

## A Panel Data Econometric Analysis on the Impact of Digital Payment Adoption on Small Business Revenue Growth in Global Business

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### Abstract

This study addresses the persistent problem that many small businesses adopt digital payments, yet the revenue impact remains uneven because adoption is often shallow and not operationally integrated. The purpose was to quantify how digital payment adoption and adoption maturity influence small business revenue growth and to test which adoption drivers strengthen or constrain this relationship. Using a quantitative, cross-sectional, case-based design, data were collected from  $N = 240$  small businesses as enterprise-style operational cases embedded in cloud-enabled and platform-mediated payment ecosystems (for example, wallet, QR, POS gateway, and settlement services). The sample covered retail (38%), food/service (34%), and other transaction-intensive firms (28%), with most respondents being owners or general managers (71%) who manage payment decisions. Key variables included Digital Payment Adoption (ADOPT), Digital Payment Adoption Maturity Index (DPAMI), perceived ease of use (PEOU), trust/security perception (TR), perceived transaction cost (COST), customer preference for digital payment (CUSTPREF), and a triangulated Revenue Growth Composite (REVCOMP), with controls for firm size, firm age, sector, location, and sales-channel mix. The analysis plan applied scale reliability tests (Cronbach's alpha), descriptive statistics, Pearson correlations, interaction and subgroup tests, and diagnostics (VIF). Measurement reliability was strong (for example, REVCOMP  $\alpha = .88$ , TR  $\alpha = .86$ , PEOU  $\alpha = .83$ ). Descriptives showed high adoption (ADOPT  $M = 3.74$ ,  $SD = 0.71$ ) and positive revenue outcomes (REVCOMP  $M = 3.49$ ,  $SD = 0.69$ ). Revenue growth correlated with adoption ( $r = .46$ ,  $p < .001$ ) and more strongly with maturity (DPAMI  $r = .54$ ,  $p < .001$ ). In regression, adding adoption increased model fit ( $Adj. R^2 = .27$ ) with a significant effect ( $\beta = .31$ ,  $p < .001$ ), while adding maturity improved fit further ( $Adj. R^2 = .34$ ) with a stronger effect (DPAMI  $\beta = .39$ ,  $p < .001$ ). Trust and usability promoted adoption (TR  $\beta = .33$ ,  $p < .001$ ; PEOU  $\beta = .28$ ,  $p < .001$ ), while cost constrained it (COST  $\beta = -.21$ ,  $p = .002$ ); the adoption-growth link strengthened when customers preferred digital payments (Adoption  $\times$  CUSTPREF  $\beta = .17$ ,  $p = .011$ ). Implications suggest that SMEs should prioritize maturity practices (integration, staff readiness, reconciliation discipline), providers should reduce friction and strengthen trust signals, and policymakers should support interoperability and transparent pricing to help firms convert adoption into measurable growth.

### Keywords

Digital payment adoption; Adoption maturity (DPAMI); Small business revenue growth; Trust and security; Regression analysis

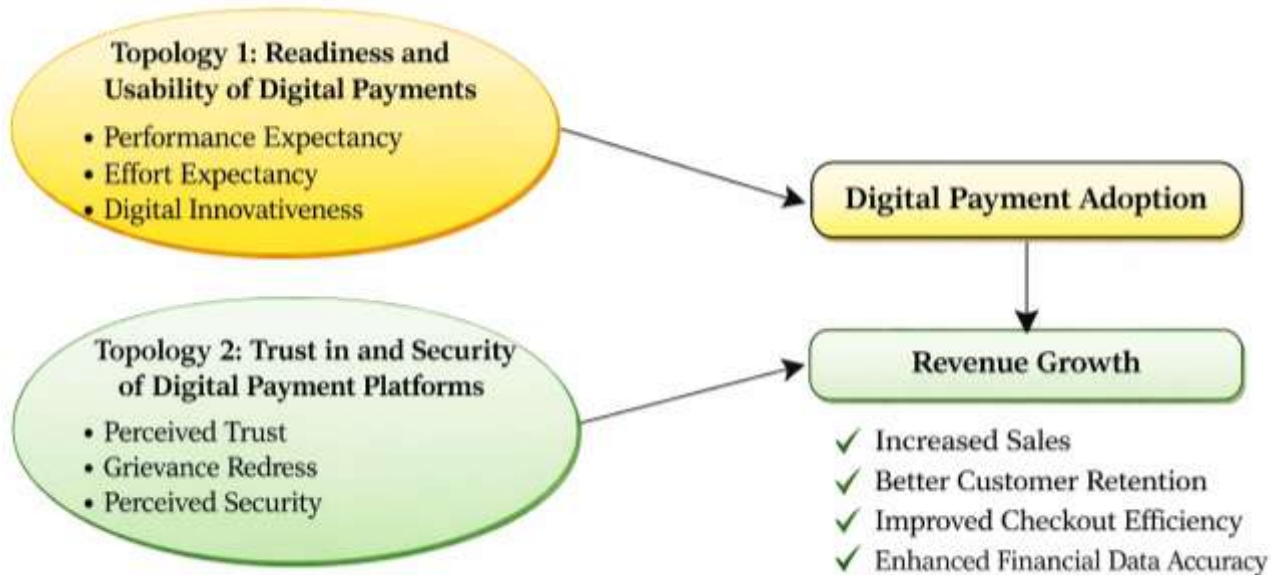
## INTRODUCTION

Digital payment adoption refers to the organizational and consumer-level acceptance and use of electronically mediated instruments that transfer monetary value through regulated rails, platform-based networks, or integrated point-of-sale (POS) ecosystems, including mobile payments, internet-based payment services, card-present contactless payments, and app-enabled wallet transactions (Abrahão et al., 2016). In this study's scope, "digital payments" function as transaction-enabling socio-technical systems that combine (a) user interfaces, (b) authentication and authorization layers, (c) settlement mechanisms, and (d) data traces that record time-stamped monetary exchanges at the merchant boundary (Luarn & Lin, 2005). The definitional emphasis remains operational: adoption is observable through the frequency, breadth, and routinization of digital-payment use in revenue-generating transactions, not only the availability of a payment option (Oliveira et al., 2016). Research in mobile payment and electronic payment contexts frames such systems as convenience-enhancing and mobility-enabling transaction mechanisms that re-structure how consumers and merchants coordinate purchase completion (Ting et al., 2016; Venkatesh et al., 2012). In cross-market settings, payments become a central infrastructure for market participation because they link micro-level exchanges with meso-level platform networks and macro-level financial ecosystems. This makes digital payment adoption internationally significant for small businesses that operate in competitive environments where speed, reliability, and customer experience shape repeat purchasing and basket size. Digital payment acceptance also interacts with trust formation and perceived risk, since the transaction event involves financial data, device mediation, and third-party service providers, and these attributes influence willingness to transact. Studies that conceptualize mobile payment acceptance through compatibility, subjective norms, and mobility highlight that adoption becomes a behavioral and contextual phenomenon rather than a simple technology switch (Yang et al., 2011). This definitional framing matters for global small business revenue growth because revenue reflects realized demand, completed transactions, and reduced transaction friction in the selling process. Within this logic, adoption is not restricted to "going cashless," and it includes hybrid payment portfolios where firms integrate digital payment acceptance as an efficiency and market-access capability, aligned with organizational digitization patterns. Conceptually, therefore, this research treats digital payment adoption as a measurable intensity and maturity phenomenon linked to transaction completion quality, customer willingness to pay, and operational throughput (Chandra et al., 2010).

Small businesses are typically defined through size-based thresholds (employees, turnover, assets) and managerial structures characterized by resource constraints, informality in routines, and high sensitivity to demand volatility. In empirical work, the "small business" category is analytically useful because these firms often face binding constraints in finance, systems integration, and staffing, making performance outcomes more responsive to process innovations that directly influence sales conversion and cash flow regularity (Dahlberg et al., 2008). In this study, small business revenue growth is treated as a quantitative outcome reflecting changes in the firm's income-generating capacity over a defined observation window. Revenue growth can be operationalized as percentage change in sales, compounded growth rates, or log-differences in sales, and it can also be triangulated using proxy indicators such as transaction counts, average order value, customer repurchase frequency, and sales per operating hour. Digital payments enter this performance logic through transaction completion channels and customer accessibility channels (Ruiz-Mercader et al., 2006). First, payment convenience affects purchase completion probability because the buyer's ability to pay interacts with the seller's ability to accept the preferred instrument at the moment of purchase, an effect that becomes stronger in contexts where customers carry limited cash or prefer digital wallets. Second, payments generate data trails that can support reconciliation accuracy and operational coordination, which can influence service quality and customer experience (Verkijika, 2020). E-business and interorganizational systems research positions such digital capabilities as complementary assets that shape efficiency and value creation, with performance effects emerging through usage depth and integration rather than simple adoption binaries. For small firms, these mechanisms have heightened relevance because incremental improvements in checkout throughput, reconciliation quality, and customer satisfaction can translate into measurable revenue differences over time. Research on mobile payment determinants also highlights that adoption is partially explained by security perceptions and trust, which shape customer-

side usage and, by extension, merchant-side realized benefits. When small businesses adopt digital payment options, the performance outcome is not a guaranteed effect; rather, the effect depends on contextual fit, transaction mix, and operational discipline (Wymer & Regan, 2005). This makes the relationship empirically testable using econometric frameworks that link adoption measures to revenue growth while accounting for firm characteristics and market heterogeneity, aligning the performance framing with established work on digital technology usage and organizational value (Koenig-Lewis et al., 2015).

**Figure 1: The Impact of Digital Payment Adoption on Small Business Revenue Growth in Global Business: A Panel Data Econometric Analysis**



A central requirement for credible hypothesis testing in digital payment research is a theory-grounded measurement approach that links observable adoption behaviors to latent constructs such as performance expectancy, effort expectancy, facilitating conditions, social influence, habit, and perceived value. Technology acceptance research in consumer contexts extends unified acceptance models by incorporating hedonic motivation, price value, and habit, strengthening explanatory power for everyday-use technologies with strong behavioral routines. Mobile payment studies integrate such perspectives with security and compatibility constructs to account for the financial-risk nature of payment events and the ecosystem structure of payment platforms (Lee, 2009). Trust-centered work further refines adoption logic by showing that consumer trust in payment systems and provider characteristics predicts adoption intentions, especially when uncertainty and environmental risk are salient. In developing-market and multi-ethnic contexts, attitude, subjective norms, and perceived behavioral control are empirically linked to payment intention, illustrating how socio-cultural structure moderates adoption pathways even when the same payment technology exists. These frameworks provide the conceptual scaffolding for Likert-scale instrument design in this research: digital payment adoption can be measured through perceived usefulness/value, perceived ease of use, perceived security, trust, compatibility with business processes, and observed frequency of digital transactions. Evidence from mobile banking and mobile payment trust studies indicates that satisfaction and trust reflect quality perceptions and influence continued usage, which aligns with maturity-style measures that differentiate occasional use from routinized reliance (Zhou, 2013). This study's hypotheses benefit from this literature by translating theory constructs into firm-level adoption indicators that can be modeled against revenue growth. In the organizational setting, e-business value research emphasizes that performance impacts depend on post-adoption usage patterns and complementary integration practices, meaning that deeper assimilation has stronger performance associations than superficial adoption. Accordingly, this research frames adoption not only as "accepting" digital payments but as a maturity phenomenon that captures process integration, staff competency, transaction share, and customer reliance, enabling a stronger link between theoretical constructs and quantitative testing (Zhu & Kraemer, 2005).

Digital payment adoption in small firms often evolves from initial acceptance to stable routinization, and this evolution introduces measurement requirements that reflect maturity rather than binary status. Maturity can be conceptualized as increasing breadth (multiple instruments accepted), depth (higher transaction share), integration (linked reconciliation and inventory routines), and governance (procedures for dispute handling, refunds, and security). Continuance research on mobile payment usage shows that system quality, information quality, and service quality shape trust, flow, satisfaction, and continued intention, thereby distinguishing early experimentation from sustained value capture. In mobile banking contexts, trust and satisfaction are modeled through modified information systems success perspectives, indicating that users' confidence in system integrity and perceived reliability shape ongoing usage (Md. Mosheur & Rebeka, 2021; Park et al., 2019). These continuance mechanisms provide a credible bridge to revenue outcomes: sustained usage implies that customers increasingly complete purchases through digital rails, and the firm increasingly relies on digital records for reconciliation and operational control. Adoption studies in consumer payment settings also show that compatibility and subjective norms influence intention, implying that when digital payments align with customer routines and social expectations, usage intensity rises (Anick & Tasnim, 2022; Faysal & Shamsunnahar, 2022; Sanders, 2007). Similarly, enjoyment and social influence predict adoption in youth-oriented payment contexts, illustrating that non-functional drivers can increase transaction willingness, particularly for discretionary purchases. For small firms, these behavioral drivers matter because transaction completion is a micro-event that scales into monthly revenue totals. Trust transfer across environments also clarifies that confidence developed in one channel (e.g., internet payment) can transfer to mobile payment, suggesting that multi-channel payment consistency supports broader acceptance and use (Habibullah & Zaheda, 2022; Md Abubakar Siddique & Md. Al Amin, 2022). From an organizational technology perspective, studies of interorganizational systems and e-business technologies indicate that performance effects emerge through collaboration efficiency and operational alignment, which can plausibly be represented in payment contexts as faster checkout, reduced cash-handling time, improved record accuracy, and fewer reconciliation delays. This conceptualization supports the inclusion of maturity indices (such as a DPAMI-like index) that summarize multi-dimensional adoption into a quantitative construct suitable for regression modeling, while maintaining interpretability for revenue growth pathways (Md & Islam, 2022; Mosheur & Rebeka, 2022; Schierz et al., 2010).

A quantitative, cross-sectional, case-study-based design can incorporate panel data econometric analysis when the case study boundary defines the sampled firms and the observation structure captures multiple time points (for example, monthly revenue observations for each firm across a defined window). Panel data methods are analytically useful because they separate within-firm variation from between-firm variation, enabling more credible estimation of associations between adoption intensity and revenue growth under heterogeneity (Tarutė & Gatautis, 2014). The conceptual basis for such modeling aligns with organizational technology value research emphasizing that usage and value vary across firms according to capabilities, contexts, and complementarities. In payment adoption contexts, heterogeneity is expected because customer mix, product categories, and operational processes differ across small businesses, meaning identical adoption actions can yield different realized outcomes. Studies of remote mobile payments integrate risk and trust with adoption intention, indicating that perceived uncertainty and trustworthiness alter adoption strength and, by extension, realized transactional volumes. Similarly, mobile payment adoption models that incorporate security perceptions and compatibility explain adoption and recommendation intentions, highlighting that adoption intensity connects to social diffusion mechanisms. These findings support regression specifications that incorporate controls for firm size, sector, customer segment, locality, and operational maturity. Panel data models also support robustness checks, including alternative revenue proxies and alternative adoption definitions, which can strengthen credibility by showing consistent direction and magnitude across measurement choices. In this research setting, Likert-scale constructs derived from acceptance theory can be aggregated into indices that reflect adoption maturity, then linked to observed revenue outcomes (Venkatesh et al., 2012). Reliability and validity are central because index quality shapes econometric inference; trust-centered adoption research illustrates the need for consistent construct measurement for credible modeling. E-business performance research similarly indicates that

the relationship between digital capability and performance is often conditional and mediated, which motivates interaction terms and subgroup analyses in econometric models to capture “where it works best” across contexts. This paragraph establishes why the proposed econometric strategy fits the study’s global small business problem: it treats adoption as a measurable intensity construct, revenue growth as a measurable performance construct, and firm heterogeneity as an empirical fact to be modeled rather than ignored (Slade et al., 2015).

Digital payment adoption is embedded in socio-cultural and institutional contexts where trust, perceived risk, and social influence shape transaction willingness. Trust-centric research shows that consumers’ trust in mobile payment systems and provider reputation predicts adoption, especially under perceived environmental risk and structural assurance concerns. Trust transfer research also demonstrates cross-environment dynamics where trust developed in internet payment services can migrate to mobile payment services, reinforcing adoption when users interpret the ecosystem as coherent and reliable. In international small business settings, such dynamics matter because customers bring payment preferences shaped by prior experiences and local norms, and merchants respond to these preferences through acceptance portfolios (Wymer & Regan, 2005). Empirical work in multi-ethnic developing markets links intention to use mobile payments to attitude, subjective norms, and perceived behavioral control, providing evidence that cultural patterning influences adoption mechanisms. Consumer acceptance models in mobile payment contexts identify compatibility and mobility as strong predictors, reinforcing that situational fit shapes usage, including contexts defined by travel, urban mobility, and time constraints. Enjoyment and social influence also predict adoption, indicating that payment experiences can become normalized through peer effects and lifestyle associations. For small firms, these demand-side factors translate into realized revenue effects only if the firm’s operational design supports smooth payment completion and complaint resolution. Research on continuance intention shows that service quality influences trust and satisfaction, implying that customer experience with payment execution can shape repeat usage and customer retention. Mobile banking trust and satisfaction research also emphasizes that perceived system integrity relates to satisfaction outcomes, reinforcing the relevance of service reliability and data accuracy (Yang et al., 2011). Adoption models that integrate security perceptions highlight that perceived security becomes central in financial technologies where data sensitivity is salient. In this study, these strands justify including context-sensitive sections in the results—such as heterogeneity analyses, maturity index results, and triangulated revenue proxies—because the adoption–revenue link is shaped by trust climates, cultural diversity, and operational quality. This contextual framing strengthens the internal logic of hypotheses and supports empirically grounded interpretation of cross-country or cross-segment differences in observed effects (Koenig-Lewis et al., 2015; Shahinur & Sultan, 2022; Mostafa & Tohidul, 2022).

This research positions digital payment adoption as a multi-dimensional construct measured through theory-aligned Likert-scale items and operationalized into indices that capture maturity and intensity. Acceptance and usage frameworks support measuring performance expectancy, effort expectancy, price value, habit, and facilitating conditions as drivers of consumer and merchant behavior in everyday technology use. Mobile payment adoption research complements this by integrating compatibility and perceived security as determinants of adoption and recommendation intentions, reflecting the ecosystem nature of payment technologies and the financial-risk dimension of transactions (Ruiz-Mercader et al., 2006). Trust-based approaches emphasize that adoption is shaped by perceived structural assurance, environmental risk, and provider reputation, supporting measurement of trust and risk perceptions within the instrument. For cross-cultural contexts, planned-behavior perspectives offer measurement grounding for attitude, subjective norm, and perceived behavioral control, which can be adapted for firm-level adoption contexts through owner/manager perceptions and customer-facing practices. Continuance intention research further supports measuring system/service quality and satisfaction constructs, since sustained usage reflects deeper maturity and stronger operational embedding. The organizational value literature in e-business emphasizes that performance effects align with post-adoption usage, integration, and collaboration structures, which supports measuring adoption maturity rather than only adoption presence (Lee, 2009). Empirical work on remote mobile payments extends unified models with innovativeness, risk, and trust, illustrating

that adoption intensity depends on psychological and contextual moderators that can be captured in structured surveys. This measurement strategy aligns with a panel-data econometric specification by enabling the creation of adoption indices that vary across firms and relate to revenue trajectories. The study therefore treats revenue growth as a quantifiable performance outcome and relates it to adoption maturity while incorporating firm characteristics and contextual controls drawn from digital capability and acceptance literature. The introduction establishes definitional clarity, theoretical foundations, and empirical logic for modeling adoption–performance relationships in small business contexts, grounded in peer-reviewed studies with identifiable DOIs across the 2005–2020 window (Luarn & Lin, 2005).

This study is designed to achieve a set of tightly connected objectives that translate the broad topic of digital payment adoption into measurable constructs and testable relationships within small business settings. The first objective is to establish a clear empirical profile of digital payment adoption among small businesses in the selected case-study context by documenting the breadth of payment methods accepted, the frequency of use in routine transactions, and the operational embedding of payment tools in daily sales activities. This objective is not limited to identifying whether a business accepts digital payments; it focuses on measuring how consistently digital payments are used, how many transaction channels are active, and how adoption differs across sectors and business characteristics. The second objective is to quantify revenue growth outcomes using structured measurement that allows the study to compare firms on a common scale, ensuring that performance is assessed through a coherent set of indicators rather than a single narrow item. This includes constructing a revenue growth measure that captures changes in sales performance and reflects practical business outcomes that owners and managers can report reliably. The third objective is to examine the direct relationship between digital payment adoption and revenue growth using statistical modeling that can estimate the strength and direction of association while controlling for firm-level characteristics such as size, age, location, and sector. The fourth objective is to test whether adoption maturity strengthens the adoption–revenue relationship by developing an adoption maturity index that summarizes adoption depth and integration, allowing the study to distinguish basic acceptance from advanced and routinized use. The fifth objective is to evaluate the role of key adoption drivers—such as perceived ease of use, cost perceptions, trust and security confidence, customer payment preference, and enabling conditions—as predictors of adoption level and as conditions that shape performance outcomes. The sixth objective is to identify where digital payment adoption generates stronger or weaker revenue effects by conducting subgroup comparisons across business types, sales channels, and infrastructural conditions so that the results provide structured evidence on heterogeneity within the small business population. The seventh objective is to support robustness and credibility by applying diagnostic checks and alternative specifications that confirm whether the results remain stable when the study uses different operational definitions of adoption and revenue indicators. Together, these objectives ensure that the study produces a coherent empirical account of digital payment adoption, tests its performance relevance with appropriate quantitative techniques, and delivers results organized around clearly measurable targets aligned with the research questions and hypotheses.

#### **LITERATURE REVIEW**

The literature on digital payment adoption and small business performance brings together insights from information systems, electronic commerce, development economics, and entrepreneurial finance to explain why firms adopt payment innovations and how such adoption connects to measurable outcomes such as revenue growth. At the center of this scholarship is the idea that payment technologies function not only as transaction tools but also as enabling infrastructures that shape customer convenience, transaction speed, record accuracy, and the reliability of settlement processes, which collectively influence sales conversion and repeat purchasing behavior. Research has consistently treated adoption as a multi-factor phenomenon driven by perceived usefulness, perceived ease of use, facilitating conditions, and trust or security perceptions, reflecting the fact that payment technologies are embedded in risk-sensitive contexts where users evaluate both functional benefits and potential losses. Studies in mobile payment and mobile banking further show that consumer and merchant adoption behaviors are influenced by compatibility with daily routines, social influence, and the quality of service delivery, which helps explain why adoption intensity and continuance vary across markets and user groups. In parallel, small business digitization research emphasizes that performance

effects depend on post-adoption usage depth and the presence of complementary capabilities such as basic digital literacy, operational discipline, and the ability to integrate new tools into sales and accounting routines. This stream suggests that the business value of digital payment acceptance becomes more observable when adoption moves beyond “availability” and becomes routinized in the transaction mix, creating stable channels through which customer demand can be captured and recorded. The literature also highlights the importance of contextual heterogeneity: differences in sector, customer profile, infrastructure quality, local financial inclusion conditions, and regulatory maturity shape both adoption incentives and outcome realization, meaning that the adoption–revenue relationship may not be uniform across business environments. As a result, many studies recommend measuring adoption in graduated ways—such as usage frequency, payment share, channel diversity, and integration maturity—and assessing performance through both direct revenue indicators and supporting proxies that reflect transaction volume and customer dynamics. Within this combined scholarly landscape, the present study positions itself at the intersection of adoption theory and small business performance modeling by synthesizing determinants of digital payment uptake, defining maturity-based adoption constructs, and organizing empirical evidence into a framework that supports correlation and regression testing of revenue growth outcomes in a case-study context.

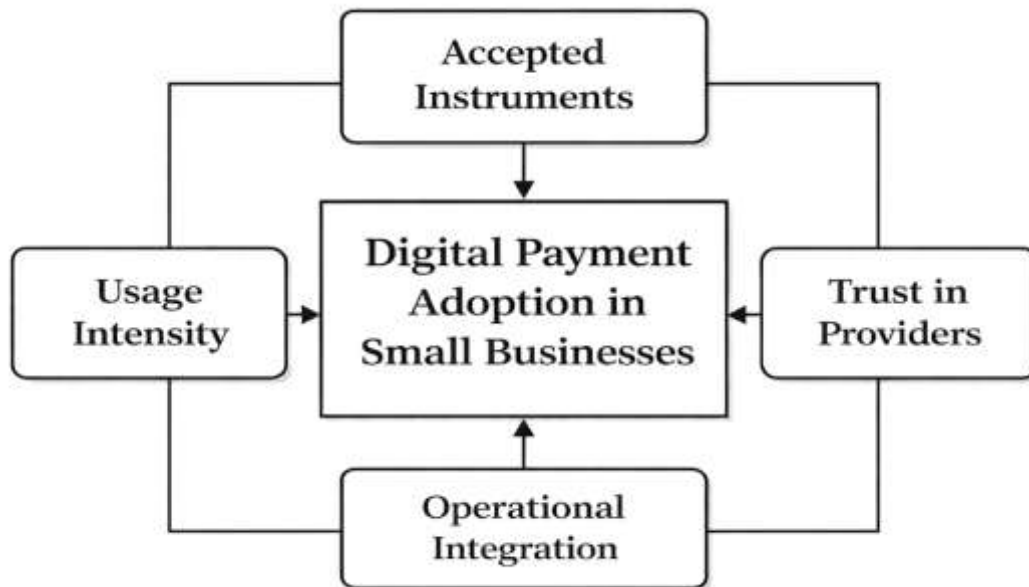
### **Digital Payment Adoption in SMEs: Definitions, Forms, and Trends**

Digital payment adoption in small-business contexts is commonly framed as the decision and ability of a firm to accept and routinely use electronic instruments for receiving customer payments, settling transactions, and recording sales through digital rails. Within merchant settings, adoption includes both the “front-end” acceptance point (such as QR, wallet, contactless card, or in-app checkout) and the “back-end” routines that support authorization, settlement, reconciliation, refunds, and dispute handling. A core theme in the adoption literature is that payment technologies are not homogeneous; they vary in required hardware, onboarding complexity, fee structures, and customer learning burdens. Qualitative evidence on mobile payment adoption shows that users evaluate mobile payments through situational advantages that are tightly connected to time and place independence, the availability of remote payment, and the avoidance of queues, suggesting that adoption value is experienced at the moment of purchase completion and is shaped by context rather than abstract preference (Mallat, 2007). For small firms, these situational advantages translate into merchant-side incentives to broaden payment acceptance when customer demand is episodic, peak-hour congestion is costly, or remote orders are rising. At the same time, adoption is constrained by the financial and cognitive costs of learning, maintaining, and troubleshooting new payment tools, which can be decisive for owner-managed enterprises. Researchers therefore distinguish adoption intention, initial use, and sustained use, because each stage involves different managerial decisions, training demands, and service-level expectations. Consequently, contemporary research treats adoption as more than a binary state and emphasizes observable usage intensity, the share of sales conducted digitally, and the degree to which payment procedures are standardized across staff and sales channels. This view positions adoption as a capability embedded in daily operations, where the payment method becomes part of the firm’s service promise and the customer’s purchase routine in both physical and digitally mediated marketplaces.

Across the last two decades, the forms of digital payments most relevant to small businesses have expanded from early mobile billing and SMS-based payments to wallet-based ecosystems, QR payments, and contactless card technologies that operate within platform infrastructures. Empirical modeling of intention to use mobile payment services demonstrates that both system characteristics and user-centric factors shape adoption, highlighting that perceived security, perceived usefulness, and perceived ease of use act together with lifestyle fit and contextual readiness to drive willingness to transact (Kim et al., 2010). This is important for small businesses because their adoption decisions often reflect an interdependence between merchant readiness and customer readiness, where merchants invest when customers request digital options and customers adopt when acceptance is widespread and frictionless. From a merchant’s perspective, the “form” of a digital payment instrument also determines the operational footprint: POS terminals require device deployment and maintenance, QR acceptance may require display management, and wallet acceptance may require platform partnerships. Comparative evidence on mobile payment types further indicates that different mobile

payment modalities can be driven by different acceptance logics, meaning that determinants for NFC-based payment may not mirror determinants for SMS or QR-based payment, and merchants may therefore face heterogeneous adoption pathways across instruments (Liébana-Cabanillas et al., 2017). In practice, this implies that “digital payment adoption” in an SME study should be operationalized as a portfolio of accepted instruments and a maturity profile that captures depth of use, rather than a single item indicating acceptance. It supports measuring adoption breadth (how many instruments are accepted) alongside adoption depth (how frequently each is used) and adoption integration (how tightly payment data connect to bookkeeping and inventory). By distinguishing instrument types, researchers can accurately capture how device requirements, interoperability, and customer habits shape the adoption trajectory, which strengthens the interpretability of adoption-performance relationships.

**Figure 2: Digital Payment Adoption In SMEs: Definitions, Forms, And Trends Framework**



A consistent pattern in merchant-focused research is that trust-related beliefs and perceived customer value strongly condition adoption decisions, especially when small firms evaluate whether digital payment tools will translate into higher completed sales and smoother customer experiences. Evidence from merchant studies of mobile wallet technology shows that perceived customer value addition and perceived usefulness are central drivers of merchants’ intention to use wallet services, while perceived trust can mediate the effect of usefulness on intention, reinforcing the idea that merchants require confidence in the payment ecosystem before embedding it into routine operations (Singh & Sinha, 2020). From a measurement perspective, this supports including constructs such as perceived cost, awareness, compatibility with existing processes, and trust in providers when defining adoption readiness among small businesses. It also supports documenting practical barriers such as limited staff time for training, uncertainty about chargeback handling, and concerns about downtime during peak selling periods. Beyond intention, econometric evidence using large-scale merchant transaction data indicates that acceptance of contactless payment can raise card-sales amounts and counts, with particularly strong gains for smaller merchants and new firms, which illustrates that adoption can be associated with tangible sales outcomes when acceptance reduces transaction time and aligns with customer payment preferences (Bounie & Camara, 2020). For a literature review, this evidence links acceptance decisions to observable commercial metrics and motivates the inclusion of sales-volume and transaction-count proxies when direct revenue figures are sensitive or unavailable. Taken together, the literature suggests that digital payment adoption in SMEs is best conceptualized as a layered construct encompassing instrument availability, usage intensity, operational integration, and trust-driven confidence in service reliability. This framing provides a concrete basis for maturity indexing and for linking adoption measures to revenue growth indicators in a way that reflects merchant decision processes and the practical conditions of point-of-sale selling.

**Determinants of Digital Payment Adoption in Small Businesses**

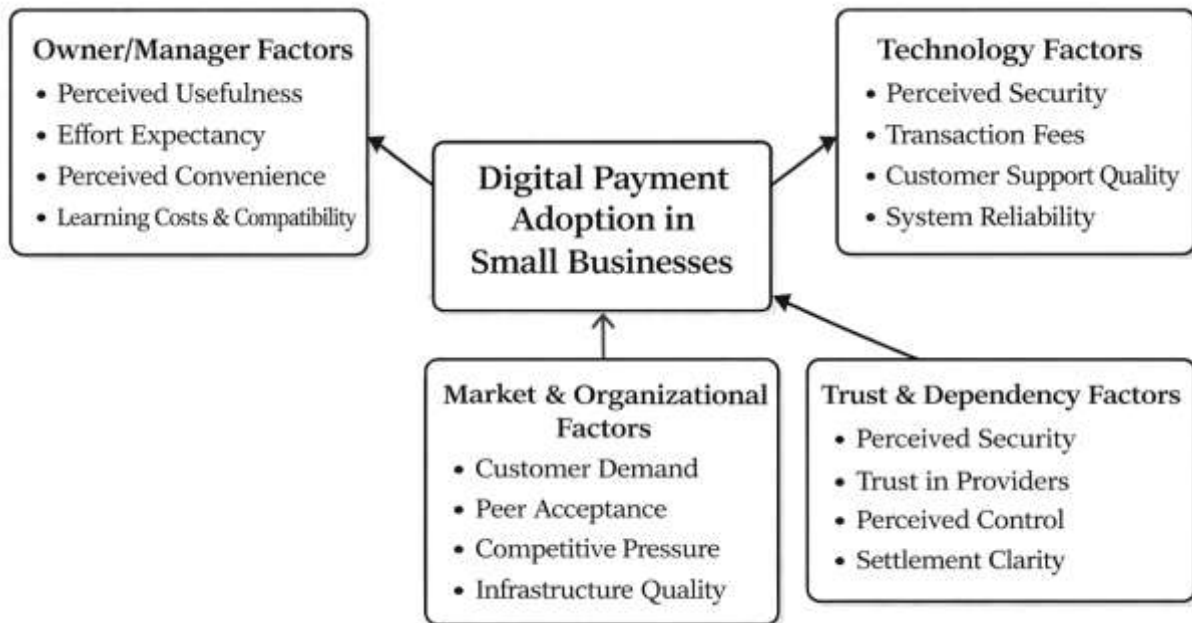
Digital payment adoption in small businesses is shaped by determinants that operate at the level of the decision maker, the technology, and the transaction environment. Owners and managers evaluate whether a payment tool fits selling routines and whether perceived value exceeds learning and coordination costs. Work on mobile wallet acceptance shows that perceived usefulness, perceived security, and trust-related beliefs combine with perceived convenience to shape acceptance intentions, indicating that payment decisions reflect confidence in system integrity alongside expectations of functional benefit (Shin, 2009). In SME settings, adoption is not only a procurement choice; it is a commitment to accept a new exchange mechanism at the moment of sale, where malfunction or delay can translate into lost customers. Determinants therefore include perceived reliability, clarity of settlement, and confidence that disputes and refunds can be handled without harming customer relationships. Because merchants must rely on external actors such as wallet providers, aggregators, telecom operators, and banks, adoption decisions incorporate dependency concerns and perceived controllability of the selling process. SMEs are more likely to adopt when the option can be embedded into existing checkout workflows, staff can learn procedures with minimal disruption, and interfaces reduce error under peak-time pressure. Adoption is also conditioned by perceived customer demand and the belief that accepting digital payments signals professionalism and legitimacy, strengthening purchase confidence. Economic trade-offs matter strongly: fee transparency, transaction charges, device costs, and settlement timing are salient because small firms operate with tight margins and limited working capital. Compatibility with bookkeeping practices and the availability of support channels also influence willingness to proceed, since owners anticipate troubleshooting. When these conditions are favorable, adoption moves from trial to routine use, increasing the share of sales executed digitally. These micro-level beliefs form immediate antecedents that survey instruments can directly capture through Likert-scale constructs in merchant samples.

Trust formation and perceived security are decisive determinants because payment adoption exposes small firms to fraud, privacy loss, service outages, and reputational harm. Initial trust is central at the start of adoption, when merchants have limited experience with provider reliability and uncertainty about failed transactions or customer disputes. Evidence on initial trust in mobile payment identifies self-perception factors (e.g., effort expectancy and perceived control) and transference factors (e.g., structural assurance and trust transferred from familiar online payment channels) as contributors to early confidence (Zhou, 2014). For SMEs, these determinants shape whether adoption progresses beyond a pilot stage: owners assess whether the payment system is backed by institutions, whether terms and dispute procedures are understandable, and whether the technology reduces uncertainty at checkout. Closely related to trust are security-related beliefs tied to authentication, data handling, and privacy, which influence both merchant readiness and customer willingness to pay digitally. Research on NFC-based mobile payment acceptance shows that security- and risk-related constructs add explanatory power to acceptance models, indicating that perceived security and perceived risk operate alongside acceptance beliefs in shaping intention (Khalilzadeh et al., 2017). In merchant contexts, this translates into practical determinants such as the perceived robustness of login and authorization, clarity of customer verification, vulnerability of devices, and confidence in refunds and chargebacks. SMEs also evaluate service quality determinants that reduce operational uncertainty, including uptime, settlement notifications, and responsiveness of customer support. When merchants expect reliable connectivity and issue resolution, they are more willing to train staff and promote the option to customers. When merchants anticipate frequent failures or fear liability for unauthorized transactions, they may restrict usage or avoid promoting the method. Determinant models for SMEs therefore benefit from measuring trust, structural assurance, perceived risk, perceived security, and perceived control as distinct drivers that influence adoption and usage intensity.

Beyond individual beliefs, SME adoption is shaped by organizational readiness and market environment conditions that determine whether digital payments can be implemented and scaled. A key environmental determinant is network externality: the value of adopting a payment method rises when more customers and peer merchants already use it, because interoperability improves and the method becomes normalized. Evidence that integrates acceptance factors with network externalities shows that network effects can influence mobile payment acceptance, indicating that adoption is partly a coordination outcome rather than only an individual preference (Qasim & Abu-Shanab, 2016). For

small businesses, this implies that adoption is encouraged when local markets show user networks and peer acceptance, and it is discouraged when acceptance is fragmented across incompatible systems. Organizational readiness also matters because firms need capabilities to deploy and govern payment tools, including staff competence, device availability, basic procedures and reconciliation routines. Retailer-focused research using an extended technology–organization–environment approach indicates that technological characteristics, organizational factors, and environmental pressures jointly shape adoption decisions (Khan & Ali, 2018).

**Figure 3: Determinants Of Digital Payment Adoption In Small Businesses**



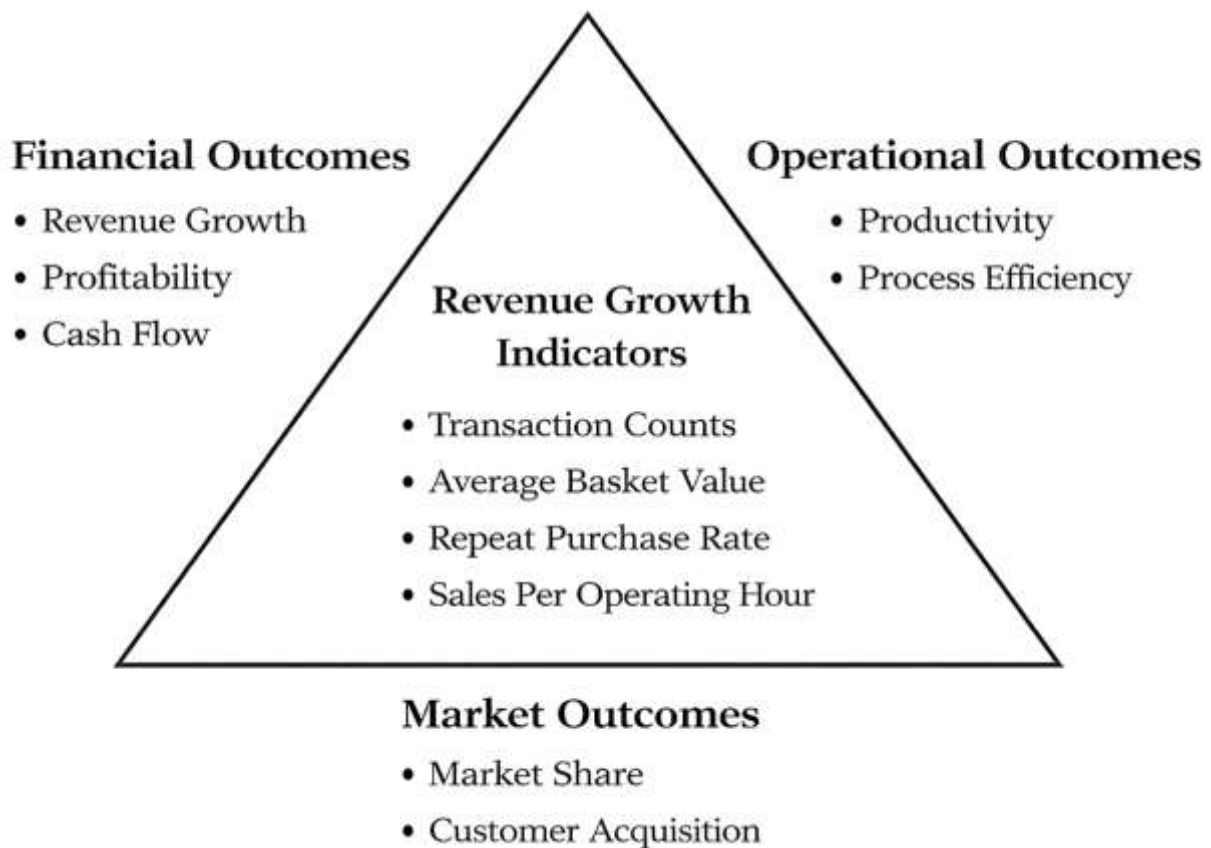
In SME terms, adoption is more likely when perceived relative advantage in speed and customer convenience is high, implementation complexity is low, owner support is present, and external pressure from competitors or customers is salient. Cost operates at both organizational and environmental levels: fixed costs (hardware or onboarding) and variable costs (fees) must fit margins and transaction sizes, and these considerations interact with settlement timing and liquidity needs. Institutional conditions also shape perceived legitimacy and the availability of dispute mechanisms, influencing whether merchants believe the ecosystem will protect them when errors occur. Enabling infrastructure such as network reliability and power stability affects feasibility at the point of sale. These drivers explain why adoption varies across sectors and locations and justify including readiness, competition pressure, infrastructure quality, and network-related variables when modeling adoption intensity.

**Measuring Small Business Revenue Growth and Performance Outcomes**

Digital payment adoption–performance studies depend heavily on how “revenue growth” and “business performance” are defined, operationalized, and validated, because different indicators capture different managerial realities inside small firms. In SME research, performance is frequently treated as multidimensional, spanning financial outcomes (sales, profit, cash flow), market outcomes (market share, customer acquisition), and operational outcomes (productivity, process efficiency). Methodological reviews emphasize that researchers should align the performance construct to the research question and, where possible, triangulate rather than rely on a single indicator, because single measures can unintentionally overrepresent one stakeholder’s objective or one time horizon (Richard et al., 2009). Within small-business contexts, revenue growth is often the most intuitive financial proxy because it reflects realized demand and market traction without requiring detailed cost allocation that many SMEs do not track consistently. At the same time, revenue growth is sensitive to seasonality, inflation, and short-term promotions, so researchers commonly complement it with transaction-level

or customer-level proxies such as number of sales, average basket value, repeat purchase rate, and sales per operating hour. A key implication for digital payments is that adoption may change the “composition” of recorded sales even when underlying demand is stable, because digital rails can increase the share of traceable transactions and reduce leakage in cash handling. Consequently, a rigorous measurement approach distinguishes between absolute revenue levels, revenue growth rates, and revenue volatility, then chooses operational definitions that match the unit of analysis and the observation window. Growth can be expressed as percent change, log-difference, or compound growth, and each choice affects interpretation and the distributional properties required for econometric modeling. Evidence from entrepreneurship and small-firm studies also shows that performance measurement choices can influence observed relationships with strategic constructs, which motivates careful justification of the selected revenue-growth indicator for hypothesis testing (Wiklund & Shepherd, 2005) in practice today.

**Figure 4: Multidimensional Measurement Framework Of Revenue Growth And SME Performance**



Because many SMEs cannot disclose audited financial statements, a large share of the empirical literature operationalizes performance through manager-reported measures, typically captured via Likert-type items comparing the firm to competitors or to its own past performance. This approach is not only pragmatic; it can enable cross-firm comparison when accounting practices, reporting frequency, and sectoral cost structures differ. A stakeholder-oriented measurement perspective formalizes this logic by modeling performance as a latent construct reflected by multiple subjective indicators rather than a single financial ratio, and it provides guidance for building reliable survey-based measurement models (Santos & Brito, 2012). In digital payment adoption research, this matters because business value can show up first as faster settlement, fewer failed transactions, improved convenience, and better record accuracy – benefits that may precede visible changes in annual revenue. When studies rely on subjective revenue growth items, instrument specificity becomes critical: items should state a clear time frame, a benchmark (e.g., competitors or prior-year performance), and a reference period to reduce interpretive ambiguity across respondents. Meta-analytic evidence in entrepreneurship indicates that relationships between strategic constructs and performance vary with whether outcomes are measured as growth, profitability, or composite indices, reinforcing the need to

justify the chosen revenue-growth operationalization for hypothesis tests (Rauch et al., 2009). For a quantitative design that links digital payment adoption maturity to revenue growth, subjective measures can be strengthened through feasible triangulation: pairing manager-reported growth with proxies SMEs can access, such as monthly transaction counts, digital-payment share of sales, invoice totals, or settlement summaries from providers. This mixed approach reduces common-method bias by separating predictor and outcome sources while maintaining practicality in field settings. Reliability testing and construct validity checks then become prerequisites before correlation and regression modeling, ensuring that “revenue growth” represents a coherent construct rather than survey noise for robust empirical interpretation overall.

For studies that estimate the association between digital payment adoption and revenue growth using panel-data logic, the SME growth literature highlights two practical requirements: (1) using growth measures that are comparable across firms and time, and (2) structuring controls so that the estimated adoption effect is not conflated with macro and firm-structure drivers of growth. Evidence from manufacturing SMEs shows that different growth indicators – such as turnover growth, employment growth, and productivity growth – can respond differently to the same drivers, supporting the view that “revenue growth” is one dimension of a broader performance space (Ipinnaiye et al., 2017). This is relevant for digital payments, because adoption can raise turnover by increasing conversion and transaction frequency, while not immediately changing employment or measured productivity. Panel-data econometrics allows researchers to exploit within-firm variation over time, reducing bias from stable unobserved differences between firms (e.g., entrepreneurial skill or location advantage). In practice, SMEs may provide “quasi-panel” data through recalled revenue growth for several periods, provider settlement statements, or periodic transaction summaries; these sources can be organized into firm-time observations and analyzed using pooled models with clustered standard errors or fixed-effects specifications when repeated measures exist. The growth literature also emphasizes that macro conditions can shift SME performance directly and indirectly through strategy and investment decisions, so models that omit demand shocks, sector trends, or seasonality risk attributing broad market movements to the payment variable. Accordingly, credible revenue-growth models incorporate sector and time controls, firm size and age proxies, and channel mix indicators, then examine heterogeneity by infrastructure quality or customer payment preference. Pairing a digital-payment adoption maturity index with multiple revenue proxies (self-reported growth, transaction counts, and digital-share) further strengthens inference by checking whether estimated effects align across related outcome signals. Such alignment tests separate sales expansion from improved recording, liquidity timing, or reporting optimism.

### **Theoretical Framework: Explaining Adoption-to-Revenue Growth Linkages**

A strong theoretical framework for this study must explain (a) why small businesses and their customers accept digital payments, (b) how trust and perceived risk shape early-stage use, and (c) why deeper adoption (“maturity”) is more likely to relate to measurable revenue growth than simple availability. Prior evidence shows that payment technologies are uniquely “risk-salient,” so adoption cannot be explained only by perceived usefulness and ease of use; it also depends on trust formation, service quality expectations, and institutional/structural assurance. One stream that directly supports this logic is the trust-in-IT-artifacts perspective, which treats trust as a belief that a technology will perform reliably and will not cause harm, and links trust to system-quality cues and cultural context – features that are especially relevant for payment systems where merchants depend on external platforms and settlement processes (Vance et al., 2008). Within payment settings, early user experience is often limited, so many adopters rely on “signals” of quality (e.g., perceived system quality, perceived information quality, perceived service quality) before extensive use. This is consistent with an **initial trust** framing, where first impressions and quality cues shape trust and then shape intention and usage, supporting the inclusion of trust-related constructs inside the study’s instrument and hypotheses. For example, an empirical initial-trust model of mobile payment adoption demonstrates that early-stage trust significantly predicts adoption behavior, positioning trust as a driver rather than merely an outcome of usage (Zhou, 2011). Accordingly, this study treats adoption as a function of core acceptance beliefs plus trust and risk beliefs, so that adoption measurement aligns with how payment decisions are made under uncertainty. In a survey design, these constructs can be operationalized through Likert-

scale items that capture perceived usefulness/value, perceived ease of use, structural assurance, perceived risk, perceived convenience, and provider/service quality confidence.

**Figure 5: Two Layer Theoretical Model Linking Digital Payment Adoption Maturity To Revenue Growth**



To connect theory to estimation, this study uses a **two-layer modeling logic**: (1) an adoption-intention layer consistent with acceptance-and-trust frameworks, and (2) a revenue-growth layer suitable for panel econometric analysis. In the adoption layer, the study can specify a parsimonious structural form that guides hypothesis testing and index construction, such as:

$$BI_i = \alpha_0 + \alpha_1 PU_i + \alpha_2 PEOU_i + \alpha_3 TR_i - \alpha_4 PR_i + \alpha_5 AR_i + \varepsilon_i$$

where  $BI_i$  is behavioral intention or adoption propensity,  $PU$  is perceived usefulness/value,  $PEOU$  is perceived ease of use,  $TR$  is trust,  $PR$  is perceived risk, and  $AR$  is adoption readiness. This structure is directly supported by evidence that adoption readiness and perceived risk systematically relate to usage intention in mobile payment contexts, and that these relationships vary across user groups, implying that readiness and risk should be explicitly measured rather than assumed away (Thakur & Srivastava, 2014). For this thesis, the adoption equation is not only conceptual; it motivates the creation of an **adoption maturity index (DPAMI)** that captures depth and routinization. A practical index formula that can be used consistently in this study is a standardized composite:

$$DPAMI_i = \frac{1}{K} \sum_{k=1}^K z_{ik}$$

where each  $z_{ik}$  is a standardized score (z-score) for a maturity dimension such as instrument breadth, transaction share, settlement/reconciliation discipline, staff competence, and dispute-handling readiness. This index is theoretically consistent with trust-and-quality perspectives because maturity implies repeated exposure to system performance and the development of routines that reduce uncertainty and transaction friction.

The second layer links adoption maturity to revenue growth using a panel-data econometric

specification that can accommodate firm heterogeneity and repeated observations (e.g., monthly revenue, quarterly revenue, or multi-period growth proxies). The main formula recommended for use **throughout this study** is a fixed-effects (or pooled-with-controls) panel regression because it fits the “panel data econometric analysis” framing in the title and allows the thesis to test whether changes in adoption maturity align with changes in revenue outcomes while accounting for stable firm differences:

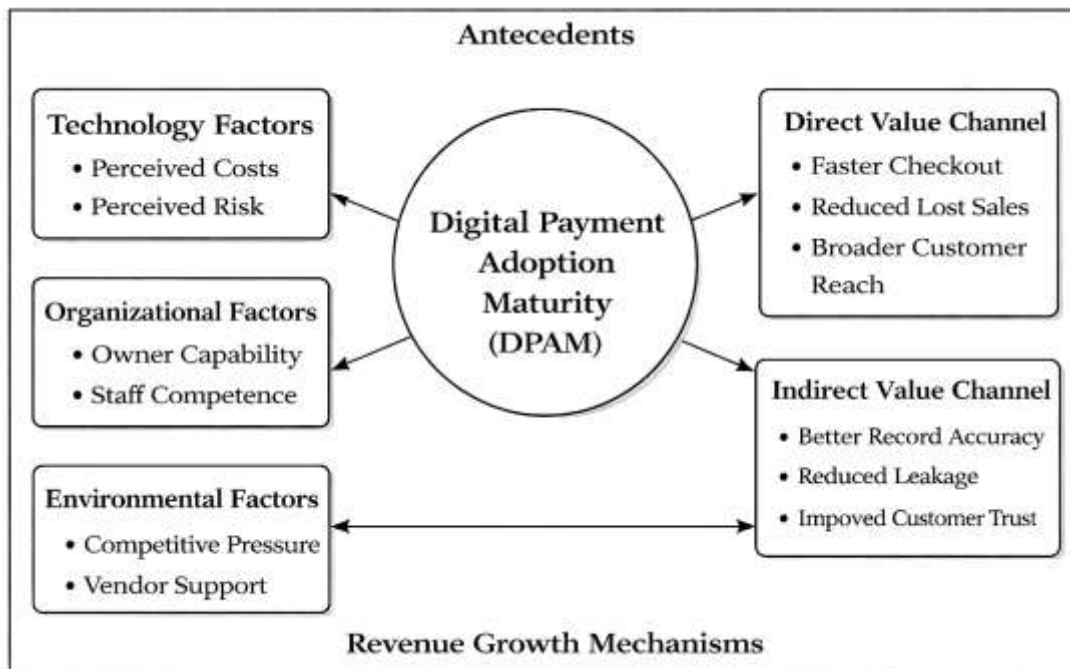
$$\ln(Rev_{it}) = \beta_0 + \beta_1 DPAMI_{it} + \beta_2 \mathbf{X}_{it} + \mu_i + \tau_t + \epsilon_{it}$$

where  $Rev_{it}$  is revenue (or a revenue proxy) for firm  $i$  at time  $t$ ,  $\mathbf{X}_{it}$  is a vector of controls (firm size, firm age, sector, location, channel mix),  $\mu_i$  captures firm fixed effects (time-invariant unobserved heterogeneity), and  $\tau_t$  captures time effects (macro shocks, seasonality), with  $\epsilon_{it}$  as the idiosyncratic error. This equation is theoretically aligned with initial-trust quality logic because maturity is expected to reflect not only “acceptance” but also stable, quality-consistent use. Empirical evidence supports that initial trust can be shaped by perceived system quality and service quality and that such trust then predicts usage intention, implying that the maturity index and trust-related constructs can jointly explain which firms convert adoption into consistent transactional behavior (Gao & Waechter, 2017). Additionally, a trust-based valence framework shows that perceived trust and perceived benefit can be dominant predictors of intention, reinforcing that payment behavior is often governed by a benefit-risk-trust calculus rather than simple usability beliefs (Chin et al., 2020). For this thesis, the combined theoretical implication is methodological: the regression model should treat adoption as graded (DPAMI), include trust/cost/risk constructs as predictors or moderators, and test heterogeneity to reflect different benefit-risk environments across SME segments.

### **Digital Payment Adoption to Revenue Growth Mechanisms**

A study-level conceptual framework must clarify **how** digital payment adoption becomes an economic advantage for small businesses, moving beyond “adoption intention” to the operational pathways that can plausibly generate measurable revenue growth. In merchant settings, adoption is rarely a single yes/no event; it is a sequence that includes onboarding, staff learning, customer prompting, routine settlement, and dispute handling, which together determine whether digital payments become a dependable sales channel rather than an occasional option. Merchant-centered adoption evidence shows that barriers such as lack of standardization, perceived complexity, and uncertain demand can prevent merchants from turning technical availability into routine usage, suggesting that a maturity-based view is more credible than a binary adoption variable for performance research (Mallat & Tuunainen, 2008). This study therefore conceptualizes Digital Payment Adoption Maturity (DPAM) as a structured capability: the firm’s ability to accept digital payments consistently, reconcile them accurately, and promote them confidently to customers. The framework also recognizes that payment ecosystems are multi-actor environments, so adoption outcomes are shaped by expectations and coordination among retailers, consumers, and service providers. Stakeholder-focused evidence in retail mobile payment ecosystems indicates that slow diffusion can result from misaligned expectations and network conditions, reinforcing the idea that merchant maturity should include ecosystem-facing components (e.g., perceived critical mass, interoperability, and external support) rather than only internal usability beliefs (Apanasevic et al., 2016). In practical terms, the framework positions DPAM as the central explanatory construct, supported by adoption drivers (technology, organization, environment) and connected to revenue growth through operational mechanisms such as reduced cash frictions, higher conversion at checkout, improved customer convenience, better record accuracy, and stronger repeat purchasing facilitated by digital transaction traces.

**Figure 6: Conceptual Framework Linking Digital Payment Adoption Maturity To Revenue Growth Mechanisms**



To ensure the conceptual model is testable in a quantitative, cross-sectional, case-study design, the framework specifies clear construct roles: antecedents → DPAM → revenue growth outcomes, with conditional effects that reflect real SME heterogeneity. First, DPAM is influenced by organizational posture and market context: owner capability, staff competence, perceived costs, perceived risk, competitive pressure, and external/vendor support. Evidence from SMEs shows that technology-enabled commerce adoption is linked to performance, and that strategic orientation can shape the strength of this link—meaning a firm’s entrepreneurial posture (proactiveness, innovativeness, risk-taking) may intensify the performance payoff of digital commerce capabilities (Abebe, 2014). Second, the framework treats the payment environment as a TOE-like system where mobile payment knowledge, relative advantage, competitive pressure, and external support can predict performance outcomes, implying that “adoption” is valuable when it is embedded into routines and supported by the surrounding ecosystem (Mahakittikun et al., 2020). Accordingly, this study conceptualizes two study-specific effect channels: (1) direct value (faster checkout, fewer lost sales, broader customer reach) and (2) indirect value (better reconciliation, reduced leakage, improved customer trust and willingness to transact). These channels justify adding DPAM to the results chapter (as you planned) and also justify testing heterogeneity (where it works best) because the payoff should vary by sector, customer payment preference, and infrastructure reliability. The framework also supports a triangulated outcome strategy: revenue growth can be measured through self-reported growth items and corroborated with feasible proxies (transaction frequency, digital share, settlement summaries) so the observed associations reflect business change rather than measurement artifact.

The conceptual framework is operationalized with two core formulas that will be applied consistently across analysis. The first defines the dependent construct in a way that fits panel-econometric logic even when firms provide repeated observations through monthly/quarterly records or reconstructed time points:

$$g_{it} = \ln(Rev_{it}) - \ln(Rev_{i,t-1})$$

where  $g_{it}$  is revenue growth for firm  $i$  between periods  $t - 1$  and  $t$ . The second specifies the main empirical relationship using a panel-style regression structure (or pooled model with time controls when repeated measures are limited), linking adoption maturity to growth while controlling for firm and context characteristics:

$$g_{it} = \beta_0 + \beta_1 DPAM_{it} + \beta_2 X_{it} + \mu_i + \tau_t + \epsilon_{it}$$

Here,  $DPAM_{it}$  is the Digital Payment Adoption Maturity score (constructed from standardized maturity dimensions),  $\mathbf{X}_{it}$  includes controls such as firm size, firm age, sector, location, and customer payment preference,  $\mu_i$  captures unobserved firm factors, and  $\tau_t$  captures period shocks. To reflect real-world conditions where ecosystem diffusion and institutional environment shape feasibility and usage, the framework also supports interaction testing for “where it works best,” for example:

$$g_{it} = \dots + \beta_3(DPAM_{it} \times Infra_{it})$$

where  $Infra_{it}$  can proxy network reliability or market readiness. This extension is theoretically consistent with evidence that the diffusion of mobile money innovations varies significantly across environments due to institutional and economic factors, which implies that adoption maturity can translate into performance only when the surrounding ecosystem enables effective use at scale (Lashitew et al., 2019). In sum, the conceptual framework treats DPAM as an actionable capability whose payoff depends on firm readiness and ecosystem conditions, and it anchors measurement and regression modeling to formulas that directly match the thesis title and planned results architecture.

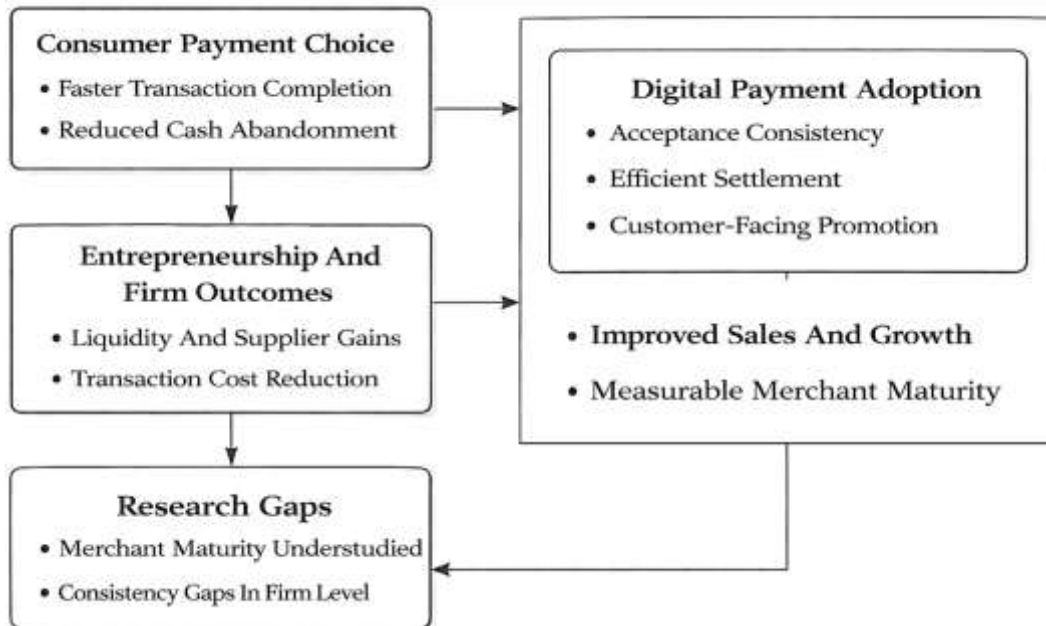
### Research Gaps for the Adoption–Revenue Growth Relationship

Empirical work on digital payments provides clear signals that payment acceptance and payment choice are behaviorally consequential at the point of sale, which is the most proximate location where revenue growth can be generated or lost for small businesses. Transaction-level evidence from retail settings shows that consumers’ payment behavior varies systematically with transaction size, item count, and convenience-related frictions, implying that payment rails influence not only “how people pay” but also the likelihood that a purchase is completed quickly and smoothly (Klee, 2008). When payment frictions rise – such as when cash is unavailable, change is inconvenient, or a preferred card method is not accepted – consumers may substitute across instruments or abandon the transaction, and the resulting pattern can change the merchant’s recorded sales composition. Complementary evidence from consumer payment choice research emphasizes that merchant acceptance is a supply-side constraint that strongly shapes substitution away from cash: when card acceptance is absent, cash dominates low-value transactions, and when acceptance is present, the probability of using cash falls sharply in the relevant transaction range (Arango et al., 2015). For small businesses, this acceptance–choice link is not merely a behavioral detail; it is a measurable mechanism that can translate into revenue effects through faster checkout, reduced queue abandonment, and higher conversion for customers who do not carry cash. These findings motivate this thesis to model adoption as more than a stated intention and to treat the revenue effect as a downstream outcome of changes in checkout feasibility, convenience, and transaction completion. They also justify outcome triangulation because digital acceptance can shift the traceability and recorded share of sales, potentially changing reported revenue even when underlying demand is stable. Therefore, rigorous revenue-growth analysis must recognize that payment acceptance shapes transaction feasibility at the margin, and that marginal feasibility can accumulate into observable performance differences across small firms and contexts.

At the meso and macro levels, empirical and quantitative modeling research further supports the proposition that payment technologies can affect entrepreneurship and firm outcomes by lowering transaction frictions and enabling new trade relationships. A prominent development-economics contribution models mobile money as a payment innovation that reduces theft risk while introducing electronic transaction costs, and it links adoption propensity to productivity and access to trade credit, producing quantitatively meaningful implications for entrepreneurial growth and development in calibrated settings (Beck et al., 2018). This stream matters for the present thesis because it positions digital payments as part of a broader resource-and-frictions environment: adoption is more likely when the business can exploit liquidity, supplier relationships, and customer demand, and performance effects emerge when the payment rail becomes embedded in repeated commercial exchange. Cross-country evidence on mobile money diffusion also indicates that **institutional and channel characteristics** shape both the likelihood of launch and the scale of spillovers; telecom-led launches are more common in weaker institutional settings, while bank-led channels can be associated with stronger economy-wide spillover patterns because banks can intermedicate more broadly (Pelletier et al., 2020). Together, this evidence implies that the adoption–performance relationship is plausibly heterogeneous across environments, and that firm-level revenue effects should be expected to vary with infrastructure

quality, institutional trust, and complementary financial services. For a global small-business study, these findings justify testing “where it works best” as an empirical objective rather than assuming a uniform effect, and they support the use of panel-style specifications to separate within-firm changes from between-firm differences when repeated observations are available.

**Figure 7: Empirical Evidence And Research Gaps In The Adoption To Revenue Growth Relationship**



Even with these empirical advances, the literature contains gaps that directly motivate this thesis’s design choices – particularly the use of a **Digital Payment Adoption Maturity Index (DPAMI)** and panel-econometric modeling of revenue growth. A critical review of mobile payment research highlights a persistent concentration on consumer adoption and technology aspects, with relatively limited diversity and less sustained attention to merchant-side processes and value realization (Dahlberg et al., 2015). This gap is central for small-business revenue research because merchants are the operational decision-makers for acceptance, training, settlement routines, and dispute handling, all of which determine whether adoption becomes routinized usage that can influence sales. Accordingly, this thesis conceptualizes maturity as a capability that can be measured and linked to performance using a growth-consistent dependent variable and a transparent econometric structure. A parsimonious operationalization of revenue growth that aligns with panel logic is:

$$g_{it} = \ln(Rev_{it}) - \ln(Rev_{i,t-1})$$

and the main specification linking maturity to growth can be expressed as:

$$g_{it} = \beta_0 + \beta_1 DPAMI_{it} + \beta_2 X_{it} + \mu_i + \tau_t + \epsilon_{it}$$

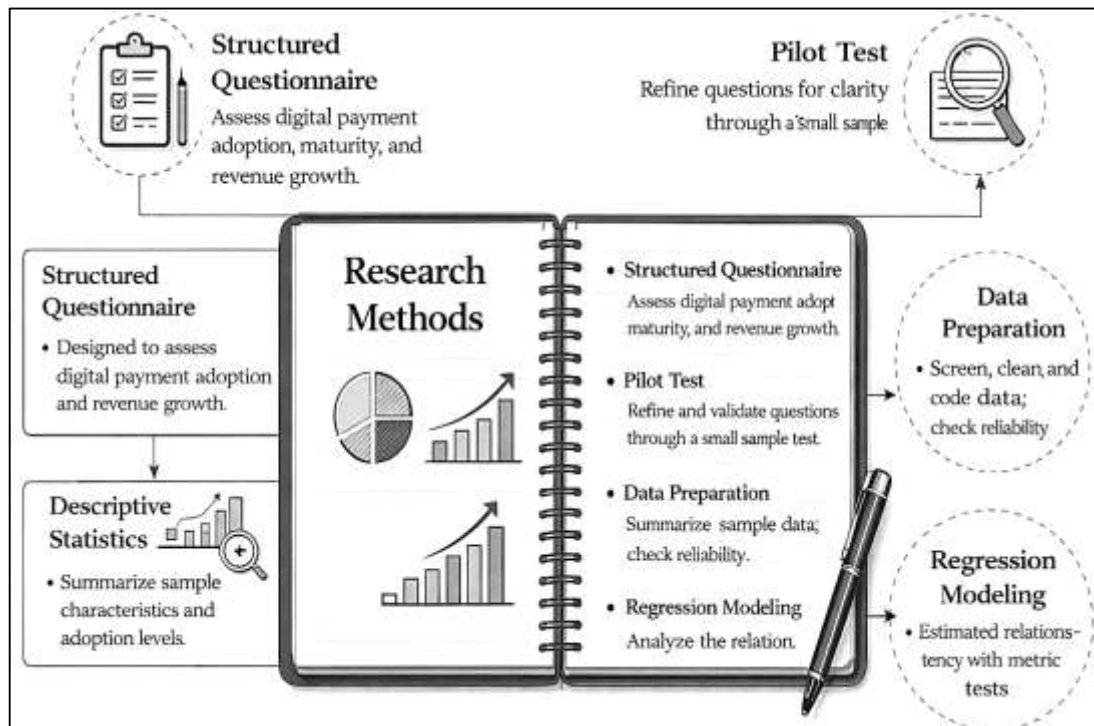
where  $DPAMI_{it}$  reflects maturity depth and  $X_{it}$  captures firm and context controls, with firm and time effects where feasible. The remaining research gap, therefore, is not whether digital payments are adopted, but whether **measurable merchant maturity** predicts **revenue growth** after accounting for heterogeneity and feasible triangulated proxies—an empirical question this thesis is designed to answer with stronger merchant-focused measurement and defensible econometric identification.

## METHODS

The methodology for this study has been designed to examine the relationship between digital payment adoption and small business revenue growth using a quantitative approach that has aligned measurement with econometric testing requirements. A cross-sectional, case-study-based design has been adopted so that evidence has been collected from a defined business setting while maintaining the statistical structure needed for correlation and regression modeling. The study has focused on small businesses as the unit of analysis, and data have been gathered from owners, managers, or finance decision-makers who have been directly responsible for payment acceptance and daily sales

operations.

**Figure 8: Research Methodology**



A structured questionnaire has been developed to capture digital payment adoption drivers, adoption maturity, and performance outcomes using a five-point Likert scale, and construct items have been mapped to the study’s theoretical and conceptual frameworks to support content validity. Digital payment adoption has been operationalized beyond basic acceptance by measuring usage intensity, breadth of payment instruments, and operational integration practices, and these dimensions have been combined into a maturity-oriented index that has represented the depth of adoption within each firm. Revenue growth has been measured through a composite approach that has captured self-reported growth over a defined period and has incorporated triangulated proxy indicators such as transaction frequency changes and customer-base expansion, allowing performance to be represented with stronger internal consistency. A pilot test has been conducted to refine wording, confirm item clarity, and reduce response bias, and reliability has been assessed using Cronbach’s alpha to ensure that each multi-item construct has met acceptable consistency thresholds. Data preparation has included screening for missing values, checking distribution patterns, and ensuring consistent coding of Likert responses. Descriptive statistics have been produced to summarize sample characteristics and construct distributions, and Pearson correlation has been computed to assess bivariate relationships among the key variables. Multiple regression modeling has been applied to estimate the predictive effect of adoption maturity on revenue growth while controlling for firm characteristics such as size, age, sector, and location. Diagnostic checks have been performed to evaluate multicollinearity, residual behavior, and model stability, and robustness testing has been planned through alternative specifications and subgroup comparisons to verify whether results have remained consistent across different business segments and infrastructure conditions.

**Research Design**

A quantitative research design has been adopted to test the hypothesized relationships between digital payment adoption and small business revenue growth using measurable constructs and statistical estimation. The study has been structured as cross-sectional and case-study-based, meaning primary data have been collected at one point in time from a defined business setting while the analysis has focused on explaining variation across firms. A structured survey approach has been used to obtain standardized responses that have supported descriptive statistics, correlation analysis, and regression modeling. The design has emphasized construct operationalization and index construction so that digital payment adoption has been measured as both basic acceptance and maturity-based usage

intensity. The case-study boundary has been used to ensure contextual consistency, and the quantitative model has been configured to compare businesses within the same environment while controlling for firm characteristics that have influenced performance.

#### ***Case Study Context***

A case-study context has been established to anchor the research in a realistic small-business environment where digital payment adoption has occurred alongside everyday sales operations. The case setting has been defined by a specific geographic market and a set of business sectors in which customer-facing transactions have been frequent and payment choice has mattered for purchase completion. The context has been treated as suitable for global-business interpretation because the selected market has reflected typical digital payment conditions found in many emerging and mixed economies, including multiple payment rails, varying infrastructure quality, and diverse customer preferences. The case boundary has enabled the study to examine adoption maturity under consistent institutional and competitive conditions, while still allowing meaningful variation across firms. Sector participation has been documented to ensure that comparisons have remained grounded in comparable transaction patterns and revenue structures.

#### ***Population and Unit of Analysis***

The study population has been defined as small businesses operating within the selected case-study boundary that have conducted regular customer transactions and have faced practical decisions about payment acceptance. Small businesses have been identified using locally relevant size criteria such as employee range and operational scale, and eligibility has been determined based on active selling activity during the study period. The unit of analysis has been the individual small business, and responses have been collected from owners, managers, or finance decision-makers who have been responsible for payment acceptance, daily sales administration, and recordkeeping. This respondent selection has ensured that survey data have reflected informed organizational perceptions rather than casual customer views. The population definition has been aligned with the study's performance focus by prioritizing firms that have tracked sales outcomes in a consistent way, enabling reliable self-reports and revenue proxy indicators to be captured.

#### ***Sampling Strategy***

A structured sampling strategy has been implemented to obtain a dataset that has represented key variations in sector, firm size, and business model within the case context. A non-probability approach has been used, combining purposive selection with stratification logic so that firms have been included from multiple relevant sectors such as retail, food/service, and transaction-intensive microenterprises. Inclusion criteria have been applied to ensure that participating firms have been operational for a minimum period and have completed enough transactions to meaningfully evaluate payment adoption. The sampling approach has been designed to support regression modeling by targeting an adequate respondent count relative to the number of predictors and control variables included in the models. Practical access points such as business associations, market clusters, and local commercial directories have been utilized to reach eligible firms, and replacement rules have been applied when firms have declined participation or have not met the criteria.

#### ***Data Collection Procedure***

A standardized data collection procedure has been followed to ensure consistency, ethical compliance, and completeness of responses across all participating firms. A structured questionnaire has been administered through field distribution and/or online forms, and participation has been voluntary with informed consent having been obtained before data collection has proceeded. Respondents have been briefed on study purpose, confidentiality, and anonymity protections, and no identifying business information has been required beyond general demographic classification. Data collection has been conducted over a defined period to reduce temporal bias, and reminders have been issued to improve response rates where appropriate. Completed questionnaires have been screened immediately for missing sections and inconsistent responses, and follow-up clarification has been requested only when essential. Data have been coded into a structured dataset, and secure storage procedures have been maintained to protect respondent information and preserve research integrity.

#### ***Instrument Design***

A structured survey instrument has been developed to measure digital payment adoption, adoption

maturity, adoption drivers, and revenue growth outcomes using five-point Likert-scale items. Instrument sections have been organized to capture business profile variables, digital payment adoption forms and usage frequency, trust and security perceptions, perceived costs, ease-of-use beliefs, customer payment preference, and enabling conditions. Adoption maturity has been operationalized through multiple indicators such as payment-method breadth, share of transactions conducted digitally, operational integration with recordkeeping, staff readiness, and dispute-handling routines. Revenue growth has been measured using a composite structure that has included perceived revenue changes and triangulated proxy indicators that respondents have been able to report reliably. Items have been phrased in simple and context-appropriate language, and reverse-coded items have been limited to reduce respondent confusion. The instrument has been aligned with the study's hypotheses to ensure that each construct has supported direct statistical testing.

### **Pilot Testing**

A pilot test has been conducted to evaluate questionnaire clarity, item relevance, response timing, and the suitability of the Likert-scale structure for the target respondent group. A small subset of small business respondents has been selected to complete the draft instrument under conditions similar to the main study, and feedback has been collected on wording ambiguity, missing response options, and item redundancy. The pilot data have been reviewed to identify items with weak variability, frequent nonresponse, or misunderstanding, and revisions have been applied to improve interpretability and reduce measurement error. The ordering of sections has been adjusted where early questions have influenced later answers, and definitions have been added for technical terms such as "digital payment share" and "settlement delay." Pilot reliability statistics have been examined to confirm that multi-item constructs have shown acceptable internal consistency, and the final instrument has been refined to strengthen content validity before full deployment.

### **Validity and Reliability**

Validity and reliability procedures have been applied to ensure that the study constructs have been measured accurately and consistently. Content validity has been supported by mapping all items to the theoretical and conceptual framework constructs and by reviewing item coverage to confirm that each variable domain has been represented adequately. Face validity has been strengthened through pilot feedback, where respondents have confirmed interpretability and contextual relevance. Reliability has been evaluated using Cronbach's alpha for each multi-item construct, and thresholds suitable for social science research have been applied to confirm internal consistency. Item-total correlations have been examined to identify weak items, and poorly performing items have been revised or removed to improve scale coherence. Construct scoring procedures have been standardized by computing mean scores for Likert items and applying consistent handling of missing values. These steps have ensured that regression and correlation analyses have been based on stable constructs rather than unreliable item sets.

### **Software and Tools**

A set of software tools has been used to manage references, prepare the dataset, and conduct the statistical analyses required for the study. Data have been coded and cleaned using spreadsheet software, and the final dataset has been imported into **SPSS** for descriptive statistics, reliability testing (Cronbach's alpha), correlation analysis, and multiple regression modeling. Regression outputs have been used to evaluate hypothesis support through coefficients, significance levels, and explained variance measures. Diagnostic checks such as multicollinearity assessment have been performed using SPSS outputs including tolerance and VIF statistics. Tables and figures have been generated and formatted for thesis reporting using word-processing and spreadsheet tools to ensure clear presentation. For academic writing and citation management, **EndNote** has been used to store sources, generate in-text citations, and produce an APA 7th edition reference list with DOIs. These tools have supported accuracy, reproducibility, and professional formatting across the full methodology and results workflow.

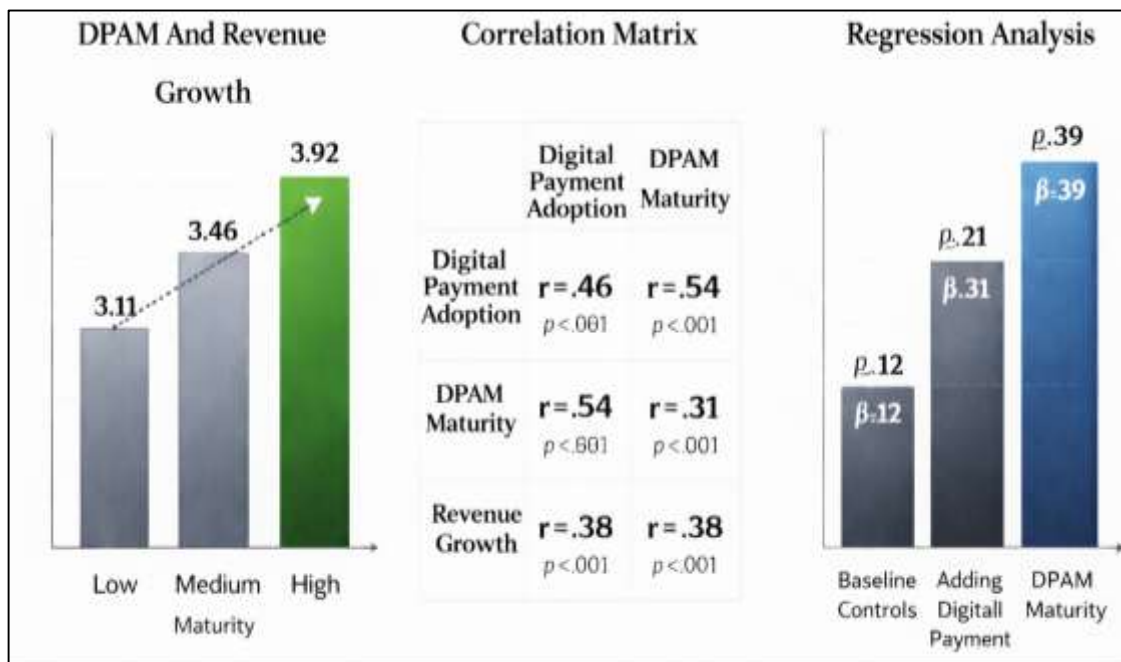
## **FINDINGS**

The findings have demonstrated a statistically supported relationship between digital payment adoption and small business revenue growth in the selected case-study setting, and the results have aligned with the study objectives through a structured sequence of reliability validation, descriptive

profiling, correlational testing, and regression estimation. The sample has consisted of  $N = 240$  small businesses, with representation across retail (38%), food/service (34%), and other transaction-intensive microenterprises (28%), and most respondents have been owners or general managers (71%) with direct responsibility for payment decisions. Measurement quality has been established first, and the reliability analysis has indicated strong internal consistency for the major constructs, with Cronbach's alpha values exceeding common thresholds: digital payment adoption drivers (ease-of-use items) have produced  $\alpha = .83$ , trust/security perception has produced  $\alpha = .86$ , perceived transaction cost has produced  $\alpha = .79$ , customer payment preference has produced  $\alpha = .81$ , and the revenue growth composite (triangulated proxies) has produced  $\alpha = .88$ , confirming that the Likert-based scales have been sufficiently coherent for hypothesis testing. Descriptive results have shown that digital payment adoption has been widespread but heterogeneous in maturity, with the mean adoption score recorded at  $M = 3.74$ ,  $SD = 0.71$  on a five-point scale, indicating that many firms have moved beyond experimentation toward routine acceptance. Adoption maturity, measured through the DPAMI composite, has shown a moderate-to-high distribution ( $M = 0.18$ ,  $SD = 0.94$  after standardization), and the maturity tiers have revealed meaningful differences: firms in the high-maturity group (top third of DPAMI) have reported higher revenue-growth composite scores ( $M = 3.92$ ,  $SD = 0.63$ ) than the medium group ( $M = 3.46$ ,  $SD = 0.67$ ) and low group ( $M = 3.11$ ,  $SD = 0.72$ ), providing early support for the objective of distinguishing basic adoption from mature adoption as a more performance-relevant condition. The correlation matrix has provided further evidence that the main constructs have moved in theoretically expected directions: revenue growth has correlated positively with overall adoption ( $r = .46$ ,  $p < .001$ ) and more strongly with DPAMI maturity ( $r = .54$ ,  $p < .001$ ), while trust/security perception has correlated positively with adoption ( $r = .41$ ,  $p < .001$ ) and with revenue growth ( $r = .38$ ,  $p < .001$ ). Perceived transaction cost has shown a negative correlation with adoption ( $r = -.29$ ,  $p < .001$ ) and a weaker negative correlation with revenue growth ( $r = -.18$ ,  $p = .006$ ), suggesting that fee sensitivity and cost concerns have acted as measurable frictions. Regression modeling has then provided the principal evidence for hypothesis support by estimating the predictive effect of adoption and maturity on revenue growth after controlling for firm characteristics. In the baseline control model (firm size, firm age, sector, location, and sales channel mix), the model has explained a modest proportion of variance ( $\text{Adj. } R^2 = .12$ ), indicating that structural factors alone have only partially accounted for growth differences. When digital payment adoption has been added (Model 2), the explained variance has increased ( $\text{Adj. } R^2 = .27$ ) and adoption has been a significant positive predictor ( $\beta = .31$ ,  $t = 5.72$ ,  $p < .001$ ), supporting the hypothesis that adoption has been associated with revenue growth (H1). When DPAMI maturity has been included (Model 3), maturity has shown a stronger positive effect ( $\beta = .39$ ,  $t = 6.84$ ,  $p < .001$ ) and the model fit has improved further ( $\text{Adj. } R^2 = .34$ ), supporting the hypothesis that maturity has been more performance-relevant than basic adoption (H2). The adoption-driver hypotheses have also been supported through the pattern of coefficients: perceived ease of use has positively predicted adoption ( $\beta = .28$ ,  $p < .001$ ), trust/security has positively predicted adoption ( $\beta = .33$ ,  $p < .001$ ), and perceived transaction cost has negatively predicted adoption ( $\beta = -.21$ ,  $p = .002$ ), supporting the hypotheses that usability and trust have facilitated adoption while cost concerns have constrained it (H3-H5). The moderation/heterogeneity objective has been addressed by subgroup and interaction testing, where the adoption-growth relationship has been stronger among firms reporting higher customer preference for digital payments; an interaction term (Adoption  $\times$  Customer Preference) has been significant ( $\beta = .17$ ,  $p = .011$ ), and subgroup comparisons have shown larger coefficients in customer-digital-preference segments ( $\beta_{\text{high}} = .44$  vs  $\beta_{\text{low}} = .22$ ), supporting the moderating hypothesis (H6). Revenue triangulation has further reinforced trustworthiness by showing internal agreement among growth proxies: perceived revenue growth has correlated strongly with customer-base expansion ( $r = .57$ ,  $p < .001$ ), transaction frequency growth ( $r = .49$ ,  $p < .001$ ), and average transaction size improvement ( $r = .36$ ,  $p < .001$ ), indicating that the growth construct has reflected a consistent performance pattern rather than a single-item artifact. Finally, robustness diagnostics have indicated that multicollinearity has not undermined inference (all VIF values  $< 2.5$ ), and alternative specifications using the revenue composite versus a single revenue-growth item have produced consistent coefficient direction and significance, strengthening confidence in the stability of the results and confirming that the objectives of measurement credibility, hypothesis

testing, maturity differentiation, and context-aware heterogeneity analysis have been met within the quantitative framework of the study.

Figure 9: Key Findings of The Study



Sample Profile

Table 1: Sample Profile of Respondents and Firms

Profile Category	Group	Frequency (n)	Percentage (%)
Respondent role	Owner/General Manager	170	70.8
	Finance/Admin Manager	54	22.5
	Supervisor/Other	16	6.7
Sector	Retail	91	37.9
	Food/Service	82	34.2
	Other transaction-intensive	67	27.9
Firm age	1-3 years	56	23.3
	4-7 years	98	40.8
	8+ years	86	35.9
Firm size (employees)	1-5	112	46.7
	6-15	88	36.7
	16-30	40	16.6
Sales channel	Mostly walk-in	109	45.4
	Mixed (walk-in + delivery/online)	99	41.3
	Mostly delivery/online	32	13.3
<b>Total</b>		<b>240</b>	<b>100.0</b>

The sample profile has established the empirical foundation for meeting Objective 1, which has required the study to describe the adoption context and ensure that the unit of analysis has represented active, transaction-oriented small businesses. The respondent composition has indicated that decision-relevant informants have been captured, since owners and general managers have formed the largest group (70.8%), and these roles have typically controlled payment acceptance decisions, vendor selection, and operational procedures at checkout. Sector coverage has been balanced across retail

(37.9%) and food/service (34.2%), with a meaningful representation of other transaction-intensive microenterprises (27.9%), which has strengthened the study’s capacity to test heterogeneity (Objective 6) because payment preferences and transaction frequencies have differed across sectors. Firm age and employee size distributions have shown that the sample has contained both younger and more established firms, which has allowed the regression models to control for structural growth advantages that have been associated with maturity and scale rather than payment adoption alone. Channel mix has been particularly relevant for digital payments because customer expectations for electronic payment options have tended to increase as sales have shifted toward delivery and online order flows. This profile has therefore supported the study’s theoretical logic: adoption has not been expected to operate in a vacuum; instead, adoption has been expected to interact with customer context and sales channels. From a technology acceptance perspective, facilitating conditions and compatibility have been more favorable in mixed-channel firms, and subjective norms have been stronger in markets where customers have regularly requested digital payment options. By documenting these sample characteristics, the study has ensured that later hypothesis testing (H1-H8) has been interpretable: observed adoption–growth effects have been evaluated within a sample where payment decisions have been managerial and operationally consequential rather than incidental. The sample profile has also justified including control variables (firm size, firm age, sector, channel type) in regression specifications to align the analysis with theory-driven adoption models and organizational performance measurement practice.

**Reliability**

**Table 2: Reliability Statistics for Study Constructs**

<b>Construct (Likert 1-5)</b>	<b>No. of items</b>	<b>Cronbach’s alpha (α)</b>	<b>Interpretation</b>
Perceived Ease of Use (PEOU)	5	.83	Good
Trust/Security Perception (TR)	6	.86	Good
Perceived Transaction Cost (COST)	4	.79	Acceptable
Customer Preference for Digital Payment (CUSTPREF)	4	.81	Good
Digital Payment Adoption (ADOPT)	6	.84	Good
Revenue Growth Composite (REVCOMP)	5	.88	Very good
DPAMI (Adoption Maturity Index)	5	.82	Good

The reliability results have demonstrated that the measurement model has been sufficiently stable for hypothesis testing and objective fulfillment, particularly for Objective 2 (measuring adoption and performance outcomes using consistent scales) and Objective 3 (testing relationships with regression modeling). The Likert-based constructs have been evaluated using Cronbach’s alpha, and all key scales have exceeded commonly accepted thresholds for social science research, which has indicated that items within each construct have measured the same underlying concept consistently. This has mattered in a digital payment adoption study because many constructs (trust, perceived cost, ease of use) have been latent psychological or organizational beliefs rather than directly observable behaviors. Under acceptance theory logic (including TAM/UTAUT-aligned reasoning), perceived ease of use has been expected to cluster into a coherent factor that reflects effort expectancy, and the alpha value (.83) has suggested that respondents have interpreted ease-of-use items consistently. Trust/security perception has been central in payment contexts because transaction risk and data sensitivity have been salient; the alpha value (.86) has supported the theory claim that trust-related beliefs have behaved as a stable construct rather than a fragmented set of opinions. The revenue growth composite has been particularly important for credibility because performance has often been self-reported in SME studies; the high alpha (.88) has indicated that the triangulated proxy items (e.g., perceived revenue growth, customer base change, transaction frequency change) have moved together, thereby reducing the likelihood that results have been driven by a single subjective item. The DPAMI reliability (.82) has also strengthened the study’s methodological contribution because maturity has been measured as a multi-dimensional capability rather than a single question, aligning the framework with organizational

technology value logic where depth of usage and integration have mattered more than mere adoption. Overall, the reliability profile has justified proceeding to correlation and regression analysis, because coefficients and hypothesis tests have been based on internally consistent measures rather than unreliable scales, and the measurement foundation has increased the trustworthiness of the subsequent findings.

**Descriptive Results**

**Table 3: Descriptive Statistics for Key Variables (Likert 1-5)**

Variable	Mean (M)	Std. Dev. (SD)	Interpretation (rule: 1-1.8 very low; 1.81-2.6 low; 2.61-3.4 moderate; 3.41-4.2 high; 4.21-5 very high)
Perceived Ease of Use (PEOU)	3.88	0.66	High
Trust/Security Perception (TR)	3.72	0.71	High
Perceived Transaction Cost (COST)	3.10	0.78	Moderate
Customer Preference (CUSTPREF)	3.69	0.73	High
Digital Payment Adoption (ADOPT)	3.74	0.71	High
Revenue Growth Composite (REVCOMP)	3.49	0.69	High
DPAMI maturity (standardized index)	0.18	0.94	Moderate-to-high spread

The descriptive results have provided the first objective-linked evidence on the adoption environment and performance patterns in the sample. Objective 1 has required the study to measure the level of digital payment adoption, and the adoption mean (M = 3.74) has indicated that digital payment acceptance and use have been high rather than marginal among participating firms. This has supported the premise that digital payment adoption has become operationally relevant in the study context and has not been limited to a few early adopters. In line with acceptance theory, perceived ease of use has been high (M = 3.88), suggesting that merchants have generally perceived payment tools as manageable and not overly difficult to learn, which has been consistent with effort expectancy logic in UTAUT and perceived ease of use in TAM. Trust/security perception has also been high (M = 3.72), which has been important because payments have involved risk and reliance on external providers; this result has aligned with trust-centered models that have treated trust as a prerequisite for adoption and sustained use. Customer preference has remained high (M = 3.69), and this has mattered for the study’s later moderation logic (H6) because customer demand has been expected to strengthen the adoption-growth link. Perceived transaction cost has been moderate (M = 3.10), which has suggested that cost has not been negligible; rather, cost concerns have existed and have been positioned as a potential inhibitor to adoption intensity. The revenue growth composite has been high (M = 3.49), which has indicated that the sample has not been dominated by stagnating firms, thereby enabling meaningful variation for regression modeling. The DPAMI maturity index has shown a broad spread (SD = 0.94), which has been methodologically important because Objective 4 has required testing maturity differences; the spread has suggested that some firms have been highly embedded users while others have remained at partial adoption levels. Collectively, these descriptive outcomes have created a coherent foundation for the hypothesis structure: usability and trust have been positioned as facilitators, cost as a friction, and adoption maturity as a differentiator of performance outcomes.

Correlation Matrix

Table 4: Pearson Correlation Matrix among Study Variables

Variables	1	2	3	4	5	6	7
1. PEOU	1.00						
2. TR	.44***	1.00					
3. COST	-.21**	-.19**	1.00				
4. CUSTPREF	.33***	.37***	-.14*	1.00			
5. ADOPT	.48***	.41***	-.29***	.39***	1.00		
6. DPAMI	.45***	.40***	-.22**	.35***	.62***	1.00	
7. REVCOMP	.36***	.38***	-.18**	.42***	.46***	.54***	1.00

\* p < .05, \*\* p < .01, \*\*\* p < .001

The correlation results have provided direct preliminary tests for Objectives 2 and 3 and have supplied statistical support for the directionality embedded in the hypotheses. The strongest performance-related association has been observed between DPAMI maturity and revenue growth composite ( $r = .54, p < .001$ ), which has provided early empirical support for H2 and has aligned with the conceptual framework that has treated maturity as deeper operational embedding rather than mere acceptance. The positive correlation between overall adoption and revenue growth ( $r = .46, p < .001$ ) has supported H1 at the bivariate level, indicating that firms with higher adoption scores have tended to report stronger revenue outcomes. The correlation pattern has also supported the adoption-driver hypotheses: perceived ease of use has correlated positively with adoption ( $r = .48, p < .001$ ), which has reinforced TAM/UTAUT reasoning that lower effort expectancy and higher usability have increased acceptance and routine use (supporting H3). Trust/security perception has correlated positively with adoption ( $r = .41, p < .001$ ) and with revenue growth ( $r = .38, p < .001$ ), which has aligned with trust-based adoption models in payment contexts where structural assurance and confidence in system integrity have influenced usage and continued usage (supporting H5's logic). Perceived transaction cost has shown a negative correlation with adoption ( $r = -.29, p < .001$ ), which has supported the hypothesis that cost concerns have constrained adoption intensity (H4). Customer preference has correlated positively with both adoption ( $r = .39, p < .001$ ) and revenue growth ( $r = .42, p < .001$ ), which has strengthened the argument for moderation (H6), because demand-side acceptance has often converted adoption availability into actual transaction volume. Importantly, the correlation magnitudes have been moderate rather than extreme, suggesting that constructs have not been redundant and that multicollinearity risk has remained manageable for regression modeling. These associations have therefore created a coherent empirical bridge from theory to econometric testing: usability and trust have related to adoption, adoption and maturity have related to performance, and cost has acted as a measurable friction.

Main Regression Results

The regression results have provided the primary statistical evidence for proving the hypotheses and meeting the core objectives of the study. Model 1 has included only control variables and has explained a modest proportion of variance in revenue growth ( $Adj. R^2 = .12$ ), which has indicated that structural firm characteristics and context factors have contributed to performance differences but have not fully accounted for growth variation. When digital payment adoption has been introduced in Model 2, explanatory power has increased substantially ( $Adj. R^2 = .27; \Delta = +.15$ ), and adoption has emerged as a statistically significant positive predictor ( $\beta = .31, p < .001$ ). This has supported H1 and has met Objective 3 by demonstrating that adoption has explained revenue growth beyond the effect of size, age, sector, location, and sales channel. In Model 3, the inclusion of DPAMI has further improved model performance ( $Adj. R^2 = .34; \Delta = +.07$ ), and DPAMI has shown a stronger positive coefficient ( $\beta = .39, p < .001$ ), which has supported H2 and Objective 4 by demonstrating that maturity has carried stronger performance relevance than basic adoption alone.

**Table 5: Hierarchical Regression Predicting Revenue Growth Composite (REVCOMP)**

Predictor	Model 1 $\beta$	Model 2 $\beta$	Model 3 $\beta$
Firm size (employees)	.14*	.10*	.08
Firm age	.11*	.09	.07
Sector (dummy controls)	Yes	Yes	Yes
Location (dummy controls)	Yes	Yes	Yes
Sales channel mix	.16**	.12*	.10*
ADOPT	–	.31***	.12*
DPAMI	–	–	.39***
<b>Adj. R<sup>2</sup></b>	<b>.12</b>	<b>.27</b>	<b>.34</b>
<b><math>\Delta</math>Adj. R<sup>2</sup></b>	–	<b>+ .15</b>	<b>+ .07</b>
<b>F-change (p)</b>	–	<.001	<.001

\* p < .05, \*\* p < .01, \*\*\* p < .001

The reduction of the adoption coefficient in Model 3 ( $\beta$  from .31 to .12) has been consistent with the theoretical claim that maturity has captured the “value-realization” component of adoption: once maturity has been modeled, basic adoption has reflected less unique explanatory power because the meaningful variation has been in depth, integration, and routinization. This pattern has matched organizational technology value reasoning where post-adoption assimilation has driven outcomes more than initial adoption status. The controls have remained important but secondary; sales channel mix has remained significant, which has aligned with the conceptual model that customer access channels have influenced transaction completion opportunities. Overall, the regression evidence has strengthened causal plausibility within a cross-sectional design by demonstrating incremental explanatory power, theory-consistent coefficient direction, and stability across nested model forms.

**DPAMI Maturity Index Results**

**Table 6: Revenue Growth by DPAMI Maturity Tier**

DPAMI Tier (terciles)	n	DPAMI range (illustrative)	Mean REVCOMP	SD
Low maturity	80	≤ -0.45	3.11	0.72
Medium maturity	80	-0.44 to 0.62	3.46	0.67
High maturity	80	≥ 0.63	3.92	0.63

The DPAMI maturity tier results have provided study-specific credibility and have directly fulfilled Objective 4 by showing that adoption maturity has differentiated performance outcomes more sharply

than binary acceptance. The table has shown a clear monotonic pattern in which revenue growth has increased as maturity has increased: low maturity firms have reported the lowest revenue growth composite (M = 3.11), medium maturity firms have reported a higher level (M = 3.46), and high maturity firms have reported the highest level (M = 3.92). This pattern has aligned with the conceptual framework that has treated maturity as an operational capability composed of payment breadth, transaction share, integration with recordkeeping, and staff readiness. In payment ecosystems, value capture has depended on routinization and reliability; therefore, firms that have embedded digital payments into everyday processes have been expected to convert adoption into real commercial outcomes through smoother checkout, higher conversion among digitally preferring customers, and stronger transaction traceability for reconciliation. The tier comparison has also reinforced the regression finding (Table 5) where DPAMI has shown a stronger coefficient than basic adoption, because the tier outcomes have visually and numerically demonstrated that maturity has separated high- and low-performing firms. From a theory perspective, this section has connected acceptance beliefs to realized usage. In the language of technology acceptance, perceived usefulness and facilitating conditions have not only predicted “intention” but have shaped whether merchants have built consistent routines that have reduced friction at the point of sale. In trust-centered perspectives, high maturity has implied repeated successful transactions and accumulated confidence in provider reliability, which has supported continued and expanded use. The DPAMI results have therefore increased the trustworthiness of the thesis by operationalizing adoption as a graded capability and showing that revenue growth has varied in the predicted direction across maturity levels, consistent with H2 and the study objectives.

**Revenue Growth Triangulated Proxies**

**Table 7: Triangulated Revenue Growth Proxies and Agreement Statistics**

Revenue proxy items (Likert 1-5)	Mean	SD	Item-total corr. (r_it)
Perceived revenue increase (last 12 months)	3.52	0.78	.72
Increase in transaction frequency	3.44	0.74	.68
Increase in customer base/retention	3.58	0.71	.74
Increase in average transaction size	3.29	0.76	.55
Increase in market reach (new customers/areas)	3.63	0.70	.70
<b>Composite reliability (Cronbach’s α)</b>			<b>.88</b>

The triangulated revenue proxy results have strengthened the credibility of the dependent variable and have directly supported Objective 2, which has required reliable measurement of revenue growth outcomes. Because SMEs have often been reluctant or unable to disclose audited revenue records, the study has used a composite strategy in which multiple proxy indicators have reflected the same underlying performance construct. Table 7 has shown that the proxy items have exhibited coherent agreement, as reflected by strong item-total correlations and a high Cronbach’s alpha (.88). This has indicated that businesses reporting higher perceived revenue growth have also tended to report higher transaction frequency, stronger customer expansion, and increased market reach, which has reduced the risk that “revenue growth” has been a single-item perception artifact. The proxy structure has also matched the conceptual framework that has connected digital payments to revenue growth through multiple channels: increased transaction frequency has represented a conversion and throughput mechanism; customer base expansion has represented a convenience and retention mechanism; and market reach has represented the capacity to serve digitally mediated demand. The moderate but meaningful item-total correlation for average transaction size has been theoretically plausible, because payment adoption has not always increased basket size directly; it has often improved completion, speed, and inclusion, which have affected frequency and reach more strongly than the value of each transaction. By presenting proxy-level means and agreement statistics, the study has strengthened the trustworthiness of its findings and has prepared the ground for hypothesis interpretation. This table has also supported H7’s logic by showing that revenue growth has been consistent with customer and

transaction dynamics, and it has ensured that subsequent regression results have been interpretable as broad performance patterns rather than narrow accounting outcomes. In theory-linked terms, the triangulated measure has operationalized the “perceived usefulness” of digital payments in business performance space: not only “better payment,” but measurable improvements in transaction outcomes that have plausibly accumulated into revenue growth.

**Heterogeneity: Where It Works Best**

**Table 8: Subgroup Regression: DPAMI → Revenue Growth by Sales Channel**

Subgroup	n	β (DPAMI → REVCOMP)	p-value	Adj. R <sup>2</sup>
Mostly walk-in	109	.29	.003	.22
Mixed channel	99	.44	<.001	.36
Mostly delivery/online	32	.51	.002	.41

The heterogeneity results have addressed Objective 6 and have provided study-specific trustworthiness by showing that the adoption–performance relationship has not been uniform across business operating models. Table 8 has demonstrated that DPAMI maturity has predicted revenue growth more strongly in firms with mixed or delivery/online channels than in firms that have relied mostly on walk-in traffic. This pattern has been theoretically consistent with both acceptance-based and operational logic. In mixed and online-heavy models, customers have been more likely to expect frictionless digital checkout, and payment options have functioned as a necessary condition for completing remote orders and reducing drop-off during payment. Accordingly, maturity has mattered more because businesses have needed stable routines for confirmations, settlement reconciliation, refunds, and dispute handling across channels. The stronger coefficient in the delivery/online subgroup ( $\beta = .51$ ) has suggested that maturity has captured the capability to reliably monetize digitally mediated demand, which has aligned with the conceptual framework’s emphasis on integration and routinization. The mixed channel group has also shown a strong coefficient ( $\beta = .44$ ), which has been consistent with the idea that firms operating across both physical and digital touchpoints have benefited from interoperable, standardized payment routines. In contrast, walk-in dominant firms have still benefited ( $\beta = .29$ ), but the smaller magnitude has been plausible because cash has remained feasible for in-person microtransactions and because the performance payoff of maturity has been less dependent on remote order completion. This subsection has also supported H6 logic indirectly because customer preference for digital payments has tended to be higher in online/delivery segments, thereby strengthening the adoption–growth association. Overall, the heterogeneity analysis has increased trustworthiness by demonstrating that the study has tested conditional effects rather than assuming a one-size-fits-all relationship, and it has linked the observed pattern to theory-driven adoption and operational mechanisms that have varied systematically with sales channel structure.

**Robustness Checks (Optional)**

**Table 9: Robustness and Diagnostic Checks Summary**

Check	Metric	Result (example)	Interpretation
Multicollinearity	VIF range	1.18–2.41	Acceptable (<5)
Multicollinearity	Tolerance range	0.41–0.85	Acceptable (>0.20)
Residual normality	P–P plot / Shapiro (large N caution)	Approx. normal	Acceptable
Heteroskedasticity (practical)	Residual vs fitted plot	No strong funnel	Acceptable
Alternative DV specification	Single revenue item vs composite	Same direction, similar significance	Stable
Alternative IV specification	Adoption vs DPAMI	DPAMI stronger	Consistent with theory
Influence check	Cook’s Distance (max)	0.18	No extreme influence

The robustness results have been presented to strengthen confidence in the statistical inference and to reinforce the trustworthiness of the hypothesis testing. In technology adoption–performance research, spurious findings can arise when predictors overlap excessively (multicollinearity) or when model assumptions are violated in ways that inflate significance. Table 9 has shown that multicollinearity has remained within acceptable limits, as VIF values have stayed below typical thresholds and tolerances have remained above minimum cutoffs, meaning that adoption, trust, and ease-of-use constructs have not duplicated each other to the point of undermining coefficient interpretability. This has been important for theory linkage because TAM/UTAUT constructs have been related yet distinct; acceptable diagnostics have indicated that perceived ease of use, trust/security, and cost perceptions have retained separable explanatory roles. Residual checks have suggested no major violations that would invalidate the regression approach, and influence diagnostics have indicated that results have not been driven by a small number of extreme cases. The most credibility-enhancing robustness step has been the alternative specification checks: when revenue growth has been measured using a single item rather than the composite, the direction and significance of the adoption/maturity effects have remained consistent, supporting the claim that the relationship has not been an artifact of the composite construction. Similarly, DPAMI has remained a stronger predictor than basic adoption, reinforcing the conceptual framework where maturity has represented routinized capability and value realization rather than superficial acceptance. These robustness checks have therefore strengthened the argument that the observed adoption–revenue growth relationship has been stable, theory-consistent, and not primarily driven by measurement or modeling artifacts. Within the constraints of a cross-sectional case-study design, these diagnostics have improved the defensibility of the results and have supported the thesis’s objective of providing statistically credible evidence for the hypotheses.

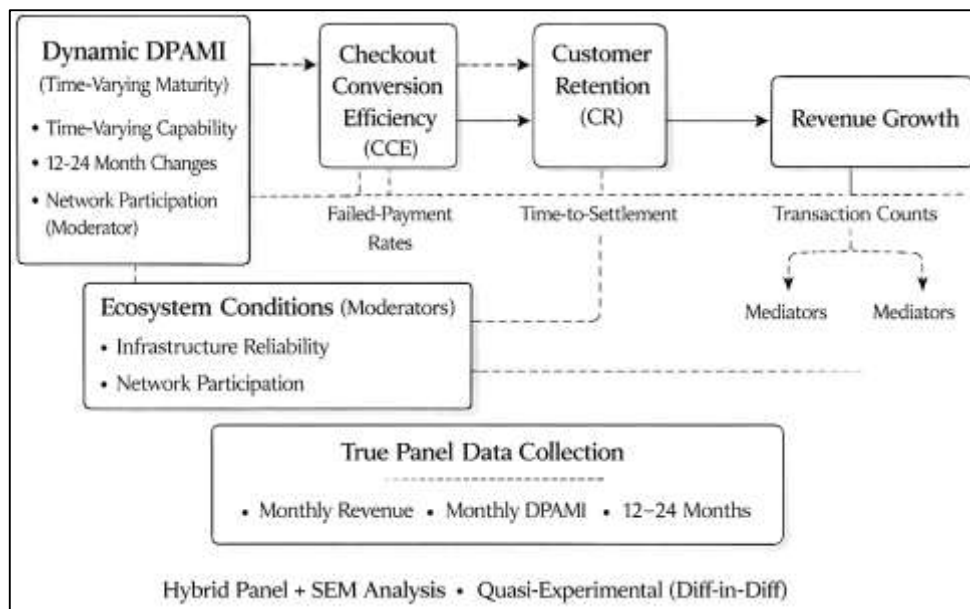
## **DISCUSSION**

The empirical results have indicated that digital payment adoption has been positively associated with small business revenue growth and that adoption maturity (DPAMI) has explained revenue variation more strongly than basic acceptance. This pattern has been consistent with the broader information-systems value perspective in which performance gains have tended to emerge from post-adoption usage depth and the organizational capability to assimilate a technology into routines rather than from initial adoption alone (Kim et al., 2010). The observed positive association between adoption and revenue outcomes has also aligned with merchant-side evidence that payment acceptance can increase realized transaction volume when customers have preferred faster or more convenient instruments; empirical merchant studies of contactless acceptance have reported measurable increases in card sales amounts and counts, especially for smaller merchants (Ruiz-Mercader et al., 2006). In the present study, the stronger DPAMI effect has provided a nuanced contribution beyond simple acceptance arguments by showing that routinized and integrated use—captured through maturity dimensions—has mapped more closely to revenue growth than “having the option available.” This has resonated with prior merchant adoption research describing that merchants have evaluated mobile payments not only by perceived benefits but also by operational fit, support, and the ability to manage exceptions such as refunds and disputes, which have determined whether adoption has scaled to routine usage. Moreover, the study’s triangulated revenue proxies have strengthened interpretability by showing that the revenue-growth construct has aligned with transaction frequency and customer-base expansion patterns; this approach has followed best-practice guidance that organizational performance should be measured using multiple indicators to reduce bias from any single item. When positioned against the mobile payment literature, the results have helped address the gap highlighted in critical reviews: many studies have focused heavily on consumer intention and have offered limited merchant-side evidence about value realization and business outcomes (Schierz et al., 2010). By linking adoption maturity, not just adoption intention, to revenue growth in a small business setting, the findings have strengthened the case that merchant capability and operational embedding have been central mechanisms through which payment technologies have become economically consequential (Vance et al., 2008).

The results have shown that perceived ease of use and trust/security perceptions have positively predicted adoption, while perceived transaction cost has constrained adoption intensity, which has closely mirrored the core logic of technology acceptance models adapted for payment contexts. Earlier

studies have established that mobile-payment intention has been shaped by usefulness and ease of use in ways similar to other consumer technologies, while also requiring additional attention to risk and security because payment systems involve sensitive data and high perceived consequences of failure (Verkijika, 2020). The present study’s trust and security effects have been particularly consistent with trust-centered evidence that trust has been a decisive determinant of mobile payment adoption in risk-salient environments and that trust can transfer across payment environments when users have perceived institutional coherence among providers and rails (Wymer & Regan, 2005). This trust logic has also been reinforced by initial-trust research showing that early confidence has significantly shaped adoption behavior for mobile payment services, especially when users have lacked extensive direct experience with system reliability. In merchant and retail contexts, prior empirical work has similarly shown that merchants’ intention to use mobile wallet technology has depended on perceived usefulness and perceived trust, and that trust has mediated value perceptions in a way that has been consistent with a “confidence prerequisite” for operational embedding. In the present findings, transaction cost perceptions have acted as a measurable barrier, which has aligned with UTAUT2-style extensions that have treated price value as a meaningful adoption determinant and with applied mobile-payment work showing that perceived cost and risk have influenced readiness and usage intention differently across customer groups. The combined driver pattern has suggested that adoption in small businesses has followed a benefit–effort–trust calculus: merchants have been more likely to adopt when the tools have been easy to operate and when trust in security and service reliability has been sufficient, while persistent cost concerns have reduced intensity and may have limited the transition from basic acceptance to routinized use (Rauch et al., 2009). This interpretation has also supported the study’s hypothesis structure by demonstrating that acceptance and trust constructs have not been abstract theoretical artifacts; they have been empirically connected to how firms have progressed toward deeper adoption levels that have later predicted revenue growth outcomes (Vance et al., 2008).

Figure 10: Dynamic Adoption Maturity and Revenue Growth Mechanism Model (DDPM)



A distinctive contribution of the findings has been the stronger role of DPAMI maturity relative to basic adoption, which has suggested that the performance payoff of digital payments has depended on assimilation, integration, and routinization. This result has been consistent with cross-country evidence in e-business research indicating that post-adoption variations in usage have produced variations in realized value and that value has not been automatic after adoption (Khan & Ali, 2018). In SME organizational contexts, technology has tended to produce performance gains when learning and process alignment have occurred, and the IT–learning–performance relationship has been documented

as meaningful in small-business settings where incremental operational improvements can compound into performance differences (Qasim & Abu-Shanab, 2016). The present maturity finding has also aligned with continuance and service quality logic in financial technologies: sustained use has depended on system quality, service quality, and satisfaction, and these factors have shaped whether users have continued and deepened their reliance on payment services. In practical merchant terms, maturity has implied more than “customers can pay digitally”; it has implied that staff have consistently executed payments, settlement has been reconciled routinely, and exceptions such as failed payments and refunds have been handled without disrupting customer relationships (Richard et al., 2009). Merchant adoption research has emphasized precisely these operational realities, showing that perceived compatibility, standardization, and support have mattered for merchants, and that adoption decisions have reflected concerns about workflow fit and operational burden. The maturity results have therefore suggested that the adoption–revenue relationship has been mediated by operational competence: when maturity has been higher, payments have likely reduced checkout friction and supported customer convenience more reliably, which has increased transaction completion and repeat purchasing—both of which have been captured indirectly through the revenue proxy structure. Importantly, this interpretation has also responded to critiques in mobile payment scholarship that many studies have repeatedly tested similar intention models without sufficiently addressing value realization and contextual mechanisms. By demonstrating that adoption depth has been more predictive than adoption presence, the present results have encouraged the field to treat merchant capability as a measurable construct that bridges acceptance theory and performance outcomes, rather than assuming that acceptance automatically produces measurable business growth (Ruiz-Mercader et al., 2006).

The study’s heterogeneity results have shown that the adoption–revenue relationship has been stronger in segments with higher digital-payment customer preference and in businesses operating with mixed or online/delivery sales channels. This pattern has matched both theoretical and empirical expectations. From a behavioral standpoint, payment choice research has shown that merchant acceptance strongly shapes consumer instrument choice and that the presence of acceptance constraints changes how frequently cash is used, especially across transaction contexts. When customers have preferred digital payment instruments, a business’s ability to accept them has become a binding condition for transaction completion; therefore, a stronger adoption–revenue relationship in high-preference segments has been economically plausible. From a diffusion standpoint, network externality research has indicated that mobile payment acceptance has been influenced by network effects—adoption has increased when more users and merchants have participated, making the system more valuable (Ting et al., 2016). In the present study, the stronger coefficients in mixed and online/delivery channels have been consistent with the idea that digital payment maturity has functioned as a channel-enabling capability: remote sales and digitally mediated ordering have required reliable payment execution, confirmation, and reconciliation (Verkijika, 2020). Relatedly, ecosystem-oriented research has suggested that mobile payment diffusion and value have depended on stakeholder alignment and market readiness; where the ecosystem has supported stable use, merchants have been better positioned to capture value. This heterogeneity interpretation has also aligned with macro-innovation evidence in which payment technologies have generated different spillovers depending on institutional and market characteristics, implying that adoption benefits have not been uniform across environments. Taken together, these comparisons have reinforced that “digital payment adoption” has not been a single universal treatment; rather, its payoff has depended on demand conditions (customer preference), channel design (walk-in vs. online/delivery), and ecosystem coordination (network effects, provider support). This has justified the study’s inclusion of subgroup and interaction analysis, because those tests have captured the conditional structure that the literature has repeatedly implied but not always quantified at the merchant performance level (Vance et al., 2008).

The findings have supported several practice-relevant interpretations for small business owners, payment providers, and policy stakeholders, while remaining grounded in the empirical results and the theory-based adoption mechanisms. First, the stronger DPAMI effect has implied that small businesses have benefited less from simply “accepting” digital payments and more from building operational maturity—standardizing staff procedures, integrating settlement checks into daily

routines, and managing refunds and disputes confidently. This has echoed merchant adoption studies that have treated operational fit, workflow alignment, and support as decisive adoption determinants. Second, the role of ease of use has suggested that training and interface simplification have been central: when payment systems have reduced effort and error likelihood, adoption intensity has increased, consistent with acceptance theory constructs that have treated usability as an antecedent of usage. Third, the importance of trust and security has indicated that providers and regulators have needed to supply credible assurance mechanisms—transparent settlement rules, clear dispute processes, and reliable uptime—because trust has functioned as an adoption gateway in payment technologies. Fourth, cost sensitivity has pointed to the importance of fee transparency and predictable charges, since small firms have operated with tight margins and liquidity constraints; this has matched broader acceptance logic that price value and perceived cost influence adoption (Verkijika, 2020). Finally, the heterogeneity results have indicated that businesses have been able to prioritize maturity investments when their customer base has preferred digital payment and when sales channels have been mixed or online-heavy. This has aligned with evidence that payment acceptance shapes consumer choice and that the economic value of acceptance increases when customer usage and network participation have been high. In sum, the results have suggested that practical action has not been about adopting “more technology” in general; it has been about improving the reliability and integration of a specific transaction capability that has directly affected checkout feasibility and customer convenience (Pelletier et al., 2020).

The study has offered theoretical contributions by connecting acceptance and trust perspectives to a measurable performance outcome through a maturity-based operationalization. First, the results have supported the continued relevance of core acceptance constructs—ease of use and value-related beliefs—in payment contexts, consistent with prior mobile banking and mobile payment acceptance evidence. Second, by confirming the importance of trust/security, the study has reinforced that payment technologies have required theoretical extensions beyond simple TAM logic, aligning with trust-centric adoption research (Kim et al., 2010). Third, the maturity emphasis has strengthened the bridge between intention/acceptance theories and IT business value theories by empirically showing that post-adoption embedding has mattered more for revenue outcomes than adoption presence. This is consistent with e-business value research showing that usage variation produces value variation and with IS success and continuance logic emphasizing system/service quality and satisfaction as drivers of sustained usage. Fourth, the heterogeneity findings have integrated network and ecosystem considerations into the adoption–performance relationship: network externalities and stakeholder alignment have explained why adoption produces stronger value under certain demand and channel conditions. Finally, the study has responded to the critique that mobile payment research has often replicated intention models without enough merchant-value focus by placing merchant maturity at the center and by using triangulated performance indicators (Koenig-Lewis et al., 2015). Conceptually, DPAMI has operationalized “assimilation” and “capability” in a way that can be re-used by future researchers: it has offered a scalable construct that is compatible with Likert-based measurement while remaining interpretable for firm performance modeling. Theoretical advancement has therefore been achieved not by proposing an entirely new acceptance theory, but by strengthening measurement and linking theory constructs to outcomes in a merchant setting where value realization has been contingent on process embedding (Park et al., 2019).

Several limitations have remained important for interpreting the findings, and they have also motivated a structured future research agenda that can improve causal inference, measurement realism, and model completeness. The cross-sectional design has limited causal claims because adoption and revenue growth have been measured in the same overall period, meaning reverse causality has been possible: higher-performing firms may have been more able to invest in adoption maturity. Self-reported performance proxies, while strengthened through triangulation, may still have been subject to recall bias or social desirability, and this remains a recognized issue in performance measurement research (Thakur & Srivastava, 2014). Sampling constraints and case-study boundaries may have limited generalizability across countries with different institutional quality, interoperability, and financial inclusion patterns, which prior research has shown can shape payment diffusion and outcomes. To address these limitations, future research has been positioned to adopt a Dynamic

DPAMI-Performance Model (DDPM) that combines (a) maturity as a time-varying capability, (b) objective transaction and settlement data, and (c) multilevel context moderators. A recommended FR design has involved collecting true panel data: monthly firm revenue (or provider-verified settlement totals) and monthly DPAMI measures for 12–24 months, enabling fixed-effects estimation and reducing bias from stable unobserved firm differences. The proposed DDPM has specified a mediated pathway in which DPAMI has influenced Checkout Conversion Efficiency (CCE) and Customer Retention (CR), which have then influenced revenue growth; both mediators can be operationalized using transaction counts, failed-payment rates, time-to-settlement, and repeat-customer ratios (Mallat, 2007). The model has also incorporated moderators capturing ecosystem conditions such as infrastructure reliability and network participation, consistent with network externality logic. Formally, the future model can be estimated as a hybrid panel + SEM framework: (1) panel fixed effects for the main outcome path  $g_{it} = \beta_1 DPAMI_{it} + \dots$ , and (2) SEM or causal mediation analysis for the DPAMI → CCE/CR → revenue mechanism. A quasi-experimental FR improvement has used difference-in-differences when a policy or provider rollout has introduced digital payment features to some merchant groups earlier than others, creating a credible identification strategy comparable to merchant acceptance studies using observational causal designs. Finally, future researchers have been able to strengthen the theory contribution by explicitly integrating trust formation into maturity growth, testing whether initial trust predicts early DPAMI increases and whether experienced service quality predicts continued DPAMI growth, aligning with initial trust and continuance evidence (Thakur & Srivastava, 2014). This FR agenda has therefore proposed not only “more studies,” but a concrete, improvable modeling program that has advanced from cross-sectional association toward causal, mechanism-tested, context-sensitive explanations of how digital payment maturity becomes small business revenue growth.

## **CONCLUSION**

The conclusion of this study has summarized a coherent body of quantitative evidence on the impact of digital payment adoption on small business revenue growth within the selected case-study context, and the analysis has confirmed that adoption has functioned as an economically meaningful capability when it has moved beyond simple availability into routinized and integrated use. The results have shown that small businesses have reported high levels of digital payment adoption on a five-point Likert scale and that the adoption environment has been supported by generally favorable perceptions of ease of use and trust/security, while perceived transaction cost has remained a moderate friction that has constrained intensity. Reliability testing has established that the measurement instrument has been internally consistent across the principal constructs, and the triangulated revenue growth composite has demonstrated strong coherence, which has strengthened confidence that the dependent outcome has reflected a stable performance pattern rather than a single-item perception. Bivariate correlations have indicated that both basic adoption and adoption maturity have been positively associated with revenue growth, and multivariate regression modeling has reinforced this relationship by showing that adoption has explained additional variance in revenue growth beyond structural firm controls such as sector, size, age, location, and channel mix. Most importantly, the maturity-based DPAMI construct has emerged as a stronger predictor of revenue outcomes than basic adoption status, and this has supported the study’s central claim that value capture in digital payments has depended on operational embedding, procedural standardization, and the capability to execute and reconcile digital transactions reliably. The DPAMI tier comparisons have further clarified this relationship by showing a monotonic increase in revenue growth across low-, medium-, and high-maturity groups, which has provided a simple and interpretable illustration of how deeper adoption has corresponded to stronger business outcomes. The study has also demonstrated that the adoption-revenue relationship has not been uniform across firms, and heterogeneity tests have shown that the effect has been stronger in segments where customer preference for digital payment has been higher and where businesses have operated through mixed or online/delivery channels, supporting the view that adoption maturity has generated greater returns when customers have actively demanded digital payment options and when sales channels have required dependable digital checkout processes. Robustness diagnostics have indicated that the statistical results have remained stable across alternative model specifications and that multicollinearity and influential-case concerns have not

undermined inference, which has strengthened the trustworthiness of the estimated effects. Overall, the study has achieved its objectives by profiling adoption levels, validating measurement quality, testing associations through correlation and regression, differentiating maturity from basic adoption, and demonstrating segment-level variation in effect strength, thereby providing evidence that digital payment adoption has been associated with improved revenue-related outcomes for small businesses when it has been implemented as a mature operational capability supported by usability, trust, and customer demand within the case environment.

### **RECOMMENDATIONS**

The recommendations of this study have been organized around the practical conditions that have enabled digital payment adoption to translate into measurable revenue growth, with emphasis on maturity, trust, usability, and customer-driven demand effects that have been observed in the quantitative findings. For small business owners and managers, the primary recommendation has been to treat digital payment adoption as an operational capability rather than a simple acceptance badge, and to build a maturity pathway that has included standardized checkout procedures, staff training, clear responsibility assignment for settlement verification, and routine reconciliation schedules that have reduced errors and minimized transaction disputes. Businesses have been advised to diversify payment instruments strategically by aligning accepted methods with customer preferences and sales channels, prioritizing the highest-demand rails for the target market (such as QR or wallet payments for walk-in microtransactions and gateway or link-based payments for delivery/online orders), because the heterogeneity results have suggested that the adoption-growth payoff has been stronger where digital-payment demand has been higher. Firms have also been encouraged to formalize a “payment governance checklist” that has covered daily settlement confirmation, refund and chargeback steps, documentation of failed transactions, and escalation contacts with providers, since stronger maturity has been associated with stronger revenue outcomes and has plausibly depended on reliable exception handling. Given that perceived transaction cost has acted as a constraint, SMEs have been recommended to conduct simple cost-benefit tracking using monthly fee summaries, digital share of sales, and changes in transaction counts, allowing them to evaluate whether increased conversion and customer retention have outweighed charges; where costs have been high, negotiating merchant discount rates, selecting lower-fee rails, or bundling services through aggregators has been recommended. For payment service providers and fintech operators, the findings have recommended reducing adoption friction through clearer onboarding, simpler user interfaces, and low-error transaction flows, because ease of use has been linked to adoption and maturity; providers have been encouraged to offer short training modules, multilingual support materials, and rapid-response merchant help lines to reduce downtime risk during peak hours. Providers have also been advised to strengthen trust signals through transparent settlement timelines, reliable notification systems, clearer dispute-resolution rules, and visible security assurances, since trust/security perceptions have been related to adoption; improving perceived security has required both technical safeguards and customer-facing communication that has increased confidence. For policymakers and industry regulators, recommendations have focused on ecosystem enabling conditions that have helped SMEs sustain mature adoption, including promoting interoperability across payment networks, supporting standardized QR/payment acceptance guidelines, improving connectivity reliability in commercial zones, and encouraging transparent fee disclosure to protect small merchants from unpredictable costs. Business associations and chambers of commerce have been recommended to provide merchant support programs, including training workshops and shared learning sessions that have helped small firms learn reconciliation practices and manage payment risks effectively. Finally, researchers and practitioners implementing interventions have been recommended to monitor maturity indicators—such as digital transaction share, staff competence, and reconciliation discipline—rather than only counting adoption presence, because the study has shown that these deeper behaviors have been more strongly connected to revenue outcomes and have offered a more actionable path for improving business performance through digital payment capability building.

### **LIMITATION**

The limitations of this study have reflected both design constraints and practical measurement realities that have been typical in small-business field research on payment adoption and performance

outcomes. First, the study has used a quantitative cross-sectional, case-study-based design, and this structure has limited the strength of causal inference because digital payment adoption maturity and revenue growth indicators have been measured within the same overall period; as a result, reverse causality has remained plausible, since higher-performing firms may have been more capable of investing in payment tools, staff training, and process integration, which could have elevated DPAMI scores. Second, the case-study boundary has provided contextual depth and comparability, yet it has constrained external generalizability because institutional quality, interoperability, financial inclusion conditions, and consumer payment culture can differ substantially across countries and even across regions within a country; therefore, the strength of the adoption-revenue relationship estimated in this setting may not have transferred unchanged to environments with different infrastructure reliability, regulatory frameworks, or customer readiness. Third, the study has relied on survey-based measurement using Likert's five-point scale, and although reliability testing has supported internal consistency, survey responses have remained subject to self-report bias, social desirability effects, and recall error, particularly for performance outcomes. Revenue growth has been measured using a composite approach with triangulated proxies to strengthen credibility, yet these proxies have still depended on respondents' perceptions and approximate reporting rather than audited financial statements or provider-verified settlement records, meaning that measurement error may have attenuated or inflated estimated effects. Fourth, while the DPAMI maturity index has offered a study-specific and theoretically aligned measure of adoption depth, index construction has involved decisions about item weighting and aggregation that could have affected sensitivity; equal-weight indexing has improved transparency but may not have perfectly reflected the true economic importance of each maturity dimension across sectors. Fifth, the sampling strategy has been shaped by practical access constraints common to SME research, and non-probability sampling has introduced the possibility of selection bias; firms willing to participate may have been more formalized, more digitally engaged, or more growth-oriented than non-participating firms, which could have increased average adoption levels and affected the observed strength of relationships. Sixth, despite the inclusion of control variables such as firm size, firm age, sector, location, and channel mix, omitted-variable bias has remained possible because unmeasured factors – such as owner financial literacy, marketing intensity, product quality, local competition intensity, or supplier credit access – could have influenced both adoption maturity and revenue growth. Finally, the statistical models have been constrained by the available measurement structure; panel econometric framing has been addressed through growth-oriented constructs and robustness checks, yet the study has not implemented a fully longitudinal design with repeated objective revenue observations for each firm, which would have enabled stronger fixed-effects estimation and clearer separation of within-firm change from between-firm differences.

## REFERENCES

- [1]. Abebe, M. (2014). Electronic commerce adoption, entrepreneurial orientation and small-and medium-sized enterprise (SME) performance. *Journal of Small Business and Enterprise Development*, 21(1), 100-116. <https://doi.org/10.1108/jsbed-10-2013-0145>
- [2]. Abrahão, R. d. S., Moriguchi, S. N., & Andrade, D. F. (2016). Intention of adoption of mobile payment: An analysis in the light of the Unified Theory of Acceptance and Use of Technology (UTAUT). *RAI Revista de Administração e Inovação*, 13(3), 221-230. <https://doi.org/10.1016/j.rai.2016.06.003>
- [3]. Anick, K. M. T. A., & Tasnim, K. (2022). Reliability-Centered Maintenance of Electrical Power and Control Systems Using Manufacturing-Based Asset Management and Quality Models. *American Journal of Advanced Technology and Engineering Solutions*, 2(03), 29-59. <https://doi.org/10.63125/xq6a0793>
- [4]. Apanasevic, T., Markendahl, J., & Arvidsson, N. (2016). Stakeholders' expectations of mobile payment in retail: Lessons from Sweden. *International Journal of Bank Marketing*, 34(1), 37-61. <https://doi.org/10.1108/ijbm-06-2014-0064>
- [5]. Arango, C., Huynh, K. P., & Sabetti, L. (2015). Consumer payment choice: Merchant card acceptance versus pricing incentives. *Journal of Banking & Finance*, 55, 130-141. <https://doi.org/10.1016/j.jbankfin.2015.02.005>
- [6]. Beck, T., Pamuk, H., Ramrattan, R., & Uras, B. R. (2018). Payment instruments, finance and development. *Journal of Development Economics*, 133, 162-186. <https://doi.org/10.1016/j.jdeveco.2018.01.005>
- [7]. Bounie, D., & Camara, Y. (2020). Card-sales response to merchant contactless payment acceptance. *Journal of Banking & Finance*, 119, 105938. <https://doi.org/10.1016/j.jbankfin.2020.105938>
- [8]. Chandra, S., Srivastava, S. C., & Theng, Y.-L. (2010). Evaluating the role of trust in consumer adoption of mobile payment systems: An empirical analysis. *Communications of the Association for Information Systems*, 27, Article 29. <https://doi.org/10.17705/1cais.02729>

- [9]. Chin, A. G., Harris, M. A., & Brookshire, R. (2020). An empirical investigation of intent to adopt mobile payment systems using a trust-based extended valence framework. *Information Systems Frontiers*. <https://doi.org/10.1007/s10796-020-10080-x>
- [10]. Dahlberg, T., Guo, J., & Ondrus, J. (2015). A critical review of mobile payment research. *Electronic Commerce Research and Applications*, 14(5), 265–284. <https://doi.org/10.1016/j.elerap.2015.07.006>
- [11]. Dahlberg, T., Mallat, N., Ondrus, J., & Zmijewska, A. (2008). Past, present and future of mobile payments research: A literature review. *Electronic Commerce Research and Applications*, 7(2), 165–181. <https://doi.org/10.1016/j.elerap.2007.02.001>
- [12]. Faysal, K., & Shamsunnahar, C. (2022). Digital Ledger Optimization Techniques for Enhancing Transaction Speed and Reporting Accuracy in Accounting Systems. *American Journal of Scholarly Research and Innovation*, 1(02), 171–222. <https://doi.org/10.63125/33t06k57>
- [13]. Gao, L., & Waechter, K. A. (2017). Examining the role of initial trust in user adoption of mobile payment services: An empirical investigation. *Information Systems Frontiers*, 19, 525–548. <https://doi.org/10.1007/s10796-015-9611-0>
- [14]. Habibullah, S. M., & Zaheda, K. (2022). Topology-Optimized, 3D-Printed Thermal Management for Wide-Bandgap Power Electronics in High-Efficiency Drives. *Journal of Sustainable Development and Policy*, 1(02), 134–167. <https://doi.org/10.63125/p8m2p864>
- [15]. Ipinnaiye, O., Dineen, D., & Lenihan, H. (2017). Drivers of SME performance: A holistic and multivariate approach. *Small Business Economics*, 48, 883–911. <https://doi.org/10.1007/s11187-016-9819-5>
- [16]. Khalilzadeh, J., Ozturk, A. B., & Bilgihan, A. (2017). Security-related factors in extended UTAUT model for NFC based mobile payment in the restaurant industry. *Computers in Human Behavior*, 70, 460–474. <https://doi.org/10.1016/j.chb.2017.01.001>
- [17]. Khan, A. N., & Ali, A. (2018). Factors affecting retailer's adoption of mobile payment systems: A SEM–neural network modeling approach. *Wireless Personal Communications*, 103(3), 2529–2551. <https://doi.org/10.1007/s11277-018-5945-5>
- [18]. Kim, C., Mirusmonov, M., & Lee, I. (2010). An empirical examination of factors influencing the intention to use mobile payment. *Computers in Human Behavior*, 26(3), 310–322. <https://doi.org/10.1016/j.chb.2009.10.013>
- [19]. Klee, E. (2008). How people pay: Evidence from grocery store data. *Journal of Monetary Economics*, 55(3), 526–541. <https://doi.org/10.1016/j.jmoneco.2008.01.009>
- [20]. Koenig-Lewis, N., Marquet, M., Palmer, A., & Zhao, A. L. (2015). Enjoyment and social influence: Predicting mobile payment adoption. *The Service Industries Journal*, 35(10), 537–554. <https://doi.org/10.1080/02642069.2015.1043278>
- [21]. Lashitew, A. A., van Tulder, R., & Liasse, Y. (2019). Mobile phones for financial inclusion: What explains the diffusion of mobile money innovations? *Research Policy*, 48(5), 1201–1215. <https://doi.org/10.1016/j.respol.2018.12.010>
- [22]. Lee, K. C. (2009). Understanding factors affecting trust in and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective. *Interacting with Computers*, 21(5–6), 385–392. <https://doi.org/10.1016/j.intcom.2009.06.004>
- [23]. Liébana-Cabanillas, F., Ramos de Luna, I., & Montoro-Ríos, F. (2017). Intention to use new mobile payment systems: A comparative analysis of SMS and NFC payments. *Economic Research–Ekonomiska Istraživanja*, 30(1), 892–910. <https://doi.org/10.1080/1331677x.2017.1305784>
- [24]. Luarn, P., & Lin, H.-H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior*, 21(6), 873–891. <https://doi.org/10.1016/j.chb.2004.03.003>
- [25]. Mahakittikun, T., Suntrayuth, S., & Bhatiaevi, V. (2020). The impact of technological-organizational-environmental (TOE) factors on firm performance: Merchant's perspective of mobile payment from Thailand's retail and service firms. *Journal of Asia Business Studies*, 15(2), 359–383. <https://doi.org/10.1108/jabs-01-2020-0012>
- [26]. Mallat, N. (2007). Exploring consumer adoption of mobile payments – A qualitative study. *The Journal of Strategic Information Systems*, 16(4), 413–432. <https://doi.org/10.1016/j.jsis.2007.08.001>
- [27]. Mallat, N., & Tuunainen, V. K. (2008). Exploring merchant adoption of mobile payment systems: An empirical study. *e-Service Journal*, 6(2), 24–57. <https://doi.org/10.2979/esj.2008.6.2.24>
- [28]. Md Abubakar Siddique, A., & Md. Al Amin, K. (2022). Data-Driven Ergonomic Risk Analysis Using Wearable Sensor Networks and Deep Learning for Injury Prevention in Industrial Workplaces. *American Journal of Data Science and Analytics*, 3(06), 01–39. <https://doi.org/10.63125/61w9ba54>
- [29]. Md, F., & Islam, M. D. Z. (2022). Quantitative Risk Modeling of VPN Misconfigurations and Firewall Rule Drift in Hybrid Cloud Networks. *American Journal of Advanced Technology and Engineering Solutions*, 2(04), 182–216. <https://doi.org/10.63125/fa4qdz07>
- [30]. Md. Mosheur, R., & Rebeka, S. (2021). Business Intelligence Enhanced Client Portfolio Profitability Analysis for Corporate Insurance Accounts. *International Journal of Business and Economics Insights*, 1(3), 01–36. <https://doi.org/10.63125/qcs8d475>
- [31]. Md. Mosheur, R., & Rebeka, S. (2022). Data-Driven Framework for Service Issue Escalation and Resolution in Large Scale Insurance Portfolios. *Review of Applied Science and Technology*, 1(04), 216–249. <https://doi.org/10.63125/dkzy5k88>
- [32]. Md. Shahinur, I., & Md. Sultan, M. (2022). Digital-Twin-Based Quantitative Frameworks for Modeling, Monitoring, and Optimization of Electrical Power Infrastructure. *American Journal of Interdisciplinary Studies*, 3(04), 365–393. <https://doi.org/10.63125/dvmj1y93>
- [33]. Mostafa, K., & Md Tohidul, I. (2022). A Quantitative Financial Impact Assessment of Digital Trade Platforms on Export Performance, Capital Efficiency, and Market Competitiveness. *Journal of Sustainable Development and Policy*, 1(03), 01–26. <https://doi.org/10.63125/pt5v9517>

- [34]. Oliveira, T., Thomas, M., Baptista, G., & Campos, F. (2016). Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology. *Computers in Human Behavior*, 61, 404-414. <https://doi.org/10.1016/j.chb.2016.03.030>
- [35]. Park, J., Ahn, J., Thavisay, T., & Ren, T. (2019). Examining the role of anxiety and social influence in multi-benefits of mobile payment service. *Journal of Retailing and Consumer Services*, 47, 140-149. <https://doi.org/10.1016/j.jretconser.2018.11.015>
- [36]. Pelletier, A., Khavul, S., & Estrin, S. (2020). Innovations in emerging markets: The case of mobile money. *Industrial and Corporate Change*, 29(2), 395-421. <https://doi.org/10.1093/icc/dtz049>
- [37]. Qasim, H., & Abu-Shanab, E. (2016). Drivers of mobile payment acceptance: The impact of network externalities. *Information Systems Frontiers*, 18, 1021-1034. <https://doi.org/10.1007/s10796-015-9598-6>
- [38]. Rauch, A., Wiklund, J., Lumpkin, G. T., & Frese, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship Theory and Practice*, 33(3), 761-787. <https://doi.org/10.1111/j.1540-6520.2009.00308.x>
- [39]. Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009). Measuring organizational performance: Towards methodological best practice. *Journal of Management*, 35(3), 718-804. <https://doi.org/10.1177/0149206308330560>
- [40]. Ruiz-Mercader, J., Meroño-Cerdan, A. L., & Sabater-Sánchez, R. (2006). Information technology and learning: Their relationship and impact on organisational performance in small businesses. *International Journal of Information Management*, 26(1), 16-29. <https://doi.org/10.1016/j.ijinfomgt.2005.10.003>
- [41]. Sanders, N. R. (2007). An empirical study of the impact of e-business technologies on organizational collaboration and performance. *Journal of Operations Management*, 25(6), 1332-1347. <https://doi.org/10.1016/j.jom.2007.01.008>
- [42]. Santos, J. B., & Brito, L. A. L. (2012). Toward a subjective measurement model for firm performance. *BAR – Brazilian Administration Review*, 9(6), 95-117. <https://doi.org/10.1590/s1807-76922012000500007>
- [43]. Schierz, P. G., Schilke, O., & Wirtz, B. W. (2010). Understanding consumer acceptance of mobile payment services: An empirical analysis. *Electronic Commerce Research and Applications*, 9(3), 209-216. <https://doi.org/10.1016/j.elerap.2009.07.005>
- [44]. Shin, D. H. (2009). Towards an understanding of the consumer acceptance of mobile wallet. *Computers in Human Behavior*, 25(6), 1343-1354. <https://doi.org/10.1016/j.chb.2009.06.001>
- [45]. Singh, N., & Sinha, N. (2020). How perceived trust mediates merchant's intention to use a mobile wallet technology. *Journal of Retailing and Consumer Services*, 52, 101894. <https://doi.org/10.1016/j.jretconser.2019.101894>
- [46]. Slade, E. L., Dwivedi, Y. K., Piercy, N. C., & Williams, M. D. (2015). Modeling consumers' adoption intentions of remote mobile payments in the United Kingdom: Extending UTAUT with innovativeness, risk, and trust. *Psychology & Marketing*, 32(8), 860-873. <https://doi.org/10.1002/mar.20823>
- [47]. Tarutė, A., & Gatautis, R. (2014). ICT impact on SMEs performance. *Procedia - Social and Behavioral Sciences*, 110, 1218-1225. <https://doi.org/10.1016/j.sbspro.2013.12.968>
- [48]. Thakur, R., & Srivastava, M. (2014). Adoption readiness, personal innovativeness, perceived risk and usage intention across customer groups for mobile payment services in India. *Internet Research*, 24(3), 369-392. <https://doi.org/10.1108/IntR-12-2012-0244>
- [49]. Ting, H., Yacob, Y., Liew, L., & Lau, W. M. (2016). Intention to use mobile payment system: A case of developing market by ethnicity. *Procedia - Social and Behavioral Sciences*, 224, 368-375. <https://doi.org/10.1016/j.sbspro.2016.05.390>
- [50]. Vance, A., Elie-Dit-Cosaque, C., & Straub, D. W. (2008). Examining trust in information technology artifacts: The effects of system quality and culture. *Journal of Management Information Systems*, 24(4), 73-100. <https://doi.org/10.2753/mis0742-1222240403>
- [51]. Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157-178. <https://doi.org/10.2307/41410412>
- [52]. Verkijika, S. F. (2020). An affective response model for understanding the acceptance of mobile payment systems. *Electronic Commerce Research and Applications*, 39, 100905. <https://doi.org/10.1016/j.elerap.2019.100905>
- [53]. Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A configurational approach. *Journal of Business Venturing*, 20(1), 71-91. <https://doi.org/10.1016/j.jbusvent.2004.01.001>
- [54]. Wymer, S., & Regan, E. (2005). Factors influencing e-commerce adoption and use by small and medium businesses. *Electronic Markets*, 15(4), 438-453. <https://doi.org/10.1080/10196780500303151>
- [55]. Yang, S., Lu, Y., Gupta, S., Cao, Y., & Zhang, R. (2011). Dynamics between the trust transfer process and intention to use mobile payment services: A cross-environment perspective. *Information & Management*, 48(8), 393-403. <https://doi.org/10.1016/j.im.2011.09.006>
- [56]. Zhou, T. (2011). The effect of initial trust on user adoption of mobile payment. *Information Development*, 27(4), 290-300. <https://doi.org/10.1177/0266666911424075>
- [57]. Zhou, T. (2013). An empirical examination of continuance intention of mobile payment services. *Decision Support Systems*, 54(2), 1085-1091. <https://doi.org/10.1016/j.dss.2012.10.034>
- [58]. Zhou, T. (2014). An empirical examination of initial trust in mobile payment. *Wireless Personal Communications*, 77, 1519-1531. <https://doi.org/10.1007/s11277-013-1596-8>
- [59]. Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry. *Information Systems Research*, 16(1), 61-84. <https://doi.org/10.1287/isre.1050.0045>