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The Impact of Mobile Payment Quality on User's Continuance Intention Toward Mobile Payment in Saudi Arabia**

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ABSTRACT

With the revolution in mobile technologies and the growing number of mobile Internet users, mobile payment was born as a convenient channel of communication between customers and firms or organizations. Nowadays, mobile payments are on the way to disrupting the traditional payment methods and contributing to a massive shift to a cashless society. However, some mobile payment users may be resistant to changing from conventional payment methods. Therefore, it is critical to guarantee users' continuance intention (CI) toward mobile payments to ensure the widespread uptake of mobile payments. Given this, this research aims to study the influence of the quality of mobile payment impacts users' CI in Saudi Arabia (SA). The conceptual model was constructed based on the information system success model and information system post-adoption researches to support the framework of the current study. Results are drawn from a self-administered survey of a random sample of 389 respondents who regularly use mobile payment services in SA. Quantitative analysis is used to determine the impact of mobile payment quality on persistence intention to operate in Saudi Arabia. The current study outcomes have shown that all three dimensions of quality (system quality (SYSQ), service quality (SERQ), and information quality (INFQ)), influence user satisfaction (SAT). Among them, SERQ and SYSQ have the most considerable impact on SAT, whereas INFQ has the lowest positive influence. Moreover, the SAT determines CI to use mobile payment. SERQ, SYSQ, and INFQ impact CI through SAT. Service providers in SA need to provide a high level of SERQ, SYSQ, and INFQ to facilitate SAT and CI to use mobile payment in SA.

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1 Introduction

In an era of technological advancement, the mobile phone has been one of the most critical conventional

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channels of communication between customers and firms or organizations [1]. The mobile Internet users' number in Saudi Arabia (SA) elevated from 19.6 million people in 2017 to 20.6 million people in 2019 [2]. Moreover, the statistics forecast the number will increase to reach 22.5 million users by 2023 [3]. In the mobile payments segment, the statistics show that 36% of Internet users preferring to use mobile payment [4]. Furthermore, the number of users that use mobile point-of-sale systems (POS), such as mobile wallets, in SA is expected to increase to 2.5 million by 2020 and 3.1 million by 2023 [3]. With the increase of smart-phone users, mobile payment has been rapidly developing worldwide according to [5], the growth of mobile payment is a result of the development of the mobile commerce industry, which in turn has increased the need for quick and HassleFree transactions.

In SA, the ICT report (2017) showed that mobile payment was considered one of the critical drivers of electronic commerce. The statistics show that 24% of Online shoppers have used digital wallets such as PayPal and Google wallets to pay for their purchases. Therefore, the mobile payment is a vital connection channel that connects merchants with customers. In recent years, SA has been going through a national transformation that aimed to enhance its "citizens" and "residents" level of satisfaction and quality of life by boosting the role of technologies to improve the services provided to them (Vision 2030, 2018). Accordingly, the consolidation of mobile payment services in SA complements the Saudi Vision 2030 objective of becoming a cashless community. Furthermore, researchers have shown an increased interest in mobile payment services and its quality impact on CI to use investigated by many researchers. [6] argued that the quality of mobile payment. Mobile payment is the main factor influencing 'users' satisfaction, trust, and flow experience that determine continuing use-intention of mobile payment. Thus, service providers need to consider quality to assist users' on-going usage of mobile payment. After reviewing the prior researches, mobile payment has rarely been tested from a quality perspective, and only a few studies assessed the influence of mobile payment quality on CI to use by using an information systems success model (IS success model). In the Saudi context, there are few researches that have focused on mobile payment and investigating the influence of mobile payment quality on CI. From these perspectives, this research aims to expand the understanding about the key factors that could predict 'users' persistence intention to use mobile payment in the SA as well as integrating the information system post-adoption researches and information system success model to study the influence of the mobile payment quality on users' persistence intention toward mobile payment in SA.

According to the technological development of the Internet, changes in the economy, and increased use of mobile devices, the demand for cashless or digital transactions is increasing, and the adoption of mobile payment is on an upward trend [7, 8]. Mobile payment refers to using a mobile phone to make payments for services, goods, and bills. Mobile payment can be classified into two main types: proximity payment and remote payment [9]. Remote payment means that customers are required to connect to remote payment servers for making the payment [10]. In contrast, proximity payment means that customers make payments by simply approaching the terminal with a mobile device [1]. Several studies on mobile payment have confirmed that customers prefer a mobile payment when they pay for goods or services because it provides fast, convenient and adds value to them [11]. [6] argued that the main advantages of mobile payment are ubiquity and flexibility, which is not the case with either offline or online payment.

Moreover, experts agree that the future of traditional payments is in doubt. Accordingly, banks, retailers, and service providers are switching to rely on mobile payment to support their services [12]. Besides, as mobile commerce has increased worldwide, mobile payment will enable convenient mobile commerce transactions and facilitate business transactions to occur anywhere, any time, and by anyone [13].

Most prior studies focused on studying the initial implementation of the mobile payment. The initial implementation of information systems studies attempts to understand the reasons behind the implementation of new technology [14]. In contrast, the researches that studied the IS post-adoption or CI to use made an effort to study the 'users' attitudes after the initial implementation of new technology and to understand how and why users continue using a new technology [10]. Moreover, [10] reported that beliefs and perceptions about IS usage altered with time, and individuals become accustomed to the system. Thus, initial implementation and the CI to use any technology are different. Therefore, many studies focused on understanding the user's post-adoption behavior by identifying the factors that impact post-adoption behavior. They affect a CI including SYSQ, content quality, INFQ, SERQ, trust, flow, perceived individual benefits, engagement, reliability, perceived usefulness, perceived ease of use, perceived service value, interaction quality, environment quality, Inertia, perceived risk, effort expectancy, and user satisfaction [6, 8, 8, 10, 15–18]. The present study attempts to investigate the persistence intention to use mobile payment in SA from a quality perspective so that the study will be integrating an IS post-adoption and IS success model. From previous studies of post-adoption, as seen in Table 1, the study will adopt the user satisfaction variable as

a mediator between the three dimensions of CI and quality.

In 1992, DeLone and McLean developed the information systems success model that contains six dimensions of IS success: SYSQ and INFQ influence use, SAT, and leads to organizational and individual impact [19]. In 2004, DeLone and McLean updated and added SERQ to the model to examine the success of the service provider. The IS success model was extensively used to study user behavior toward different information systems. [6] generalized IS success model to mobile payment and integrated IS success model, flow theory, and users' trust factor to examine persistence intention of mobile payment. Furthermore, in 2017 Gao and Waechter [20] used the quality dimensions in the IS success model to represent the particular welfares of using mobile payment systems. [21] study tested the key factors that could foresee the use of mobile banking in SA by integrating two models: the IS success model and UTAUT2. While the IS success model was extensively used to study user implementation of information systems, it has hardly ever been tested in mobile payment, particularly in Saudi Arabia. Accordingly, it is essential to apply IS success model to examine user implementation of mobile payment in SA.

IS post-adoption researches have noted that CI depends on past experiences and is determined by two main determinates: perceived usefulness and user satisfaction [22, 23]. However, IS post-adoption researches did not study the role of quality in CI. [24] claimed that SYSQ and INFQ are essential measurements to understand and analyze net benefits. Although the IS success model paid attention toward the role of quality dimensions in IS success, it concentrated on the intention to use or use and does not explain the motivation for continued use of the information systems. The present study is interested in investigating the importance of quality dimensions in persistence intention to use mobile payment. Accordingly, the research model is built on both IS post-adoption researches and IS success model to form a link between CI, quality dimensions, and satisfaction.

The 2030 Vision of SA developed a digital transformation unit as one of the fundamental programs to realize Vision 2030. The program aims to support investments in ideas and to take advantage of technological evolution to advance the quality of services offered to users (Vision 2030, 2018). Thus, SA is taking advantage of these modern technologies to replace traditional processes with digital processes to be more responsive and flexible also, to enable faster innovation such as e-payment systems to achieve higher satisfaction rates and quality of living for both citizens and residents (Vision 2030, 2018). In the financial sector, The Financial Sector Development Program contributes to the

digital economy and supports innovation to realize the Vision 2030 objectives of creating a cashless society. As a result, the program implements the integrated digital payment strategy to increase the percentage of cashless transactions from 18% in 2016 to 28% by 2020 until it reaches 70% by 2030 (Vision 2030, 2018). Lately, there are some initiatives to support Vision 2030, such as Fintech Saudi. This initiative was started in April 2018 by the Saudi Arabian Monetary Authority (SAMA). It refers to financial technology and aims to support the digital transformation program of Saudi Vision 2030. Currently, SAMA endorses digital payments by activating the digital wallet service via mobile phone and smart-phone to facilitate payment and purchase (Fintech Saudi, 2019).

Consequently, with the analysis of the previous studies and theories, the conceptual model of this research uses the updated IS success model as a theoretical model. As shown in Figure 1, the model proposes that SERQ (independent factor), SYSQ, and INFQ influence SAT (mediator factor), which therefore affects CI (dependent factor) towards mobile payment. Each construct and the proposed hypotheses are clarified in-depth in the succeeding subsections.

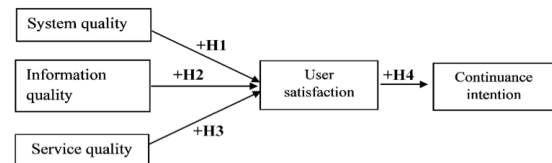


Figure 1. The impact of mobile payment quality on the users' continuance intention toward mobile payment .

[19] defined SYSQ as a quality that is showed in a system's performance and is estimated by "users" views. SYSQ reflects the ease of use, access speed, navigation, and appearance [6, 19]. In the lack of these features, the user might recognize that service "providers" absence of the ability to provide the service as they may face difficulties using the system [6]. As a result, poor SYSQ might affect "users" intention to use mobile payment. [23] found that high performance that users experience with the system will positively affect SAT and CI. Accordingly, higher SYSQ leads to SAT [6, 15, 21, 25]. The previous argument leads to the following hypothesis:

H1: SYSQ has a positive effect on user satisfaction toward mobile payment in SA.

Information quality encompasses the system characteristics relevance, timeliness, accuracy, and sufficiency of the provided information by a system [6, 12, 26–28]. Users expect that by using mobile payments, they will be able to pay bills and access their payment information at any time and place. Therefore, [29] found

that the INFQ as one of the vital factors that affect “users” approach towards technology. [25] noted that low INFQ might lead to dissatisfied users as they presume to have their expectations of being provided quality information through the use of mobile payment met. [30] and Sharma and [12] studies indicate that INFQ might be considered as one of the key factors that lead to satisfaction. However, INFQ has a low positive influence on SAT as the User already has received a high level of INFQ from a service provider, thus, no longer strongly impacts SAT [30]. Thus, this research hypothesizes as follow:

H2: INFQ has a positive effect on user satisfaction toward mobile payment in SA.

Service quality shows assurance, personalization, reliability, and responsiveness [6]. Baabdullah *et al.*, (2019) argued that user of a novel and a new technology needs a higher level of support to be satisfied. Consequently, SERQ is essential for the provider of the services to attract the customer. For example, if users encounter unreliable services or slow responses when using mobile payment systems, they may be annoyed and cannot then be satisfied [20]. Therefore, service providers should focus on providing a personalized and prompt service that may help the user to have enjoyable experiences and perform their transactions with the least possible time and effort [20]. As a result, SERQ leads to SAT and positively affects intention to use and persistence intention to use new technology [12, 21]. Thus, SERQ may impact SAT. From the previous arguments, this research hypothesizes:

H3: SERQ has a positive effect on user satisfaction toward mobile payment in SA.

According to Oliver (1980), satisfaction reflects cumulative feelings that arise from different interactions between users and the service provider. [23] argued that the intent to continue with the use of a specific system or service is determined by SAT with experiences when using a service or system. The updated version of the IS success model by [24] confirmed the study of [31]. It proposed that user satisfaction in the process sense is preceded by the use. In contrast, in the informal sense the user satisfaction is accomplished by positive experiences when using a service. Many researchers [6, 8, 15, 16, 18, 32–34] have discovered that satisfaction is a strong predictor of persistence behavior. On that premise, the following hypothesis was proposed:

H4: SAT has a positive effect on CI to use mobile payment in SA.

2 Method

This study followed the deductive approach and focused on a quantitative strategy to emphasize the

quantification measurement and determine the relationship between variables within the population. The data was collected through a self-administered questionnaire. To analyze these quantitative data, the study followed the quantitative analysis, and SPSS program (Version 22.0) was used to analyze data. In the current study, all users of mobile payment who live in SA have been chosen as the study's population. The research sampling strategy was a probability or representative sampling which was chosen randomly, which means the chance of every case selected from the community is well-known and has a like likelihood of inclusion in the sample (Saunders *et al.*, 2009). According to Krejcie and Morgan (1970), the sample size required for a population of $N \geq 100000$ is 384 participants at CI 95%, and the study has (389) participants. The primary instrument used in the current study is the questionnaire and used a closed-ended question method to collect data. After three weeks of data collection, a total of 531 responses were received. Every answer was examined, and the invalid responses with many missing values were disqualified. After this process, 389 out of 531 of the responses were valid and had used mobile payments.

3 Instrument Development

The study model consists of five factors SERQ, SYSQ, SAT, INFQ, and CI, and every factor was measured with several items. The items in the survey were adapted from previously validated studies. Items were measured by using a 5-point Likert scale from Strongly Agree to Strongly disagree. This category of the scale was chosen because previous research that studied the same factor of this study used a 5-point Likert scale to measure their question [6, 8, 12, 15, 35].

4 Instrument Reliability and Validity

Before distribution, a pilot study was carried out to pre-test the questionnaire to ensure its validity and reliability and to confirm the appropriateness of the measurement scales. It was examined among 17 users that used mobile payment. Based on their notes, some items in the questionnaire have been adjusted to be more transparent and more understandable. Table 1 below shows Cronbach's Alpha α reliability test for the pilot study and modified questionnaire. According to George & Mallery (2000), the value of α ranges from 0 to 1, and the higher value is preferable. For this study, the values of α range from questionable to excellent reliabilities for five scales. Given the reliability scores, the scales used for this study were considered reliable.

5 Results

As shown in Table 2, 71% of the users were females, and the majority of user's possessed bachelor's degrees

Table 1. Cronbach’s Alpha (α) reliability test for the study

Instruments	NO. of Items	Cronbach Alpha Value for N=17	Internal consistency	Cronbach Alpha Value for N=389	Internal consistency
SERQ	3	0.613	Questionable	0.731	Acceptable
INFQ	4	0.754	Acceptable	0.842	Good
SERQ	4	0.842	Good	0.800	Acceptable
SAT	4	0.914	Excellent	0.902	Excellent
CI	2	0.538	Poor	0.672	Questionable

($n = 249, 64\%$). Table 2 also showed that the participant’s age and their mobile payment were used per month. Most of the users aged between (25) and (34) years and 50% had been used mobile payment about (1-3) times per month. The leading mobile payment methods used were mobile banking applications and digital wallets.

Table 2. User’s general information (values were reported as frequencies and percentages)

Variables	N=389	%
Gender		
Female	275	71
Male	114	29
Age		
Less than 18	3	.8
18 24	153	39.3
25 34	170	43.7
35 44	56	14.4
45 or above	7	1.8
Education level		
High school or less	36	9.3
Diploma	16	4.1
Bachelor’s degree	249	64.0
Postgraduate degree	88	22.6
Mobile payment use		
1-3	196	50.4
Frequency/month		
4-10	91	23.4
11-20	44	11.3
21 or more	58	14.9

6 Hypotheses Test

In order to investigate the relationship between the main variables of the study, a Person correlation has been used. See Table 3 and Figure 2, as it shows the significance level and correlations coefficients to accept or reject the overall hypothesized model. We note that in Table 3, values are analysed using Pearson correlational and abbreviations are, SS for statistically significant ($*p \leq 0.05$), HS for highly significant ($**p \leq 0.01$), SERQ for service quality, SYSQ for system quality, INFQ for information quality, SAT for user satisfaction, CI for continuance intention, and PAYQ for payment quality. The association between

Table 3. Correlation matrix of relationship between the primary variable

Main variables	SYSQ	INFQ	SERQ	PAYQ	SAT	CI
SYSQ	Pearson Correlation	1	.448**	.549**	.785**	.552**
	P value		.000	.000	.000	.000
INFQ	Pearson Correlation	.448**	1	.616**	.843**	.463**
	P value	.000		.000	.000	.000
SERQ	Pearson Correlation	.549**	.616**	1	.866**	.586**
	P value	.000	.000		.000	.000
PAYQ	Pearson Correlation	.785**	.843**	.866**	1	.638**
	P value	.000	.000	.000		.000
SAT	Pearson Correlation	.552**	.463**	.586**	.638**	1
	P value	.000	.000	.000	.000	
CI	Pearson Correlation	.449**	.359**	.430**	.493**	.658**
	P value	.000	.000	.000	.000	.000

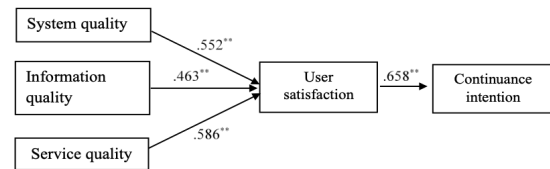


Figure 2. The impact of mobile payment quality on the users’ CI toward mobile payment.

SYSQ and SAT was detected by using Pearson correlational analyses, as depicted in Table 3. Results displayed a highly significant association since ($p\ value = 0.00$), and that relationship was positively moderate correlation since ($r = 0.552$). So that, mobile payment SYSQ influence on SAT toward mobile payment positively, and the first hypothesis was accepted. Also, Results indicated a highly significant association between INFQ and SAT since ($p\ value = 0.00 < 0.01$), and that relationship was positively low correlation since ($r = 0.463$). So that, INFQ influence on SAT toward mobile payment positively, and the second hypothesis was accepted. Moreover, results showed a highly significant association between SERQ and SAT since ($p\ value = 0.00 < 0.01$), and that relationship was positively moderate correlation since ($r = 0.586$). So that, mobile payment service quality influence on SAT toward mobile payment positively, and the third hypothesis was accepted. Finally, the association between SAT toward mobile payment and CI was highly significant since ($p\ value = 0.00 < 0.01$), and that relationship was positively moderate correlation since ($r = 0.658$). So that, SAT toward mobile payment influence persistence intention to use mobile payment positively, and the fourth hypothesis was accepted.

7 Test for Mediating Effect

The three-step method suggested by Baron and Kenny (1986) was used to test the mediating effects. As shown in Table 4, the mediating had a partial impact on CI with the impact of SAYQ. But mediating had a full impact on CI toward mobile payment with the impact of SERQ and INFQ.

Table 4. The mediating effect

IV	Coefficient in regressions			IV+M → DV		Correlation Mediating	
	M	DV	IV → DV	IV → M	M		
SYSQ	Satisfaction	CI	.375**	.338**	.160**	.708**	Partial
INFQ	Satisfaction	CI	.114	.102**	.078	.751**	Full
SERQ	Satisfaction	CI	.259**	.359**	.083	.743**	Full
SAT	→	CI	.790**				Full

8 Discussion

The main aim of the current research is to study the role of quality in CI to use mobile payment. According to the findings of the present study, the results showed that SERQ and SYSQ have a moderately positive effect on SAT, while INFQ has a low positive impact on SAT. System quality was discussed by [20] as a vital dimension of quality that formed the 'users' first impressions when adopting a new system. The current study has confirmed this argument's study's results. SYSQ shows the ease of use, access speed, navigation, and appearance [6, 19]. The discoveries of the present study point out that the higher level of SYSQ increases the level of SAT towards mobile payment in SA. Accordingly, Saudi users expect that by using mobile devices, they will be able to make the payment anywhere, at any time they choose, with a high level of access speed, ease of use, navigation, and appearance. The result of the current study demonstrates that there was a moderate positive significant link between mobile payment SERQ and SAT towards it. This is consistent with several previous researches which have demonstrated that SERQ has a significant influence on SAT towards mobile payment [12, 21]. Indeed, the main dimensions of SERQ (i.e., security/privacy, design/aesthetics, practicality, sociality, and enjoyment). As shown in the result, most 'study's participants used mobile banking apps (222 users) and digital wallets (212 users). These technologies are new in SA. Accordingly, the usage rate of mobile payment in SA is low, and about 50% of the mobile payment users in SA used mobile payment between 1 to 3 times per month. According to [21] argument, a user of new technologies needs a higher level of support. Therefore, in SA, a user needs more support and a higher level of SERQ to endorse mobile payment, which will, in turn, increase their SAT toward mobile payment. The current 'study's outcome is compatible with the findings of [12] and [30], which demonstrated that INFQ is one of the critical success factors that affect SAT toward

mobile payment in SA. However, the result of the current study supports the finding of [30] that INFQ has a low positive effect on the SAT towards mobile payment. This finding can be explained by [30] argument that if the service provider already provides a high level of INFQ, then the effect of INFQ on the SAT will be less. In this study, most users have used mobile banking apps and digital wallets to conduct payments, and most of the service providers of these technologies might provide a high INFQ; thus, this no longer strongly influences SAT. The results of the current research corroborate the findings of [6, 8, 15, 16, 18, 32–34, 36] that satisfaction has a major impact on CI to use mobile payment in SA. Lastly, CI is an essential factor in determining whether users intend to continue to use mobile payment. The findings of the present research are consistent with the findings of [15]; [6, 10] that INFQ, SERQ, and SYSQ, mediated by satisfaction, had indirect impacts on the CI. Accordingly, a service provider should consider the significance of the three dimensions of quality to retain their satisfied users and encourage their continued usage. Based on the research's results, the following recommendations are given. Service providers must enhance the quality of the mobile payment system through developing the system with a clear layout, robust navigation, and well-designed interface. Besides, they might improve the system infrastructure to be more reliable. Service providers need to improve ease of use to increase the usage of a mobile payment system, through using advertising and marketing power to highlight how to use the system and show that mobile payments are easy and fast which in turn helps familiarize the user with the mobile payment system. Service providers need to improve the quality of the mobile payment service, related to concerns about security and privacy issues as well as the quality of the mobile payment information through increasing the level of personal customization of information in mobile payment services to minimize the effort and the time spent searching for information. Service providers could focus on young people since they represent the majority of users that have a concern about using their mobile to conduct payments, and they have a will to use mobile payment in the future. This study makes several contributions. First, it provides new quantitative knowledge about the three dimensions of quality that affect the users' persistence intention to use mobile payment in SA. Second, this study tested the IS success model in a new context (i.e., SA). This is compatible with [6] suggestions about testing the IS success model in new contexts. Third, the integration between the IS success model and IS post-adoption research has enriched the power of forecasting regarding 'users' continued usage of mobile payment in SA. In addition, the findings of this study can be embedded by service providers

in SA to ensure the persistence intention to use mobile payment by users in SA. Service providers should take the roles of the three dimensions of quality into consideration when aiming to enhance the level of satisfaction toward using mobile payment, to ensure its continued usage. This research has several limitations that should be addressed in future studies. This research analyzed the impact of quality dimensions on CI by using a cross-sectional design as the data was collected from each respondent at one time only, and the study could not track the behavior of the respondent. The study did not consider the impact of the time factor, which is essential in this type of research that assesses user behavior, which is dynamic as it changes over time and due to changes in technological services. Therefore, future research should employ the longitudinal design to track the development of user behavior over time, which will be helpful to improve the reliability of the research results. This research was conducted in SA, which is considered as a culture dominated country. Previous studies confirmed that culture has a significant effect on 'customers' habit, behavior, and perception toward new systems [37–39]. Thus, cultural factors may also influence the persistence intention to use mobile payment in SA. Accordingly, future research should consider the impact of culture. The present study's data was collected from the second week of February 2020 to the first week of March 2020 before Coronavirus (COVID-19) spreading in SA in the second week of March 2020. The situation after the spreading of this virus in SA is changed especially after the ministry of health enforced the home quarantine. It is causing changes to the way of life and consumer shopping behavior as they are increasingly moving to depend on online shopping and contactless payment to avoid spreading of the virus as the ministry of health suggested. Accordingly, future researches should consider the impact of the pandemic on users and service providers of mobile payment in SA by conducting a comparison study that uses the current study's results to compare the status of the mobile payment before and after the pandemic.

9 Conclusion

The current study highlights the impact of the quality of mobile payment on user's CI on mobile payment in SA. Therefore, this study proposed an integrated model based on the IS success model and IS post-adoption researches. The findings have shown that SERQ and SYSQ are supported to have a moderately positive effect on SAT, whereas INFQ has a low positive impact on SAT. Moreover, the SAT was supported to be a strong determinate of CI to use mobile payment. Finally, the study found that the three dimensions of quality influence persistence intention to use mobile payment through the SAT.

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