

Perceived Risk, Structural Assurance and Trust in Mobile Payments

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Abstract: Mobile technologies have emerged as a new business phenomenon as a result of the increasing popularity of mobile devices and the proliferation of mobile technologies. A number of marketing research studies have focused on the identification of the background and consequences of mobile commerce, thus enabling m-commerce service providers to design appropriate marketing strategies. This paper's major contributions are the importance of trust in adopting mobile payments under the influence of perceived risk and structural assurance, as well as the identification of business-related factors that affect mobile trust. A quantitative study was carried out, with 175 valid auto-administered questionnaires collected and analysed using structural equations modelling. The analysis results indicate the positive effect of perceived risk and structural assurance in mobile trust on mobile payment adoption intention. It is important to raise managers' awareness of preserving the security of services in order to develop mobile trust. Also, to reduce the perceived risk associated with mobile financial transactions, managers need to provide basic insurance for customers in order to defend their transactions in the event of fraud or a particular problem.

Keywords: Trust; mobile payment; perceived risk; structural assurance; intention to adopt.

Introduction

M-commerce is distinguished from traditional E-commerce by its user interface and associated risks, ubiquity, interactivity, location services and usage habits (Wang, Ou & Chen, 2019). To develop mobile commerce, merchants, financial intermediaries and

telecommunications operators have joined forces to propose a new mobile payment offer; this is the m-payment. In recent years, mobile payments have become widely accepted due to their dependable and efficient transaction services ([Huang, Wang & Wang, 2020](#)). However, there are a variety of factors that affect the adoption of mobile payments ([Liébana-Cabanillas et al., 2018](#)). The literature review indicates that trust remains “as a prerequisite for the success of e-commerce sites” ([Chouk, 2005](#)). Several studies did not integrate it until lately and they have emphasized the role of the characteristics of the merchant site in the development of trust. Other research has focused on the study of brand trust ([Chaudhuri & Holbrook, 2002](#); [Gurviez & Korchia, 2002](#)). Thus, there is still little work on trust in the mobile payment setting ([Srivastava, Chandra & Theng, 2010](#); [Xin, Techatassanasoontorn & Tan, 2013](#)); and those that have identified antecedents to trust in electronic payment (TEP) and trust in mobile payment (TMP) do not always share the same results. This research is interested in identifying the factors related to business characteristics that are most explanatory of mobile trust.

In the current context, the study of the conceptual and empirical framework of mobile trust in the development of mobile commerce is a captivating area of research. It is then crucial to understand how consumers develop their mobile trust and adopt the mobile payment service in a developing country like Tunisia. Thus, the objectives of this investigation are threefold:

- 1- Succeed in mobile payment under the mobile trust effect;
- 2- Identify business-related factors that affect mobile trust;
- 3- Examine the impact of trust on mobile payment adoption intention.

This paper explores the importance of trust in adopting mobile payment under the effect of perceived risk and structural assurance. Expected search results can supplement existing literature and provide new perspectives on payment-related factors. This research is structured as follows: first, a literature review on trust constructs, explanatory factors and mobile payment adoption intention, and the relationship between these constructs is conducted. Secondly, the article presents the research methodology used and the instrument chosen for data collection. Finally, the analysis of the results is presented followed by a discussion and managerial implications on the mobile payment service.

Literature Review

Trust in mobile payment

While the number of retail banks offering mobile banking services has increased significantly, consumer adoption remains very low. Trust is one of the key issues identified by researchers ([Sawadogo et al., 2022](#)). Understanding the impact of mobile services on purchase intentions has become critical ([Zhani, Mouri & Ahmed, 2022](#)). Consumer trust was considered to be one

of the most important predictors of mobile adoption, as it is a key determinant of success. ([Rana et al., 2019](#)). It has been defined as the willingness of one party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the client, regardless of the first party's ability to monitor or control that other party.

In fact, several authors have synthesised trust, in a traditional context ([Guibert, 1999](#); [Guibert et al., 2009](#); [Rousseau et al., 1998](#)) and even online ([Chouk, 2005](#)). They have shown the complication of this concept, where it is difficult to propose an exact definition because of the multiplicity of dimensions to be considered ([Wang & Emurian, 2005](#)). Indeed, trust is difficult to observe and measure directly ([Hwang & Kim, 2007](#)). The study of trust is undergoing a real evolution since it has several facets: cognitive, affective, emotional and behavioural ([Chouk, 2005](#); [McKnight, Choudhury & Kacmar, 1995](#)) and is used in different fields such as psychology, sociology and marketing.

Furthermore, Jarvenpaa, Tractinsky & Vitale ([1999](#)), Veijalainen ([2007](#)) and Pavlou ([2003](#)) emphasise the notion of vulnerability that impacts on online trust. This vulnerability increases the fragility of the client who can be exploited by the other party in the exchange. In line with this idea, several researchers ([Bart et al., 2005](#); [Bermeo Giraldo et al., 2021](#); [Hwang & Kim, 2007](#)) have shown the importance of trust in different transactions and its role in reducing uncertainty and perceived risks. It is in this context that we thought it appropriate to conclude this section with the emergence, through our readings, of a new concept, named 'mobile trust'.

Perceived risk and trust

Eastin ([2002](#)) has shown empirically that perceived risk negatively influences the adoption of online banking. This same result has been confirmed in other research, where it has been shown that the more risk the consumer perceives, the less likely they are to adopt the service ([Bauer, Falk & Hammerschmidt, 2006](#); [Yousafzai, Pallister & Foxall, 2009](#)). Malaquias & Hwang ([2016](#)) concluded that there is a direct negative effect between perceived risk and trust in mobile banking as it lowers their average level.

On the other hand, ([Tournois & Cheikho, 2015](#)) studied in depth all possible interactions between perceived risks in m-banking on customers' trust in their bank in the mobile context. They attest to the positive influence of perceived risk on trust in the mobile context.

In 2009, Lee revisited the six risk dimensions, replacing "physical risk" with "security risk" because it is inadequate for the virtual world. It is in this context that we pose the following hypothesis:

Hypothesis 1: Perceived risk has a positive influence on trust in mobile payments.

H1.1. Perceived risk has a positive influence on benevolence.

H1.2. Perceived risk has a positive influence on integrity.

H1.3. Perceived risk has a positive influence on competence.

Structural assurance and trust

Structural assurances can be considered among the legal dispositions (laws, guarantees, and regulations) provided by the institutional environment to protect the security of transactions.

In the context of mobile commerce, Xin, Techatassanasoontorn & Tan (2013) expose the positive effect of structural assurances on consumer trust. M-payment services give rise to problems of vulnerabilities and data leakage. Therefore, in order to build trust in mobile payment and to close the reliability and security gaps of this payment method, users can rely on structural assurances (Srivastava, Chandra & Theng, 2010).

In this same context, Srivastava, Chandra & Theng (2010) and Zhou (2011) have shown that structural assurance as an institution-based trust mechanism can effectively enhance user trust and decrease perceived risk in online transactions. In this sense, we confirm the positive effect of structural assurance on trust in mobile payments. Hence the following hypotheses are given:

Hypothesis 2: Structural assurance has a positive influence on trust in mobile payment.

H2.1. Structural assurance has a positive influence on benevolence.

H2.2. Structural assurance has a positive influence on integrity.

H2.3. Structural assurance has a positive influence on competence.

Trust and mobile payment adoption

Lack of trust is seen as a barrier to consumer adoption of the technology (Dounia & Fatine, 2020). Since mobile payment is a relatively new innovation, consumers may have uncertainties about their technology and operating environment (Srivastava, Chandra & Theng, 2010).

Extending this logic to the mobile payment context, several researchers (Xin, Techatassanasoontorn & Tan, 2013) show that trust in mobile payment has a positive effect on consumers' intentions to adopt mobile payment.

It is in this context that we pose the following hypothesis:

Hypothesis 3: Trust in mobile payment has a positive influence on intention to adopt mobile payment.

H3.1. Benevolence has a positive influence on intention to adopt mobile payment.

H3.2. Integrity has a positive influence on intention to adopt mobile payment.

H3.3. Competence has a positive influence on intention to adopt mobile payment.

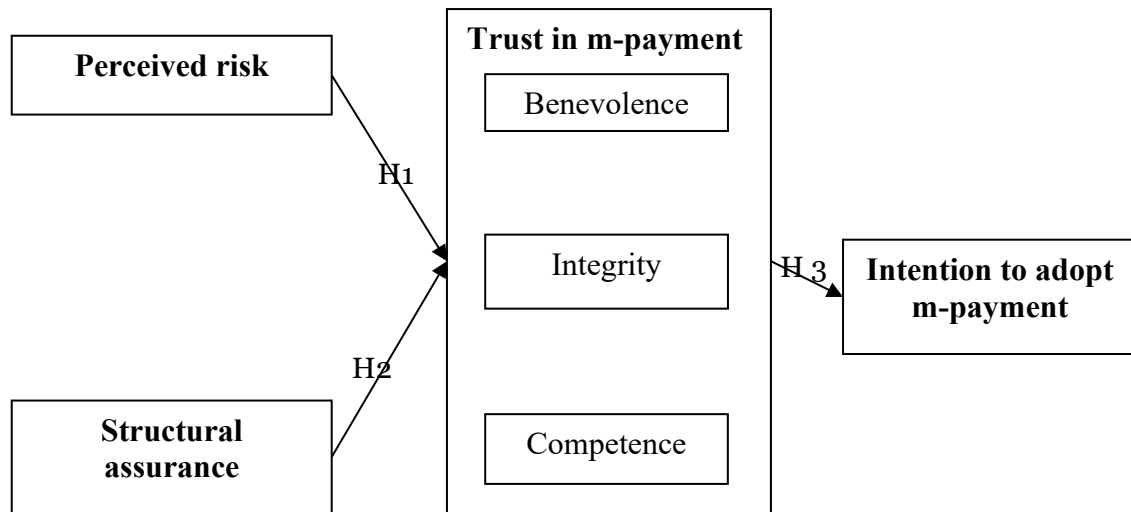


Figure 1. Research model

Material and Methods

Measuring instruments

To empirically measure the effect factors and test the model presented above, we chose the questionnaire survey as a data collection instrument. The constructs are measured by scales from the literature (Table 1). These scales have been adapted to the context of the present research “mobile payment”. In this research, the dependent variable “trust in m-payment” is measured according to a three-dimensional scale (benevolence, integrity and competence) inspired by Hwang & Kim (2007) and also the variable “perceived risk” is measured according to a three-dimensional scale (performance risk, security risk and financial risk) inspired by Lee (2005).

Table1. Measurement scales

Variable	Scale items	Authors
Perceived risk	Perceived performance risk The performance of the Ooredoo mobile payment system server may be affected by slow download speeds, blocking or maintenance. Ooredoo’s mobile payment system server may malfunction and perform incorrect operations.	Adapted from Lee (2005)
	Perceived safety risk I would not feel completely safe providing personal information via the Ooredoo mobile application (MobiCash). By using mobile payment via the Ooredoo mobile application (MobiCash), I am afraid that other people will have access to my account. I don’t feel safe sending important information via Ooredoo’s mobile applications (MobiCash, Mobiflouss).	

Variable	Scale items	Authors
	Financial risk When transferring money via the Ooredoo mobile application (MobiCash), I am afraid of losing money because of careless mistakes (mistakes in the account number or in the amount). When there are transactional errors, I fear that I will not be reimbursed by Ooredoo.	
Structural assurance	Ooredoo offers enough guarantees to make me feel comfortable using MobiCash. I am confident that Ooredoo's legal structures effectively protect me from the problems of mobile technology. I am convinced that the safeguards in the mobile technology sector are secure for using MobiCash. In general, mobile technology provides a robust and secure environment for using MobiCash.	(Srivastava, Chandra & Theng, 2010)
Trust in mobile payment	Benevolence I expect Ooredoo's m-payment system to have good intentions towards me. I expect Ooredoo's m-payment intentions to be benevolent. I expect Ooredoo's m-payment system to work in my interest.	(Hwang & Kim, 2007)
	Integrity The promises made by Ooredoo's m-payment system seem reliable. I don't doubt the honesty of Ooredoo's m-payment. I expect Ooredoo's m-payment to deliver on its promises.	
	Competence Ooredoo's m-payment system understands the market in which it operates. Ooredoo's m-payment system knows all about financial products. Ooredoo's m-payment system knows how to provide an excellent service.	
Intention to adopt mobile payment	I intend to use MobiCash in the future. I will be using MobiCash frequently in the coming months. I would strongly recommend others to use MobiCash.	(Xin, Techatassa nasoontorn & Tan, 2013)

Choice of study area

To carry out our survey, we used a popular application known by Tunisians, the “MobiCash” service of the Tunisian telephone operator “Ooredoo”: “this is a new-easy to use payment method which is thoroughly secure. It grants you both, mobile money and mobile payment transfer”.

Sampling and data collection

The validation of the conceptual framework was carried out using a quantitative data collection method, based on a survey of Ooredoo mobile payment users. The data was collected using an online questionnaire. A total of 200 questionnaires were completed, of which 25 were removed from the database due to incomplete or contradictory answers. A total of 175

questionnaires constituted the final sample. We have used the Likert 5-point semantic scale, ranging from “strongly agree” to “strongly disagree”. According to Touzani & Driss (2007), this scale is the most adapted to the Tunisian context.

However, in order to respect the notion of representativeness of the sample, we took into consideration socio-demographic criteria such as age, gender, educational level and income.

Our sample consists of 61.5% of men and 38.5% of women, the majority (39%) belong to the age category (20-35 years) and almost 95% have a university education and have been subscribing to Ooredoo.

Results

A two-stage analysis was conducted. Exploratory factor analysis follows confirmatory factor analysis.

In order to conduct the exploratory factor analysis, the results obtained show that Cronbach's alpha is acceptable (>0.7), KMO (Kaiser–Meyer–Olkin test) is acceptable (>0.5), Bartlett's test is significant (>0.000) and the explained variance is good (Abraouz Chakir 2020 ; Tritah & Daoud, 2021). All these results are presented in Table 2.

Table2. Result of the principal component analysis

Constructs/Dimensions	KMO	Bartlett Test Significance	Explained Variance %.	Cronbach's α
Perceived risk R. of performance dimension R. of safety dimension R. financial dimension	0.563	828.924; p=0.000	31.728 23.193 23.178	0.766 0.750 0.899
Structural assurance	0.818	622.160; p=0.000	70.505	0.860
Confidence in payment Benevolence dimension Integrity dimension Competence dimension	0.760	1987.878; p=0.000	39.105 25.631 18.029	0.911 0.917 0.838
Intent to adopt mobile payment	0.636	340.104; p=0.000	70.370	0.776

For the confirmatory factor analysis, we used the structural equation method (SEM) using the Smart PLS.3 (Partial Least Squares) to test the hypotheses and estimate our structural model. The results obtained show that the construct reliability is good; hence the Cronbach alpha and composite reliability are acceptable, which is above the acceptable value of 0.70, indicating that the internal consistency is confirmed. Convergent reliability is tested by the average variance extracted (AVE) and the recommended threshold is 0.5 (Table 3). Discriminant validity is assessed by three methods (Gold, Malhotra & Segars, 2001; Henseler, Ringle & Sarstedt, 2015). First, the Fornell-Larcker test when $\sqrt{AVE} > R$ (Fornell & David, 1981);

second, the Cross-loading technique ([Chin, 1998](#)) when Cross-loadings < Loadings; and, third, examination of the correlation ratio HTMT, also called the Heterotrait-Monotrait matrix when $HTMT < 0.90$. Hence, the discriminant validity is confirmed. We have noted that, thanks to the reliability and validity of the measurement scales selected, the quality of our measurement model is satisfactory.

Table 3. Result of the factor analysis

Built Constructs/Dimensions	Reliability of construction		Convergent validity
	Cronbach Alpha > 0.7	Composite reliability > 0.7	Average variance extracted > 0.5
Perceived risk			
R. performance dimension	0.766	0.878	0.785
R. of safety dimension	0.752	0.856	0.655
R. financial dimension	0.899	0.952	0.909
Structural assurance	0.860	0.905	0.704
Trust in mobile payment			
Benevolence dimension	0.912	0.944	0.850
Integrity dimension	0.918	0.948	0.859
Competence dimension	0.848	0.877	0.763
Intent to adopt mobile payment	0.787	0.876	0.703

Structural model assessment

The structural model, also known as the “internal model”, presents all the hypothetical relationships between the latent variables ([Hair et al., 2014](#)). Thus, the evaluation of the structural model makes it possible to empirically test the set of hypotheses put forward and to evaluate the predictive power of the model on the basis of indicators and statistical estimates.

First, the assessment of the predictive validity is based on the coefficient of determination R^2 (R Squared) and the Stone-Geisser Q^2 coefficient ([Fernandes, 2012](#)). The value of these two coefficients lies between 0 and 1 ([Wetzels, Odekerken-Schröder & Van Oppen, 2009](#)). Both indices are significant.

Secondly, the evaluation of the goodness of fit of the structural model is based on the goodness of fit ($GOF > 0.36$) according to Wetzels, Odekerken-Schröder & Van Oppen ([2009](#)), and the Standardized Root Mean Square Residual ($SRMR < 0.08$). An SRMR value of less than 0.08 generally indicates good model fit according to Hu & Bentler ([1999](#)). Our results demonstrate the acceptability of the SRMR index. It is 0.006 for the saturated model and 0.006 for the radiating model. The acceptability of the GOF index is shown by its value of 3.860; which confirms the good quality of adjustment of the model.

Analysis result of structural model

The quality of the global model being good, the convergent and discriminant validity being verified, an estimation of the structure model that reproduces the relationships between the latent constructs is necessary in order to test the research hypotheses through a bootstrapping procedure and significance (at the 5% significance level). The estimation of the different relationships represented in the model is carried out by examining the standardized path coefficients (β) or correlation coefficients and the student t-values after bootstrapping. Indeed, bootstrapping allows the stability of the PLS estimate to be verified (Chin, 1998), and this procedure is recommended as a solution for a small sample size.

A company factor constitutes a guarantee for consumers and therefore reinforces consumer confidence. The results obtained show that trust in mobile payment is affected by perceived risk (H1) and structural assurance (H2). Furthermore, mobile trust positively influences mobile payment adoption intention (H3). The test results are summarised in Table 4.

Table4. Test of business-related factors on mobile trust

Assump tions	Relations	B (Path Coefficient)	T Student	p-Value	Conclusion
H1	Perceived risk -> Mobile trust				
H1.1	RP -> Benevolence	0.019	2.317	0.047	Confirmed
H1.2	PR -> Integrity	0.017	0.226	0.819	Rejected
H1.3	PR -> Competence	-0.069	0.952	0.299	Rejected
H1.4	RS -> Benevolence	0.092	1.650	0.098	Confirmed
H1.5	RS -> Integrity	-0.084	1.004	0.288	Rejected
H1.6	RS -> Competence	0.000	0.001	0.999	Rejected
H1.7	RF -> Benevolence	0.112	2.139	0.025	Confirmed
H1.8	RF -> Integrity	0.082	1.343	0.201	Rejected
H1.9	RF -> Competence	-0.060	1.073	0.288	Rejected
H2	Structural assurance -> Mobile trust				Confirmed partially
H2.1	Assurance -> Benevolence	0.244	4.620	0.000	Confirmed
H2.2	Assurance -> Integrity	0.134	1.996	0.046	Confirmed
H2.3	Assurance -> Competence	-0.022	0.425	0.671	Rejected
H3	Trust -> Intent to adopt				
H3.1	Benevolence -> Intention	0.039	0.954	0.341	Rejected
H3.2	Integrity -> Intent to adopt	-0.026	0.640	0.522	Rejected
H3.3	Competence -> Intention	0.705	27.834	0.000	Confirmed

Discussion

The result of this study showed that hypothesis H1 was confirmed. As a result, the postulated link between perceived risk (performance risk, security risk and financial risk) and trust in mobile payment (benevolence, integrity, competence) is partially validated. This finding is in line with the work of Aldás-Manzano *et al.* (2009). Thus, the higher the performance risk, the higher the benevolence. This high level can be explained by the context of m-payment, which is focused on virtual transactions through a wireless network. This is why this service is perceived as vulnerable and may face problems related to mobile networks and technology. “This mode of transaction may not work as advertised, and therefore it does not provide the desired benefits” (Chaix & Torre, 2015).

Moreover, the greater the security risk, the greater the benevolence. Also, the participants interviewed are concerned about the security and risks of virtual transactions. For example, in order to carry out transactions via the mobile phone, they have to give personal and confidential information such as their credit card number and the payment code. This type involves the risks of fraud, financial loss and hacking when using m-payment. For the interviewees, this risk increases, as they do not have a written proof of the transactions made and they are afraid that their data will be hacked and their bank accounts will be stolen.

Hypothesis H2 was confirmed. The results showed that the relationship between structural assurance and mobile trust is partially confirmed. This relationship is consistent with previous work (Srivastava, Chandra & Theng, 2010; Xin, Techatassanasoontorn & Tan, 2013). Some work shows that structural assurance can be an antecedent of trust as it covers users against risks, hacks and interceptions of information (McKnight & Norman, 2002). Structural assurance means that there are adequate technological and legal structures to ensure the security of payments. Compared to online payments, mobile payments embedded in wireless networks may be more vulnerable to hackers’ attacks and information interception. In addition, viruses may exist in mobile terminals. These problems will affect the security of the account and the money. Thus, if there are sufficient structural assurances such as certification and regulation to ensure the security of payments, users can build their trust in mobile payments. It should be noted that structural assurance has the greatest positive and significant impact on mobile trust. The more protective regulations and safeguards the company has, the more confident the consumer is to adopt the mobile payment service (Chaix & Torre, 2015).

The link between mobile confidence and adoption intention is significant, which is consistent with the literature (Srivastava, Chandra & Theng, 2010; Xin, Techatassanasoontorn & Tan, 2013). Lack of consumer trust is observed as a barrier to the adoption of the new technology. Since m-payment is a new mode of transaction, it can create a degree of uncertainty for users

regarding their technology and operational environment ([Srivastava, Chandra & Theng, 2010](#)). As such, the presence of trust is paramount in the decision to adopt mobile payment. Previous studies on e-commerce and m-commerce consistently demonstrate that trust has a positive relationship with technology adoption intention ([Gefen, Karahanna & Straub 2003](#); [Srivastava, Chandra & Theng, 2010](#)). Extending this logic to the mobile payment context, Xin, Techatassanasoontorn & Tan ([2013](#)) found that consumers' level of trust in mobile payment has a positive effect on their intention to adopt the service.

A new theoretical concept "mobile trust" has been developed in this research. "It reflects mobile users' trust in transactions conducted on their mobile phone." This definition can be used to provide a theoretical foundation for future research.

Following that, our findings added to the work of Chandra *et al.* ([2010](#)) and Xin, Techatassanasoontorn & Tan ([2013](#)), who established perceived reputation, perceived opportunism, and perceived risk as predictors of trust in mobile payment. We improved both perceived safety and structural assurance.

Furthermore, the choice of the Tunisian context, where mobile payment adoption is low or non-existent, is novel. As a result, it is crucial to encourage Tunisians to register for and use regular mobile payment services. When compared to previously used products and services, the adoption of mobile payment represents a significant shift in customer behaviour.

Conclusions/Recommendations

The aim of the present research was to examine how three firm-related factors, knowledge, perceived risk, and structural assurance, affected user trust in the context of mobile payments. According to the findings, trust positively influences mobile payment adoption intention. Furthermore, perceived risk and structural assurance influence mobile trust significantly.

The research revealed the company-related factors, such as perceived risk and structural insurance. As a result, in order to correct the limitations of the mobile payment system, such as illegal downloading, content loss, a lack of safety, hackers, an absence of authentication, a total absence of a monitoring system, and so forth, the primary role of professionals is to code any mobile payment transaction to be 100% safe and protected.

In light of the importance of structural assurance as a key factor in mobile trust, the government and the Central Bank must strengthen the institutional environment by enacting regulations and laws that protect user confidentiality and identification, as well as protection against uncertainty, fraud, and the risk of using new technology.

Greater efforts are required to ensure:

- Sensitizing mobile service providers to the importance of service security in order to foster mobile trust.
- Holding communication campaigns, mobile payment demonstrations, mode of employment distribution, and benefit distribution to reduce perceived risk associated with mobile financial transactions.
- Providing clients with assurances to protect their transactions in the event of fraud or a specific problem, as well as to reduce their hesitation when making mobile payments.
- Establishing a legal framework that, on the one hand, protects mobile transactions and consumer interests while, on the other hand, boosts competition by incorporating, for example, new players in order to expand electronic commerce.
- Incorporating customer experience into the design of mobile phones in order to make them more accessible and performant to different types of customers (Generation X, Generation Y, etc.).
- Encouraging telecom operators to invest in mobile technologies in order to make transactions faster (mobile application download, mobile payment, etc.) and to ensure network availability.

However, the evolution of m-commerce remains a problem for some countries, particularly Tunisia, because m-payment is limited to domestic transactions.

One limitation of this study is that it did not include demographic variables, such as age, gender, income, and socio-professional category, which can influence trust in mobile payments, nor individual and mobile app factors that can affect mobile trust. Notwithstanding these limitations, the study suggests that future research can provide a better understanding of these variables' roles in the context of mobile payment. This would be a fruitful area for further work.

The findings of this study have a number of important implications for future practice. It is therefore necessary to raise the awareness of mobile payment stakeholders to preserve the security of services in order to develop mobile trust. In this sense, it is imperative to launch communication campaigns, mobile payment demonstrations, distribution of instructions for use and benefits, etc. to reduce the perceived risk associated with financial transactions on mobile phones. As a result, managers need to put in place assurance for customers to defend their transactions in case of fraud or other problems.

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