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Critical factors for digital wallet continued usage intention during pandemic in the Peruvian context

Luis Angel Inciso-Vera, *Universidad del Pacifico, la.incisov@alum.up.edu.pe*

Christian Fernando Libaque-Saenz, *Universidad del Pacifico, cf.libaques@up.edu.pe*

Abstract

Peru is one of the less financially inclusive countries in the region, where almost 50% of the population is not part of financial institutions. Peruvians, however, can benefit from being part of the financial system because it may enable individuals to access loans to face situations such as the one faced during the pandemic, or situations where business owners need to grow their enterprises. In the case of governments, financial inclusion could also generate traceability over the economy, for example. Digital wallets might represent a feasible solution to achieve this goal (financial inclusion). However, the use rate of these platforms is low, with only 12 million Peruvians having a digital wallet on their phones. Hence, the objective of this study is to identify the critical factors that influence the continued use intention of those apps. A research model based on structural equation modelling was developed, and a total of 185 observations were collected online. Findings suggest that interoperability, social distancing, system availability, perceived security, and perceived usefulness are critical factors that influence continuance intention. Finally, theoretical and managerial implications associated with these results are discussed.

Keywords: digital wallet, interoperability, social distancing, system availability, continuance intention

Introduction

Financial inclusion boosts countries' development as it allows people to access various financial tools and services (Demirguc-Kunt et al., 2017). At the individual level, for example, people can apply for loans at financial institutions and in this way be able to deal with any emergency they may face (Demirguc-Kunt et al., 2018). At the business level, small and medium enterprises (SMEs) that are part of the financial system may also apply for loans to develop their new ideas, grow their business and enter new markets, which in turn incentivizes job creation and economic prosperity in the long run (Adams, 2018). In the case of governments, a banked and financially connected population will increase the speed of economic activities. At the same time, this financial inclusion will decrease the size of the informal market, providing high levels of transparency and tight regulations (Adams, 2018).

With the development of technology, especially mobile services, people started accessing financial services through mobile payment (m-payment) platforms, enabling users to transfer funds through their mobile devices to any peer or business, providing a reciprocal benefit in an interactive economy (Adams, 2018). There are some economies that have developed their financial system and achieved financial inclusion through the usage of m-payments. In China, for example, there are two main players in the m-payment segment: AliPay and WeChat Pay. These platforms enable individuals to perform daily transactions, which can be done through a bank-based model or without the need of holding a bank account. Both options have entered into every aspect of China's daily life, from buying a cup of coffee to paying electricity bills, since almost all commercial outlets support them (Huang et al., 2020).

In the case of Peru, the financial inclusion index reached just 36.6% in 2019 (Zarate et al., 2021). In the specific case of digital wallets, by 2020, just 14.4% of the Peruvian banked population used them to pay at any venue or commerce, and only 22.8% used those platforms to make peer-to-peer transactions (Prieto, 2021). An important roadblock for the use of these platforms is the lack of interoperability across digital wallets. For instance, Yape had 5.14 million users at the end of 2020 (Banco de Crédito del Perú, 2020) and Plin over 3 million as at march 2021 (BBVA, 2021), without the possibility of cross-platform transactions. Lowering the interoperability barrier may result in higher incentives for users to engage with digital wallets, as it would create network benefits for this type of technology (Oghuma et al., 2015).

Another important factor regarding the low use of digital wallets in Peru may be the systems' availability, not only from the user side, but also because not many venues or stores accept this type of payment. Some stores, in fact, still stick to traditional payment methods such as cash. In addition, digital wallets require an internet connection to work and complete transactions, meaning that areas with poor internet connectivity will face big challenges in implementing those solutions, taking into consideration that only 69.8% of the population has access to the internet, which is worse in rural areas (38.8%) (Instituto Nacional de Estadística e Informática, 2021).

In addition, the pandemic meant that it became highly convenient to boost the use of digital wallets, as they help individuals to reduce contact during transactions, enabling everyone to maintain social distancing (Zhao & Bacao, 2021). By using these technological solutions, a country can embrace public health regulations, while increasing financial inclusion at the same time. Hence, the objective of the present study is to find the determinant factors that influence continued usage intention of digital wallets in Peru.

Literature review

Variables selection process

This study followed the procedure provided by Ajzen (2002) to identify the salient beliefs related to a specific behavior. Table 1 shows the questionnaire that was developed.

Table 1: Questionnaire for Eliciting External Salient Beliefs for Digital Wallet Use

1. What do you believe are the advantages of utilizing digital wallets for any type of transfer?
2. What do you believe are the disadvantages of utilizing digital wallets for any type of transfer?
3. Is there anything else you associate with the usage of digital wallet platforms?

This questionnaire was applied to a random sample of 40 people. From the assessment of the responses, six concepts that potentially impact on the use of these platforms were identified: ease of use, usefulness, social distancing, perceived security, interoperability, and system availability.

Research gap

To determine whether the concepts discussed in the previous section were addressed by prior research, a literature review was conducted. In this review, it was found that most prior studies focused on factors related to user perceptions of the features of these platforms, such as perceived usefulness (e.g., De Luna et al., 2019; Shankar & Datta, 2018), and perceived ease of use (e.g., Leong et al., 2020; Malaquias & Hwang, 2019). A second research stream focused on the influence of others on the use of these platforms, with variables like subjective norms and social influence (e.g., Alexandrino et al., 2021; Malaquias &

Hwang, 2019). User characteristics stand as the third group of independent variables that were assessed by previous research, including variables such as user's lifestyle, and demographics like age and gender (e.g., Al-Saedi et al., 2020; Liébana-Cabanillas et al., 2020). A fourth group of studies focused on variables related to privacy concerns and its impact on the use of m-payments. In this group we have variables like perceived security and privacy (e.g., Leong et al., 2020; Martínez & Paredes, 2020). In fifth place, a research stream reviewed variables related to the user's ability to use the technology, with mobile skillfulness and readiness being some of the constructs addressed (e.g., Alexandrino et al., 2021; Liébana-Cabanillas et al., 2020). Other studies looked at variables related to the benefits and costs of using m-payment platforms, such as perceived benefits, perceived risk, and perceived costs (e.g., Al-Saedi et al., 2020; Zhao & Bacao, 2021). Finally, another group of factors studied in prior research includes attitudes towards use and trust (e.g., Alexandrino et al., 2021; Martínez & Paredes, 2020; Shankar & Datta, 2018).

Of all the factors that were covered in prior literature, it should be highlighted that perceived usefulness, perceived ease of use, and perceived security were also potentially important in the Peruvian context. However, there are no studies that included: 1) importance of interoperability between different digital wallets 2) availability of the service to users, and 3) importance of the platforms for social distancing. In the case of this last gap, it is important to mention that Zhao and Bacao (2021) focused on the role of the pandemic in boosting the usage of m-payments as a way to maintain social distancing in China. Although this study addressed a similar concept to the one that is proposed by this study, it should be noted that in China most of its population had already been using m-payments (including digital wallets) before the pandemic. Hence, their results are not directly applicable to Peru, where the use of digital wallets is considerably lower.

In sum, although this study includes perceived ease of use, perceived usefulness, and perceived security, its contribution lies in the study of interoperability, social distancing, and system availability as antecedents to the use of digital wallets.

Conceptual framework and hypotheses

Interoperability

For Wegner (1996, p. 285), "interoperability is the ability of two or more software components to cooperate despite differences in language, interface, and execution platform". This concept has been reviewed before by Mantri and Feng (2011), who suggest that m-payments lack universal standards that can provide a unified mode of payment, when reflecting on the challenges regarding interoperability amongst different platforms. In addition, Bourreau (2015) suggests that network effects can be low in the m-payment sector since there is not a possible connection between all existing platforms, which in turn may discourage new users.

In the case of digital wallets, a specific case of m-payment, this variable represents an important issue since it was perceived as a disadvantage by the interviewees. For example, as at 2022, it was not possible to make transactions between Yape and Plin (the two main digital wallets in Peru). In this study, interoperability is defined as user perception of the ability to make cross-platform transactions when using digital wallets. Based on this discussion, it is hypothesized that:

H1: *Interoperability positively influences continuity intention of digital wallets*

Social distancing

As reviewed by Zhao and Bacao (2021), social distancing influences user perception of convenience when using m-payments during the pandemic. It can be seen as a benefit when users perceive a sense of higher safety when using m-payments than when they use traditional payment methods. Following this idea, Chen et al. (2021) explain that social distancing aims at reducing contact and decreasing the spread of the virus.

Based on the above discussion, digital wallets can be used as a feasible alternative for individuals to make transactions on a daily basis. This feature may provide users with a sense of perceived safety since the use of digital wallets is contactless and allows individuals to keep social distancing when performing any type of financial transaction. The following hypothesis is proposed:

H2: *Social distancing positively influences continuity intention of digital wallets*

System availability

According to the literature, system availability refers to user perception of the proper technical functioning of the platform (Parasuraman et al., 2005). In the preliminary interview of this study, participants mentioned that they often face problems regarding the availability of the platform, hence, system availability is defined as user perception that he or she can utilize the app properly, without coming up against any technical issue, either because of an update of the app is running, or because of a weak internet connection. If users feel they may face these technical issues when using a digital wallet app, they may not feel motivated to use them, going back to traditional payment methods. Thus, it is hypothesized that:

H3: *System availability positively influences continuity intention of digital wallets*

Perceived security

This variable is defined as user perception of the security features of digital wallets. These platforms hold personal financial information, and thus may be perceived as risky. For the present study, perceived security is highly significant for users since there is not enough trust from the population on m-payment apps in general. Even though these apps may meet the required security and privacy standards, some users may feel concerned about this issue because they are not aware of or cannot understand the technical features associated to security. For example, 55% of Peruvians are afraid of providing either credit card or personal information on e-commerce sites (Cámara Peruana de Comercio Electrónico, 2021). Under this scenario, users can feel unmotivated to continue using digital wallets if they do not perceive that there are enough security measures in the app, as they may feel vulnerable when providing financial and private information. Following these ideas, it is proposed that:

H4: *Perceived security positively influences continuity intention of digital wallets*

Perceived ease of use

Perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Hence, the easier the use of the app, the more likely it is to be used. In line with this proposition, Apanasevic and Arvidsson’s study (2016) found that this variable is likely to influence m-payment use in retail. In the case of this study, this variable also highlights the effortless experience that digital wallets require in order to be used. This study thus proposes that:

H5: *Perceived ease of use positively influences continuity intention of digital wallets*

Perceived usefulness

This variable has been studied by Davis (1989, p. 320), who defines it as “the degree to which a person believes that using a particular system would enhance his or her job performance”. In the context of m-payments, perceived usefulness is related to the perception of the users about the app features that enable a better handling of money transfers and mobile shopping (Shankar & Datta, 2018). This variable has been empirically validated as a crucial factor of technology use (Apanasevic & Arvidsson, 2016). In this study, this variable refers to the degree to which users believe that the features provided by digital wallets enable them to money and transfers well. Thus, if users perceive that digital wallets are capable of solving any pain points, they will be motivated to use them. Hence, it is hypothesized that:

H6: *Perceived usefulness positively influences continuity intention of digital wallets*

Figure 1 shows the proposed research model, which is consistent with prior studies based on TPB that claim that salient beliefs have a direct impact on behavior (e.g., Davis, 1989; McKnight et al., 2002).

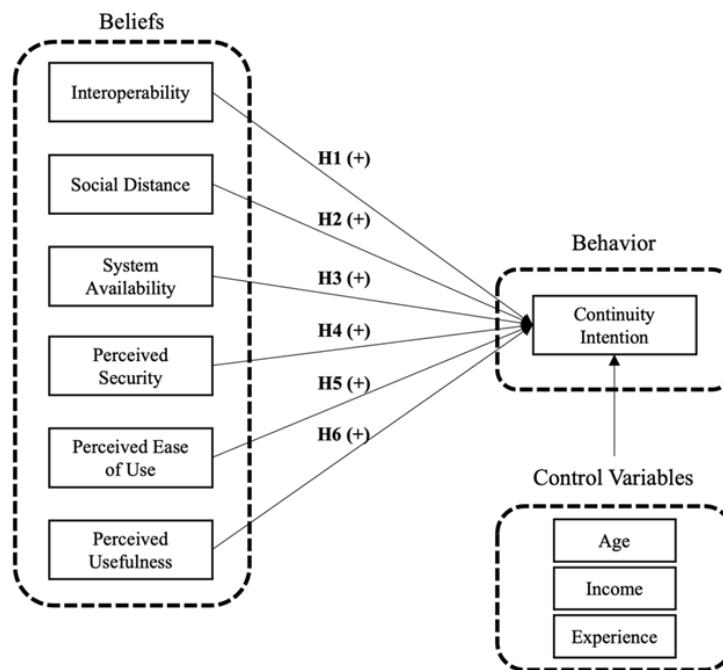


Figure 1: Research Model

Methodology

Measurement instrument

Interoperability was measured with four items from Lew et al. (2020). Social distancing was measured with four items, three from Zhao and Bacao (2021) and one from Chen et. al (2021). System availability (Parasuraman et al., 2005) and perceived usefulness (Malaquias & Hwang, 2019) were measured with four items each. Perceived security was measured with three items (Al-Saedi et al., 2020; De Luna et al., 2019),

as was perceived ease of use (Malaquias & Hwang, 2019). In the case of the dependent variable, continuity intention was measured with three items from Yen and Wu (2016). All the items were reflective, have been contextualized to fit digital wallet adoption, were measured with 5-point Likert scales, and were anchored from “strongly disagree” “strongly agree”. (See Appendix A.)

Data collection

This study targeted Peruvian users. Data were collected in October and November 2021 via Google Forms. In this way, respondents were able to self-administer the survey, which was provided in Spanish. It included three sections: the first to confirm that interviewees are already using a digital wallet, the second with all the items described the Appendix section, and the third with demographic questions to characterize the sample. This study contacted participants through social media and used the snowball sampling method. Finally, to decrease the number of careless responses, respondents were informed that participation was voluntary, and that their personal information would remain anonymous.

The final sample was made up of 185 respondents. Following the recommendation of Cohen (1992) on sample size, and 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, this study’s sample size met this requirement. In terms of characteristics, the sample mainly consists of Yape users (69.19%) followed by Plin users (15.68%). The age range with the highest frequency is respondents between 18 and 25 years old (around 80% of the sample). In terms of gender, the sample was almost equally divided into males (49.19%) and females (50.81%). Finally, almost 85% of the sample has at least one year of experience with the use of these platforms.

Data analysis

This study used structural equation modeling to assess the hypotheses as they are based on a cause-effect relationships (Hair et al., 2017). Smart PLS was used as an 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 first two, this study used item reliability, internal consistency, and average variance extracted (AVE). Item reliability was assessed by examining each item’s loading on its corresponding latent variable. All item loadings were greater than the minimum criterion of 0.7 suggested by Barclay et al. (1995). (See the Appendix.) The internal consistency was assessed by examining the composite reliability and Cronbach’s alpha values, which ranged from 0.866 to 0.947 and from 0.770 to 0.930, respectively, (See Table 2.)

Both composite reliability and Cronbach’s alpha values were greater than the recommended minimum value of 0.7 (Nunnally, 1978). In the case of AVE values, all of them were greater than the minimum threshold of 0.5 suggested by Hu et al. (2004). (See Table 2.) Hence, the proposed measurement instrument is reliable and internally consistent.

Table 2: Reliability and Convergent Validity

Construct	α	CR	AVE
Continuity intention	0.899	0.937	0.833
Interoperability	0.930	0.947	0.782
Perceived ease of use	0.882	0.927	0.810
Perceived security	0.770	0.866	0.684
Perceived usefulness	0.893	0.933	0.824
System availability	0.893	0.926	0.759
Social distancing	0.892	0.925	0.756

To establish discriminant validity, this study assessed the heterotrait-monotrait ratio (HTMT). According to current literature, HTMT values supporting discriminant validity should be lower than 0.85 if constructs are conceptually different, while the threshold is set to 0.90 if the constructs are conceptually similar (Kline, 2011). Table 3 shows that all HTMT values are under 0.85, except the one for perceived usefulness and perceived ease of use (0.886). However, this value is under 0.90, and thus it supports the discriminant validity between these two variables, which are conceptually related (Davis, 1989).

Table 3: Heterotrait-monotrait ratio (HTMT)

Construct	CON	INT	PEOU	PS	PU	SA	SD
Continuity intention	---						
Interoperability	0.520	---					
Perceived ease of use	0.779	0.504	---				
Perceived security	0.744	0.366	0.633	---			
Perceived usefulness	0.848	0.553	0.886	0.615	---		
System availability	0.589	0.136	0.496	0.726	0.548	---	
Social distancing	0.824	0.579	0.738	0.662	0.835	0.406	---

Structural model

To assess the explanatory power of the proposed structural model, this study examined the R^2 values of the dependent variable and the paths between variables (see Figure 2). 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 71.62% of the variance (R^2 value) in continuity intention to use digital wallets. The results of the path analysis indicate that continuity intention is predicted by interoperability (H1, $\beta=0.070$, p -value<0.10), social distancing (H2, $\beta=0.285$, p -value<0.05), system availability (H3, $\beta=0.146$, p -value<0.05), perceived security (H4, $\beta=0.157$, p -value<0.05), and perceived usefulness (H6, $\beta=0.239$, p -value<0.010). However, the effect of perceived ease of use on the continuity intention to use digital wallets was found to be non-significant, hence, H5 was not supported.

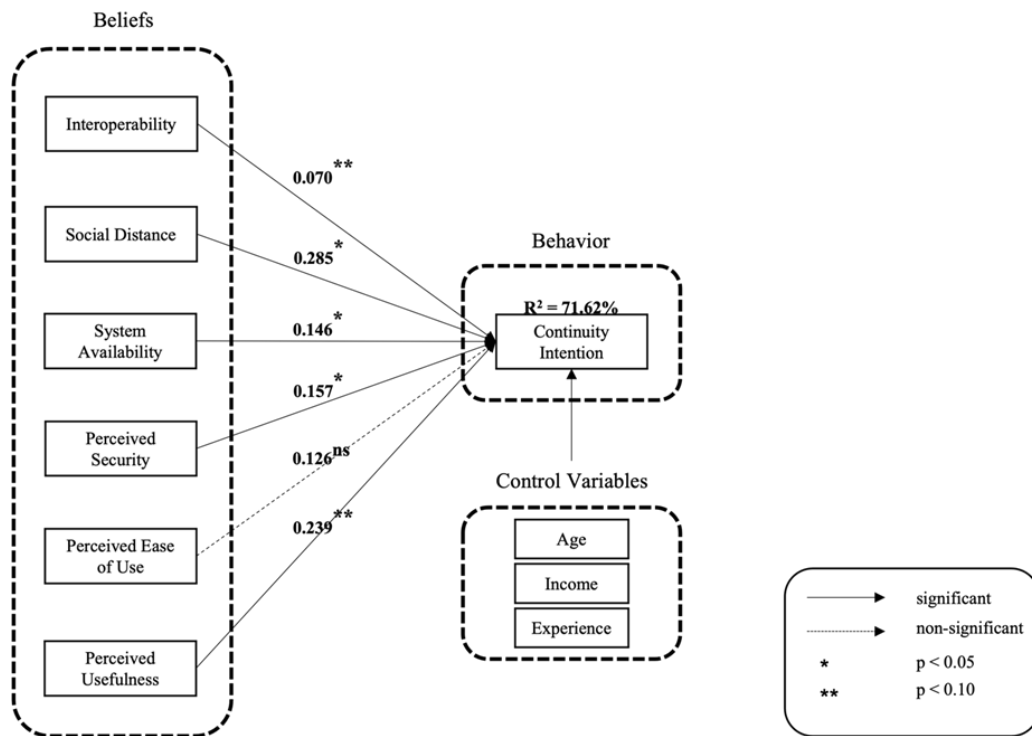


Figure 2: Structural Equation Model Assessment

Discussion

The use of digital wallets has recently become important in Peru, especially during the pandemic. However, in spite of the associated potential benefits described previously, the use rate of these platforms is low, where 24.1% of the banked population use them for peer-to-peer transactions and 14.4% on retail (Prieto, 2021). Hence, the main objective of this study is to understand the critical factors that influence continuity intention of these platforms. Accordingly, this study developed a model that includes current users’ salient beliefs about this technology. Results found empirical evidence that suggest the significant role of interoperability, social distancing, system availability, perceived security, and perceived usefulness, supporting most of the hypotheses. It is important to highlight that social distancing is the strongest antecedent to continuity intention, which supports that idea that users feel encouraged to use digital wallets as a means to avoid contact with people and certain surfaces such cash or cards. In the case of interoperability, it is also important to highlight that this variable has a path coefficient of 0.07 in the full sample. In terms of interoperability,

Yape may be the platform with most restrictions as at 2021 (users of this platform cannot make transactions to users of other platforms), but at the same time it is the one with the highest number of users. Hence, this study additionally ran an exploratory analysis to assess the role of interoperability for Yape users only (69% of the full sample). In that analysis, a path coefficient of 0.175 (p -value=0.027) was found for the effect of interoperability on continuity intention, which is larger than the one obtained from the full sample. This result suggests that interoperability is important in the case of Yape users probably because of the large network externalities of this platform that allows users to interact with most of their acquaintances, friends, family, and venues. However, these results should be taken with caution. Future studies may include larger sample sizes to validate these findings.

Finally, the only hypothesis that was not supported is the impact of perceived ease of use on continuity intention. This finding, though, may be explained by the demographics of the users surveyed. First, around 80% of the sample are between 18 and 25 years old, and second, almost 85% of them have at least one full year of experience with digital wallets, which means that they have grown up surrounded by technology and have already learned how to use the features of those apps. In other words, most of the respondents are already able to use those apps effortlessly, and thus perceived ease of use might not be important for them to continue using these platforms.

Theoretical implications

In the literature review section, this study identified that there are no studies on interoperability, social distancing, and system availability as potential critical factors that influence users' continuity intention of digital wallets, especially in developing countries. Accordingly, the present study contributes to filling these gaps by finding empirical evidence of the positive impact of these variables on users' intention to continue using digital wallets. In the case of digital wallets, interoperability is a technical feature that should be present to achieve a successful dissemination of these platforms. Thus, theories of technology adoption and dissemination should also include this concept in their frameworks when assessing similar technologies.

As for social distancing, it can be concluded that emergency situations can boost the adoption of some technologies. This is the case of digital wallets, but other technologies can also be included such as Covid tracing apps, earthquake apps, or any other service that is used during emergencies. In short, this study concludes that emergencies can function as a catalyst of innovations dissemination.

Finally, system availability is a technical feature that should be taken into account when studying services needing high levels of availability such as the case of bank-based services. This finding can be extended to other services requiring outstanding levels of availability, such as health monitoring services or security systems.

Practical implications

The present study provides recommendations for both banks and government. First, in terms of interoperability, the government should design incentives for banks to allow cross-platform transactions. With this recommendation, more individuals may be motivated to use these platforms, which may generate traceability over transactions, and in the long run it may reduce informality levels. As for the banks, they may be also motivated to achieve interoperability across their platforms as users would generate more transactions and with greater frequency, providing banks with a higher volume of financial assets.

Second, in terms of social distancing, government and banks can work together to generate campaigns about the contactless nature of these platforms and the associated benefits in this pandemic context. The government can even use this channel to distribute economic support and financial benefits to people who need it during the pandemic. This strategy is expected to further decrease the amount of people that crowd outside banks and financial institutions to collect said financial benefits.

Third, with regard to system availability, banks should focus on decreasing the downtime of their digital wallets because it may disincentivize individuals to continue using these platforms, and in turn, it may reduce the number of transactions made with the apps themselves, damaging the image of the institution. With a view to avoiding crashes, banks may rely on cloud services that provide scalability if the number of users increases. Finally, banks should also develop campaigns to generate awareness among their customers

regarding the security attributes and the technical features their digital wallets have, as those factors are important for users to decide whether to continue using digital wallets or not.

Conclusions

This study aimed to address the existing gap in the current literature by highlighting the significance of interoperability, social distancing, and system availability as variables influencing the continued usage intention of mobile payments (m-payments) in Peru. Through our research, we have found that all these variables have a positive impact on the objective variable, with social distancing emerging as the strongest factor, along with perceived security and perceived usefulness. These findings have several implications. Theoretical implications focus on the technological features and environmental circumstances that can enhance the objective variable, while practical implications relate to the actions that the government and relevant financial institutions can undertake.

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Appendix A: Survey Questions

Item	Question
Continuity intention (CON)	
CON1 ($\lambda=0.936$)	I intend to continue the use of this digital wallet in the future.
CON2 ($\lambda=0.864$)	I intend to increase the use of this digital wallet in the future.
CON3 ($\lambda=0.936$)	I will keep using this digital wallet as regularly as I do now.
Interoperability (INT)	
INT1 ($\lambda=0.878$)	Most of my colleagues often use the same digital wallet for paying.
INT2 ($\lambda=0.916$)	Most of the people I talk to use the same digital wallet for paying.
INT3 ($\lambda=0.913$)	Most people in my group use the same digital wallet.
INT4 ($\lambda=0.884$)	Many people I talk to regularly use the same digital wallet.
INT5 ($\lambda=0.826$)	Most of my friends frequently use the same digital wallet for paying.
Social distancing (SD)	
SD1 ($\lambda=0.891$)	I found it convenient to use my digital wallet during the Covid-19 pandemic.
SD2 ($\lambda=0.859$)	I feel using my digital wallet as a contactless payment is safer than traditional payment during the Covid-19 pandemic.
SD3 ($\lambda=0.905$)	I feel using my digital wallet is a beneficial payment method among people when conducting a financial transaction during the Covid-19 pandemic.
SD4 ($\lambda=0.822$)	Digital wallets are beneficial for me because they help me keep my distance from others when performing transactions.
System availability (SA)	
SA1 ($\lambda=0.826$)	My digital wallet is available.
SA2 ($\lambda=0.911$)	My digital wallet launches and runs right away.
SA3 ($\lambda=0.837$)	My digital wallet does not crash.
SA4 ($\lambda=0.908$)	My digital wallet does not freeze during transactions.
Perceived security (PS)	
PS1 ($\lambda=0.867$)	I feel protected when providing personal information through my digital wallet.
PS2 ($\lambda=0.882$)	I feel comfortable about the use of my digital wallet, as the app does not allow other people to access my data.
PS3 ($\lambda=0.724$)	There is a low chance that something might go wrong when using my digital wallet.
Perceived ease of use (PEOU)	
PEOU1 ($\lambda=0.899$)	I find that digital wallets are easy to use.
PEOU2 ($\lambda=0.905$)	Using digital wallets is easy for me.

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PEOU3 ($\lambda=0.895$)	It is easy to get digital wallets to do what I want to do.
Perceived usefulness (PU)	
PU1 ($\lambda=0.903$)	Using my digital wallet enables me to pay more quickly.
PU2 ($\lambda=0.904$)	Using my digital wallet makes it easier for me to conduct transactions.
PU3 ($\lambda=0.915$)	I find my digital wallet is a useful possible means of payment.