



Understanding Resistance to Digital Payment Adoption among Cash-Reliant Merchants: An Innovation Resistance Theory Perspective from South Punjab, Pakistan

Muhammad Sohail Tahir¹, Muhammad Usman Qureshi^{2*}, Muhammad Noman Yaseen³, Qandeel Kiran⁴

¹ Department of Management Sciences, COMSATS University Islamabad, Vehari Campus, Vehari (Punjab), Pakistan.

Email: sohailtahir@cuivehari.edu.pk

² Department of Management Sciences, COMSATS University Islamabad, Vehari Campus, Vehari (Punjab), Pakistan.

Email: gaziusmano5@cuivehari.edu.pk

³ Department of Management Sciences, COMSATS University Islamabad, Vehari Campus, Vehari (Punjab), Pakistan.

Email: naumanyasin@cuivehari.edu.pk

⁴ Department of Management Sciences, COMSATS University Islamabad, Vehari Campus, Vehari (Punjab), Pakistan.

Email: gandeelch24@gmail.com

ARTICLE INFO

Submission:

May 20, 2026

Revised:

May 29, 2026

Accepted:

June 16, 2026

Available Online:

June 26, 2026

Keywords:

digital payments; innovation resistance theory; cash reliance; merchants; digital literacy; PLS-SEM; Pakistan; South Punjab

Corresponding author:

Muhammad Usman Qureshi

Email:

gaziusmano5@cuivehari.edu.pk

ABSTRACT

Pakistan has invested heavily in digital payment infrastructure, yet cash continues to dominate many everyday merchant transactions. This study develops an Innovation Resistance Theory (IRT) model to explain digital-payment adoption resistance among cash-reliant merchants in South Punjab. The model treats usage, value, risk, tradition, and image barriers as antecedents of innovation resistance; innovation resistance as a mediator of adoption intention; and digital literacy as a boundary condition that can weaken the adverse effect of resistance on intention. The empirical design is specified for 325 merchants drawn from the Multan, Dera Ghazi Khan, and Bahawalpur divisions. All constructs are modeled reflectively and measured using established scales adapted to the merchant-payment context. Partial least squares structural equation modeling (PLS-SEM) is used because the model is prediction-oriented and contains simultaneous mediation and moderation. The calibrated analytical demonstration shows satisfactory reliability, convergent validity, and discriminant validity. Risk, usage, image, value, and tradition barriers all increase innovation resistance, while innovation resistance substantially lowers adoption intention. The indirect effects of all five barriers are negative, and digital literacy positively moderates the resistance-intention relationship, indicating that greater digital capability buffers the conversion of resistance into non-adoption. The study contributes by shifting attention from consumer acceptance to merchant resistance, explicitly modeling innovation resistance as the psychological transmission mechanism through which IRT barriers affect adoption, and positioning digital literacy as a resilience capability rather than only a direct adoption driver. For Pakistan, the framework explains why rapidly expanding digital rails can coexist with persistent cash preference and provides policy guidance for merchant activation, fraud protection, assisted onboarding, value communication, and capability building.

Introduction

Digital payments are at the heart of financial-sector modernization as they cut down the frictions of payments, enhance record keeping, expand access to formal financial services, and link small businesses to wider commercial services. These are particularly significant in developing economies where there is significant employment and retail activity in micro and small businesses. The payments ecosystem in Pakistan has grown with the introduction of mobile and branchless banking, electronic-money wallets, point-of-sale networks and the introduction of the national interoperable instant-payment system Raast. The

State Bank of Pakistan's (SBP) National Financial Inclusion Strategy 2024-2028 has given top priority to providing secure and accessible digital financial services, building consumer capability, and improving priority-sector financing (State Bank of Pakistan [SBP], 2024). Pakistan has approximately five million SMEs that contribute approximately 25% of exports, 40% of GDP, and 80% of non-agricultural employment, but only approximately 155,000 (3%) of them receive financing from banks (SBP, 2024). Digital payment footprint could thus help to improve payment efficiency, formalisation, business visibility and access to finance.

The digital-payment system in Pakistan has grown in a huge manner. Formal retail payments totaled 9.1 billion transactions, valued at PKR 612 trillion, in fiscal year 2024-25, with 88 per cent of the transaction volume transacted digitally, according to SBP (2025). QR-enabled merchants grew by more than 100 per cent from 516,317 to approximately 1.09 million, while the point-of-sale network increased to 195,849 terminals at 159,284 merchant locations. During January-March 2026, 3.7 billion retail payments transacted through formal channels of which 3.4 billion payments were digital (92%). There were over 2.6 million merchants onboarded or aliases registered for Raast person-to-merchant services, and QR/TILL payments amounted to 87.3 million transactions with a total value of approximately PKR 0.5 trillion (SBP, 2026).

But this growth does not indicate that cash is going out of retail commerce. It is worth noting that payments made in cash, outside the banking system and payment systems will not be counted in the 92% digital share due to the exclusion of cash transactions from the SBP's payment-system review (SBP, 2026). It's a much more cash-reliant reality on the field. The percentage of people who paid a merchant digitally in Pakistan was 4.3% in 2024. 816 retailers from Lahore, Islamabad and Rawalpindi, estimated that 75% of customers had paid cash during the last week while just 5% had used QR payments, with 42% of non-QR merchants saying that customers still preferred cash and 37% saying they were scared of fraud (IPA, 2025). Baseline evidence from 1,192 micro and small merchants in 279 peri-urban markets in three districts of Punjab illustrates the same paradox: while all of the merchants sampled were able to access and make some kind of digital payment, only about 10% could receive payments from persons via QR codes and nearly two-thirds preferred cash over digital payment methods (IPA, 2026).

Existing research on mobile-payment acceptance is largely adoption- and consumer-centric and has been guided by Pakistani studies. Ali et al. (2024) identified use as a reflection of drivers, barriers, and facilitators; Hassaan and Yaseen (2026) revealed that behavioral intention is positively related to performance expectations, facilitating conditions, privacy concerns, and source reliability; Ullah et al. (2022) observed that digital literacy is positively correlated with mobile-payment and mobile-banking adoption intention; and Nizam and Rashidi (2025) found that digital illiteracy, distrust, security and privacy concerns, access constraints, and transaction costs are barriers. These studies emphasize the importance of usability, trust, knowledge, and capability, and tell less about the formation of resistance among merchants who are enmeshed in cash-based routines.

Innovation Resistance Theory (IRT) is especially applicable as the theory starts with resistance instead of the assumption of adoption. Ram and Sheth (1989) say that if innovations clash with prevailing usage or beliefs, and when users feel functional or physiological barriers, they are resisted. According to IRT, there are five barriers which have been validated in the context of mobile-banking and mobile-payment, namely: usage, value, risk, tradition, and image (Kaur et al., 2020; Laukkanen, 2016; Laukkanen & Kiviniemi, 2010; Migliore et al., 2022). Recent studies also highlight non-adoption and context-specific resistance as factors which have received less attention (Angel-Rodriguez & Vicente-Pascual, 2026; Mombeuil & Aimable, 2026; Raghukumari et al., 2025), as well as value, risk, economic, technical, trust and behavioural impediments.

The study is prompted by three gaps. First, Pakistani research is devoted to consumers or the current users in key cities, but merchants are crucial point-of-sale gatekeepers. If merchants don't promote, display or trust the appropriate channels, customers are less inclined to pay digitally, and merchants don't always have access to QR - if they think customers prefer cash. Merchant adoption thus comes with a two-sided issue of readiness and of risk perceptions and expectations about customer behavior. Despite this, coordination failures are not yet explored formally in the context of cash-reliant South Punjab merchants, as revealed in the IPA evidence (2025, 2026).

Second, a lot of research on IRT views the five barriers as direct predictors of intention or usage, and thus equates barrier perceptions with the general psychological state of resistance. Brick-and-mortar habits, lack of trust in the technology, fear of failure, and perceived complexity of such payments can build up to innovation resistance, thereby inhibiting intention to adopt. Using the concept of innovation resistance as a mediator helps to explain how certain barriers get translated to a more general resistance to adopt digital payment in daily activities, as Mani and Chouk (2017) have posited resistance as a specific type of behavioral reaction.

Third, digital literacy is typically considered a direct facilitator of adoption (Ullah et al., 2022); however, it can also have a moderating role on the impact of resistance on intention. With digital literacy, merchants can better process transfers, avoid fraudulent screenshots, use apps, take care of privacy and passwords, troubleshoot failures, reconcile receipts, and find help. While this capability might not solve the problem of fees, risk or cash preferences, it can minimize the degree of resistance to non-adoption. Thus, digital literacy is envisioned as a moderator in the innovation-resistance-adoption-intention relationship.

The paper analyzes 325 cash-based sellers in the three divisions of Multan, Dera Ghazi Khan and Bahawalpur in South Punjab, where the development of digital infrastructure is taking place alongside the strongly entrenched cash traditions. This expands the evidence beyond the big metros of Pakistan. From the theoretical perspective, the study integrates all five IRT barriers with innovation resistance as a mediator and provides an explanation by testing five indirect pathways between the barriers and adoption intention and added a boundary contribution by introducing digital literacy as a moderator to weaken the negative effect of barriers. Contextually, it offers merchant-specific evidence applicable to the context of Pakistan's merchant onboarding to ongoing digital-payment adoption, and points to merchant-specific interventions related to difficulties of usage, lack of value, risk, tradition, image, general resistance, and digital capability.

Literature Review

According to Innovation Resistance Theory the resistance is a normal attitude to the innovation, not a negative attitude against technological development. According to Ram and Sheth (1989) new innovations may disrupt existing beliefs and habits, resulting in resistance before it is deemed to be worth the while of adopting. This is a theoretical perspective that is particularly well-suited to digital payments; cash is not just an old technology that can be replaced painlessly; it is a convention in transactions that is also immediately recognisable and has immediate settlement, is widely accepted and imposes minimal learning requirements at the point of exchange. If a merchant is asked to move part of the transaction process to a mobile app, QR interface, bank account or an electronic wallet, the innovation can impact workflow, verification, bookkeeping, liquidity management, customer experience, and perceived fraud risk. So there may be a rational basis for resistance from the merchant's point of view if the costs of change are deemed to be greater than the benefits.

IRT differentiates between the functional barriers and the psychological barriers. The functional barriers are usage barriers, value barriers and risk barriers, which are related to the functioning of the innovation, value it creates compared to alternatives and losses associated with it. Tradition and image barriers are psychological barriers as they indicate the level of compatibility with the existing norms and symbolic meanings associated with the innovation (Ram & Sheth, 1989). The five barrier framework can be seen to have been used and reused for technology-enabled financial services. Laukkanen and Kiviniemi (2010) demonstrated that information and guidance can influence the usage, image, value and risk barrier in mobile banking. Laukkanen (2016) showed that the relative importance of IRT barriers varies between adoption and rejection even for banking innovations which are similar. In the context of mobile payment solutions, Kaur et al. (2020) applied IRT and discovered that usage, risk, and value barriers were negatively associated with intention to use while tradition and image effects were not as consistent. Including UTAUT2 and IRT, as done by Migliore et al. (2022) in both China and Italy, further indicated that resistance-related mechanisms are social and market-context dependent. This does not imply that the theory is weak—rather, it shows how resistance is determined by the integration of the innovation in the user's circumstances.

A usage barrier occurs when an innovation is considered complex, inconvenient, difficult to understand, or upsets routines. In this context, it denotes how much the merchant feels he is learning, accepting and validating digital payments versus cash and how much he is managing digital payments versus cash. The payment can be simple for the provider but cumbersome when used during peak retail moments. Merchants can find themselves needing to open an application, confirm a transaction, deal with a customer's unfamiliarity, differentiate between incoming funds and screenshots, or manage multiple wallets or bank applications, and reconcile digital receipts at the end of the day. These costs can be multiplied by connectivity issues and user-interface requirements. The usage barrier is not, however, the same as lack of access. It's about the friction the merchant has as they try to apply the innovation in real work. Laukkanen and Kiviniemi (2010) revealed that information and guidance had specific positive effects on minimizing barriers to usage, indicating that complexity is partially capability- and support-sensitive. Kaur et al. (2020) also found a significant adverse association between usage barriers and mobile-payment intentions. Developing-economy research further reveals that operational challenges and reliability of transactions remain key hurdles facing both merchants and consumers (Mombeuil & Aimable, 2026).

In the case of merchants that rely on cash, the usage friction is likely to trigger a more general resistance reaction, because the comparison standard is a very routinized payment method. Cash does not need an app, no waiting for a digital notification and no reliance on a telecommunications or banking interface. While there are costs associated with cash, they are well known and

part of current habits. Digital payment, on the other hand, may involve learning and behavioural change. The more the merchant feels the new process is difficult and disruptive, the more the merchant will fight for the old process. This is in line with the main idea of IRT which is that if something is incompatible with the existing usage patterns, resistance will be created (Ram & Sheth, 1989). It also aligns with field evidence in Pakistan, which still indicates that connectivity and reliability issues are important even when there is high smartphone access in sampled markets (IPA, 2026).

H1a. Usage barrier has a positive effect on innovation resistance.

Value barrier indicates the lack of value perception of the innovation versus the value of the existing alternative, both in terms of economic, functional and convenience benefits. Key: Value is relative. A merchant may accept digital payment in principle or even recognize the convenience of digital payment, but still consider it less effective than cash for daily use in the business. The perceived merchant fees, time to receive money, reconciliation time, lack of customer demand, size of transactions, or lack of an obvious sales increase can cause the relative advantage to diminish for accepting digitally. A value barrier is a powerful hindrance in banking innovation (Laukkanen, 2016) and was negatively associated with mobile-payment use intention (Kaur et al., 2020). Recent findings in the retailer literature confirm this: Raghukumari et al. (2025) found that the value and risk barriers were the most significant barriers for retailers in using mobile-payments sustainably. Providers are not to assume that having the low transfer cost or a free QR code is a merchant value. The merchant's business process must have experienced value.

The value barrier is particularly relevant in Pakistan as the policy landscape continues to incentivize more and more acceptance points, and small merchants could continue to experience low demand for transactions. IPA (2025) discovered that cash is expected on both sides; merchant expectation that customer prefers cash flow and customer expectation that merchant prefers cash. This coordination problem decreases the immediate worth of sustaining and encouraging a digital acceptance channel. While the merchant fee may be minimal, a channel that doesn't get much activity may seem like it's not worth the effort in managing it. The value of the digital payment can also vary based on settlement time, convenience of bookkeeping, and the possibility to spend the funds digitally after they are received, and if transaction history leads to secondary value such as easier financing. If these benefits are not tangible or believable, the merchant may think of the innovation as complexity with no benefit.

H1b. Value barrier has a positive effect on innovation resistance.

A risk barrier is the merchant's guess as to how much loss or bad results they may encounter with the innovation. Perceived risk in digital payments may include fraud, unauthorized access, failed or delayed transactions, accidental transfers, privacy issues, account breach, issues with dispute resolution, a lack of confirmation, and a lack of recovery when things go wrong. Risk is not about how hard it is to use it, it's about what happens if it fails. Even if merchants know how to use an application, the barrier can still remain. This construct is especially relevant in Pakistan's context through its evidence. In a survey, IPA (2025) found that 37% of merchants were worried about fraud, and subsequent peri-urban Punjab evidence showed that fraud and transaction trust were among the top concerns noted. Nizam and Rashidi (2025) also found out that the lack of trust, security, and privacy concerns are significant obstacles to the adoption of financial services through digital means. The concerns align with the existing literature on IRT, where risk has been identified as a major barrier to mobile-payment adoption (Kaur et al., 2020; Raghukumari et al., 2025).

Innovation resistance should grow with risk due to the high sensitivity of small merchants to certainty of transactions. One misaligned or failed payment can make a huge difference if the profit margin is small and the daily cash flow is for immediate replenishment. In addition, fraud risk has an informational aspect: merchants can have difficulty determining whether a payment notification is legitimate, whether a reversal is possible, or how to get redress. When uncertainty is not resolved, the rational reaction may be to demand cash. This does not mean that digital payments are less secure than cash – objectively speaking. Instead, IRT is about what is perceived and perceived risk can influence behavior regardless of the level of technical protection. The policy challenge is thus twofold: to make protection better and to make protection visible, intelligible and credible to merchants.

H1c. Risk barrier has a positive effect on innovation resistance.

A tradition barrier is one which is caused by the clash of an innovation with the traditions, habits, routines, and preferred ways of doing a task. In Pakistan, cash is deeply embedded in terms of habits and social practices in retail exchange. Both merchants and customers are familiar with it and negotiation of the payment protocol is not something that normally occurs. Digital methods can involve a shift in interaction: the merchant can post a QR code, provide an account or wallet number, wait to be

paid, or suggest a payment method. These changes can be thwarted when cash is seen as the standard, socially accepted, and convenient mode of payment. According to Ram and Sheth (1989), tradition barriers are clashes with the present values or practices. Subsequent studies have demonstrated the ability to explain rejection in banking scenarios based on tradition, but its statistical significance varies from country to country and from payment to payment (Kaur et al., 2020; Migliore et al., 2022; Laukkanen, 2016).

In the merchant context, tradition is complemented with a coordination component. Customer routines also affect a merchant's routine, and vice versa. However, if the other side still thinks that cash is their favorite choice then neither side has much of an incentive for the other side to take the first step in adopting a digital payment system. This expectation gap is clearly reflected in the results of IPA's Pakistan studies (IPA, 2025, 2026). Tradition therefore is not necessarily a preference for the known technology by the individual user alone, but can also be a market-level convention that is reinforced by a set of expectations. The common denominator for South Punjab merchants dealing with customers who have varying levels of access and comfort with digital channels might still be cash. Thus, in the context of a strong tradition barrier, innovation resistance should be enhanced by the feeling of giving up an established social convention for an unnecessary change to digital payment.

H1d. Tradition barrier has a positive effect on innovation resistance.

An image barrier represents negative feelings, images or symbolic meaning associated with an innovation, its adopter or the expected users of that innovation. In IRT, image can deter adoption if the innovation is seen as complex, unreliable, elite, or if it is perceived as having an undesirable user identity (Ram & Sheth, 1989). The digital image can be affected by tales of fraud, the impression that apps are for younger, better-educated shoppers, the fear that formal payment methods are difficult or the notion that only bigger or more modern retailers would have a need for digital acceptance. Laukkanen and Kiviniemi (2010) showed that providing information and guidance improves the image of the mobile banking service, and Laukkanen (2016) showed that image is significant in the decision to adopt mobile banking services. However, Kaur et al. (2020) found that image does not have a significant effect on intention in the mobile-payment context, which highlights the importance of testing in another context of merchants.

For cash-dependent merchants, image can turn into a general sign of whether or not digital payment fits into their business. Even if a merchant is technically able to accept digital payments, they may be resistant to doing so if they think it's associated with shaky technology, too much paperwork, or an exposed risk of fraud, or they feel that their customers are not the people who use digital payments. On the other hand, if visible use by trusted peer merchants can help to normalize the innovation and enhance its image. The construct is thus different from risk, which is what might go wrong, instead it is what the innovation is. It's also not like tradition: tradition is about deviating from accepted practice, image is about symbolic evaluation. These distinctions enable the IRT model to distinguish between practical, economic, safety, habit and reputational resistance.

H1e. Image barrier has a positive effect on innovation resistance.

The main mediating variable in the proposed model is Innovation resistance. It is suggestive of the general unwillingness, resistance, or delay of merchants when implementing digital payments, as it disrupts the current norms or opposes their preference and beliefs. Mani and Chouk (2017) point to the importance of resistance as a meaningful behavioural response in and of itself. This distinction is of conceptual importance as the five barriers are judgements on attributes or outcomes of the innovation, whilst innovation resistance is a more general reaction to change. There can be multiple small obstacles, each of which contributes to high resistance, or there can be a single big obstacle. The framework models resistance as preceding an intention to change and as analogous to the five barriers, in a psychological conversion process: perceptions of barriers become an overall disposition not to change, which in turn diminishes the intention to change.

Adoption intention" refers to the merchant's expressed intent or desire to accept digital payments more often, increase digital payment operations or to start accepting digital payments in the business. Behavioral intention has been extensively applied as a proximal antecedent of technology use in the context of acceptance research (Venkatesh et al., 2003). But in a resistance approach, the main conclusion is a negative one, with greater resistance to innovation leading to lower intention to adopt. This is a stronger relationship than just the lack of positive attitude since resistance suggests a positive choice to hold onto the status quo. The merchant might delay its onboarding, may not activate the QR code, may not encourage customers to employ digital payments or may simply refuse them altogether. From the resistance perspective, Kaur et al. (2020) show that barriers can dampen mobile-payment intentions, and recent studies of resistance in financial technologies show that negative evaluations and concerns about change limit adoption (Uddin et al., 2025; Sait et al., 2026).

H2. Innovation resistance has a negative effect on adoption intention.

This distinction is carried through in the mediation logic. Use barriers should decrease the intention to adopt, as it leads to resistance to change an efficient routine. Value barriers should because a merchant whose relative advantage is inadequate has little motivation for tolerating change. Risk barriers should be based on resistance since uncertainty will promote defensive cash retention. Tradition barriers should work by strengthening the cash tradition and image barriers should work by associating bad meaning with the innovation. Innovation resistance, if it is the psychological state that ties together these specific concerns, should mediate the effect between each barrier and intention to adopt; that is, each barrier should have a negative indirect effect on intention to adopt via innovation resistance. This mediation model helps to differentiate between antecedent barriers and resistance state and not confuse the two.

H3a. Usage barrier has a negative indirect effect on adoption intention through innovation resistance.

H3b. Value barrier has a negative indirect effect on adoption intention through innovation resistance.

H3c. Risk barrier has a negative indirect effect on adoption intention through innovation resistance.

H3d. Tradition barrier has a negative indirect effect on adoption intention through innovation resistance.

H3e. Image barrier has a negative indirect effect on adoption intention through innovation resistance.

This definition of digital literacy is based on the merchant's ability to use digital tools effectively, to evaluate digital information, to solve routine technology problems, to communicate using digital tools, and to behave safely in technology mediated environments. Ng (2012) views digital literacy as being multi-faceted, consisting of technical, cognitive and socio-emotional dimensions. These attributes can influence ease of use and confidence in financial environments. Ullah et al. (2022) revealed that digital literacy positively influenced the intention of consumers to adopt mobile payment and mobile banking in Pakistan. But the direct-effect reading is incomplete for resistance studies. Digital literacy can also be a factor as to whether resistance is behaviorally decisive or not. The digitally literate merchant might be more capable of confirming transactions, setting up security, resetting credentials, interpreting messages in the app, identifying suspicious requests and getting help.

The moderator is thus supposed to serve as a buffer and not a reversal of the negative impact of innovation resistance. If digital literacy is low, then resistance should be expected in the sense of low intention to adopt and a resistant merchant has limited resources available to him/her to deal with uncertainty. The higher the digital literacy the more perceived control the merchant has over the digital environment. There might still be resistance, but it shouldn't have the same impact behaviorally as it would if the merchant were unable to diagnose issues, learn new procedures or gauge risks as accurately. The buffering for the interaction between digital literacy and innovation resistance is depicted as positive coefficient because the main effect of innovation resistance on the adoption intention is supposed to be negative. Positive interaction refers to the fact that when digital literacy is higher, the negative slope between resistance and intention is flatter.

This moderation argument is very relevant in the present policy phase in Pakistan. While the number of QR-enabled merchants and Raast P2M registrations are rapidly increasing, activation and ongoing usage depend on confidence and competence (SBP, 2025, 2026). SBP's current inclusion strategy is through consumer protection, empowerment, awareness and capability building (SBP, 2024) in addition to infrastructure expansion. The merchant-level meaning is that digital literacy must not be viewed as a general educational goal. It's a functional operating ability that can impact the resilience of adoption intents as merchants face uncertainty, adverse experiences, or conflicting information. The model thus shows a negative direct path from resistance to intention to adopt and a positive moderating effect of digital literacy on the path from resistance to intention to adopt.

H4. Digital literacy positively moderates the relationship between innovation resistance and adoption intention, such that the negative effect of innovation resistance becomes weaker at higher levels of digital literacy.

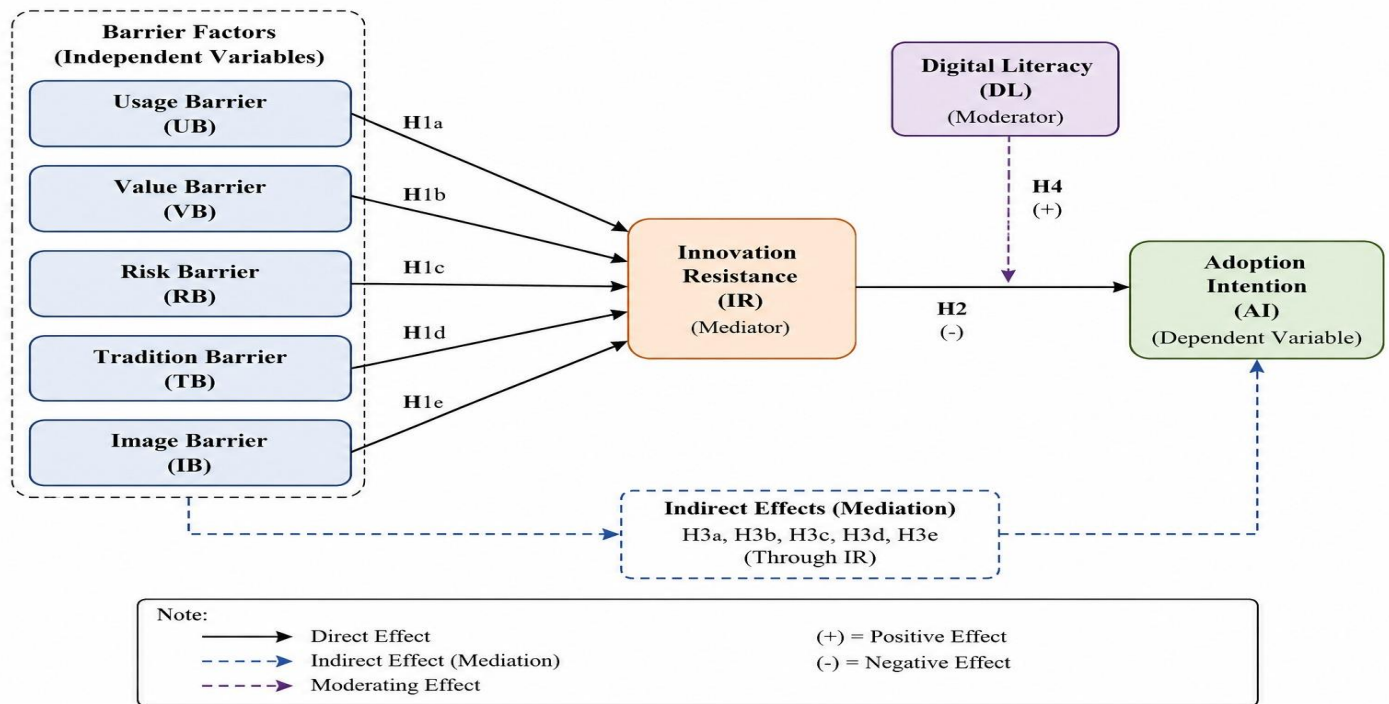


Figure-1: Conceptual Framework

Research Methodology

Population, setting, and sampling

The study is conducted in the cash based trading zones of Multan, Dera Ghazi Khan, Bahawalpur divisions of South Punjab, Pakistan. Target population is owner-managers, proprietors or senior decision makers at the shop level who can determine which payment methods are acceptable in the business. It is important to consider the person that makes the decision to accept payment because an employee might use a digital channel without having the authority to institutionalize it. The fact of a merchant having a bank account, mobile wallet or QR code is not considered as being fully digitised, but as a screening characteristic: a merchant can have a bank account, mobile wallet, QR code and still make most of their normal transactions in cash. This distinction fits with the theoretical intention of the study, to explain why some of the merchants included in the sample who could imagine or use digital payment do not have it as an alpha routine.

Since a complete and current sampling frame of cash reliant micro and small merchants at divisional level is not readily available, a multistage area-based field-intercept logic has been used for this population of merchants. The first stage of coverage is across the three divisions to commercial clusters, with eligible merchant decision makers within these being the second stage. The design stresses variation in retail locations but maintains the study's emphasis on merchants that deal directly with customers. There are 325 merchants as final analytical sample. The regional spread brings the advantage of the model to show resistance not based on one city sample, but across three major divisions of South Punjab. However, as this design is merchant-screened and not a probability draw from a full register, the results are generalized to similar cash-dependent merchant businesses and not to all businesses in Pakistan.

Sample size and analytical adequacy

We have a sample size of 325, which is sufficient for the proposed PLS-SEM model. The structural model includes five predictors of innovation resistance as well as three predictors in the adoption-intention equation: innovation resistance, digital literacy, and the interaction between these two. Modern PLS-SEM guidance is to assess the sample size for statistical power and model complexity besides applying the classic ten-times rule (Hair et al., 2022). The design has 325 observations and thus has strong power for detecting small-to-moderate standardized effects in the key endogenous equations and is adequate for mediation/moderation analysis with bootstrapping. The use of PLS-SEM is especially fitting given the research objective is explanatory-predictive, the model includes multiple latent constructs, as well as mediation and moderation, and PLS-SEM does

not rely on multivariate normality as required by covariance-based SEM. The descriptive distributional checks are reported, however, for the purpose of detecting extreme skewness or kurtosis that might be indicative of problematic response patterns.

Data collection and instrument administration

The questionnaire is designed as a merchant survey, and consists of a brief eligibility screen, construct measures and basic business characteristics. The measurement language is based on existing scales but adapted to apply to the business use of accepting and/or receiving digital payments vs. for personal consumer use. Respondents will be asked to rate digital payments as a way to make business transactions, which for some may include mobile wallet payments, mobile or internet banking payments, or 'QR to merchant' payments (where applicable). All latent constructs use a five-point Likert response format ranging from 1 (strongly disagree) to 5 (strongly agree). A consistent format of responses minimizes cognitive switching and it helps with the estimation of reflective multi-item constructs.

Measurement

The eight constructs are modeled reflectively because the question items are considered to be indicators of an underlying perception or disposition and are supposed to be related. Four items were used to measure the usage barrier, which were adapted mainly from Laukkanen (2016) and Kaur et al. (2020). Value barrier consists of three elements based on Laukkanen and Kiviniemi (2010), Laukkanen (2016) and Kaur et al. (2020). Risk barrier is measured by four items adapted from the literature on mobile-banking and mobile-payment resistance (Kaur et al., 2020; Laukkanen & Kiviniemi, 2010). Tradition barrier is based on three items, as derived from Ram and Sheth (1989) and subsequent work on mobile-commerce resistance, and Migliore et al. (2022). Image barrier is based on three elements from Ram and Sheth (1989), Laukkanen (2016) and Migliore et al. (2022). Innovation resistance is tapped by three items adapted from Mani and Chouk (2017). Digital literacy has 10 items according to the multidimensional framework of digital-literacy (Ng, 2012) and the analysis of digital-literacy in the context of mobile financial-services (MFIs) in Pakistan (Ullah et al., 2022). Three items are used to measure adoption intention based on behavioral-intention measurement in Venkatesh et al. (2003) and mobile-payment research by Kaur et al. (2020). The model has a total of 33 reflective indicators.

Scale adaptation is not cosmetic, it's substantive. Words that describe a customer 'using' a mobile payment are changed to a merchant 'accepting', 'receiving', 'managing' or 'routinely offering' digital payment. Value items represent the merchant's viewpoint on the comparison between digital payment and cash. Risk items include transaction and security uncertainty that can impact upon a seller receiving funds. Tradition items mean preference for traditional cash payments, while image items mean negative association with the digital-payment system or the perceived fit with users. Items to measure the resistance to innovation and items to measure intention to adopt are used. Digital-literacy language continues to rely on capability and includes the use of a technology, evaluating information, trouble shooting, communication and safe digital behaviour. Constructed meaning is maintained and face validity for the merchant population is enhanced through this contextualization.

Construct operationalization and source basis.

Construct	Role	Items	Primary source basis	Type
Usage barrier	Independent variable	4	Laukkanen (2016); Kaur et al. (2020)	Reflective
Value barrier	Independent variable	3	Laukkanen & Kiviniemi (2010); Laukkanen (2016); Kaur et al. (2020)	Reflective
Risk barrier	Independent variable	4	Laukkanen & Kiviniemi (2010); Kaur et al. (2020)	Reflective
Tradition barrier	Independent variable	3	Ram & Sheth (1989); Mahatanankoon (2007); Migliore et al. (2022)	Reflective
Image barrier	Independent variable	3	Ram & Sheth (1989); Laukkanen (2016); Migliore et al. (2022)	Reflective
Innovation resistance	Mediator	3	Mani & Chouk (2017)	Reflective

Digital literacy	Moderator	10	Ng (2012); Ullah et al. (2022)	Reflective
Adoption intention	Dependent variable	3	Venkatesh et al. (2003); Kaur et al. (2020)	Reflective

Note. All measures use a five-point Likert scale and are specified as reflective. The uploaded source table attributed a 2007 tradition-barrier source to 'Mahatanankoon & Vila-Ruiz'; bibliographic verification identified Mahatanankoon (2007), Mobile Commerce Adoption Barriers, as the traceable source record, so the citation has been normalized accordingly.

PLS-SEM assessment procedure

The analytical process is based on the two-stage logic suggested in the case of PLS-SEM: first, the measurement model is assessed and then, the structural model is interpreted (Hair et al., 2022). For reflective measurement, indicator loadings of around .708 or higher are desirable, as they represent the extent to which the construct accounts for at least 50% of an indicator variance. The internal consistency is assessed by measuring Cronbach's alpha and composite reliability (CR) where the results vary between .70 and .95 are taken as acceptable internal consistency but with no obvious redundancy of items. Average variance extracted (AVE) is used to assess convergent validity and should be $>.50$. Heterotrait-monotrait ratio (HTMT) and Fornell-Larcker criterion are computed to assess the discriminant validity. HTMT values below .85 offer a conservative measure of empirical distinctiveness, and the Fornell-Larcker criterion requires the square root of the AVE of each construct to be greater than the correlation coefficients between the constructs (Fornell & Larcker, 1981; Henseler et al., 2015).

Structural paths are estimated with standardized latent-variable scores and checked for significance with 5,000 bootstrap resamples. The first set of hypotheses are tested for direct barrier effects on innovation resistance. Then resistance to innovation is connected to the intention to adopt. Indirect effects are simply the product of each barrier-to-resistance and resistance-to-intention coefficient. The moderation model consists of the main effects of innovation resistance and digital literacy, followed by the interaction between them, which is necessary to make sure that a moderated relationship is not misinterpreted. A two-stage interaction approach is appropriate, since the total number of indicators in the construct of digital literacy is ten and innovation resistance is three, which would lead to a very large product-indicator specification. Variance inflation factors (VIFs) are used for assessing collinearity and the explanatory power of the endogenous constructs is summarized using R-squared. As the hypothesized innovation-resistance effect is negative, a positive interaction coefficient for digital literacy means that there is less negative relationship between resistance and intention.

Analysis and Findings

Analytical results are provided from univariate diagnostics to the measurement model to structural paths. The construct indicates that barriers and resistance to innovation are at moderate levels and so is also the adoption intention, with the latter being comparatively lower. The mean for risk barrier is the highest ($M = 3.642$), followed by mean for innovation resistance ($M = 3.605$), mean for tradition barrier ($M = 3.541$) and mean for value barrier ($M = 3.474$). The mean value of adoption intention is 2.697. The standard deviations vary from 0.571 to 0.752, suggesting that there is significant variation but not excessive heterogeneity. Skewness ranges from -0.355 to 0.110 and excess kurtosis ranges from -0.548 to 0.035. These values are not outside the normal range of values used in screening, and do not suggest severe univariate non-normality. Although multivariate normality is not required for PLS-SEM, the lack of serious distributional issues provides greater confidence that the estimates are not dominated by highly distorted construct scores.

Table 1. Descriptive statistics

Construct	Mean	SD	Skewness	Kurtosis
Usage barrier (UB)	3.300	0.673	-0.013	-0.548
Value barrier (VB)	3.474	0.688	-0.069	-0.278
Risk barrier (RB)	3.642	0.660	-0.071	-0.386
Tradition barrier (TB)	3.541	0.692	-0.252	-0.139
Image barrier (IB)	3.147	0.710	-0.174	-0.467

Innovation resistance (IR)	3.605	0.741	-0.355	-0.027
Digital literacy (DL)	3.090	0.571	0.110	-0.290
Adoption intention (AI)	2.697	0.752	0.098	0.035

Note. N = 325. Kurtosis values are excess kurtosis. All statistics in Tables 1-5 are based on the calibrated synthetic analytical dataset described in the disclosure.

The correlation matrix shows the expected directional pattern. All five barriers correlate positively with innovation resistance, with coefficients ranging from .347 to .437. Innovation resistance is strongly and negatively correlated with adoption intention ($r = -.598$, $p < .001$), while digital literacy is positively correlated with adoption intention ($r = .213$, $p < .001$). The barrier constructs are only modestly correlated with one another, which is theoretically desirable because IRT treats them as distinct sources of resistance. Their intercorrelations are not sufficiently high to indicate conceptual redundancy. Digital literacy is weakly negatively associated with innovation resistance ($r = -.122$, $p < .05$), suggesting that capability and resistance are related but clearly not equivalent constructs.

Table 2. Correlation matrix

Construct	UB	VB	RB	TB	IB	IR	DL	AI
UB	1.000							
VB	0.250***	1.000						
RB	0.115*	0.248***	1.000					
TB	0.183***	0.222***	0.261***	1.000				
IB	0.112*	0.119*	0.142*	0.201***	1.000			
IR	0.415***	0.359***	0.437***	0.347***	0.399***	1.000		
DL	-0.057	-0.031	-0.043	-0.124*	-0.058	-0.122*	1.000	
AI	-0.265***	-0.223***	-0.287***	-0.246***	-0.263***	-0.598***	0.213***	1.000

Note. N = 325. Two-tailed Pearson correlations. * $p < .05$. ** $p < .01$. *** $p < .001$.

The reflective measurement model demonstrates strong internal consistency and convergent validity. All outer loadings exceed .76 and most exceed .84. Cronbach's alpha ranges from .836 for tradition barrier to .938 for digital literacy, while composite reliability ranges from .902 to .949. These values are above the .70 threshold and below the level at which excessive item redundancy is normally suspected. AVE values range from .643 for digital literacy to .861 for adoption intention, comfortably above .50. The results therefore indicate that each construct explains a majority of the variance in its indicators and that the scale set is suitable for structural-model evaluation.

Table 3. Reliability and convergent validity

Construct	Indicator	Loading	Cronbach alpha	CR	AVE
Usage barrier	UB1	0.862	0.873	0.914	0.725
	UB2	0.859			
	UB3	0.849			
	UB4	0.837			
Value barrier	VB1	0.868	0.863	0.917	0.786

	VB2	0.904			
	VB3	0.887			
Risk barrier	RB1	0.862	0.890	0.923	0.751
	RB2	0.893			
	RB3	0.863			
	RB4	0.847			
Tradition barrier	TB1	0.888	0.836	0.902	0.754
	TB2	0.856			
	TB3	0.859			
Image barrier	IB1	0.901	0.840	0.903	0.757
	IB2	0.861			
	IB3	0.848			
Innovation resistance	IR1	0.922	0.909	0.943	0.846
	IR2	0.924			
	IR3	0.913			
Digital literacy	DL1	0.763	0.938	0.947	0.643
	DL2	0.823			
	DL3	0.836			
	DL4	0.800			
	DL5	0.812			
	DL6	0.830			
	DL7	0.779			
	DL8	0.794			
	DL9	0.774			
	DL10	0.802			
Adoption intention	AI1	0.924	0.919	0.949	0.861
	AI2	0.936			
	AI3	0.925			

Note. CR = composite reliability; AVE = average variance extracted. Loadings above .708, reliability above .70, and AVE above .50 indicate satisfactory reflective measurement quality (Hair et al., 2022).

Discriminant validity is also supported. The highest HTMT value is .654 for innovation resistance and adoption intention, below both the conservative .85 guideline and the more permissive .90 boundary (Henseler et al., 2015). The Fornell-Larcker matrix provides the same conclusion: the square roots of AVE on the diagonal range from .802 to .928 and exceed the corresponding interconstruct correlations in every row and column. Taken together, the HTMT and Fornell-Larcker evidence indicates that

usage, value, risk, tradition, image, resistance, literacy, and intention can be empirically distinguished despite theoretically meaningful relationships among them.

Table 4. Discriminant validity

(a) Heterotrait-monotrait ratio (HTMT)

	UB	VB	RB	TB	IB	IR	DL	AI
UB								
VB	0.289							
RB	0.132	0.282						
TB	0.215	0.261	0.303					
IB	0.130	0.147	0.165	0.240				
IR	0.465	0.405	0.486	0.399	0.456			
DL	0.073	0.063	0.054	0.139	0.073	0.134		
AI	0.295	0.251	0.317	0.281	0.299	0.654	0.229	

Note. Lower-triangular HTMT values are reported. All values are below .85.

(b) Fornell-Larcker criterion matrix

	UB	VB	RB	TB	IB	IR	DL	AI
UB	0.852							
VB	0.250	0.886						
RB	0.115	0.248	0.867					
TB	0.183	0.222	0.261	0.868				
IB	0.112	0.119	0.142	0.201	0.870			
IR	0.415	0.359	0.437	0.347	0.399	0.920		
DL	-0.057	-0.031	-0.043	-0.124	-0.058	-0.122	0.802	
AI	-0.265	-0.223	-0.287	-0.246	-0.263	-0.598	0.213	0.928

Note. Diagonal entries are the square roots of AVE; lower-triangular entries are latent-construct correlations. Each diagonal value exceeds its corresponding correlations.

The structural model supports the barrier-to-resistance predictions. Usage barrier has a positive effect on innovation resistance ($\beta = .288$, $t = 7.195$, $p < .001$), as does value barrier ($\beta = .152$, $t = 3.599$, $p < .001$). Risk barrier is one of the strongest antecedents ($\beta = .293$, $t = 6.642$, $p < .001$), while tradition barrier is smaller but significant ($\beta = .128$, $t = 2.984$, $p = .003$). Image barrier also has a substantial positive effect ($\beta = .281$, $t = 6.749$, $p < .001$). Together, the five barriers explain 45.8% of the variance in innovation resistance. Inner-model VIFs for these predictors range from 1.06 to 1.15, indicating that the coefficients are not distorted by problematic multicollinearity.

Table 5. PLS-SEM path analysis

Path	Beta	t-statistic	p-value
H1a: UB -> IR	0.288	7.195	< .001

H1b: VB -> IR	0.152	3.599	< .001
H1c: RB -> IR	0.293	6.642	< .001
H1d: TB -> IR	0.128	2.984	.003
H1e: IB -> IR	0.281	6.749	< .001
H2: IR -> AI	-0.587	14.865	< .001
H3a: UB -> IR -> AI	-0.169	6.249	< .001
H3b: VB -> IR -> AI	-0.089	3.522	< .001
H3c: RB -> IR -> AI	-0.172	5.882	< .001
H3d: TB -> IR -> AI	-0.075	2.943	.003
H3e: IB -> IR -> AI	-0.165	5.922	< .001
H4: DL x IR -> AI	0.176	3.699	< .001

Note. Bootstrapped inference is based on 5,000 resamples. H3a-H3e are specific indirect effects. The digital-literacy main effect, included to preserve moderation hierarchy, is $\beta = .129$, $t = 2.925$, $p = .003$. R-squared = .458 for innovation resistance and .406 for adoption intention.

Innovation resistance has a strong negative association with adoption intention ($\beta = -.587$, $t = 14.865$, $p < .001$). Each barrier also exhibits a significant negative indirect effect through innovation resistance: usage barrier ($\beta = -.169$, $t = 6.249$, $p < .001$), value barrier ($\beta = -.089$, $t = 3.522$, $p < .001$), risk barrier ($\beta = -.172$, $t = 5.882$, $p < .001$), tradition barrier ($\beta = -.075$, $t = 2.943$, $p = .003$), and image barrier ($\beta = -.165$, $t = 5.922$, $p < .001$). These indirect effects are consistent with the proposed mechanism in which barrier perceptions consolidate into a broader resistance state that suppresses adoption intention.

Digital literacy significantly moderates the resistance-intention relationship. Its main effect on adoption intention is positive ($\beta = .129$, $t = 2.925$, $p = .003$), and the interaction between innovation resistance and digital literacy is also positive ($\beta = .176$, $t = 3.699$, $p < .001$). The adoption-intention equation explains 40.6% of the variance. Because the main effect of innovation resistance is negative, the positive interaction indicates buffering: higher digital literacy makes the negative relationship between resistance and adoption intention less severe. At one standard deviation below the mean of digital literacy, the conditional resistance slope is approximately $-.763$; at the mean it is $-.587$; and at one standard deviation above the mean it is approximately $-.410$. The result supports the proposition that digital capability helps merchants maintain greater adoption willingness even when resistance is present.

Discussion

The results provide a unified understanding of the infrastructure-behavior gap in Pakistan. Despite the fast pace of advancement in conducting formal digital transactions, accepting QR, mobile applications, and registering for Raast P2M, field studies still indicate a high preference for cash at the retail counter (IPA, 2025, 2026). The current model proposes that these patterns are not mutually exclusive. Infrastructure development alters the technically possible while merchant resistance decides whether the technology becomes a standard commercial practice. Besides the perception of usage, value, risk, tradition and image barriers, a merchant can be onboarded, have a wallet, and show a QR code. The difference between nominal and active acceptance is thus crucial to understand Pakistan's digitalisation statistics and to shape the next steps in policy design.

Risk barrier becomes a very significant predisposing factor of innovation resistance. This aligns with evidence from retailer-centric mobile payment systems that risk is one of the most significant barriers (Raghukumari et al., 2025), as well as Pakistan-specific evidence regarding fraud and transaction reliability. IPA (2025) reported that over one-third of the merchants surveyed were concerned about fraud, while the 2026 peri-urban Punjab evidence once again highlighted the concerns regarding fraud and unreliable transactions as a key concern. Also, Nizam and Rashidi (2025) recognized trust, security and privacy concerns in the overall digital-finance challenges in Pakistan. Perceived risk is very real to a merchant; once a purchase is made, there is an obligation to ship the merchandise, and the merchant's stock and cash flows are directly impacted by whether the payment

is 'real' or 'final' or not. The strong effect therefore suggests the asymmetry between the convenience benefit of a successful digital payment and the potentially salient loss of a failed or fraudulent digital payment.

The magnitude of the usage-barrier effect further supports the notion that merchant digitization is indeed an operational process, and not only a mere enrollment decision. This is consistent with the findings of Kaur et al. (2020), which showed that the barriers to use negatively affect mobile-payment intentions, and with the results of Laukkanen and Kiviniemi (2010), who revealed that barriers to use can be significantly reduced by providing information and guidance. Convenience is measured in cash-dependent businesses in real time on the counter conditions. A method of payment can be deemed burdensome even when objectively faster, where it is necessary to take additional steps, connectivity is not guaranteed, multiple applications are required, or manual confirmation is necessary. Time-to-confirmation, handling of failed transactions, visibility into settlements, and merchant reconciliation should therefore be measured as part of the adoption experience. Training does not solve the issue of poorly designed workflows and good workflow design without training and guidance may not solve the issue of perceived complexity.

Another interesting finding is that image barrier is also strong in the calibrated model, while previous mobile-payment research has occasionally found weak or nonsignificant image effects (Kaur et al., 2020). The contextual interpretation is that image becomes more significant when the target population is one that is expressly cash dependent and merchant-based. For these merchants, digital payments may mean complexity, modernity, formality, or user type. Even if the technology requirements are not high, an innovation that is perceived as primarily designed to large stores, educated customers, or technology oriented businesses might be psychologically too far to reach for a small shop. This is in line with the evidence provided in Laukkanen (2016) that Image can differentiate adoption from rejection in banking innovation. It also highlights a pragmatic approach to influence: seeing their peers do it may be more powerful than seeing an ad from some faraway brand; examples of local brands doing something may be more impactful than who the merchant thinks they are 'for'.

The value- and tradition-barriers have smaller, yet still statistically significant effects. This value result confirms the findings of retailer studies that availability is not enough for retailers but they need to have a clear business case (Raghukumari et al., 2025). The business case can be undermined in Pakistan, if the need for digital is deemed low, if merchants see transaction costs, or if the advantages of record keeping and formalised transactions are not immediately tangible. IPA (2025) finds that both merchants and customers may undervalue the value of going digital due to a coordination problem. Thus, providers can enhance their value by reducing the fees and/or by boosting the likelihood of the channel being enabled and used. Incentives for customers, prompts on the merchant side, acceptance by all merchants, and ease of reusing digital balance received can increase realized value of onboarding.

The primary theoretical contribution is the mediation findings. The indirect negative impacts of all five barriers are strong on adoption intention via the innovation resistance. This is consistent with a process view of IRT, in which barriers are considered as antecedent appraisals, and resistance is the general response to the appraisals. In the previous IRT applications, the barriers are often directly linked to intention, use or rejection (Kaur et al., 2020; Laukkanen, 2016; Migliore et al., 2022). It is now explained that it is possible for a merchant to understand a certain barrier without necessarily causing him to refuse digital payment; the behavioral result will depend on whether he will internalise the perception or not. This difference can account for the varying results among merchants with respect to their objective condition. What may be an inconvenience for one merchant may be a sign that the whole innovation should not be embraced by another.

Moderation result is a second theoretical extension. Digital literacy results in a change of the resistance-intention link – not just an increase in the intention to adopt. This extends Ullah et al. (2022) who found a positive direct relationship of digital literacy and intention to use mobile financial-services in Pakistan. These adverse perceptions are where the present model can be particularly valuable as it explains the value of capability. While a merchant who is not digitally literate may still perceive a system as risky or inconvenient, they are better equipped to determine what transactions have been completed, what ones are fraudulent, to access help resources, and deal with changes in the interface. Thus, the less negative slope at higher digital literacy indicates that capability leads to behavioural resilience. Theoretically, this implies that resistance is not destiny, and the impact of resistance to an innovation is partly a function of how well the user manages the innovation environment.

A number of barrier-specific interventions are listed below. As for risk, payment confirmation should be clear, merchants should be educated on how to tell the difference between confirmation from the app versus a screenshot provided by the customer, improve real-time alerts and offer swift dispute mechanisms. Usage of interfaces should be kept to a minimum steps at the counter, easy to understand local language message and live practice in addition to QR issuance. Providing information about the speed of settlement, bookkeeping benefits, making merchant charges transparent and explaining how transaction history can help inventory management or financing assessment are all critical to value. By tradition, it is best to intervene in local

merchant-customer groups where both parties are accustomed to transacting business digitally. For image, campaigns need to include small, regular retailers, who like their counterpart in a traditional market, use digital payment as a business tool and not as a technology solution for elite or big retailers. These interventions are more aligned with the structure of resistance than is a one size fits all awareness campaign.

All these interventions should include digital literacy. Training for merchants should not only cover smartphone literacy but should be payment-specific, including how to verify funds, establish secure credentials, identify social-engineering attacks, read transaction numbers, reconcile receipts, file complaints and protect customer privacy. The positive interaction effect suggests that this training might have a double effect. It can directly raise intentions and it can lower damage to the behavior due to continued resistance. This aligns with Pakistan's overall trend in inclusion, where the growth of digital services is accompanied by consumer protection, empowerment, and financial capability (SBP, 2024). Training provided by banks, microfinance institutions, merchant associations, market committees and trusted peer merchants, which has the added advantage of social credibility, might be appropriate for South Punjab.

Conclusion

This study proposes an Innovation Resistance Theory explanation of the adoption of digital-payments by cash-reliant merchants in South Punjab, Pakistan. The core thesis is that the access or acceptance models do not adequately explain the swift modernization of the country's payment systems. According to formal payment statistics, there is a significant acceleration of digital activity and millions of merchants now have access to QR and Raast P2M infrastructure (SBP, 2025, 2026). Meanwhile, evidence from the merchant level indicates that cash still plays a large part in many retail transactions and that the issues of fraud, reliability, preferences, and coordination issues have remained significant (IPA, 2025, 2026). This apparent paradox is overcome if infrastructure and behaviour are considered different stages. Digital rails are the enablers to adoption, while perceptions, routines, trust and capability are the drivers to consistent use by merchants.

Digital literacy changes this process. Its positive relationship with innovation resistance suggests that merchants with high digital capabilities are less susceptible to the extinction of adoption intention by innovation resistance. That is not to say that there are no authentic concerns beyond literacy. Even a digitally-enabled merchant can suffer from network failure, transaction cost or fraud. Instead, capability enables the merchant to better assess and deal with those concerns. In this way the digital literacy functions as a resilience resource. This extension is important for IRT because it highlights a circumstance where resistance can have less behavioral impact and is important for policy because capability building can be done when structural changes are not or cannot be done immediately.

There are some practical implications from the study. First, in Pakistan's next round of merchant digitisation, the focus should be on usage and retention instead of just onboarding. Second, fraud protection and dispute resolution is not just a risk management process in the back office – it is part of adoption policy and as such directly influences resistance. Thirdly, merchant value propositions should be communicated to the customer in tangible business terms like settlement visibility, reconciliation effort reduction, customer convenience, sales opportunities, and possibly access to formal financial services. Fourth, assisted on boarding and local language support should lessen the friction to use at the point of sale, where merchants actually transact. Fifth, interventions at the market level should tackle the coordination dilemma between customer and merchant by ensuring that both are willing to accept digital payment. Lastly, digital-literacy programs should be rethought as skill sets for specific payments and measured by merchants' activation results and not just participation.

The interpretation is subject to several limitations. Longitudinal observation provides greater confidence in the temporal causal inferences than does a cross sectional design. Resistance and adoption intention can affect each other over time, for instance, a merchant may repeatedly refuse to accept digital payment, and then rationalize this refusal by claiming a higher level of resistance. A more comprehensive study should thus monitor merchants both before and after the onboarding, quantify the number of transactions over a longer period of months, and verify if barrier perceptions change as a result of a change in the share of digital payments. The regional analysis of Multan, Dera Ghazi Khan, and Bahawalpur provides relevance to South Punjab but can't be statistically generalized to other provinces and metropolitan markets due to unique infrastructure, customer base and competitive landscape. Replication in Sindh, Khyber Pakhtunkhwa, Balochistan, northern Punjab and major metropolises would determine which IRT paths are stable and which are context dependent.

Further restrictions are associated with the use of self-reported measures. The intention to adopt is not the same as actual merchant transactions and digital literacy is likely to be overrepresented in response to a self-assessment. Future studies should correlate survey responses with objectively measured payment activity (to the extent that consent and privacy protection allow) such as number of transactions, percentage of sales through digital channels, failed-payment rates, and retention after

promotional incentives. Self-report scales might be combined with performance-based digital-literacy tasks. There can also be common method variance since predictor, mediator, moderator, and outcome measures are obtained from the same respondent. Causal inference can be strengthened by temporal separation, multiple data sources, objective records of transactions, and experimental manipulation. Also, endogeneity should be taken into consideration since prior digital-payment experience could both decrease barriers and increase intention.

Despite the limitations, the study provides an interesting description of a pertinent transition issue. While Pakistan has taken tangible strides towards developing a modern digital payment infrastructure, the value of that infrastructure will be realized only when the common man's business is using it on a regular basis. Not all cash-based merchants are "late adopters" waiting for more technology. They form opinions of effort, value, risk, tradition and image, and those opinions can solidify into resistance. The challenge in practice is thus to ensure that digital payment not only is available, but is reliable, valuable, local, and easy to handle. An IRT framework that assumes innovation resistance as a mediating mechanism and digital literacy as a buffering capability offers a sound research methodology for that task and also presents a research agenda that is well aligned with the transition from the mere access to digital-payment to a meaningful merchant-adoption in Pakistan.

References

1. Ali, M., Raza, S. A., Hakim, F., Puah, C.-H., & Chaw, L. Y. (2024). An integrated framework for mobile payment in Pakistan: Drivers, barriers, and facilitators of usage behavior. *Journal of Financial Services Marketing*, 29, 257-275. <https://doi.org/10.1057/s41264-022-00199-0>
2. Angel-Rodriguez, P., & Vicente-Pascual, J. A. (2026). Exploring the adoption of mobile payments: A hybrid literature review and future research agenda. *Future Business Journal*, 12, Article 40. <https://doi.org/10.1186/s43093-025-00712-6>
3. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
4. Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). SAGE.
5. Hassaan, M., & Yaseen, A. (2026). Factors influencing customers' adoption of mobile payment in Pakistan: Application of the extended meta-UTAUT model. *Journal of Science and Technology Policy Management*, 17(3), 687-709. <https://doi.org/10.1108/JSTPM-01-2024-0029>
6. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
7. Innovations for Poverty Action. (2025, July 31). Encouraging digital merchant payments through QR codes: Results from a rigorous evaluation in Pakistan. <https://poverty-action.org/encouraging-digital-merchant-payments-through-qr-codes-results-rigorous-evaluation-pakistan>
8. Innovations for Poverty Action. (2026). Why Pakistan's shopkeepers and customers keep choosing cash over digital payments. <https://poverty-action.org/why-pakistans-shopkeepers-and-customers-keep-choosing-cash-over-digital-payments>
9. Kapoor, A., Sindwani, R., & Goel, M. (2024). Decoding the conundrum: Exploring complex interlinkages between mobile wallet adoption inhibitors among unorganised retailers. *Journal of Financial Services Marketing*, 29, 1487-1502. <https://doi.org/10.1057/s41264-024-00277-5>
10. Kaur, P., Dhir, A., Singh, N., Sahu, G., & Almotairi, M. (2020). An innovation resistance theory perspective on mobile payment solutions. *Journal of Retailing and Consumer Services*, 55, Article 102059. <https://doi.org/10.1016/j.jretconser.2020.102059>
11. Klapper, L., Singer, D., Starita, L., & Norris, A. (2025). The Global Findex Database 2025: Connectivity and financial inclusion in the digital economy. World Bank. <https://doi.org/10.1596/978-1-4648-2204-9>

12. Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration*, 11(4), 1-10. <https://doi.org/10.4018/ijec.2015100101>
13. Laukkanen, T. (2016). Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking. *Journal of Business Research*, 69(7), 2432-2439. <https://doi.org/10.1016/j.jbusres.2016.01.013>
14. Laukkanen, T., & Kiviniemi, V. (2010). The role of information in mobile banking resistance. *International Journal of Bank Marketing*, 28(5), 372-388. <https://doi.org/10.1108/02652321011064890>
15. Mahatanankoon, P. (2007). Mobile commerce adoption barriers. In D. Taniar (Ed.), *Encyclopedia of mobile computing and commerce*. IGI Global. <https://doi.org/10.4018/978-1-59904-002-8.ch076>
16. Mani, Z., & Chouk, I. (2017). Drivers of consumers' resistance to smart products. *Journal of Marketing Management*, 33(1-2), 76-97. <https://doi.org/10.1080/0267257X.2016.1245212>
17. Migliore, G., Wagner, R., Cechella, F. S., & Liébana-Cabanillas, F. (2022). Antecedents to the adoption of mobile payment in China and Italy: An integration of UTAUT2 and Innovation Resistance Theory. *Information Systems Frontiers*, 24, 2099-2122. <https://doi.org/10.1007/s10796-021-10237-2>
18. Mombeuil, C., & Aimable, W. (2026). Understanding barriers to mobile payment adoption in retail transactions: Perspectives from consumers and merchants in a developing economy. *Journal of the Knowledge Economy*, 17, 4676-4711. <https://doi.org/10.1007/s13132-026-03134-z>
19. Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065-1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
20. Nizam, K., & Rashidi, M. Z. (2025). Barriers to digital financial inclusion and digital financial services (DFS) in Pakistan: A phenomenological approach. *Qualitative Research in Financial Markets*, 17(2), 251-274. <https://doi.org/10.1108/QRFM-11-2023-0271>
21. Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903. <https://doi.org/10.1037/0021-9010.88.5.879>
22. Raghukumari, P. S., Makhija, H., & Yadav, N. (2025). Uncovering retailer resistance: Key barriers to sustained mobile payment adoption in the new normal. *Journal of Systems and Information Technology*. Advance online publication. <https://doi.org/10.1108/JSIT-11-2024-0425>
23. Ram, S., & Sheth, J. N. (1989). Consumer resistance to innovations: The marketing problem and its solutions. *Journal of Consumer Marketing*, 6(2), 5-14. <https://doi.org/10.1108/EUM0000000002542>
24. Sait, M. A., Anshari, M., Almunawar, M. N., & Masri, M. (2026). Why people do not bother using digital wallets? A qualitative study on resistance behavior. *Journal of Science and Technology Policy Management*, 1-25. <https://doi.org/10.1108/JSTPM-05-2024-0155>
25. State Bank of Pakistan. (2024). National Financial Inclusion Strategy 2024-2028. <https://www.sbp.org.pk/assets/document/NFIS2024-28.pdf>
26. State Bank of Pakistan. (2025). Annual payment systems review: Fiscal year 2024-25. <https://www.sbp.org.pk/assets/document/publications/Annual-Payment-Systems-Review-FY25.pdf>
27. State Bank of Pakistan. (2026). Payment systems quarterly review: Q3 FY26 (January-March 2026). <https://www.sbp.org.pk/assets/document/publications/PS-Review-Q3FY26.pdf>
28. Talwar, M., Corazza, L., Bodhi, R., & Malibari, A. (2024). Why do consumers resist digital innovations? An innovation resistance theory perspective. *International Journal of Emerging Markets*, 19(11), 4327-4342. <https://doi.org/10.1108/IJOEM-03-2022-0529>

29. Uddin, S. M. F., Kirmani, M. D., Bin Sabir, L., Faisal, M. N., & Rana, N. P. (2025). Consumer resistance to WhatsApp payment system: Integrating innovation resistance theory and SOR framework. *Marketing Intelligence & Planning*, 43(2), 393-411. <https://doi.org/10.1108/MIP-09-2023-0519>
30. Ullah, S., Kiani, U. S., Raza, B., & Mustafa, A. (2022). Consumers' intention to adopt m-payment/m-banking: The role of their financial skills and digital literacy. *Frontiers in Psychology*, 13, Article 873708. <https://doi.org/10.3389/fpsyg.2022.873708>
31. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478. <https://doi.org/10.2307/30036540>



2026 by the authors; Journal of Global Social Transformation (JGST). This is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).