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Factors driving NFC-based mobile payment adoption: the case of Peru

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Abstract

Mobile payment services are positioning themselves as the drivers of digital transformation regarding means of payment in various countries. Therefore, the emerge of services that seek to facilitate transactions between businesses and customers is increasing. An example is mobile payment systems based on near field communication (NFC) technology, which is a relatively new service in Peru. The objective of this study is to identify the factors that influence the usage intention of this service. A research model including specific factors for this context such as physical risks and number of establishments, as well as technological features such as system availability, ease of use and technological risks, was developed based on the social cognitive theory. A total of 186 observations were collected through an online survey. Findings suggest that convenience, number of establishments, perceived physical risks, and perception of technological risks have a direct impact on the intention to use this mobile payment system, while system availability and ease of use present an indirect effect. Theoretical and managerial implications are also discussed.

Keywords: Near field communication (NFC), mobile payment, usage intention, physical risks, Peru

Introduction

In recent years, access to and use of information and communication technologies (ICTs) has increased considerably, particularly through mobile phones and internet services. A recent report of the International Telecommunications Union (ITU) highlights that, after a small decline in 2020, the worldwide penetration of mobile phone subscriptions increased again in 2021, reaching a record of 110 subscriptions per 100 inhabitants, with 83% being broadband (3G or higher) connections (International Telecommunication Union, 2021). Also, 95% of the world's population now has access to a mobile broadband network, and 4G network coverage doubled between 2015 and 2021 to reach 88% of the world population (International Telecommunication Union, 2021). Based on the abovementioned trend, and looking to thrive in an era of digital disruption, most technology-based companies focus their efforts on launching new services through these devices. These companies are developing tools that contribute to progress in the digital transformation process and customer experience strategies (Ramos de Luna et al., 2020). For example, several BigTech and FinTech companies have started to launch payment services such as mobile wallets and payment apps in the last decade (Ramos de Luna et al., 2020). The functions of these tools range from optimized user interfaces to personalized content (Ramos de Luna et al., 2020). Therefore, mobile payment services are perfectly positioned to drive the digital transformation of all businesses (Ramos de Luna et al., 2020).

This phenomenon is also evident in Latin America, where El Salvador had reached 49% in technology adoption, followed by Argentina at 43%, and Colombia at 41% by the end of 2021 (Comisión Económica para América Latina y el Caribe, 2022). In the case of Peru, technology adoption has grown to 38% by the

same point in time (Comisión Económica para América Latina y el Caribe, 2022). According to Mastercard's New Payments Index study, 79% of Peruvians are open to trying new payment methods (Business Empresarial, 2021). The report also shows the potential benefit of these platforms for micro and small enterprises considering that 81% of Peruvians would buy more from these companies if they offered more payment options such as contactless payments, online purchases, or purchases through a mobile app (Business Empresarial, 2021). There are, however, some barriers to the adoption of these technologies. According to the Instituto Nacional de Estadistica e Informatica (2021a), in the second quarter of 2021, about 50% of adult Peruvians did not have a bank account. Among the main factors that cause this lack of banking are the high financial and digital illiteracy, the high informality of the country (more than 70%), and the gap in telecommunications infrastructure (Instituto Nacional de Estadistica e Informatica, 2021a). This banking problem limits the use of the main commercial mobile wallets such as Yape, Tunki or Plin, which are bank-based.

Although there was significant progress in financial inclusion in the country, going from 42.7% to 51.9% of bank users between 2020 and 2021 (Instituto Nacional de Estadistica e Informatica, 2021a), a large proportion of the population is still not aware of the benefits of the financial system. In addition, there are some technological barriers. For example, the Instituto Nacional de Estadistica e Informatica (2021b) indicates that internet access in Peruvian households reached 55.0%, and 94.5% of households have at least one member with a mobile phone, which clearly depicts an access gap in a large part of the population. It is worth mentioning that 71% of Peruvians had at least one smartphone by 2021, but the other 29% did not have access to these devices (Organismo Supervisor de Inversion Privada en Telecomunicaciones, 2021a).

Near field communication (NFC) is a short-range wireless communication technology that potentially facilitates the use of mobile phones for a huge number of use cases including credit cards, debit cards, loyalty schemes, and car keys (Coskun et al., 2012). Due to its technological features, NFC has supported progress towards a cashless society, and poses new challenges such as the universalization of contactless digital payments (Prieto, 2021). In Peru, the first platform service with NFC as a mobile payment method is Apple Pay. This payment system entered the market in mid-March 2022 and presented a secure and reliable contactless payment method that uses iPhone technology to protect each transaction (Phillips, 2022). Also, this new payment method is compatible with four banks in Peru: BCP, Interbank, BBVA and Scotiabank. It should be noted that according to figures from StatCounter (2022), the iOS market in Peru represented just 8.39% of the total users at August 2022, and therefore there is still a large market to cover.

NFC-based mobile payment turns out to be a convenient technology for Peruvian society for two reasons. First, it allows the use of both credit and debit cards. This feature enables cover to a larger audience and thus to have greater impact, given that 5.28 million Peruvians have a debit card while only 1.5 million have a credit card (IPSOS, 2021). Second, in contrast to mobile wallets, in the case of NFC, the service can be delivered even without internet access. Hence, the 18.5% of Peruvians who do not have mobile internet access would not be excluded (Organismo Supervisor de Inversion Privada en Telecomunicaciones, 2021b). The present study aims to analyze the factors that affect the technological adoption of NFC-based mobile payment. The results are expected to highlight the main factors that may motivate the use of this technology in Peru, contributing to achieving a national digital transformation and an improvement of user experience.

Literature review

Previous studies found mixed results regarding the adoption of NFC-based mobile payment. The literature review has been divided into three sections: 1) studies on the technological adoption of NFC-based mobile payment in Asian countries, 2) studies on the technological adoption of NFC-based mobile payment in

European countries, and 3) studies on the adoption of NFC-based mobile payment technology in American countries.

In the first case, there are studies that found a positive relationship between perceived usefulness and trust as significant drivers of individuals' intention to use NFC-based mobile payments, as is the case of Pu et al. (2020). This study analyzed Apple Pay with a sample of 166 iPhone users in China. There are other studies that found that intention to adopt NFC-based mobile payments is affected by product-related factors, personal-related factors, and attractiveness of alternatives, as is the case of Pham and Ho (2015), who analyzed 402 consumers of the platform in Taiwan. In addition, studies such as the one conducted by Salamah et al. (2022), found that performance expectancy, effort expectancy, personal innovation, trust, and anxiety factors influence user adoption of these mobile payment systems. In this study, a sample of 315 Saudi customers was used regarding the adoption of Apple Pay. Finally, Kuo et al. (2016), who focus on measuring the intention to choose Apple Pay for mobile payment in 172 Asian consumers, found that privacy protection, perceived security protection, positive reputation, risk, consumer disposition, and trust are the most significant factors driving consumer adoption.

In the second case, there are also mixed results. For example, a reference study is that of Moroni et al. (2015), who focused on the adoption of this technology in 1,051 users in Italy. In that study, the authors found that compatibility with users' needs, habits, and lifestyle are the dominant factors in adoption. In contrast, another study, carried out with 539 clients in Switzerland, found that perceived value is the variable that most influences the intention to use this mobile payment system, followed by perception of utility and risk (Liébana-Cabanillas et al., 2020). Karjaluoto et al. (2019), for their part, found that habit and consumers' overall satisfaction have the strongest influence on usage intentions. Their study confirms the positive relationship between intention and usage with an analysis of 1,165 customers who cooperated with a contactless payment service provider in Finland. In addition, there are studies that compare the adoption of two NFC-based mobile payment platforms: Apple Pay and Google Wallet. For example, Kazan (2015) focused on users of digital payment platforms in Denmark and found that those digital payment platforms use two different modes of open innovation. Finally, another study, with a sample of 180 users, analyzed the status of NFC mobile payment systems in public transportation in Spain (Liébana-Cabanillas et al., 2019), finding that satisfaction, service quality, effort expectancy, and perceived risk are the main factors affecting intention to use said payment systems.

In the last case, some studies conducted in the USA found strong evidence of the effect of risk, security, and trust on customer intention to use NFC-based mobile payment technologies. For example, Khalizadeh et al. (2017) used a sample of 412 restaurant customers to test the adoption of the technology in restaurant settings. In contrast, Shin and Lee (2021) proposed a model with new constructs such as credibility and service intelligence. The results of this study show that performance expectancy, effort expectancy, credibility, service intelligence, and habit have a strong positive relationship with user intention. Another study, conducted by Flavián et al. (2020), used a sample of 414 USA and 380 Spanish users to find the main determinants of mobile payment usage. The results showed that mindfulness, perceived ease of use, perceived usefulness, subjective norms, and attitude have significant influence. On the other hand, some studies proposed factors to compare mobile payment solutions. For example, Issa (2011) found that NFC-based mobile payment was comparatively the easiest to use and most useful among existing mobile payment systems. Finally, Ramos-de-Luna et al. (2017), through an online survey conducted among 423 Brazilian users, found that the factors that directly and indirectly influence the adoption of NFC-based payment systems are attitude, personal innovation, and perceived usefulness.

Based on the above findings, the factors driving NFC-based mobile systems adoption may vary across contexts. Thus, considering the diversity of contexts across Latin American countries, there is still room

for researching adoption in new countries. Therefore, as a preliminary step, this study conducted an open-ended questionnaire to identify the more salient beliefs that may be driving the use of this service specifically in Peru. For this step, this study followed the procedures suggested by Ajzen (2002). (see Table 1 for the questions used in this step).

Table 1: Questionnaire for Eliciting External Salient Beliefs

1. What do you think are (or would be) the advantages of making payments or transactions through an NFC-based mobile payment system?
2. What do you think are (or would be) the disadvantages of making payments or transactions through an NFC-based mobile payment system?
3. Is there anything else you associate with the usage of the NFC-based mobile payment system?

This questionnaire was applied to a random sample of 35 people. From the assessment of the open responses, six concepts were identified: customer convenience, system availability, perception of technological risks, perception of physical risks, ease of use, and number of establishments. Although some of them have been used in prior research, system availability and physical risks are new and may be of importance in Latin America, which is characterized by low level of accessibility and high levels of criminality. In short, this study seeks to contribute with the state of art in this field by studying the adoption of NFC-based mobile payment systems in a new context, by including two novel antecedents as is the case of system availability and physical security, both of which may be important factors in Peru and Latin America at large.

Theoretical framework

NFC-based mobile payments

There are currently five main technologies implemented in mobile payments: short message service (SMS), wireless application protocol (WAP)/internet, near field communication (NFC), unstructured supplementary service data (USSD), and voice services (Liébana-Cabanillas et al., 2020). NFC is bespoken of as the payment solution of the future (Olenik et al., 2021). It is a technology that provides a solution for contactless mobile payments, and NFC-enabled mobile devices (smartphones) can facilitate the payment process by allowing "touch and go" transactions at point-of-sale (POS) terminals with or without the requirement of internet access for the user (Pasquet et al., 2008). In short, an NFC system allows individuals to enter the information of a credit or debit card in an application and thus view the card on the device, which is called a "digital card". With the digital card in the smartphone, transactions can be made at the POS, replacing physical cards and cash in stores.

Social cognitive theory

Developed by Bandura (1997), social cognitive theory (SCT) emphasizes that human behavior is shaped and controlled by personal cognition in a social environment. The model proposes that individuals' expectations of the associated outcomes will be affected by the environmental features (Bandura, 1997). SCT also considers that individuals will perform a specific behavior if the outcome expectations are beneficial to them, and if the environmental features facilitate the behavior (Bandura, 1997). Figure 1 resumes graphically SCT. As environmental factors, which refers to users' evaluation of the context, this study proposes two groups: technological and non-technological features. Regarding the first group, this study found that perception of technological risks, ease of use, and system availability may be potential causes of adoption. These variables are features of the technology itself. The second group covers

perception of physical risks and number of establishments, which are related to the social environment in which the platform will be used. In the case of personal factors, which refers to the expected results from using the system, user convenience was considered. Finally, usage intention was proposed as a behavioral factor, representing the dependent variable of the model.

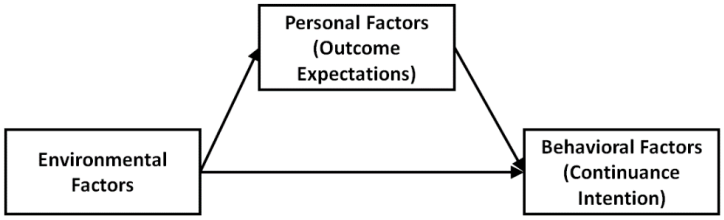

Figure 1: Social Cognitive Theory Model

Variables

Hypotheses were formulated considering the SCT guidelines, discussed in the previous section.

Convenience

Convenience is divided into two related variables: perceived convenience and social convenience. Regarding the first, the literature mentions that the perceived convenience of mobile technology has an important effect on improving usage performance and is a crucial factor (Pal et al., 2021). The second is defined as the convenience that increases when entities (people or markets) with a commercial relationship use the platform or application (Lu & Wung, 2021).

For the context of this study, convenience refers to the fact that people carry communication devices (smartphones) everywhere, and the provision of smart payment services reduces the need to carry cash. Likewise, as long as the person has a smart mobile device with an NFC-based mobile payment, they can use it to pay at any place with a POS. Thus, the following hypothesis is proposed:

H1: *Customer convenience positively influences usage intention*

System availability

Parasuraman et al. (2005) define the availability of the system as user perception of the correct technical functioning of the platform. In this study, it was identified that people are frequently aware of the existence of problems related to the availability of the platform. This context refers to the fact that a platform may not let users access or use their digital cards, and if the use is through a bank app, it can be disconnected.

Hence, system availability is defined as user perception that using the system will be free of technical problems. If a user feels the possibility of having problems with the system is high, the motivation to use it will be affected. Then:

H2a*: System availability positively influences usage intention*
H2b: *System availability positively influences convenience*

Ease of use

According to the literature, ease of use is defined as the perceived degree of easiness in learning and using a technology or mobile service (Lew et al., 2020). Consequently, studies suggest that a platform or application is more likely to be used when it is easy to use (Davis, 1989). In relation to this study's context, easiness may be also an important factor to highlight the effortless experience that the use of NFC-based mobile payment requires. The easier the use of the platform, the more motivated users will be to adopt it. Thus, the following hypotheses are proposed:

H3a*: Ease of use positively influences usage intention*
H3b: *Ease of use positively influences convenience*

Technological risks

This construct is defined as user perception of the security of mobile payment platforms (Wong et al., 2019). This feature is important because users may face many fears and points of failure within this environment that holds personal financial information. Consequently, perception of technological risks has been consistently recorded as a major factor limiting adoption (Pal et al., 2021). In the case of Peru, 55% of Peruvians are afraid of providing personal information or credit/debit cards on e-commerce sites (Cámara Peruana de Comercio Electrónico, 2021). Therefore, users may not feel motivated to use mobile payment platforms if they do not perceive that there are sufficient security mesures. The following hypotheses are proposed:

H4a: *Technological risks negatively influence usage intention*
H4b: *Technological risks negatively influence convenience*

Physical risks

Perceived physical security reflects people's perceptions of the safety of a particular destination and their intention to revisit the destination (Patwardhan et al., 2020). Hong and Chen (2014) stated that perceived safety against crime will affect people's decisions, that is, people who perceive that their neighborhoods are safe tend to walk more due to risk reduction. In this study, this variable is manifested through user perception of security when going out on the street with their mobile phone. In Peru, from January to August 2022, more than 4,500 mobile phones were stolen on average in a single day (Organismo Supervisor de Inversion Privada en Telecomunicaciones, 2022). Therefore, users will not be motivated to use NFC-based mobile payment systems if they do not feel safe leaving their home. Hence:

H5a: *Physical risks negatively influences usage intention*
H5b: *Physical risks negatively influences convenience*

Number of establishments

This variable refers to the availability of a wide variety of establishments available for the use of digital cards. Shin and Kang (2020) highlighted the importance of having numerous businesses that accept a wide variety of payment methods. According to the context of this study, users will feel motivated to use an NFC-based mobile payment if they consider that it is easy to find establishments that accept this payment method. Thus, this study hypothesizes:

H6a: *Number of establishments positively influences usage intention*
H6b: *Number of establishments positively influences convenience*

Methodology

The proposed model has seven constructs, each of which was measured with multiple items adapted from extant literature to improve content validity (Straub et al., 2004).

Measurement instrument

All variables were measured following prior studies. Convenience was measured with three items (Lu & Wung, 2021). In the case of the environmental features, system availability was measured with four items (Parasuraman et al., 2005), ease of use with four items (Lew et al., 2020), technological risks with five items (Lee, 2009), physical risks with three items (Hong & Chen, 2014; Patwardhan et al., 2020), and number of establishments with four items (Lew et al., 2020). The dependent variable, usage intention, was measured with four items (Yen & Wu, 2016). The model is shown in Figure 2 and the contextualized items can be seen in the Appendix, which were each anchored on a five-point Likert scale.

Data collection and analysis

Data were collected from October to November 2022 via Survey Monkey. The survey was provided in Spanish and participants were contacted using a snowball sampling technique at a large private Peruvian university. To decrease the number of careless responses, this study informed the respondents that participation was voluntary and that their personal information will remain anonymous.

The final sample was made up of 186 respondents. Considering that there are six independent variables in the research model, it would be necessary to have a minimum of 48 observations to detect an R2 value of at least 0.25 to achieve a statistical power of 0.8 at a significance level of 0.05 (Hair et al., 2010). Therefore, the sample size is adequate. The sample was composed of a similar number of male (57.53%) and female (42.47%) respondents; respondents' age distribution was mostly between 21 and 29 years old (55.38%), followed by respondents between 18 and 20 years old (23.66%), with the remaining 20.96% respondents being over 30 years old.

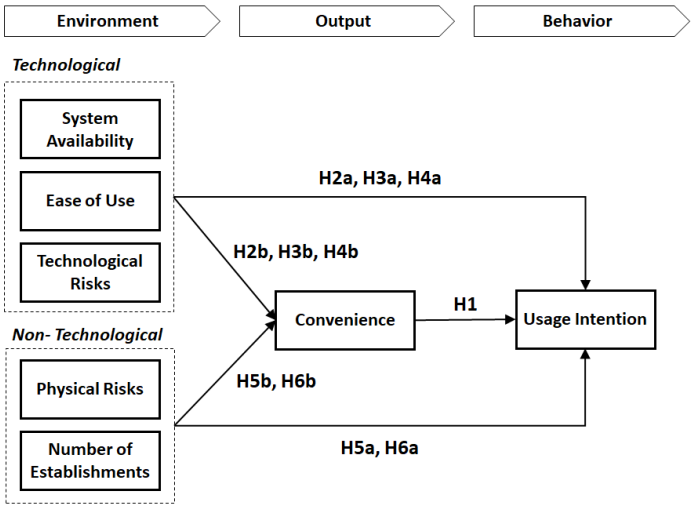

Figure 2: Research Model

For data analysis, the present study used partial least squares (PLS) within structural equation modeling (SEM) techniques. Smart PLS was used as the analysis tool.

Results

Analysis of reliability and validity

The validity of the measurement model was established using construct reliability, convergent validity, and discriminant validity. To assess the reliability and convergent validity, the study used item reliability, internal consistency, and average variance extracted (AVE). The item reliability was assessed by examining each item's loading on its corresponding latent variable. It was found that the loadings of items PTR4, PTR5 and PPR1 were less than 0.7 (see the Appendix); thus they were removed from further analysis. All the other item loadings were greater than the criterion of 0.7 (see the Appendix) suggested by Barclay et al. (1995). The internal consistency (reliability) was assessed by examining the composite reliability and Cronbach's alpha values, which ranged from 0.876 to 0.958 and from 0.804 to 0.941, respectively (see Table 2). Both composite reliability and Cronbach's alpha values were greater than the recommended value of 0.7 (Nunnally, 1978). The study also found all AVE values were greater than the criterion of 0.5 (see Table 2) suggested by Hu et al. (2004). These results indicate that the measurement model is reliable and internally consistent.

To establish the discriminant validity, this study analyzed the heterotrait-monotrait ratio (HTMT). According to current literature, HTMT values supporting discriminant validity should be lower than 0.85 (Kline, 2011). Table 3 shows that all HTMT values are under 0.85, and thus this test suggests that the measurement model demonstrated an adequate discriminant validity.

Table 2: Reliability and Convergent Validity

Construct	Cronbach's alpha	Composite reliability	Average variance extracted
Convenience	0.861	0.915	0.782
Ease of use	0.867	0.909	0.715
Usage intention	0.941	0.958	0.85
Number of establishments	0.902	0.932	0.775
Perception of physical risks	0.849	0.927	0.864
Perception of technological risks	0.804	0.876	0.702
System availability	0.843	0.893	0.678

Table 3: Heterotrait-Monotrait Ratio (HTMT)

Construct	CON	EOU	INT	NOE	PPR	PTR	SAVA
CON	---						
EOU	0.436	---					
INT	0.830	0.434	---				
NOE	0.552	0.406	0.563	---			
PPR	0.320	0.070	0.283	0.224	---		
PTR	0.144	0.123	0.221	0.096	0.288	---	
SAVA	0.412	0.327	0.362	0.361	0.101	0.199	---

Note: CON = Convenience, EOU = Ease of use, INT = Usage intention, NOE = Number of establishments, PPR = Physical risks, PTR = Technological risks, SAVA = System availability

Structural model

To assess the explanatory power of the proposed structural model, this study analyzed the R^2 values of the dependent variables and the paths between the variables (see Figure 3). The statistical significance of each path was estimated using a bootstrapping method of 5,000 subsamples as recommended by Hair et al. (2017). The proposed research model accounts for 39.7% and 62.9% of the variances (R^2 values) in convenience and usage intention, respectively. The results of the path analysis indicate that usage intention is significantly influenced by convenience (H1, β=0.580, p<0.000), number of establishments (H6a, β=0.160, p<0.021), physical risks (H5a, β=-0.102, p<0.039), and technological risks (H4a, β=0.138, p<0.044). Moreover, the results show that convenience is predicted by ease of use (H3b, β=0.236, p<0.007), number of establishments (H6b, β=267, p<0.000), physical risks (H5b, β=-0.282, p<0.000), and system availability (H2b, β=0.216, p<0.000). However, the direct effect of system availability and ease of use on usage intention was found to be non-significant and thus the hypotheses H2a and H3a, respectively, were not supported. The same occurs with the effect of technological risks on convenience, so hypothesis H4b was not supported.

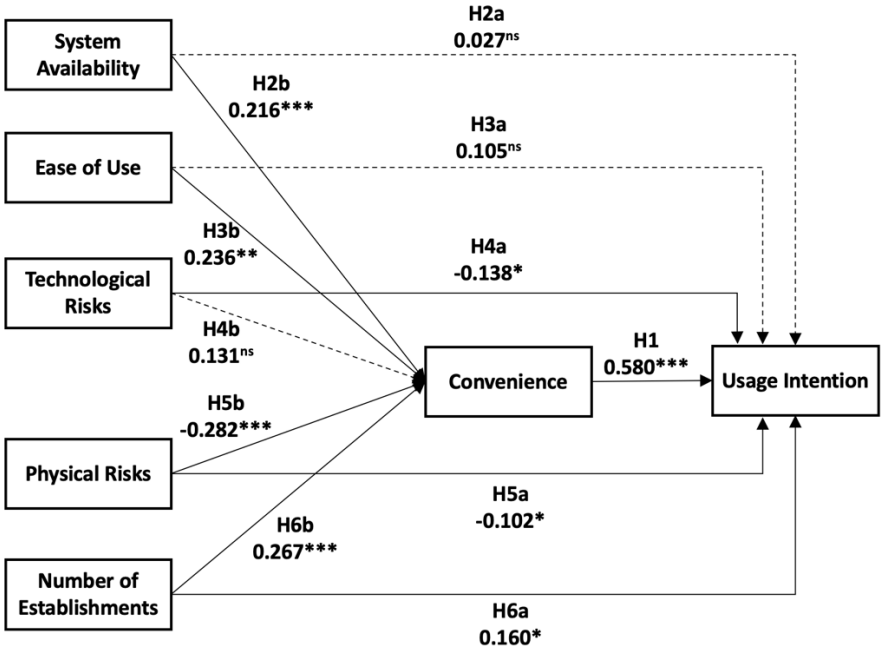

Figure 3: Structural Equation Model Assessment

Discussion

The NFC-based mobile payment turns out to be a convenient technology for Peruvian society since it means a trend towards an open banking ecosystem that facilitates interoperability, in such a way that it may contribute to the national digital transformation and to the improvement of user experience. This study attempted to find the factors that drive the adoption of NFC-based mobile payment. A model was presented including salient beliefs regarding this phenomenon. Results found empirical evidence that suggests the significant role of certain variables, supporting most of the proposed hypotheses.

Regarding the hypotheses proposed in this study, it was found that convenience has a positive impact on the intention to use this mobile payment method; that is, the more convenient a user perceives the use of this service to be, the higher his or her intention to use it. Likewise, it has been shown that the number of establishments that accept this means of payment has a positive impact on user intention. Also, physical

risks and technological risks both have a significant effect on user intention to use these systems. In addition, an impact of ease of use on convenience was evidenced. In the case of intention to use these systems, the number of establishments also has a significant effect on convenience. The same is true for physical risks that impact on convenience, since using a means of payment in a secure environment is beneficial for the user. Finally, the availability of the system was found to increase user convenience regarding the use of NFC-based mobile payment systems.

Three hypotheses were not supported. First, regarding the impact of ease of use on intention, a total mediating effect was identified since the impact of ease of use on intention is explained by convenience. Second, in the case of system availability, its impact on intention is also completely mediated by convenience since its direct effect was found to be non-significant. Lastly, technological risks do not affect convenience but directly affect the intention of use. This finding may be explained by the assumption that most mobile wallets have some incorrect functioning from time to time, so it is possible that users have already normalized these situations, and thus system availability does not affect user convenience.

Theoretical implications

In the literature review section, this study found that there is no evidence of the role of system availability and physical risks on NFC-based mobile payment systems adoption. In addition, prior literature suggests that factors driving the use of this technology may be context-specific. Consequently, the present study contributes to identifying the impact of both system availability and physical risks on user convenience and user intention to use NFC-based mobile payment systems in a new context. It is important to highlight that the variables included in this study's research model were obtained in a preliminary step that aimed to capture what is happing specifically in Peru. This study also found empirical evidence of the positive impact of certain variables such as convenience, ease of use, number of establishments, and technological risks on the intention to use this service. Adoption literature can then include these variables in its usage intention framework when evaluating similar technologies in similar contexts, such other Latin American countries.

Practical Implications

Based on the above findings, this study will provide recommendations for both the government and banks. First, in terms of the number of establishments, the Peruvian government should design incentives for businesses to access a POS that enables transactions with this mobile payment method. With this recommendation, more people can be motivated to use this service. This adoption can enable the traceability of transactions and, in the long run, may reduce informality levels. Likewise, the Peruvian government should reinforce physical security to generate confidence in the users to load financial information onto their mobile devices. This strategy may be helpful for a future creation of an Open Banking ecosystem. Finally, the Peruvian government should facilitate user convenience with access initiatives, incentives should be offered to expand the range of financial services that mobile wallets offer on their own or in partnership with other companies, with a long-term focus on getting started with the integration of technologies such as NFC in massive public services.

Second, regarding banks, they may also be motivated to facilitate the growth of the number of businesses that accept this payment method, since it would generate more transactions and increase their frequency, providing banks with a higher volume of financial assets. Thus, banks may launch incentives or technical support to businesses (especially to micro and small companies) to motivate them to establish these systems as payment options for their customers. In terms of system availability, banks should focus on reducing the downtime of the application. For instance, they should aim to have scalability in their network. To that end, banks may evaluate the possibility of renting services in the cloud. Finally, in relation to technological risks,

banks should develop campaigns to raise awareness among their customers about the security attributes and technical characteristics of these mobile payment systems.

Conclusions

This study makes it possible to determine the factors that may influence the use of NFC-based mobile payment systems in Peru. It was found that convenience, number of establishments, physical risks, and technological risks have a direct impact on user intention to use these platforms. Likewise, a total mediating effect of convenience was identified in the relationship between ease of use and intention, as well as in the relationship between system availability and intention. It is recommended that future studies can collect data from a more heterogeneous sample and from other Latin America countries to improve the external validity of these results, generalizing them to other populations.

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Appendix. Survey Questions

Convenience (CON)	
CON1 (λ = 0.905)	This mobile payment app would make it convenient for me to leave my house without cash[a]
CON2 (λ = 0.878)	It would be convenient that you only need a smartphone to carry out transactions with this mobile payment app[a]
CON3 (λ = 0.871)	This mobile payment app would be a very convenient payment method[a]
System availability (SAVA)	
SAVA1 (λ = 0.758)	This mobile payment app will always be available to carry out transactions[a]
SAVA2 (λ = 0.750)	This mobile payment app will start and work immediately[a]
SAVA3 (λ = 0.897)	This mobile payment app will not fail[a]
SAVA4 (λ = 0.878)	This mobile payment app will not freeze during transactions[a]
Ease of use (EOU)	
EOU1 (λ = 0.859)	I think using this mobile payment app would be easy for me[a]
EOU2 (λ = 0.860)	I think that learning how to use this mobile payment app would be easy[a]
EOU3 (λ = 0.807)	I think that finding what I want through this mobile payment app would be easy[a]
EOU4 (λ = 0.855)	I think becoming proficient in using this mobile payment app would be easy[a]
Perception of technological risks (PTR)	
PTR1 (λ = 0.852)	This mobile payment app will not work well and will process payments incorrectly[a]
PTR2 (λ = 0.767)	If I make transactions with this mobile payment app, I would be afraid of losing money due to careless errors, such as wrong card selection or wrong amount of money[a]
PTR3 (λ = 0.890)	If transaction errors occurred, I would be worried that I do not get compensation from the mobile payment app[a]
PTR4 (deleted)*	I would not feel completely safe providing personal information through this mobile payment app[a]
PTR5 (deleted)*	I am worried about using this mobile payment app because other people could access my account[a]
Perception of physical risks (PPR)	
PPR1 (deleted)*	I feel unsafe walking around during the day with my smartphone[a]
PPR2 (λ = 0.959)	The places where I travel daily with my smartphone are not safe[a]
PPR3 (λ = 0.900)	Crime in my neighborhood makes it unsafe to walk at night with my smartphone[a]
Number of establishments (NOE)	
NOE1 (λ = 0.807)	… of the establishments have a POS that would allow me to pay with this mobile payment app[b]

NOE2 (λ = 0.920)	… of the establishments where I usually buy have a POS that would allow me to pay with this mobile payment app[b]
NOE3 (λ = 0.917)	… of the establishments that I frequent daily have a POS that would allow me to pay with this mobile payment app[b]
NOE4 (λ = 0.872)	… of the establishments in my area of residence have a POS that would allow me to pay with this mobile payment app[b]
Usage intention (INT)	
INT1 (λ = 0.920)	If I get the chance, I will use this mobile payment app[a]
INT2 (λ = 0.942)	I am likely to use this mobile payment app in the near future[a]
INT3 (λ = 0.899)	I am open to using this mobile payment app in the near future[a]
INT4 (λ = 0.927)	I intend to use this mobile payment app when the opportunity arises[a]

[a] Scale: Strongly disagree / strongly agree
[b] Scale: None of / a great deal of
* Items deleted because loading is less than 0.7