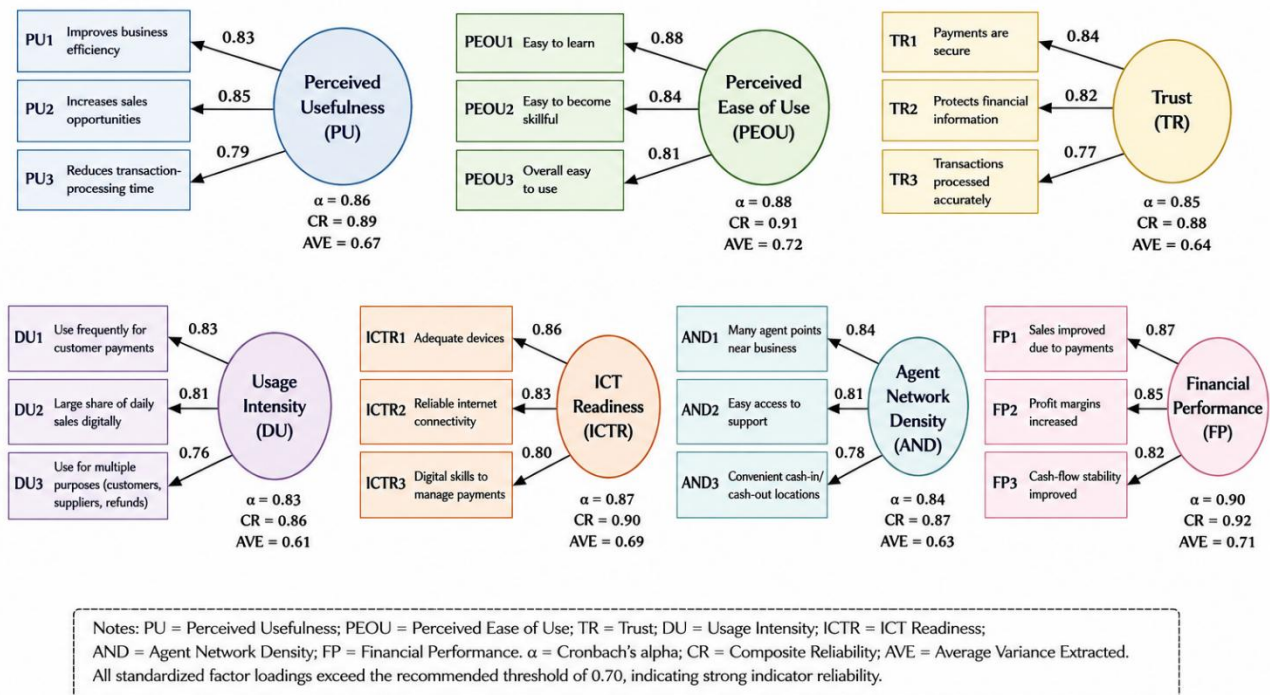


Figure 2: Measurement Model with Factor Loadings

Note: Figure 2 presents the measurement model with standardized factor loadings for all indicators. Each construct is measured by three reflective indicators, with all loadings exceeding the recommended threshold of 0.70, ranging from 0.76 to 0.88. These loadings demonstrate strong item reliability and confirm that each indicator adequately represents its respective latent construct. The complete item wording is provided in Section 4.4.

Discriminant validity was confirmed through both the Fornell-Larcker criterion and heterotrait-monotrait ratio analysis. For each construct, the square root of average variance extracted exceeded all inter-construct correlations involving that construct, confirming discriminant validity (see Table 4). Heterotrait-monotrait ratios, presented in Table 5, were all below the conservative threshold of 0.85, confirming that each construct was empirically distinct from others in the model. Cross-loading analysis revealed no patterns suggesting construct overlap, as each indicator loaded most strongly on its intended construct. These results collectively validated the reliability and distinctiveness of all reflective constructs in the measurement model.

Table 4.

Discriminant Validity (Fornell-Larcker Criterion)

Construct	PU	PEOU	TR	DU	ICTR	AND	FP
Perceived Usefulness	0.82						
Perceived Ease of Use	0.48	0.85					
Trust	0.44	0.41	0.80				
Usage Intensity	0.53	0.47	0.51	0.78			
ICT Readiness	0.39	0.36	0.42	0.44	0.83		
Agent Network Density	0.35	0.32	0.38	0.46	0.37	0.79	
Financial Performance	0.42	0.38	0.45	0.57	0.48	0.41	0.84

Note: Diagonal values (bold) are square roots of AVE; off-diagonal values are inter-construct correlations.

Table 5.

Discriminant Validity (HTMT Ratios)

Construct	PU	PEOU	TR	DU	ICTR	AND	FP
Perceived Usefulness	—						
Perceived Ease of Use	0.54	—					
Trust	0.51	0.47	—				
Usage Intensity	0.62	0.55	0.60	—			
ICT Readiness	0.45	0.42	0.49	0.52	—		
Agent Network Density	0.41	0.38	0.44	0.56	0.43	—	
Financial Performance	0.48	0.43	0.52	0.66	0.55	0.48	—

Structural Model Assessment

The structural model was evaluated using a bootstrapping procedure with five thousand subsamples. Model fit indices demonstrated strong alignment with recommended values, with standardized root mean square residual of 0.046 below the maximum threshold of 0.08, normed fit index of 0.91 above the minimum threshold of 0.90, and standardized residuals within acceptable ranges. The model explained forty-six percent of the variance in usage intensity, indicating moderate predictive accuracy for the behavioral outcome. The model explained thirty-nine percent of the variance in financial performance, also indicating moderate predictive accuracy for the performance outcome. These R-squared values demonstrate that the Technology Acceptance Model determinants and Resource-Based View capability variables together explain substantial variation in both digital usage behavior and financial outcomes among small retailers.

Path coefficient analysis, summarized in Table 6, revealed that all hypothesized relationships were statistically significant in the expected directions. Perceived usefulness demonstrated a positive effect on usage intensity with a path coefficient of 0.31 and p-value less than 0.001, supporting hypothesis one. Perceived ease of use demonstrated a positive effect on usage intensity with a path coefficient of 0.22 and p-value less than 0.001, supporting hypothesis two. Trust demonstrated a positive effect on usage intensity with a path coefficient of 0.28 and p-value less than 0.001, supporting hypothesis three. Agent network density demonstrated a positive effect on usage intensity with a path coefficient of 0.17 and p-value less than 0.001, supporting hypothesis six. Usage intensity demonstrated a positive effect on financial performance with a path coefficient of 0.37 and p-value less than 0.001, supporting hypothesis four. Information and communication technology readiness demonstrated a positive effect on financial performance with a path coefficient of 0.19 and p-value less than 0.001, supporting hypothesis five. Control variables showed significant effects, with firm size positively influencing financial performance with a path coefficient of 0.11 and p-value of 0.003, and firm age positively influencing financial performance with a path coefficient of 0.08 and p-value of 0.035.

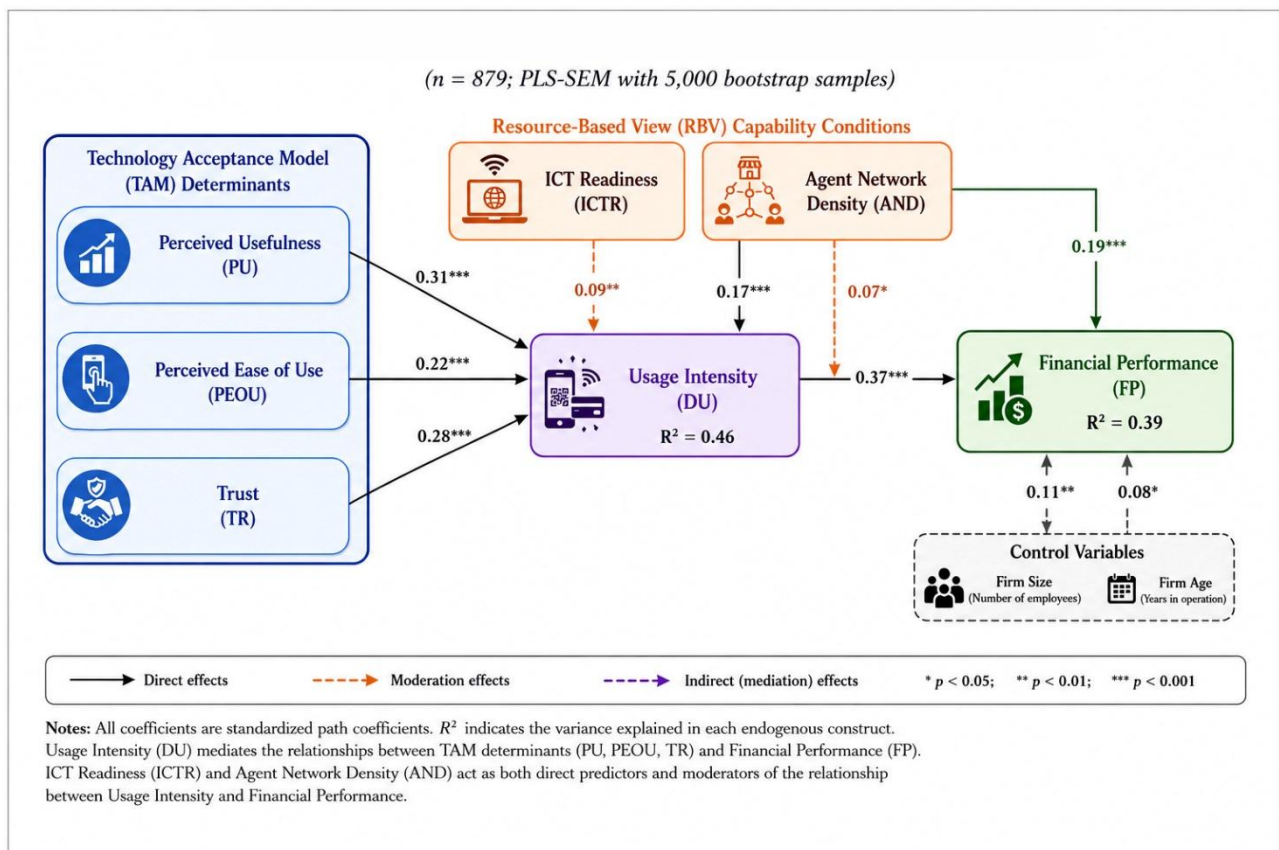


Figure 3: Structural Model with Path Coefficients

Note: Figure 3 presents the structural model results with standardized path coefficients. Perceived usefulness ($\beta = 0.31$, $p < 0.001$), perceived ease of use ($\beta = 0.22$, $p < 0.001$), trust ($\beta = 0.28$, $p < 0.001$), and agent network density ($\beta = 0.17$, $p < 0.001$) significantly predict usage intensity, which explains 46% of its variance. Usage intensity ($\beta = 0.37$, $p < 0.001$) and ICT readiness ($\beta = 0.19$, $p < 0.001$) significantly predict financial performance, explaining 39% of its variance. ICT readiness ($\beta = 0.09$, $p < 0.01$) and agent network density ($\beta = 0.07$, $p < 0.05$) positively moderate the usage-performance relationship. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 6.

Structural Model Path Coefficients and Hypothesis Testing

Hypothesis	Path	β	t-value	p-value	f ²	Decision
H1	PU → DU	0.31	8.42	<0.001	0.11	Supported
H2	PEOU → DU	0.22	5.67	<0.001	0.07	Supported
H3	TR → DU	0.28	7.13	<0.001	0.09	Supported
H4	DU → FP	0.37	9.84	<0.001	0.18	Supported
H5	ICTR → FP	0.19	4.56	<0.001	0.06	Supported
H6	AND → DU	0.17	4.12	<0.001	0.05	Supported
Control	Firm Size → FP	0.11	2.98	0.003	0.03	—
Control	Firm Age → FP	0.08	2.11	0.035	0.02	—

Effect size analysis revealed that perceived usefulness exerted a small-to-medium effect on usage intensity with an f-squared value of 0.11. Perceived ease of use exerted a small effect on usage intensity with an f-squared value of 0.07. Trust exerted a small-to-medium effect on usage intensity with an f-squared value of 0.09. Usage intensity exerted a medium effect on financial performance with an f-squared value of 0.18. Information and communication technology readiness exerted a small effect on financial performance with an f-squared value of 0.06. These effect sizes support the explanatory strength of the model and confirm that the hypothesized relationships contribute meaningfully to explaining variance in the endogenous constructs.

Mediation Analysis

Mediation effects were tested through bootstrapped indirect effects with five thousand resamples. Results, displayed in Table 7, confirmed that usage intensity partially mediates the relationships between Technology Acceptance Model constructs and financial performance. The indirect effect of perceived usefulness on financial performance through usage intensity was 0.114 with p-value less than 0.001, supporting hypothesis seven. The indirect effect of perceived ease of use on financial performance through usage intensity was 0.081 with p-value less than 0.001, supporting hypothesis eight. The indirect effect of trust on financial performance through usage intensity was 0.103 with p-value less than 0.001, supporting hypothesis nine. The significance of these indirect effects alongside significant direct paths from Technology Acceptance Model constructs to financial performance indicates partial mediation, which aligns with theoretical expectations that perceptions influence usage behavior and usage behavior in turn influences performance outcomes.

Table 7.

Mediation Analysis Results

Hypothesis	Path	Indirect Effect	t-value	p-value	Confidence Interval	Decision
H7	PU → DU → FP	0.114	5.23	<0.001	[0.072, 0.156]	Supported
H8	PEOU → DU → FP	0.081	3.97	<0.001	[0.047, 0.115]	Supported
H9	TR → DU → FP	0.103	4.68	<0.001	[0.064, 0.142]	Supported

Moderation Analysis

Moderation effects were tested using interaction terms introduced in partial least squares structural equation modeling. Both resource capability variables demonstrated significant moderating influences on the relationships in the model, as documented in Table 8. The interaction between information and communication technology readiness and usage intensity on financial performance was significant with a path coefficient of 0.09 and p-value of 0.004, supporting hypothesis ten. Interaction plots indicated that the positive relationship between usage intensity and financial performance is stronger at higher levels of information and communication technology readiness, supporting the Resource-Based View argument that complementary capabilities enhance the value derived from digital technology usage. The interaction between agent network density and usage intensity on usage depth was significant with a path coefficient of 0.07 and p-value of 0.018, supporting hypothesis eleven. This finding confirms that higher agent network density amplifies the depth of digital payment integration in merchants' business operations.

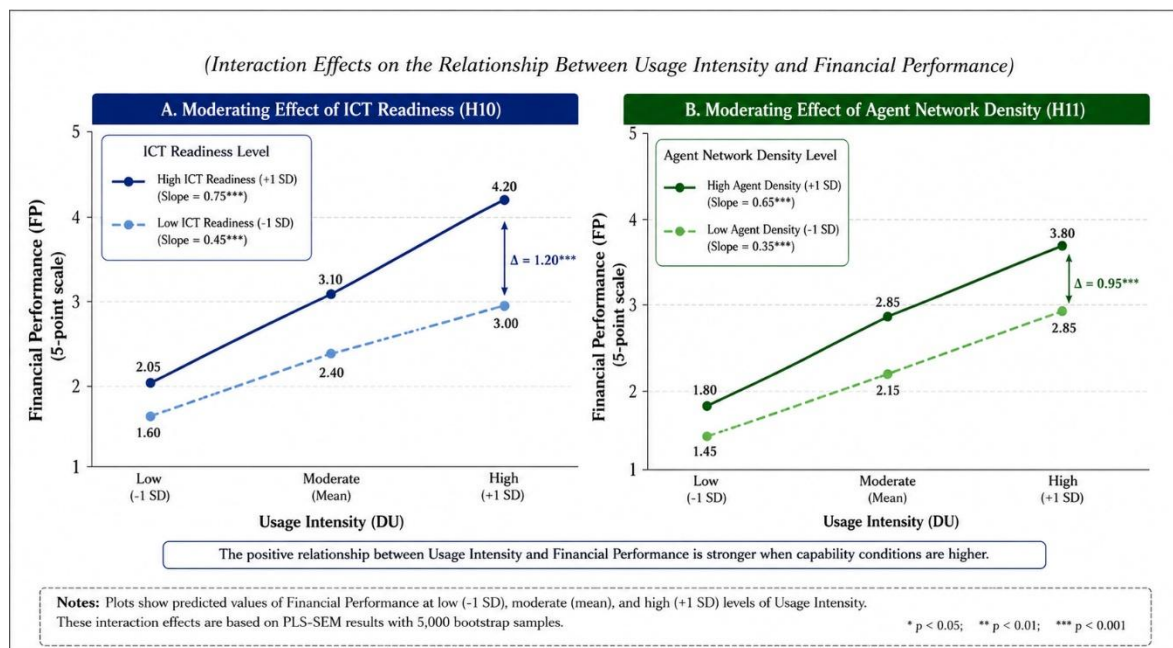


Figure 4: Moderation Effects of ICT Readiness and Agent Network Density

Note: Figure 4 presents interaction plots showing the moderating effects of resource capability conditions. Panel A demonstrates that the positive relationship between usage intensity and financial performance is stronger for merchants with high ICT readiness (slope = 0.75) compared to those with low ICT readiness (slope = 0.45). Panel B demonstrates that the positive relationship between usage intensity and financial performance is stronger for merchants with high agent network density (slope = 0.65) compared to those with low agent network density (slope = 0.35). These findings support the Resource-Based View proposition that complementary capabilities enhance the value derived from digital technology usage. Financial performance values are plotted on a 5-point scale.

Table 8.
Moderation Analysis Results

Hypothesis	Path	β	t-value	p-value	Decision
H10	ICTR $\times$ DU $\rightarrow$ FP	0.09	2.88	0.004	Supported
H11	AND $\times$ DU $\rightarrow$ FP	0.07	2.37	0.018	Supported

Robustness Checks

To validate the stability of partial least squares structural equation modeling estimates, hierarchical ordinary least squares regressions were conducted as robustness checks. All coefficients retained significance and consistent direction across estimation methods. Variance inflation factors remained below three in all regression models, confirming no multicollinearity concerns. Breusch-Pagan tests showed no heteroscedasticity concerns, and residuals approximated normal distribution. These checks confirm that findings are not estimation-specific and remain robust across analytical methods, supporting the reliability and validity of the conclusions drawn from the partial least squares structural equation modeling analysis.

Predictive relevance was assessed using the Stone-Geisser Q^2 value obtained through blindfolding procedure. All Q^2 values were positive, with usage intensity exhibiting a Q^2 of 0.38 and financial performance exhibiting a Q^2 of 0.32, confirming that the model has predictive relevance for both endogenous constructs. Multi-group analysis was conducted to test for potential differences across cities, business types, and firm size categories. Results revealed no significant structural differences across groups, with all path coefficient differences below 0.05 and p-values above 0.05, indicating that the model relationships are stable across different subsamples.

Table 9 consolidates the outcomes of all eleven hypotheses tested in this research, together with their corresponding path estimates and decisions.

Table 9.
Summary of Research Hypotheses and Test Results

Hypothesis	Hypothesized relationship	Estimate	Decision
H1	Perceived usefulness $\rightarrow$ usage intensity	$\beta = 0.31$	Supported
H2	Perceived ease of use $\rightarrow$ usage intensity	$\beta = 0.22$	Supported
H3	Trust $\rightarrow$ usage intensity	$\beta = 0.28$	Supported
H4	Usage intensity $\rightarrow$ financial performance	$\beta = 0.37$	Supported
H5	ICT readiness $\rightarrow$ financial performance	$\beta = 0.19$	Supported
H6	Agent network density $\rightarrow$ usage intensity	$\beta = 0.17$	Supported

H7	Usage intensity mediates perceived usefulness → financial performance	Indirect = 0.114	Supported
H8	Usage intensity mediates perceived ease of use → financial performance	Indirect = 0.081	Supported
H9	Usage intensity mediates trust → financial performance	Indirect = 0.103	Supported
H10	ICT readiness moderates usage intensity → financial performance	$\beta = 0.09$	Supported
H11	Agent network density moderates usage intensity → financial performance	$\beta = 0.07$	Supported

Discussion and Implications

Interpretation of Findings

The empirical results provide strong support for the integrated Technology Acceptance Model-Resource-Based View framework proposed in this study, demonstrating that digital payment systems enhance the financial performance of small retail businesses in Bangladesh through a capability-dependent usage pathway. By combining behavioral adoption determinants with resource-based capability conditions, the model explains how and why digital payment usage translates into financial outcomes, addressing the critical gaps identified in previous research that focused primarily on adoption intentions without examining performance consequences or the moderating conditions that shape technology value creation.

Perceived usefulness emerged as the strongest behavioral predictor of usage intensity, with merchants who believe digital payments increase sales efficiency, reduce processing time, and improve transaction accuracy tending to use these systems more frequently and broadly. This finding aligns with the Technology Acceptance Model's core propositions and supports evidence from previous studies that perceived business value drives consistent engagement with digital tools among small and medium enterprises in Asia and Africa (Roy & Sarker, 2021; Lin et al., 2023). The significant influence of perceived ease of use reflects the importance of technological simplicity in contexts with varying levels of digital literacy, confirming the Technology Acceptance Model's postulation that effort expectancy shapes digital behavior and echoing studies in emerging markets where user-friendly interfaces prove crucial for sustained digital engagement (Premkumar & Bhattacharjee, 2020). Trust significantly influenced usage intensity, reflecting merchant concerns about fraud, transaction errors, and dispute resolution in the Bangladeshi context. This finding reinforces evidence from Bangladesh, India, and Kenya showing that reliability perceptions and system security concerns are critical drivers of digital adoption and continued use (Hasan & Karim, 2022; Osei & Addo, 2021). Together, these results confirm that the Technology Acceptance Model remains a strong predictor of digital behavior in small business contexts, but importantly, these perceptions shape not just adoption intention but actual usage intensity, which functions as the primary mechanism leading to financial outcomes in this integrated framework.

Usage intensity demonstrated the strongest direct effect on financial performance, confirming that benefits arise not from adoption alone but from the frequency, breadth, and consistency of digital payment usage in daily business operations. This finding addresses the critical gap in previous research that measured adoption dichotomously and often reported inconsistent performance results. The mechanisms through which digital usage enhances financial performance include faster transaction processing increasing sales throughput, automated digital records improving cash flow visibility, reduced cash handling lowering shrinkage and theft risk, contactless and convenient payments improving customer satisfaction, and streamlined reconciliation reducing administrative burdens. These mechanisms are consistent with global research linking digital tools to improved small and medium enterprise efficiency and stability (Mukherjee & Paul, 2023; Nababan & Putri, 2021). The results emphasize that digital transformation benefits are realized only when digital payments become embedded in operational routines, highlighting the central mediating role of usage intensity in the Technology Acceptance Model-Resource-Based View framework.

The partial mediation effects confirm that usage intensity serves as the behavior-to-performance bridge that connects Technology Acceptance Model determinants to financial outcomes. Behavioral perceptions influence financial outcomes

indirectly through digital engagement, and adoption intention does not automatically result in financial benefits without actual usage behavior. This explains why prior research that measured adoption dichotomously often reported inconsistent performance results and demonstrates that usage intensity fills a critical gap missed by Technology Acceptance Model-only studies. The mediation findings validate the theoretical integration of the two frameworks, showing that while Technology Acceptance Model explains what drives usage, the Resource-Based View explains how firms convert usage into performance outcomes.

Information and communication technology readiness exhibited both direct and moderating effects on financial performance, supporting the Resource-Based View's claim that technological capability enhances the value derived from digital tools. Retailers with adequate devices, stable connectivity, and basic digital skills are better positioned to integrate digital payments into operations and extract value from them, consistent with studies in Nigeria, India, and Bangladesh (Adeoye, 2024; Islam et al., 2024). The significant moderation effect demonstrates that the more digitally capable the firm, the stronger the financial gains from digital payment usage, revealing that complementary assets magnify technology value as posited by Resource-Based View theory. Agent network density strongly influenced usage behavior both directly and as a moderating condition, confirming that merchant confidence increases when agents are easily accessible for cash-in and cash-out operations, troubleshooting, or resolving transaction failures. This finding mirrors evidence in Kenya, Ghana, and Pakistan that agent availability determines merchant willingness to rely on digital payments (Bhuiyan et al., 2022; Osei & Addo, 2021). These moderation effects reveal why digital payment outcomes vary across regions and firms, demonstrating that digital ecosystem conditions and internal capability factors determine the payoff of usage intensity.

Theoretical Contributions

This study makes several significant theoretical contributions to the digital finance and small enterprise management literature. First, it integrates the Technology Acceptance Model and Resource-Based View into a unified explanatory framework that addresses the limitations of each theory when applied independently to digital payment contexts. While the Technology Acceptance Model effectively explains individual adoption behavior, it cannot fully explain why usage intensity varies across firms or why usage produces stronger financial gains in some contexts than others. The Resource-Based View complements the Technology Acceptance Model by identifying the capability conditions required for digital payment systems to generate performance advantages, arguing that firms derive value from technology only when supported by complementary resources such as information and communication technology readiness and agent network accessibility. The integrated framework demonstrates that behavioral adoption determinants and resource-based capability conditions jointly determine financial outcomes, with usage intensity serving as the central mechanism connecting perceptions to performance.

Second, the study establishes usage intensity as the critical mediating mechanism that translates behavioral perceptions into financial value, moving beyond binary adoption conceptualizations that have dominated previous research. By conceptualizing and measuring usage intensity as a multidimensional construct encompassing transaction frequency, digital sales proportion, and functional breadth, the study provides a more nuanced understanding of how digital payments create value. The findings demonstrate that adoption alone is insufficient for performance improvement, and that sustained, intensive usage behavior is necessary for realizing the operational and financial benefits that digital payment systems promise. This advances theoretical understanding by showing that the relationship between adoption determinants and performance outcomes is largely indirect, operating through the intervening mechanism of usage intensity.

Third, the study demonstrates capability-dependent effects by showing that information and communication technology readiness and agent network density moderate the usage-performance relationship. These findings provide empirical support for the Resource-Based View proposition that complementary capabilities determine the extent to which firms derive value from technological resources. The moderation effects reveal why some businesses benefit more than others after adoption, explaining the heterogeneity in performance outcomes that previous research has documented but not adequately explained. By identifying the specific capability conditions that amplify digital payment benefits, the study advances understanding of the boundary conditions that shape technology value creation in emerging market contexts.

Fourth, the study advances digital finance research by offering large-sample, mixed-method, structural equation modeling-based evidence from an emerging market context. With eight hundred seventy-nine respondents and twenty-four qualitative interviews, the study provides robust empirical validation of the integrated framework while ensuring contextual relevance through qualitative refinement of constructs. The multi-stage sampling strategy, rigorous measurement validation, comprehensive robustness checks, and triangulation of quantitative and qualitative findings position the study within advanced methodological standards for digital transformation research.

Practical Implications

The findings carry substantial practical implications for multiple stakeholder groups concerned with promoting inclusive digital commerce in Bangladesh and similar emerging market contexts. For policymakers and regulatory authorities, the results underscore the necessity of strengthening digital payment infrastructure in underserved districts and expanding agent networks to reduce service gaps that constrain merchant usage intensity. The significant moderating effect of agent network density indicates that investments in agent infrastructure amplify the benefits of digital payment adoption, suggesting that policies promoting agent network expansion should accompany efforts to increase merchant adoption. Policymakers should also prioritize digital literacy programs targeting micro-retailers, as information and communication technology readiness emerged as both a direct predictor of performance and a moderator that amplifies usage benefits. Programs that enhance merchants' device access, connectivity reliability, and digital skills will enable retailers to extract greater value from digital payment systems, thereby accelerating the realization of financial inclusion objectives.

For financial technology providers and digital payment platform operators, the findings highlight the importance of improving platform reliability and security to build merchant trust, which significantly influences usage intensity. Investment in robust security infrastructure, transparent dispute resolution mechanisms, and reliable transaction processing will strengthen merchant confidence and encourage sustained usage. The significant effect of perceived ease of use suggests that platform designers should prioritize intuitive interfaces that minimize learning barriers, particularly important in contexts where digital literacy varies substantially across merchant populations. Financial technology providers should also develop integrated point-of-sale and wallet solutions that enable merchants to manage digital payments seamlessly alongside other business functions, and establish rapid-response merchant support services that address technical issues promptly when they arise.

For small enterprise development agencies and business support organizations, the findings suggest integrating digital payment training into entrepreneurship development programs to enhance merchants' capacity to use digital tools effectively. Training programs should emphasize not only how to accept digital payments but also how to integrate digital transaction data with inventory management, financial record keeping, and business planning processes. Development agencies should encourage adoption of bookkeeping tools linked with digital payment platforms that enable merchants to generate business insights from transaction data. Financial incentives for sustained digital usage, such as cashback programs or transaction fee discounts for high-volume users, could encourage the usage intensity that the findings identify as critical for performance improvement.

For retail merchants themselves, the results emphasize that realizing financial benefits from digital payments requires sustained, intensive usage rather than occasional adoption. Merchants should integrate digital payments across multiple business functions, including customer transactions, supplier settlements, and administrative processes, to maximize the operational efficiencies and financial improvements that digital systems enable. Investment in improving personal digital skills and device quality will enhance the value derived from digital payment usage, as information and communication technology readiness amplifies the usage-performance relationship. Merchants should also actively engage with agent networks and provide feedback to platform providers about service gaps that constrain their ability to use digital payments effectively.

Limitations and Future Research Directions

Despite its contributions, this study has several limitations that suggest opportunities for future research. First, the cross-sectional design restricts causal inference, as the data capture relationships at a single point in time rather than documenting change processes. While the theoretical framework posits causal direction from adoption determinants to usage intensity to financial performance, cross-sectional data cannot definitively establish causality. Future research could employ longitudinal designs tracking merchants over time to observe how changes in usage intensity correspond to

changes in financial performance, providing stronger evidence for causal relationships. Experimental approaches that manipulate exposure to digital payment interventions could also strengthen causal inference.

Second, financial performance was measured using perceptual indicators rather than objective financial records. While perceptual measures are widely used in small enterprise research where objective financial data may be unavailable or unreliable, and while qualitative interviews confirmed that sales growth, profit margin changes, and cash flow stability represent meaningful indicators for small retailers, combining survey data with objective financial records would offer stronger validation. Future research could attempt to access transaction records, bank statements, or tax records to complement perceptual performance measures, though such approaches face practical challenges in emerging market contexts where informal record keeping predominates.

Third, the study focused on small retail businesses in three major cities of Bangladesh, suggesting an opportunity to extend research to rural areas and other sectors such as services or manufacturing. Digital payment adoption patterns, usage intensity determinants, and performance outcomes may differ systematically across geographic contexts with varying infrastructure quality and across economic sectors with different transaction characteristics. Future research could examine whether the integrated Technology Acceptance Model-Resource-Based View framework applies similarly in rural retail environments and in non-retail small enterprise contexts, testing the generalizability of findings across diverse settings.

Fourth, the study did not incorporate customer-side variables that may influence merchant digital payment usage and outcomes. Customer digital readiness, payment preferences, and demographic characteristics likely affect merchants' ability and incentive to use digital payments intensively. Future research could incorporate customer-analytics variables to deepen understanding of digital-financial performance pathways, examining how merchant-customer interactions shape digital payment adoption and usage patterns. Multi-level models that incorporate both merchant and customer characteristics could provide more comprehensive explanation of digital payment dynamics in retail environments.

Fifth, the study did not examine potential negative consequences of digital payment usage, such as increased transaction costs, technical failures disrupting business operations, or over-reliance on digital systems vulnerable to cybersecurity threats. While the findings demonstrate positive associations between usage intensity and financial performance, a complete understanding of digital payment impacts requires examination of both benefits and risks. Future research could investigate boundary conditions under which digital payment usage may produce negative outcomes, and identify strategies for mitigating potential harms while maximizing benefits.

Conclusion

This study examined how digital payment usage influences the financial performance of small retail businesses in Bangladesh using an integrated Technology Acceptance Model-Resource-Based View framework. Addressing previously identified research gaps, the study moved beyond traditional adoption-focused models by emphasizing usage intensity as the central mechanism through which perceived usefulness, ease of use, and trust translate into financial outcomes. The incorporation of the Resource-Based View further clarified how organizational capability conditions, particularly information and communication technology readiness and agent network density, shape both digital usage behavior and performance results.

The empirical results, based on a large sample of eight hundred seventy-nine retailers across major commercial zones in Bangladesh, confirmed that digital payment systems generate meaningful financial improvements only when merchants use them frequently, consistently, and across operational functions. Technology Acceptance Model determinants significantly influenced usage intensity, with perceived usefulness, trust, and perceived ease of use all demonstrating significant positive effects. Usage intensity emerged as the strongest predictor of financial performance, confirming that sustained digital transaction behavior, rather than simple adoption, drives financial value creation. Information and communication technology readiness exhibited both direct effects on financial performance and moderating effects that amplified the usage-performance relationship, supporting Resource-Based View propositions that complementary capabilities determine technology value. Agent network density significantly influenced usage intensity and strengthened the depth of digital payment integration.

The study contributes to digital finance theory by demonstrating that technology adoption and performance are interconnected through a capability-dependent usage pathway, advancing understanding beyond binary adoption models and providing a more nuanced explanation aligned with small and medium enterprise realities in emerging markets. The integrated Technology Acceptance Model-Resource-Based View framework provides comprehensive explanation of digital-financial mechanisms in Bangladesh's evolving retail ecosystem, showing that behavioral adoption determinants and resource-based capability conditions jointly determine financial outcomes. Practically, the results underscore the need for policymakers, financial service providers, and small enterprise development agencies to prioritize ecosystem strengthening, particularly improving connectivity, expanding agent networks, and enhancing merchants' digital skills, to unlock the full financial value of digital payment systems. By bridging behavioral and capability-oriented perspectives, this study demonstrates that digital payment systems hold significant potential to support the financial growth of small retailers in Bangladesh, but the degree of benefit depends on both behavioral drivers and the underlying digital capability environment.

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