The Effect of Perceived Risk on Value and Adoption of Proximity Mobile Payments

Zumae Barnard
University of Pretoria
zumbot@gmail.com

Michael Humbani
https://orcid.org/0000-0002-2416-5016
University of Pretoria
michael.humbani@up.ac.za

Abstract

Purpose/objectives: The purpose of this study was to explore the influence of risk dimensions on the perceived value and adoption of proximity mobile payments (m-payments) through the perspective of the perceived value theory.
Design/methodology/approach: A quantitative approach was adopted, and a convenience sample of 261 adults participated in this study.
Findings: The findings of this study indicate that psychological risk has the most significant influence on perceived value of m-payment adoption, followed by time risk; whereas social and privacy risks are insignificant factors. Perceived value also emerged as a significant predictor of adoption.
Practical implications: M-payment service providers can enhance perceived value and increase adoption by addressing psychological and time-risk concerns by offering clear information about the features and functions of the application, as well as creating calibrated payment systems that shorten the payment process. The study provides some insights to service providers on how to improve their value propositions so as to attract more users.
Originality/value: Limited studies have used the perceived value theory in emerging markets, especially pertaining to the sub-dimensions of risk in the context of proximity m-payments. The study identifies the salient risks that influence adoption of proximity mobile payments, and recommendations to management are made to that effect.

Keywords: perceived risk; psychological risk; time risk; social risk; privacy risk; adoption intention; proximity mobile payments; m-payments

Introduction

As mobile payment technology continues to evolve, consumers are fast adapting to it and changing their spending and payment habits. There were slightly over two billion

users of mobile payments (m-payments) across the globe in 2020, and this number is expected to grow to four billion by 2024 (Vector ITC 2020), suggesting that m-payments could be the future. As expected, the increase in the use of m-payments is in synch with mobile channel fraud (Kount 2018). Cardona (2021) reports that as the volume of mobile transactions is increasing, partly because of COVID-19, the surface area of risky transactions is simultaneously increasing. A worrisome observation is that despite merchants witnessing rapid growth in mobile-related fraud, they are showing signs of complacency, and some are even regressing in their efforts to manage mobile channel fraud (Kount 2018). The lack of determination to secure mobile transactions by the merchants makes consumers wonder whether m-payments are really safe to use. As Whisker and Lokanan (2019) point out, the growth of m-payments is not without risks, and criminals continue to seek opportunities to take advantage of vulnerabilities in the payment system. Realising that mobile phones are used to store large amounts of personal information and to access services such as social networks, banking and payments, hackers always shift their attention to the mobile environment for malicious opportunities (Park et al. 2019). The newer technologies, such as the near field communication (NFC) and Quick Response (QR) codes, commonly used to effect m-payments, open up pathways for hackers to compromise the mobile devices through phishing and data corruption (Anurag and Devendra 2012). As such, an understanding of how risk factors could adversely affect consumers' perceived value could add valuable knowledge to existing literature.

Defining M-payments and Perceived Risk

M-payments can be described as the use of any mobile device connected to a network to fulfil an economic transaction between individuals or between an individual and a business (Liébana-Cabanillas, Sánchez-Fernández, and Muñoz-Leiva 2014). There are two types of m-payments, namely remote m-payments and proximity m-payments. Remote m-payments are similar to electronic commerce payment methods and take place when a product or service is paid for using short message services (SMSs) or a mobile connection (De Kerviler, Demoulin, and Zidda 2016). Proximity m-payments refer to payments that take place at the retailer's point-of-sale by scanning a QR code or holding a phone to the NFC device and processing the payment through an associated mobile application (De Kerviler et al. 2016). This study is based on proximity m-payments, which are described as "the use of smartphones by consumers to pay for purchases at the point-of-sale" (Bailey et al. 2019, 3).

M-payments offer several benefits to the consumer, such as being safer than using cash, being easy to use, and saving time as transactions can be completed in seconds (Deloitte 2019; Demoulin and Djelassi 2016). Despite these perceived benefits, it is plausible for the consumer to also consider the perceived risks of using the system, particularly in the developing world where cyber-security systems are not "water-tight" (Lin, Wang, and Huang 2020). Perceived risk is described as the consumer's expectation of unfavourable consequences that may arise from the purchase of a new or unfamiliar product (Featherman and Hajli 2015). In the context of this study, perceived risk is described as

the potential losses that can arise because of the uncertainties that are created by the use of proximity m-payments. Such potential losses could include mental stress, wasted time, compromised confidential information and disapproval from one's peers. However, as people are becoming more conscious of hygiene practices in the wake of COVID-19, mobile payment use is expected to rapidly increase as a way to avoid the spread of the virus (Yao 2020). The question is whether or not the reality on the ground is commensurate with the expected rate of adoption of m-payments during the COVID-19 pandemic.

Review of the Literature on Perceived Risk

Previous studies that looked at risk as a multidimensional construct studied the impact of various uncertainties on perceived risk dimensions (Yang et al. 2015); the effect of trust and perceived risk on adoption intention (Abdul-Hamid et al. 2019; Yang et al. 2015); motivations for continued use of m-payments (Lin et al. 2020); the impact risk has on purchase intention (Ariffin, Mohan, and Goh 2018); and perceived risk as an antecedent for perceived usefulness and its effect on adoption intention (Biucky, Abdolvand, and Harandi 2017). There is a lack of studies that examined the influence of perceived risk factors on perceived value. This study explores the influence of psychological risk, time risk, social risk and privacy risk on the perceived value of proximity m-payments and how perceived value influences adoption. A review of literature indicates that these factors are worthy of further investigation in the context of an emerging market, as they have been found to be significant inhibitors in other regions (Ariffin et al. 2018; Demoulin and Djelassi 2016; Featherman and Hajli 2015). A review study conducted by Albashrawi (2021) indicated that risk-type factors have been emphasised more in developed nations than in developing ones, suggesting the need for more research to expand the academic knowledge on the topic. Besides, researchers concur that the success of mobile payment acceptance is highly contextual (Abdul-Hamid et al. 2019; Albashrawi 2021). For instance, as of 2017, about 50% of the total population in Ghana had access to m-payments, while in Mexico, the the proportion was barely 2% during the same period (Abdul-Hamid et al. 2019), even though both countries are considered developing economies. Despite the advanced telecommunication network in South Africa (Killian and Kabanda 2017), only about six million consumers envisage fully engaging in proximity m-payments by 2023, compared to 16.5 million users of m-payments recorded in Malaysia in 2019 (US Embassies 2019), despite both countries being emerging economies. This shows that consumers' mindsets towards m-payments differ depending on the context, and therefore, understanding which risk factors are crucial in deterring mobile payment adoption will not only add to existing literature but will also aid service providers to develop mobile payment apps that consumers can actually accept and use.

Knowledge Gap

There seems to be a knowledge gap regarding why the adoption of m-payments has been relatively low in South Africa despite high numbers of active smartphone

connections (Deloitte 2019). The available studies do not delineate the specific types of deterrent risks to inform tangible solutions for service providers. To address this gap, this study investigates the aforementioned risk dimensions through the lens of the perceived value theory (Lin et al. 2020), which has rarely been used to ground studies of proximity m-payment adoption in emerging economies. Of the 12 peer-reviewed articles that were analysed during 2020, only three investigated the concept of perceived value in developing countries, suggesting a knowledge gap. The perceived value theory suggests that perceived risks and benefits are what customers use to form a perception of the value of new technologies (Lin et al. 2020). Therefore, this study could provide invaluable insights into identifiable risk factors that potentially inhibit perceived value and ultimately adoption of proximity m-payments from an emerging market perspective to add to the existing body of academic knowledge on m-payments. South Africa is of particular interest in this study because consumers could be more vulnerable, as m-payment services currently occur in underdeveloped ecosystems where transactions are not specifically regulated in any promulgated piece of legislation (King and Graham 2015).

Research Objective

The primary objective of this study is to determine the extent to which different risk dimensions could influence consumers' perceived value of proximity m-payments and ultimately their adoption intention, the purpose of which is to inform tangible solutions that promote adoption.

This study makes both theoretical and practical contributions. Theoretically, the study applies the perceived value theory to further understand proximity m-payment research within an emerging market perspective, as similar prior studies (Makhitha and Ngobeni 2021; Park et al. 2019; Yang et al. 2015) investigated remote (online) payments. Hence, by focusing on emerging economies, this study will enrich the current m-payment literature. Furthermore, the study explores the specific sub-dimensions of perceived risk in relation to the under-researched field of proximity m-payments to expand marketing knowledge through determining the most significant risk factors that affect perceived value and ultimate adoption. The study thus provides invaluable insights, as several prior studies investigated risk as a unidimensional construct (Karjaluoto et al. 2019; Park et al. 2019). From a practical perspective, this study is envisaged to provide mobile payment application (also referred to as app/s) developers and service providers valuable insights into the development of safer proximity m-payment applications to increase adoption levels by targeting the increasing number of smartphones users, and may assist practitioners in enhancing mobile payment experiences.

Theory, Literature Review and Hypotheses Formulation

Perceived Value Theory

Perceived value is defined as the subjective assessment of how well a product can achieve its intended goal by considering the costs and benefits (Lin et al. 2020). The

relationships between price, sacrifice, perceived quality, perceived value and willingness to buy were first tested by Dodds and Monroe (1985). Perceived risk was later incorporated into the perceived value theory by Wood and Scheer (1996). The perceived value theory suggests that the benefits offered by new technology serve as a motivator to adopt, whereas perceived monetary and non-monetary costs of using the new technology inhibit the adoption thereof (Killian and Kabanda 2017). Lin et al. (2020) report that the cost of adoption has a bigger impact on value than the benefits.

Although determining the perceived value of a product based solely on price is important, it is seldom sufficient, unless researchers consider the overall perceived benefits and sacrifices to address the multi-dimensionality of decision-making (Featherman and Hajli 2015). The perceived value theory is often used to study adoption intention of new technologies, as perceived value has been found as customers' main consideration in purchase decisions (Lin et al. 2020; Lin et al. 2012).

Development of the Conceptual Framework

Yang et al. (2015) developed the uncertainty-risk value framework that incorporates the perceived value theory with the perceived risk and the prospect theory to connect the antecedents and outcomes of perceived risk. This framework was chosen to explain the relationships between the perceived risk dimensions and value of proximity m-payments for this study. The uncertainties included in the model by Yang et al. (2015) that influence risk (perceived technological and regulatory uncertainties) are excluded from the framework, since the focus of the study is on the effect that different types of perceived risk have on the value perceptions and adoption intention of proximity m-payments, as indicated in figure 1.
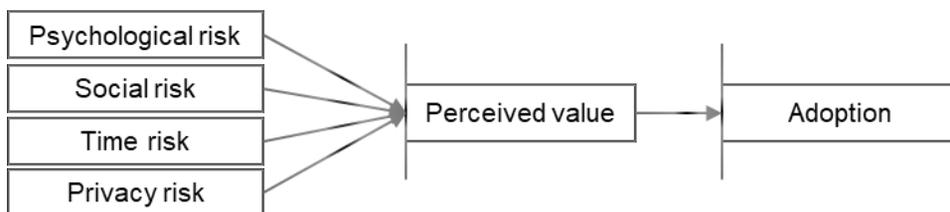
Figure 1: Conceptual framework

Factors that Influence the Value of Proximity M-payments

Perceived Psychological Risk

Perceived psychological risk results from purchases that lead to frustration, mental pressure, or anxiety because the expected outcome of the purchase was not met (Ariffin et al. 2018). Using m-payments can cause anxiety if the payment was unsuccessful and the user has difficulty retrieving evidence thereof (Yang et al. 2015). M-payment applications that are not user-friendly and make it difficult for customers to upload their

payment details or process the payment can lead to anxiety or pressure, especially when there are no other payment options available. More so, the learning cost associated with switching from one payment method (cash) to another (m-payments) can result in lower adoption rates (Molina-Castillo, Lopez-Nicolas, and De Reuver 2020). In a situation where m-payments are the only available payment method, its lack of testability can also lead to perceived psychological risk (Biucky et al. 2017, 184). Customers who have experience in using m-payments may have more confidence using the system and experience less psychological risk (De Kerviler et al. 2016). The opposite is true for inexperienced users.

There are, however, some conflicting reports in literature regarding the influence of psychological risk on perceived value. On the one hand, Abdul-Hamid et al. (2019) found that in an m-payment and mobile money context, psychological risk does not have an impact on perceived value and that customers have a positive attitude toward the payment mode. On the other hand, Leong et al. (2020) found that customers are less likely to adopt mobile wallet technologies when they become frustrated when using it, suggesting that the higher the psychological risk, the less the perceived value and more inclination towards non-adoption. Chen, Siburian, and Chen (2020) also discovered that the perceived value of m-payments is negatively impacted by psychological risk, resulting in low adoption. It is, therefore, argued that:

H$_1$: *There is a relationship between the perceived psychological risk and the perceived value of proximity m-payments.*

Perceived Time Risk

If m-payments in a retail setting function correctly, customers will see the time saved by using m-payments as beneficial (Demoulin and Djelassi 2016; Lin et al. 2020), and this can be used as an important selling proposition in marketing communications. This means that customers have a high expectation for the time that will be saved by using m-payments, which can easily lead to disappointment if this expectation is not met (Gill and Prowse 2012). If a customer who is new to m-payments has the perception that the set-up and learning process of a new application will waste their time, it can be defined as perceived time risk (Featherman and Hajli 2015). The transaction time of m-payments relies on network speed and the ability of the terminals and networks to process the transaction, which can contribute to perceived time risk (Yang et al. 2015). Time risk can also refer to the time spent after the transaction to rectify incorrect payments or the payment of incorrect amounts (Featherman and Hajli 2015).

The anticipation that using m-payments might waste time instead of saving time can negatively impact customer trust in the m-payment system and the intention to use it (Abdul-Hamid et al. 2019). Contrary to previous studies (Gill and Prowse 2012; Lin et al. 2020), Yang et al. (2015) found that time risk has no effect on acceptance intention and that the time spent using m-payments is justified by its benefits. The effect of time

risk on adoption needs to be further investigated in a proximity m-payment setting, and it is thus hypothesised that:

H₂: *There is a relationship between the perceived time risk and the perceived value of proximity m-payments.*

Perceived Social Risk

When the use of m-payments causes a customer to lose social status or makes them look foolish in front of their peers, it is defined as perceived social risk (Featherman and Hajli 2015). Social risk can also be anticipated when users of proximity m-payments expect that their family, friends or colleagues will not approve of them using the technology (Abdul-Hamid et al. 2019).

Social self-image, which is the perceived recognition from peers in purchase situations, and social norms, which are acceptable behaviours prescribed by a social group, all influence individuals' buying intentions (Lin et al. 2020). If using a new technology enhances customers' positive social self-image, their perceived value of the technology increases (Bailey et al. 2019; Lin et al. 2020). If the use of new technology has the opposite effect on customers' social self-image, it can be a barrier to its adoption (Abdul-Hamid et al. 2019). Based on the above, it can be hypothesised that:

H₃: *There is a relationship between the perceived social risk and the perceived value of proximity m-payments.*

Perceived Privacy Risk

Privacy risk has been described from the online perspective to refer to the theft of personal data and confidential information through an online platform (Featherman and Hajli 2015). With respect to proximity m-payments, consumers' privacy concerns are hightened during the check-out process, which may result in abandonment of the purchase (Makhitha and Ngobeni 2021). As m-payment apps require users to add private information such as phone numbers, identity numbers and bank details, it poses a privacy risk when this information is spread by service providers without the consent of the customer. Reports indicate that consumers do not entirely trust organisations to protect their personal information (Baloyi and Kotzé 2017), although they are aware that the m-payment app providers have a responsibility to protect their data (Shaw and Sergueeva 2019).

Abdul-Hamid et al. (2019, 11) suggest that customers are more concerned with the financial loss associated with privacy risk than with the risk of losing personal information that can lead to identity theft. It was, however, found that perceived privacy risk has an impact on the perceived value of a new technology and its ultimate adoption (Chen et al. 2020). Even though concerns about privacy make customers more reluctant to use m-payments, if they see the value of using the payment mode, adoption intention

is enhanced (Leong et al. 2020; Yang et al. 2015). Based on the above, the following hypothesis is formulated:

H₄: *There is a relationship between the perceived privacy risk and the perceived value of proximity m-payments.*

Perceived Value

Value has long been reported as an important antecedent of the adoption of new technologies (Karjaluoto et al. 2019; Park et al. 2019). This study takes the view that the higher the value placed on proximity m-payments, the less the impact of perceived risks on deterring adoption. Consumers' perceived risks indirectly influence purchase intention through perceived value to suggest that if perceived risk is high (Anwar, Thongpapanl, and Ashraf 2020), then consumers will have a low perceived value and the intention to adopt will be reduced (Hariguna, Adiandari, and Ruangkanjanases 2020). A clear understanding of how consumers derive value from proximity m-payments can inform effective strategies aimed at increasing customer usage (Anwar et al. 2020). More importantly, it becomes imperative to understand consumers' value perceptions from an emerging market perspective where there is a lack of understanding of the barriers to effective adoption (Hariguna et al. 2020). Several studies identified perceived value as a significant predictor of adoption of mobile technologies (Karjaluoto et al. 2019; Park et al. 2019). Consequently, it is hypothesised that:

H₅: *There is a relationship between the perceived value and the adoption of proximity m-payments.*

Research Methodology

Population, Sampling and Data Collection

A quantitative research methodology was adopted for the study, and the data were collected through an online, self-administered, cross-sectional survey. Various relevant studies that investigated the adoption intention of new technologies used a quantitative approach (Abdul-Hamid et al. 2019; Ariffin et al. 2018; Park et al. 2019; Yang et al. 2015).

Responses were obtained from individuals aged 18 years and older, residing in South Africa, who had a data-enabled mobile device at the time of conducting the survey. The sample was selected using non-probability convenience sampling. Online data collection was an appropriate method to contact the respondents because having access to a data-enabled mobile device is a requirement for using m-payment applications.

The survey instrument was pre-tested with 20 participants from the study population, and minor changes were made. Qualtrics, an online data gathering tool, was used to produce the final questionnaire. Access to the population was gained through distributing the online survey on special media sites such as specific Facebook pages

that granted the researcher permission to post a message along with a link to the survey on the page's wall.

Questionnaire Design

To achieve the objectives of the study, all constructs were measured using existing scales from previous studies that were adapted to fit the context of the study. A 7-point Likert response format, 1 representing *strongly disagree* and 7 representing *strongly agree*, was used. Scales measuring perceived psychological risk, perceived time risk, perceived value and perceived privacy risk were adapted from Yang et al. (2015). The items measuring perceived social risk were adapted from Abdul-Hamid et al. (2019). Items measuring adoption intention were taken from Liébana-Cabanillas, Muñoz-Leiva, and Sánchez-Fernández (2015). All adopted scales met the Pallant (2016) criterion in which values equal to or greater than 0.7 indicate internal consistency reliability, and the average variance extracted (AVE) of the adopted scales and the factor loadings were above the cut-off point of 0.5 as suggested by Fornell and Larcker (1981). Thus, valid scales were used for the study.

Results

Sample Profile

A total of 261 valid and completed questionnaires were received for further analysis. Of the total respondents, 63.2% were female and 36.8% were male. In terms of the ages of the respondents, the 19–29 age group constituted the majority (49.1%), followed by the 30–39 age group (27.2%). Most of the respondents were White (75.1%), followed by Black African (14.2%). With regards to income, 24.5% of respondents earned a monthly household income of more than R55 000 and 18.4% earned less than R15 000 per month at the time of the survey. Regarding respondents' experience with m-payments, 64.4% of respondents had downloaded an m-payment application at the time of the survey, while 67.4% of the total respondents indicated they had used an m-payment application before.

Results of the Measurement Model

Structural equation modelling, using Amos version 27 Graphics, was used to test the relationship between the perceived risk dimensions, value and adoption, as well as to determine the fit indices. First, the measurement model tested construct validity and reliability of the constructs. The initial results indicated that two items relating to time risk had loadings below the 0.5 threshold as recommended by Pallant (2016). These two items were deleted and the results of the second confirmatory factor analysis (CFA) indicated a significant chi-square ($\chi2$ = 253.591; p-value = 0.00; df = 155). The overall model fit was adequate as indicated by the following fit indices (fit indices' thresholds adapted from Hair et al. 2016): Comparative fit index (CFI) = 0.972; normed fit index (NFI) = 0.936; Tucker-Lewis index (TLI) = 0.962. The root mean square error of

approximation (RMSEA) equalled 0.052, as recommended by Hooper, Coughlan, and Mullen (2008).

Convergent Validity

CFA was used to assess the specifications of the reflective constructs. Table 1 shows that the results provide satisfaction for the criteria regarding Cronbach's alpha, composite reliability and AVE (Hair et al. 2016). In terms of internal consistency reliability (Pallant 2016), the Cronbach's alpha coefficient exceeded the threshold of 0.7, except for time risk. It is argued that the Cronbach's alpha coefficient is related to the number of items in the calculation and that $\alpha > 0.6$ is acceptable when there are fewer items (Hair et al. 2016; Pallant 2016). Thus, perceived time risk was retained for further analysis. Regarding the AVEs, all constructs met or exceeded the recommended threshold of 0.5 to suggest that all scales used in this study showed convergent validity (Pallant 2016).

**Table 1:** AVE, Cronbach's alpha values and composite reliability

Construct	AVE	Cronbach's alpha	Composite reliability
Psychological risk	0.78	0.91	0.91
Social risk	0.53	0.73	0.77
Time risk	0.52	0.62	0.68
Privacy risk	0.79	0.88	0.91
Perceived value	0.73	0.93	0.89
Adoption intention	0.63	0.94	0.84

Finally, the sample provided sufficient discriminant validity for all constructs, except between value and adoption, as indicated in table 2. Based on Fornell and Larcker's (1981) criterion, the square root of the AVE should exceed the shared correlations between the constructs. Thus, discriminant validity was not achieved between the aforementioned constructs, and therefore, the two constructs were subjected to further testing.

Table 2: Discriminant validity

	Psychological risk	Social risk	Time risk	Privacy risk	Value risk	Adoption intention
Psychological risk	**0,883**					
Social risk	0,442	**0,728**				
Time risk	0,786	0,584	**0,721**			
Privacy risk	0,608	0,366	0,453	**0,889**		
Value risk	-0,594	-0,274	-0,600	-0,391	**0,854**	
Adoption intention	-0,631	-0,322	-0,566	-0,46	0,908	**0,794**

Clearly, items relating to perceived value and adoption tended to confuse respondents. The two constructs were tested for discriminant validity using the chi-square difference test following Segars's (1997) recommendations, in which two models are tested. First, model 1 is created in which the two constructs are uncorrelated (figure 2) and the CFA is performed, and then model 2 is created in which the two constructs correlate (figure 2) and the CFA is performed.
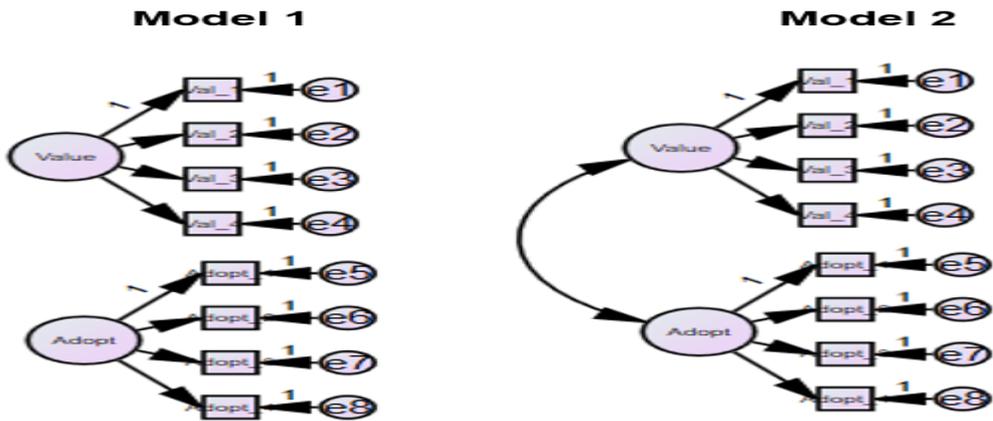
Figure 2: Perceived value versus adoption intention

Finally, the chi-square difference test is performed, and if the test is significant, then discriminant validity exists between the concerned constructs. The results for performing the difference test in Amos version 27 Graphics are shown in table 3.

Table 3: CFA results for chi-square difference tests

Model 1	Model 2
Chi-square = 346.107	Chi-square = 52.074
Degrees of freedom = 20	Degrees of freedom = 19
Probability level = 0.000	Probability level = 0.000
χ_1-χ_2 = 294.033	
df_1-df_2 = 1	

As the difference test result was significant ($p < 0.05$), it means that the two constructs (perceived value and adoption) pass the discriminant test; therefore, they are unique constructs.

Structural Model and Fit Indices

After confirming validity, the second step involved evaluating the structural model to test the hypothesised paths, as suggested by Hair et al. (2016). The results of the goodness of fit indices were: Chi-square ($\chi^2 = 279.573$; p-value = 0.00; df = 159), IFI = 0.970, CFI = 0.969, TLI = 0.964, RMSEA = 0.054. It showed adequate model fit (Hair et al. 2016).

Hypotheses Testing

The results of the hypotheses testing are indicated in table 4. As indicated, there was support for Hypotheses 1 (H_1) ($\beta = -0.288$, $p > 0.05$), 2 (H_2) ($\beta = -0.102$, $p > 0.05$) and 5 (H_5) ($\beta = 0.910$, $p > 0.05$), which suggests that perceived psychological risk and time risk significantly influence perceived value, and that perceived value influences adoption. Hypotheses 3 (H_3) and 4 (H_4) were rejected, which indicates that perceived social risk and privacy risk are not significant in influencing the perceived value of proximity m-payment adoption.

Table 4: Results of hypotheses testing

H	Hypothesis statement	Result
H_1	There is a relationship between the perceived psychological risk and the perceived value of proximity m-payments	Accepted
H_2	There is a relationship between the perceived time risk and the perceived value of proximity m-payments	Accepted
H_3	There is a relationship between the perceived social risk and the perceived value of proximity m-payments	Rejected
H_4	There is a relationship between the perceived privacy risk and the perceived value of proximity m-payments	Rejected
H_5	There is a relationship between the perceived value and the adoption of proximity m-payments	Accepted

Discussion and Managerial Implications

The purpose of this study was to investigate which sub-dimensions of perceived risk are the most significant in influencing perceived value and the resultant effect on the adoption of proximity m-payments. Since perceived risk is multidimensional (Abdul-Hamid et al. 2019), it is beneficial to marketers of m-payment applications to understand which risk sub-dimensions are concerning to customers and how to address these concerns to ensure widespread adoption. The results reveal the particular risk factors that deter perceived value of proximity m-payments, particularly in a country where the phenomenon is still gaining traction but at a snail's pace.

Perceived psychological risk was found to have the largest influence on perceived value of m-payments, followed by time risk. The result pertaining to psychological risk is in tandem with prior findings of Leong et al. (2020) and Chen et al. (2020), suggesting that users of m-payment applications anticipate frustration or anxiety if the payment is unsuccessful or if they are unsure of how it works.

M-payment application service providers should address the potential psychological risk concerns, particularly with first-time users of m-payment applications, who may lack confidence using the payment system. Having knowledge about the features and functions of m-payment applications will help customers evaluate the risks and benefits associated with using them (Park et al. 2019, 38). Service providers could use graphics that clearly outline the payment process in the marketing material so that the novice user can engage the process with ease. Similarly, a guided tutorial to explain the payment process can be provided to first-time users as a way of boosting their confidence. More importantly, retailers should calibrate their payment systems so that consumers receive instant notifications of successful transactions to minimise possible frustration or anxiety. As suggested by Hariguna et al. (2020), system failures are inevitable, but should there be a system error, the service provider must ensure that the process is recovered instantly.

The value proposition of m-payments is that it is a faster payment method than using cash or a card, thus creating the expectation that it will save time. The results of this study indicate that time risk influences value perceptions of proximity m-payments. Researchers concur that customers do not want to waste time in the process of making m-payment transactions (Anwar et al. 2020; Hariguna et al. 2020). It is, therefore, important for m-payment service providers to continually minimise time risk, and they can do so by actively promoting m-payments as a faster alternative. In retail settings, dedicated queues for m-payment check-outs can be implemented, which should be a faster alternative than the queue for cash and card payments. This will enforce the messaging that m-payments offer a clear time benefit over other payment methods.

A surprising finding of the study indicates that customers are not influenced by their social group's opinions about using m-payments, contradicting the findings by Lin et al. (2020), who reported that recognition from peers and social norms could influence individuals' buying intentions or behaviour. This could be because this study did not target a user base of a specific m-payment application, but proximity m-payment apps in general. The associated brand and brand attributes of a specific m-payment application could enhance the social pressure and perceived social risk could have a more significant impact on adoption (Lin et al. 2020). If a customer's positive social self-image is enhanced by using m-payments, their perceived value of it increases (Lin et al. 2020). Despite these unexpected results, m-payment service providers should continue to minimise social risk by maximising the social benefits of using m-payments. M-payment applications can include a feature to easily calculate and pay shared bills when friends visit a restaurant together. This not only offers a social benefit but can also encourage group adoption of m-payments.

Inconsistent with previous research (Abdul-Hamid et al. 2019; Chen et al. 2020; Lin et al. 2020), the findings of this study suggest that privacy risk is not quite relevant to consumers when it comes to forming value perceptions regarding proximity m-payments. The results of the study suggest that customers are more concerned with psychological and time risks than the consequences that may result from a potential privacy breach or misuse of their personal data. Even though concerns about privacy may not make customers more reluctant to use m-payments, they still see the value of using the payment mode (Leong et al. 2020; Yang et al. 2015). Thus, it may be argued that South African consumers have a level of trust with proximity m-payments. Despite this surprising result, m-payment providers need to continuously ensure visibility of the privacy measures, such as seeking consumer consent to receiving marketing related communications from the retailer.

The study also investigated the influence of perceived value on the adoption of proximity m-payments and the results point to a significant relationship. This is consistent with Lin et al. (2020) as well as the findings of Hernandez-Ortega et al. (2017). In particular, the result indicates that if consumers consider proximity m-payments as efficient, convenient and safe, they tend to develop value perceptions that

lead to increased adoption intentions. To attract more users, it is thus recommended that service providers should endeavour to continuously offer incremental benefits that outweigh costs. Prior studies concur that users are inclined to compare benefits against costs when evaluating the value of new technology (Hernandez-Ortega et al. 2017; Lin et al. 2020). Hence, service providers should be cognisant of the salient negative effect of perceived risks that may render proximity m-payments unsafe to use. Marketing communications should emphasise measures taken to avert the risks to encourage positive value perceptions that can increase adoption.

In conclusion, service providers need to invest in the latest technologies that can be used to prevent fraud, as perceived risk generally makes consumers anxious. Thus, the ability to create and deliver superior value to digital consumers will grow overall customer satisfaction, which in turn increases the business value of the service providers.

Limitations and Recommendations for Future Research

The results of this study include some limitations worth noting. The study used a non-probability convenience sampling technique for data collection, which means that the findings cannot be generalised to the broader population of proximity m-payment users in South Africa. It is recommended for future research to collect data during a usage situation of proximity m-payments to provide clearer context to the respondents; this was not possible during the survey because of COVID-19.

This study only included four sub-dimensions of perceived risk, namely psychological, time, social and privacy risk. There are, however, other sub-dimensions that can be included in future research to provide a clearer picture to m-payment service providers on which risk areas to address to achieve better customer adoption.

Finally, this study did not distinguish between users and non-users of m-payments. Future research could do a comparative analysis between the risk perceptions of both groups to determine which risk dimensions significantly influence value, so as to inform developers to come up with highly valued apps that attract widespread adoption.

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