## Research Article

# Mobile Payment Gateway Adoption and Risk Concerns in South Africa

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### Abstract

The growing reliance on digital systems for everyday financial transactions has accelerated the adoption of mobile payment gateways in South Africa. Although these platforms offer convenience and efficiency, they also introduce significant cybersecurity and privacy risks. This study examines the determinants of user adoption of mobile payment gateway systems and assesses how perceived risk influences user behaviour. The research integrates constructs from the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT2) to analyse adoption dynamics. Data were collected through an online survey administered via Qualtrics XM, yielding 268 valid responses. Descriptive statistics, reliability and validity tests, and principal component analysis (PCA) were used to assess the measurement model and identify key influencing factors. The results show that perceived ease of use and perceived trust (which strongly loaded as factors that determine mobile gateway adoption, also with a mean score of approximately 4.5 and 3.5, respectively) significantly enhance adoption intentions. However, perceived risk exhibits a neutral influence among South African users, with mean score of 3.103, indicating that most participants were neither particularly worried nor concerned about the risks associated with mobile payment gateway systems. This neutrality is likely associated with strong regulatory oversight and the relative stability of the South African financial system. The findings underscore the importance of maintaining user trust and strengthening cybersecurity awareness to sustain growth in mobile payment adoption.

## 1 Introduction

### 1.1 Background

Digitisation has forcefully made businesses advance their models and change their processes to accommodate a new stream of digital consumers (Farahzadia et al., 2017). The development of digitisation has led to the finance technology (FinTech) nexus, in which enterprises and consumers find comfort in transacting online (Johnson et al., 2018). This nexus has escalated due to the continuous advancement in the mobile internet, cloud computing and other technological features that enable mobile payments (Farahzadia et al., 2017). Banks also responded to this shift to pursue e-banking to ensure they cater for digital consumers (Wong et al., 2008).

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Most countries including emerging markets and African countries have significantly shifted toward digitisation of every system including payments. Though the shift towards digitisation could take different levels, tempos and stages in different countries. For instance, India's demonetisation vision of 2014 forced the population to adopt digital payments, which boosted the demand for mobile payment services (Srivastava, 2017). While in Zimbabwe, adoption of e-banking was very slow, youth in the country had migrated to other countries in search of prosperous paths. Most remaining mature individuals still prefer in-contact financial services enquiries and not easily open to new ways of digital banking (Margaret & Ngoma, 2013).

Digital transacting platforms are merely used to provide convenience to the consumer and increase the profit level of banks as they promote frequent transactional activities (Johnson et al., 2018). Moreover, the digital channel has allowed consumers to have input in online services offered by enterprises. This feedback channel enabled businesses to find areas for operational enhancement (Johnson et al., 2018).

The advancements in finance and technology have led to a drastic increase in financial institutions in the finance ecosystem, where companies have sought to get licensed to become Payment Service Providers (PSPs) and facilitate online financial transactions (Huang et al., 2020). On the other hand, some companies have opted to build partnerships with existing banks to pursue digital financial ventures. Banks also leverage on this such partnership to enable the expansion of their resources (Johnson et al., 2018). This type of partnership requires restructuring companies' networks and technology to allow for the development of a value-sharing ecosystem.

Payment Service Providers (PSPs) are companies that offer payment capabilities to businesses without them necessarily being banks (Bartelt & Hommel, 2021). Some of PSP's transaction activities are done by the banks as confirmed by the law. For instance, the Central Bank Act on digital payments of Iran allows banks to delegate tasks to PSPs through a contract restricting the services to be provided the PSPs (Khalilzadeh et al., 2020). The banks that PSPs work with are referred to as acquiring banks and they settle the transactions of consumers into respective accounts based on the request received from the PSPs. For this to occur, the PSP and the bank's systems must be connected so that payment information or requests can be transparent (Bartelt & Hommel, 2021; Khalilzadeh et al., 2020). PSPs facilitate online payments on cloud-based systems using payment gateways and pay-as-a-service (PaaS) (Khalilzadeh et al., 2020). The digital payment strategy is in line with the aim of the global economy to reduce cash circulation, thus it supports consumers and businesses to make financial transactions online (mobile payment). Mobile payment (m-payment) services have been viewed to be secure, convenient, and fast for both consumers and merchants (Chen et al., 2017). With merchants, it provides them with increased transaction activity at a lower cost and increases consumer loyalty (Feldhaus & Mathauer, 2018; Johnson et al., 2018). As much as mobile payment (m-payment) services have great benefits, it has been denoted that the adoption of online payment services is very low in Asia, Europe, and the United States of America (USA), and that the adoption of m-payments is not necessarily correlated to the purchase of smartphones. For instance, 25% of adults could potentially purchase smartphones but may not see the interest in understanding the applications. It is believed that the penetration of Apple Pay, Android Pay, and other M-payment services could increase the adoption of m-payment services globally (Johnson et al., 2018).

Some barriers that cause consumers to adapt to online payment services at a lower rate include concerns about the security of payment platforms with consumer information (Johnson et al., 2018). Despite digital businesses stating that online platforms are very secure, there have been numerous cases of cyberattacks that have been reported (Khalilzadeh et al., 2020). Cyberattacks and cybercrimes have been defined as stealing of personal information and using it to make fraudulent activities. The increase in cyberattacks over time has shown that the advances in technology to create a complex infrastructure network, also result in more complex ways cyberattacks can occur. For instance, companies in the US that have experienced cyber breaches include Target Corp. and JP Morgen Chase, whereby a breach led to 130 million credit and debit card information being stolen by cybercriminals and exposed personal information and social security details of consumers, respectively (Johnson et al., 2018). From South African context, IBM's 2024[*] report flagged South Africa as the third country to be victimised by cybercrimes costing enterprises a total of R2.2 billion annually. It shows

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[*] https://socradar.io/ibms-cost-of-data-breach-report-2024-cybersecurity/

that cybercriminals are observing the vulnerability in the South African internet infrastructure, and this causes the country to become an agent of ransomware. For instance, Transnet suffered a cyberattack, which forced them to pay a ransom to protect their data. In IBM's 2024 report, average cost of a data breach in South Africa is R49[†] million . These events in the market have disquieted consumers from utilising mobile payment services. It then puts pressure on businesses to strengthen the security of their internet infrastructures, ensuring that their online services are completely secure to rebuild their trust with consumers (Vimal et al., 2021; Johnson et al., 2018).

Though regulatory bodies exist, for instance in the South African context, the South African Reserve Bank (SARB) regulates the national payment systems (NPS) to ensure safety and convenient use of payment systems t for both consumers and businesses, however mobile payment platforms come with increased risks, including cyberattacks and other risks related to mobile transactions.

Cybercriminals often target mobile transactions, leading to financial and data losses (Chen, & Lai, 2023). This is due to insufficient security measures and consumers' concerns about their privacy and the protection of their personal information (Chen, & Lai, 2023). Most at times consumers are stunned with the popularity and benefits of mobile payment, therefore inadvertently ignore the risk concerns on the usage of mobile payment gateway systems.

Based on these identified problems, this study aims to identify factors that influence consumers to adopt and make use of mobile payment gateway systems in South Africa. Secondly to assess how consumers respond to risk concerns on the usage of mobile payment gateway systems, and how such risk concerns affect adoption of payment platforms.

Mobile payment has come to stay due to the linked benefits; therefore, consumers and enterprises need to understand the inherent risks and how such risks can affect adoption. Therefore, the findings of this study will enable developers as well as users of mobile payment systems to take into consideration risk concerns that are attributed to the use of mobile payment gateways. Most importantly, the findings will enable financial regulators to understand how and where to pitch policies guiding mobile payments, especially in combating cybercrimes.

The paper is organised in sections: section one provides the background of the study, as well as the identified problems, objectives and the assumed benefits of the research findings. The second section provides brief literature review on the research concepts, while section three explains the methodology adopted in achieving the objectives. Section four provides results from the analysis, while section five discusses the findings. Section six concludes and provides policy recommendations and gaps for further studies in relation to the research findings.

## 2  Literature Review

### 2.1  Introduction

Technology innovation has brought up automation of business operations, which has influenced or stimulated the influx in e-commerce platforms (González-Carrasco et al., 2019). This has put pressure on payment administrators to recruit resources with technical expertise, build secure payment infrastructures, ensure that they can provide their services and goods online, and enhance business operations. This then requires such businesses to facilitate the adoption and use of payment systems, as well as to be cognisant of the concerns users may have due to the inherent risks of combining finance and technology.

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[†]`chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://wp.table.media/wp-content/uploads/2024/07/30132828/Cost-of-a-Data-Breach-Report-2024.pdf`

## 2.2   Payment Gateway Operators

Payment systems/gateways are normally operated by banks and other financial institutions, including technology companies, telecommunications and internet providers.

### 2.2.1   Financial and Technology Institutions

Financial institutions and tech companies have different operational processes and procedures based on the customers they serve (González-Carrasco et al., 2019). Syed (2021) reported that, with increased competition in the financial industry, companies develop specialised products and services and become more customer-centric by understanding and developing products and services their customers require. Some of the elements companies focus on to better their service delivery is providing a great customer experience (data-centric), offering incentives, and implementing loyalty programmes to retain and grow their customers (Thomas-Bryant, 2017). All these services become easier with digitisation, especially by introducing mobile payment gateways.

Recent banks are also becoming tech companies whereby state-of-the-art technology is used to better the operations of financial institutions (Deninzon et al., 2019). Moreover, banks use analytics to build more accurate measures to monitor payment behaviour customers, making banking experience customer-centric (Kitsios et al., 2021). This then explores another option to track customer behaviour and concerns, and not only to rely on the call-centre data. Operational consultants can also manage key performance indicators (KPIs) regularly and use these to continuously evaluate the customer success in using payments system based on analytics (Deninzon et al., 2019; Thomas-Bryant, 2017).

### 2.2.2   Telecommunications and Internet Architecture

Telecommunications (Telecoms) have invested in digital disruptions to be able to produce new internet networks. The internet is not owned by anyone or any organisation; however, it is a decentralised system that spans a wide range of networks. Certain protocols are in place to ensure that the networks communicate within these protocols, namely, the Transmission Control Protocol (TCP) and the Internet protocol (IP) (Shacklett et al., 2021). The standards of the protocols are set and run by organisations such as the World Wide Web Consortium (W3C) (Shacklett et al., 2021). The internet has benefited businesses and individuals by ensuring that information travels quickly and that they can communicate with people across the world (Khalilzadeh et al., 2020).

TCP/IP are communication protocols that are used to manage the end-to-end process of sending information, packing the information, messaging, reassembling, and routing the message to the receiver (Shacklett et al., 2021). TCP assembles the information sent via the internet after it has been packeted while the IP ensures that the information/communication is sent to the correct destination. Moreover, TCP/IP allows for remote login into systems or server hosts, and are used to establish applications across industries, such as mobile applications, internet logins, etc (Van Schewick, 2010). Network Address Translations (NATs) are used with the IP to improve security on the servers and companies' networks; therefore, the networks and their hardware ensure that information is sent to the appropriate destination and remains uncorrupted (Van Schewick, 2010). The development of internet has strengthened the conglomerate between the financial institutions/technology companies with telecommunications which in turn has facilitated the use of mobile payment and e-commerce platforms.

## 2.3   Mobile Payment Gateway Systems and E-commerce

Information and communication technology (ICT) has changed the operations of the business and caused an increase in the emergence of businesses in payment services. The rise in e-commerce has forced payment administrators to obtain technical expertise or hire IT specialists to build secure payment infrastructure to ensure efficient online provision of goods and services. The technical specialists would understand the internet

architectures so as to construct the right protocols to ensure that the right servers are being accessed as well as send information to the correct hardware in the network infrastructure (Shacklett et al., 2021). This is critical for business operations to ensure efficient security of the platform so that consumer and merchant information is not breached, most importantly, to ensure that the payment infrastructure can perform the activities it was invented for (Van Schewick, 2010; Waverman et al., 2005). The activities could include, sending payment requests, recording transactions in the cloud, and enabling remote login to the platform by merchants and consumers.

E-commerce normally offers low transaction costs as it bypasses intermediate systems, and institutions need to ensure that the e-platforms are governed and always regulated (Diethe et al., 2019; Domingue et al., 2011). Moreover, the view of communities towards e-commerce raises concerns for businesses about whether the market will respond well to a payment venture or channel (Frempong & Atubra, 2001). In addition, most businesses are reluctant to pursue e-commerce ventures in developing countries due to lack of responsiveness in the market to digital platforms (Margaret & Ngoma, 2013).

The outbreak of Covid-19 made businesses to rethink on new ways to continue with operations, of which most of them continued through digital channels and e commerce facilities (Craven et al., 2022). Though some businesses could not implement e-commerce facilities due to lack of experience in the space and inability to adopt and maintain infrastructures needed for the shift, however, there was still an erupted increased competition in the digital space. The high competitiveness in the market enabled companies that could not fully develop their e-commerce platforms to partner with financial services to pursue e-commerce services as well as digital (mobile) payment platforms. Moreover, these partnerships allowed businesses to facilitate their operations at a lower cost and gain valuable customer data from the systems. The data could be used to make future customer-centric decisions around the product and services (Feldhaus & Mathauer, 2018; Kitsios et al., 2021).

## 2.4    Risk and Uncertainties Associated with Payment Gateway

Payment applications should have a strong infrastructure to ensure that consumers' information online is protected (Johnson et al., 2018; Vimal et al., 2021). Payment infrastructure continuously becomes advanced and allowed money to move across countries and ensure that payments are processed in real-time (González-Carrasco et al., 2019). Moreover, the modernised infrastructure enables the cost of processing transactions to decrease and improve its accessibility anywhere at any time (Rodrigo-Salazar et al, 2021). The infrastructure plays a key role by making sure that when payment is initiated, the right message is sent to the system to process the request (Rodrigo-Salazar et al, 2021). The Internet of Things (IoT) enables this instance, whereby objects speak to systems to process a request that is initiated by a consumer (Rodrigo-Salazar et al, 2021). IoT has made it easy for information to be passed in one form and received in a different form between systems or objects while keeping the messaging information intact. These infrastructures are exposed to high level technology breaches, exposing consumers to cyber-attacks, and businesses to high cost of mitigating the cybercrimes, for instance in the South African case of approximately R2.2 billion annual cost on cyber-attack.

To minimise risk, Machine Learning (ML) has been used by financial institutions and card associations such as VISA and Mastercard to strengthen their cybersecurity. ML can detect consumer behaviour and report fraudulent activities (González-Carrasco et al., 2019). Machine learning in this instance tracks the spending behaviour of a consumer and capture anomalies in the spending patterns. Cordray et al. (2014) reported that sometimes the analysis can result in false positives and impact consumer usage of the mobile payment application due to dissatisfaction experienced (Vimal et al., 2021).

## 2.5    User Adoption and Risk Concerns of Adoption

Technology breaches have caused severe limitations to consumers adopting mobile payment services. A study by Johnson et al. (2018), using the diffusion of innovation (DOI) reported that adoption of technology is impacted by the security and the perceived risk linked to internet transactions as consumers fear losing money

and show low tolerance to risk. This has been the biggest hindrance to consumers exploring mobile payments as they are concerned about their personal information being violated on websites or mobile applications (Khalilzadeh et al., 2020; Johnson et al., 2018). Moreover, Johnson et al. (2018) also discovered that the ease of use is a limitation in consumers exploring mobile payments. Consumers that struggle with using mobile applications tend to give up quickly due to the pain points that they will experience with mobile payment services. Therefore, mobile payment services must be easy to use for consumers to readily adopt payment applications.

Theoretical models explored user behaviour towards technological adoption, including mobile payments (Chen, & Lai, 2023). Technological Acceptance Model (TAM) and The Unified Theory of Acceptance and Use of Technology (UTAUT) models are two prominent theoretical frameworks used to understand the adoption of modern technologies (Napitupulu, et al., 2017). In the context of technology adoption, TAM suggests that users' intentions to use a technology are shaped by their perceived usefulness and perceived ease of use. Perceived usefulness refers to the belief that the technology will improve performance or enhance job satisfaction (Napitupulu, et al., 2017). Perceived ease of use, on the other hand, is the belief that the technology is easy to use and requires minimal effort.

Another factor modelled on the TAM to technology adoption includes the perceptions of the benefits the users obtain from using such technologies (Chen & Lai, 2023). The perception of the benefits of mobile payment gateway systems influences the user to explore technological advancements. UTAUT and its modified version (UTAUT 2) include more factors in determining effects technology adoption (Venkatesh et al., 2003, 2012; Venkatesh & Zhang, 2010). The factors include attitude towards usage, self-efficacy, and anxiety, as well as demographic factors (age, gender, experience, voluntariness, etc.).

Combined model of UTAUAT-TAM also analysed additional factors that could influence adoption of technology, such as perceived risk, perceived security and perceived trust and privacy (Maqableh et al., 2016). Chen & Lai (2023) further assert that one of the reasons for low adoption of digital payments is a lack of public trust, which is the major focus of this study. Chen added that other factors outside the UTAUT-TAM model, such as frequent malfunctions, potential fraud, and limited availability of e-payment machines, can lead people to question the usefulness of a payment gateway. Because this study focuses on the risk concerns of usage of payment gateway, the TAM questionnaire was adopted with inclusion of perceived trust and perceived risk in the model. We leveraged on Chen's model and focused on perceived ease of use, subjective norms, perceived trust, and perceived risk, along with demographic factors, such as age, gender and educational qualifications. Recent studies focusing on South Africa (Horvey, Godspower-Akpomiemie, & Asare Boateng, 2025; Dörfling & Godspower-Akpomiemie, 2024) also confirmed that these factors affect adoption of technology especially in the insurance sector, therefore exploring how they affect risk concern in usage of payment gateway is paramount.

## 2.6   Regulation and Risk Management

The ongoing changes in technology and globalisation in e-commerce and digital payment have caused a rise in risk over time. Risk is associated with ways that economic activity and the safety of individuals are negatively impacted by a situation (Srivastava, 2017). The current risks (cyber-attacks) in financial institutions have to do with the advancements in payment systems enabled by technology, which has increased the activity of fraudsters online to always try to corrupt business systems and steal valuable data (Srivastava, 2017). This is a noticeably big concern for businesses and individuals that operate in digital spaces and is seen as a limiting factor in persuading individuals to use online platforms. Since consumers have a low tolerance for risk, there must be risk management systems in place to ensure that personal and business details are always protected (Johnson et al., 2018). Most importantly, this has indicated that the government must work on cybersecurity regulation and act to ensure that it is in full operation to prevent South Africa from being a victim of cyberattacks.

# 3   Methodology

## 3.1   Data Collection and Sampling

This study investigates the risk concerns on adopting a mobile payment gateway using some of the factors that affect technology usage in UTAUT-TAM model (perceived ease of use, subjective norms, perceived trust, and perceived risk, along with demographic factors, such as age gender and educational qualifications). The use of combined model of UTAUAT-TAM is based on its ability to incorporate additional factors to TAM, such as perceived risk, perceived security and perceived trust. This provides insight into how consumers accept and use payment gateways in this digital and e-commerce era. The positivist research paradigm and quantitative design were employed, using cross-sectional data collection method through online survey. Online surveys have been popularly adopted by academics in similar studies (Horvey, Godspower-Akpomiemie, & Asare Boateng 2025; Dörfling & Godspower-Akpomiemie, 2024; Milanović et al., 2020) and were judged appropriate for this study due to design flexibility, and ability to gather a large sample of diverse sample (De Gregorio & Sung, 2010). South Africa was purposively selected due its advanced level of technology adoption in business operations (Horvey & Odei-Mensah, 2024). The survey link was distributed through Qualtrics XM via email and social media platforms, including WhatsApp, Facebook, LinkedIn, and Instagram. These platforms were chosen due to their widespread use in South Africa (Statista, 2022), maximizing accessibility to potential participants. A convenience sampling method was adopted for data collection, selecting participants based on accessibility and willingness to participate (Emerson, 2021). Though convenience sampling has limited generalizable attributes, this research covered diverse segments across different South African provinces, generating 268 respondents. Moreso, it has been deployed in similar technology acceptance research (Horvey, Godspower-Akpomiemie, & Asare Boateng 2025; Dörfling & Godspower-Akpomiemie, 2024). The online survey was distributed to a population that use mobile payment gateways.

Ethics approval was obtained from the University of the Witwatersrand, with cover letter explaining the purpose of the study was issued to the participants before data collection. To ensure anonymity, no personal information of respondents was captured in the process of data collections. Participants were also informed to express their consents to participate in the study and could withdraw from the research at will.

## 3.2   Profile of Respondents

Out of the 294 responses collected, 268 who fully responded to the questionnaire were eligible for analysis. Majority of the respondents were African population constituting 97.1%, followed by coloured population at 1.8%, while Indian and White represented 0.7% and 0.4%, respectively. While the survey was made diverse as possible, there was a strong concentration of participants in Gauteng, accounting for 84.6% of the sample, followed by Limpopo with 2.9% representation. Participation from the other provinces was minimal, all falling below the 2.6% threshold. Notably, no participants indicated residence in the Northern Cape.

Female representation is at 57.7%, while males stood at 39.8%, with 2.2% of the participants preferred not to disclose their gender identity. This indicates that female population of South African are becoming inclusive in digital transformation, narrowing the gap digital divide by gender. The age distribution of the participants demonstrated a significant concentration in the 20-39 age group, accounting for 82.5% of the total sample. The >40 age group followed with 13.9% participation, while the <20 age group had the lowest representation, comprising only 3.6% of the participants.

The survey results demonstrate a significant presence of graduates within the sample group, comprising 51.8% of the total respondents. The second largest segment is individuals with postgraduate qualifications at 24%. Also 24% of the sample group indicated a senior certificate as their highest level of education. This indicates that graduates may be exposed to use of mobile payment gateway and may be able to understand its associated risks compared to individuals with lower educational qualifications.

### 3.3　Measures

The constructs used in this study were taken from the literature and were scored on a 5-point Likert scale, where 1 denotes "strongly disagree" and 5 denotes "strongly agree. The TAM2 questionnaire was adapted to investigate the risk concern of using mobile payment gateway in online transactions of goods and services. Four constructs from Davis (1989) were used to measure the perceived ease of use (PEU1 to PEU4). The subjective norm, (SN1 to SN3) were measured with three constructs from (Venkatesh & Davis, 2000; Shih & Fang, 2004). Perceived trust (PT1 to PT4) and Perceived risk (PR1 to PR4) were both measured with four constructs (Dash & Saji, 2008).

### 3.4　Analyses

A factor analysis, principal component analysis (PCA) was used to verify the validity and reliability of the research constructs. Also to define constructs that sensibly reflect the adoption of mobile payment gateway, PCA is applied to identifiable mobile payment adoption related variables (proxies) to derive measures that effectively reflect adoption (Godspower-Akpomiemie & Ojah, 2021). PCA extracts most important information from a relevant dataset and helps to capture as much variance as possible between the most related variables (Abdi and Williams et al., 2010). In this study, the constructs generated through the survey that most defined adoption of mobile payment gateway systems were captured using PCA[‡].

　　Communalities are used to quantify the extent to which each variable's variance is explained by the extracted factors. Variables with communalities below 0.4 have a minor contribution to the underlying factors. The model fit was evaluated using Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy to ensure its suitability for factor analysis. KMO ranges from 0 to 1, and a value of 0.50 or higher is considered significant (Napitupulu, et al., 2017). Bartlett's test of sphericity was adopted to examine whether the correlation matrix is significantly different from an identity matrix. The study used Cronbach's alpha to test the reliability of the scales in the research questionnaire. The measurement model offers values between 0 – 1 that determine how closely related a set of items are as a group (Gliem & Gliem, 2003). The scale is reliable when the value of Cronbach coefficient alpha is higher than 0.7 (Gliem & Gliem, 2003). However, coefficient values between 0.5 and 0.6 are still acceptable.

## 4　Results and Interpretations

### 4.1　Assessment of the Measurement Model

Linear regression was conducted to examine the influence of trust on the performance of small enterprises within ESD programmes. Results are summarised in Table 2.

### 4.2　Regression Analysis

The Kaiser-Meyer-Olkin (KMO) yielded a value of 0.852, which exceeded the recommended threshold of 0.5, indicating high sampling adequacy (See Table 1). Furthermore, Bartlett's test of sphericity returned a statistically significant result (p < 0.001) (shown in Table 1). This significance confirms that the correlations among the variables are sufficiently strong to warrant factor analysis. A Cronbach's alpha value of at least 0.7 is commonly accepted as an indicator of acceptable reliability, the construct in this analysis exhibited a Cronbach's alpha of 0.821, which was based on a sample size of 268 valid responses.

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Table 1: KMO measure of the results of the Survey with 268 valid responses

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | ,852 |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1476,929 |
| | df | 105 |
| | Sig. | <0.001 |
| | | |
| Cronbach's alpha | 0.821 | |
| Number of items | 15 | |

From table 2, among the factors examined, Perceived Ease of Use (PEU) exhibited the highest mean score at 4.353, indicating strong agreement. Perceived Trust (PT) followed with a mean of 3.520, suggesting a positive perception. Perceived Risk (PR) had the lowest mean score at 3.1 and standard deviation of 1.1, indicating a neutral response, neither agreeing nor disagreeing with the statements related to risk.

By showing that trust influences enterprise performance, this study extends the explanatory power of Social Capital Theory in contexts characterised by institutional voids. In such environments, relational governance serves as a substitute for formal institutional mechanisms, highlighting the dual role of trust as both a theoretical construct and a strategic performance lever in South Africa's entrepreneurial landscape.

Table 2: Descriptive statistics of combined variables

| Constructs | N | Min | Max | Mean | Std. Dev |
|---|---|---|---|---|---|
| Perceived Ease of Use (PEU) | 246 | 1 | 5 | 4.353 | 0.806 |
| Subjective Norm (SN) | 246 | 1 | 5 | 3.287 | 1.082 |
| Trust (PT) | 246 | 1 | 5 | 3.520 | 0.982 |
| Perceived Risk (PR) | 246 | 1 | 5 | 3.103 | 1.129 |

Table 3 displays the correlation matrix among the constructs, which shows that the highest correlation is between Perceived Trust (PT) and Perceived Risk (PR) on mobile payment gateway usage, whereas the lowest correlation exists between Subjective Normative (SN) and Perceived Risk (PR). This shows that risk and trust of using mobile payment gateway among South Africa are significantly correlated, which is in line with Horvey, Godspower-Akpomiemie, & Asare Boateng (2025), who found that risk and trust of using peer to peer insurance are correlated.

Table 3: Correlation matrix for the variables

| | PEU | SN | PT | PR |
|---|---|---|---|---|
| PEU | 1.000 | | | |
| SN | $0.157^{**}$ | 1.000 | | |
| PT | $0.255^{***}$ | $0.219^{***}$ | 1.000 | |
| PR | $0.152^{**}$ | $0.150^{**}$ | $0.341^{***}$ | 1.000 |

Note: $^{***}$ indicates correlations are significant at $p < 0.01$; $^{**}$ $p < 0.05$

From Table 4, two variables (SN1 and PR3) exhibit communalities below 0.5, suggesting a moderate level of contribution. Conversely, the remaining variables demonstrate communalities exceeding 0.5, indicating a substantial contribution to the extracted factors.

Table 4: Communalities of the 268 valid responses

| | Communalities | |
|---|---|---|
| | Initial | Extraction |
| PEU1 | 1.000 | 0.595 |
| PEU2 | 1.000 | 0.634 |
| PEU3 | 1.000 | 0.620 |
| PEU4 | 1.000 | 0.575 |
| SN1 | 1.000 | 0.436 |
| SN2 | 1.000 | 0.571 |
| SN3 | 1.000 | 0.666 |
| PT1 | 1.000 | 0.642 |
| PT2 | 1.000 | 0.623 |
| PT3 | 1.000 | 0.503 |
| PT4 | 1.000 | 0.515 |
| PR1 | 1.000 | 0.689 |
| PR2 | 1.000 | 0.723 |
| PR3 | 1.000 | 0.360 |
| PR4 | 1.000 | 0.588 |
| Extraction Method: Principal Component Analysis. | | |

Table 5 guides factor selection from the PCA analysis by retaining only those with eigenvalues exceeding 1. This criterion led to the selection of three components, which collectively explain 58.28% of the total variance. This percentage slightly falls short of the recommended threshold of  60%. The factors that significant loaded within the three selected components according to their eigenvalues are presented in Table 5.

Table 5: Total variance of the component being posed in the survey.

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.268 | 35.118 | 35.118 | 5.268 | 35.118 | 35.118 | 4.221 | 28.137 | 28.137 |
| 2 | 2.105 | 14.032 | 49.150 | 2.105 | 14.032 | 49.150 | 3.005 | 20.032 | 48.169 |
| 3 | 1.369 | 9.127 | 58.277 | 1.369 | 9.127 | 58.277 | 1.516 | 10.108 | 58.277 |
| 4 | 0.955 | 6.365 | 64.641 | | | | | | |
| 5 | 0.837 | 5.582 | 70.223 | | | | | | |
| 6 | 0.747 | 4.983 | 75.206 | | | | | | |
| 7 | 0.652 | 4.344 | 79.549 | | | | | | |
| 8 | 0.560 | 3.735 | 83.284 | | | | | | |
| 9 | 0.485 | 3.236 | 86.520 | | | | | | |
| 10 | 0.446 | 2.974 | 89.494 | | | | | | |
| 11 | 0.380 | 2.533 | 92.027 | | | | | | |
| 12 | 0.369 | 2.458 | 94.485 | | | | | | |
| 13 | 0.308 | 2.053 | 96.538 | | | | | | |
| 14 | 0.271 | 1.809 | 98.347 | | | | | | |
| 15 | 0.248 | 1.653 | 100.000 | | | | | | |

Table 6 reveals a pattern of strong correlations between Component 1 with ten variables comprising all the constructs used in this study: perceived trust (PT), perceived risk (PR), perceived ease of use (PEU) and subjective norm (SN). Furthermore, Component 2 demonstrates moderate to strong correlations with only two variables of PEU, while Component 3 exhibits similar correlations with three variables of SN and PR. However, the correlation between Component 3 and a PR variable is notably weaker, with a correlation coefficient below 0.5. This result indicates that the use of mobile payment gateway is more determined by the level of trust, risk

associated with, and the ease of use of such payment gateway compared to the subjective norms of the users. However, the risk and trust associated with such payment gateway mostly determine how well it will be adopted by users.

Table 6: Component Matrix of the questions to the three components with top variance

| Item | Question | Comp. 1 | Comp. 2 | Comp. 3 |
|---|---|---|---|---|
| PT2 | Mobile payment systems are likely to be reliable | 0.782 | | |
| PT1 | I believe that my transactions on mobile payment systems are likely to be safe | 0.770 | | |
| PR1 | Do you think the security of mobile payment systems is good enough? | 0.737 | | |
| PR2 | I feel confident that my personal data is secure on mobile payment systems. | 0.728 | | |
| PT4 | I am confident that my transactions with mobile payment systems will be transparent. | 0.700 | | |
| PR4 | Is Authentication of the mobile payment system sufficient? | 0.665 | | |
| PT3 | Many things may not go wrong with my transactions with mobile payment. | 0.597 | | |
| PEU3 | Mobile payment gateway is easy to use. | 0.580 | | |
| PEU4 | It is easy to learn how to use a mobile payment gateway | 0.563 | | |
| SN1 | The people important to me think I should use the mobile payment systems. | 0.551 | | |
| PEU1 | Mobile payment gateway makes it easier to perform transactions. | | 0.623 | |
| PEU2 | Payment Gateway enables us to do transactions quicker. | | 0.564 | |
| SN3 | I feel under social pressure to use mobile payment systems | | | 0.781 |
| SN2 | It is expected of me to utilise the mobile payment systems. | | | 0.545 |
| PR3 | I have experienced security issues (Fraudulent transactions, Loss of funds, data breaches) on the mobile payment systems. Extraction method: Principal Component Analysis a: 3 components with eigenvalues exceeding 1 are extracted | | | 0.458 |

# 5  Discussion

## 5.1  Adoption of Mobile Payment Gateway Systems

Understanding the factors influencing individual technology acceptance is a crucial area within information systems (IS) research (Chang, 2012). The findings of this research reveal that some factors relating to the UTAUT-TAM model adopted in this study, as well as the demographic factors determine the adoption of the payment gateway system in South Africa.

## Perceived Ease of Use (PEU)

Perceived ease of use (PEU) of mobile payment gateways emerged as the strongest factor influencing adoption in this study, with a high mean score of approximately 4.3 out of 5 and a standard deviation of 0.806. This suggests a strong positive perception of ease of use, with 86% of participants reacting favourably. More so PEU constructs loaded strongly in the component 1 of the PCA result (see Table 6). This aligns with previous research, such as ALRashdan (2025), who identified perceived usefulness and ease of use as key drivers of technology adoption. Furthermore, the findings support Indarsin and Ali (2017), who also observed a positive impact of PEU on user attitudes towards technology.

## Subjective Norms (SN)

Though in this study, subjective norms (SN) mostly loaded in component 3, with one construct loading in component 1, but it still provides an indication of the significance of SN in shaping usage of mobile payment gateway. Prior research, including Chang (2012), indicates that subjective norms can directly shape perceptions of usefulness and ease of use of technology. This study also supports this, revealing a correlation of 0.157 between aspects of ease of use and subjective norms. This suggests that social influences play a role on how individuals perceive the usefulness and ease of use of technology, potentially using technology to boost their social standing and influence within their social groups. This observation is consistent with Joa and Magsamen-Conrad (2021), who also found that perceived social norms surrounding technology adoption can increase the intention to use modern technologies.

## Perceived Trust (PT)

Studies have consistently shown that lack of trust poses a significant barrier to the long-term success of any financial system. Nguyen and Nguyen (2020) highlighted perceived trust and perceived risk as core constructs. This underscores the critical importance of building and maintaining consumer trust to mitigate the risks associated with e-commerce and similar technologies, thereby facilitating increased adoption of mobile payment gateway systems (Maqablesh et al., 2016). The strong correlation between perceived trust and perceived risk observed in this study further emphasises this interrelationship. More so, PT strongly loaded as factors that determine mobile gateway adoption, also with a mean score of approximately 3.5. This emphasises that, to effectively promote the adoption of mobile payment gateways, service providers must prioritise building and maintaining strong trust relationships with consumers by effectively addressing and mitigating the perceived risks associated with their services (Ponte, et al. 2015).

## 5.2    Risk Concerns on the Usage of Mobile Payment Gateway Systems

### Perceived Risk (PR)

Perceived risk is a key factor in technology adoption, reflecting how concerns about potential risks, like security breaches (Penney et al., 2021), affect consumer acceptance. In this study, participants' risk perception had a neutral mean score of 3.1, indicating that most participants were neither particularly worried nor concerned about the risks associated with mobile payment gateway systems. However, most participants are confident that their information and personal data are well protected while using mobile payment gateways. This is evidence in the PR2 and PT4 loadings in table 6. This finding could be linked to high level of infrastructure in South Africa, as well as some regulations on information disclosure, such as Protection of Personal Information Act (POPIA). This finding is in line with Abdul-Hamid et al., (2019) findings across five Ghanaian cities that higher perceived risk discouraged adoption; while in South Africa, people are more confident of information safety, therefore have neutral risk perception towards usage of mobile payment gateway.

## Mobile Payment Gateway Security

Mobile technology has revolutionised consumer access and facilitating online transactions, which was further accelerated by the COVID-19 (Ramokgopa, Smallwood, & Allen, 2023). However, lack of user trust stemming from security concerns remains a significant barrier to the widespread adoption of mobile payment gateways. This study found participants to be indifferent to the risks associated with mobile payment gateway adoption, though confident about their information protection. Furthermore, this study revealed a moderate positive correlation (0.341) between perceived risk (PR) and perceived trust (PT), suggesting a complex interplay between these two factors. Encryption and authentication are fundamental to secure payment systems (Puchert, 2025), and without these, no system can be considered truly safe.

## End-User Security Awareness

According to Gartner Research, 2018[§] , the global information security market, projected to reach \$170.4 billion in 2022 is fuelled by increasing data breaches, hacking, phishing, malware, and mobile device theft. Even with the controlled environments offered by platforms like Google and Apple, security breaches remain a concern, with threats like phishing, malware apps, and click-fraud on the rise (Weichbroth & Lysik, 2020). This aligns with this study's finding of a neutral reaction to perceived risk (mean of 3.1), though South African have confidence in their information protection, the neutral reaction represented by the mean of 3.103 suggests a lack of proactive self-protection against fraud. This underscores the need for increased consumer security awareness. As Ophoff and Robinson (2014) highlight, understanding user perspectives is crucial for bridging the gap between security managers and users. This understanding can lead to the development of more effective security measures and better security practices. By improving user knowledge of best security practices, compliance can be significantly enhanced (Balapour, Nikkhah, & Sabherwal, 2020).

## Mobile Payment Gateways System Providers

The rapid growth of Mobile Payment Gateway Systems (MPS) in developing countries highlights their transformative potential (Phajane, 2023). Several factors contribute to this expansion. Firstly, socioeconomic conditions in these economies are pushing a transition from cash to digital transactions, as evidenced by the strong Subjective Norms (mean of over 3.2) observed in this study. This shift is further encouraged by the cost-effectiveness of mobile payment apps, particularly for services like money transfers, which often offer lower fees than traditional methods (Kihombo et al., 2021). Secondly, widespread mobile phone access has been crucial (Phajane, 2023). In many developing countries, mobile phone penetration exceeds access to basic services like electricity and clean water (Phajane, 2023), providing a solid base for mobile payment adoption, which aligns with the strong perceived ease of use found in this study. While this study found a neutral level of perceived risk, security concerns could remain a major obstacle to wider adoption (Weichbroth & Lysik, 2020).

Given South Africa's historical inequalities, fostering institutional trust between corporates and Black-owned suppliers remains a central challenge to achieving inclusive and transformative ESD outcomes. Embedding measurable trust mechanisms can promote equity, transparency, and mutual respect within procurement systems, mitigating the grey areas where social capital, ethical practice, and corruption may intersect.

## Regulation

Information security is crucial for protecting data confidentiality and integrity, especially in the face of evolving cyber threats globally, including in South Africa, where the use of mobile payment gateway systems is growing exponentially (Balapour, Nikkhah & Sabherwal, 2020; Weichbroth & Lysik, 2020). Though there was no construct to capture regulatory effect in this study, but this study found a neutral perceived risk level among

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[§]https://www.gartner.com/smarterwithgartner/gartner-top-10-strategic-technology-trends-for-2018

South African consumers, while other research suggests that perceived risks can significantly hinder mobile payment adoption in the country (Lee, 2013; Chen, 2017). This could be attributed to various regulatory bodies in South Africa that oversee e-commerce platforms to maintain security and reliability (Mothibi & Rahulani, 2021). For instance, the Electronic Communications and Transactions Act (ECTA) of 2002, which mandates compliance with regulations like the Protection of Personal Information Act (POPIA) to ensure consumer protection and cybersecurity (International Trade Administration, 2024).

However, there are other shortfalls of South Africa's regulatory bodies in adoption of mobile payment gateways. For instance, the limited success of mobile money services like M-Pesa in South Africa compared to Kenya further illustrates the challenges posed by the regulatory landscape (Phajane, 2023). The Financial Sector Conduct Authority (FSCA) acknowledges this and advocates for a more supportive regulatory framework that encourages digitisation and the development of accessible financial services (Mothibi & Rahulani, 2021). Most importantly, this framework should address key consumer concerns like perceived ease of use and perceived risk to promote wider adoption of mobile payments. China's success demonstrates the importance of a clear legal framework, and active regulatory bodies focused on consumer protection and market stability, as well as supportive regulatory environment (Huang, Wang & Wang, 2020).

# 6   Conclusions and Recommendations

## 6.1   Conclusions

This study analysed the factors influencing the adoption of mobile payment gateway systems in South Africa and to explore how users perceive the risks associated with these systems. Using an online survey of 268 participants, this study contributes to the growing body of knowledge and trends on the analysis of factors that affect technology adoption, focusing on South Africa. The results indicated that factors from the Unified Theory of Acceptance and Use of Technology (UTAUT), and Technology Acceptance model (TAM) specifically, Perceived Ease of Use, Subjective Norms, and Perceived Trust, influence the adoption of mobile payment gateway systems. The study also found that participants had a neutral perception of the risks in using these systems, which can be attributed to reliable technology infrastructure and relatively reliable regulatory bodies governing the country's information dissemination and consumer protection on financial transaction. This study's participants were primarily young adults aged 20-39, revealing a strong positive correlation between gender and mobile payment usage. Women constituted a majority (57%) of the participants indicates narrowing the gap of digital divide by gender. Also, a considerable proportion of at least 50% held university qualifications, suggesting a link between higher education levels and the adoption of mobile payment gateways.

The findings demonstrate a strong link between perceived ease of use (PEU) and both the adoption and activation of mobile payment gateway systems. This suggests that when users find these systems easy to use, they are prone to incorporate them into their routines. This finding can be linked to increase in the digital payment sector holds significant economic potential for South Africa and the broader African continent, with digital commerce projected to reach $180 billion, or 5.2% of Africa's total GDP by 2025 (African Leadership Magazine, 2024). South Africa's 66% increase in online sales in 2023, exceeding ZAR 30 billion (International Trade Administration, 2024), underscores this trend and the importance of PEU for South African consumers.

Most importantly, while global studies indicate that perceived risk discourages digital payment adoption, South African have neutral risk perception towards adoption of mobile payment gateways. This can also be attributed the safe reliance on the stability of South African financial system, due to availability of relatively strong regulation compared to other African countries.

### 6.2   Policy recommendations

**Payment Gateway Service Providers**

In terms of risk perception and security concerns, given the rise in cyber threats like fraud, consumer security and privacy are essential for modern businesses. Mobile payment gateway vendors must proactively educate users on security best practices to protect their information and privacy, thereby maintaining trust and promoting digital adoption in South Africa. This effort should involve key stakeholders, including regulatory bodies like the Electronic Communications and Transactions Act (ECTA), the South African Reserve Bank (SARB), mobile payment vendors, and the broader South African community.

**Traditional Banking Sector**

Despite the adoption of mobile payment gateway in South Africa, there is still preference for traditional banking and in-person interactions (evidence from incomplete survey responses and refusal to participate in the survey). This suggests that some individuals value the perceived security of human contact when managing finances. This highlights an opportunity for the financial industry to improve digital offerings, building trust by replicating the security and personalised experience of traditional banking within the digital space, while collaborating closely with regulatory bodies.

**Regulators**

Effective collaboration among South African regulators, the government, mobile payment providers, and consumers is vital for enhancing mobile payment security and fostering adoption within the country (Weichbroth & Lysik, 2020). Learning from international examples, including China's approach, this collaboration will be crucial for ensuring that the regulatory framework remains relevant and effective in the rapidly evolving South African mobile payment landscape, addressing the specific needs and concerns of South African users.

### 6.3   Recommendation for further research

This study is limited to South Africa. It also did not explore all aspects of the UTAUT-TAM model, which restricts a complete understanding of how these factors influence consumer behaviour. Future research should investigate the interrelationships between all UTAUT constructs for a more nuanced understanding of the South Africa mobile payment gateway system. Cross-cultural studies in other countries are also needed to determine if these findings are generalizable and to identify any variations in consumer attitudes and behaviours across countries.

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