Journal of Trade Science

ISSN 1859-3666
E-ISSN 2815-5726

Volume 10 Number 4 December 2022

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Journal of Trade Science 10:4 (2022) 92 - 104
ISSN 1859-3666
E-ISSN 2815-5726

A MODIFIED ISS MODEL PERSPECTIVE: DETERMINANTS IMPACTING INDIVIDUAL CUSTOMER SATISFACTION WITH MOBILE BANKING SERVICE IN HO CHI MINH CITY, VIETNAM

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Received: *24th September 2022* ***Revised***: *15th December 2021* ***Accepted***: *23th December 2021*

This paper aims to identify determinants affecting individual customer satisfaction with the Mobile Banking service in Ho Chi Minh City. Our model was based on the Information System Success Model (ISS) of Delone and Mclean (2003) with the official sample size being 415. By applying the exploratory factor analysis EFA, confirmatory factor analysis CFA, structural equation modeling SEM, the authors have discovered that factors positively impacting customer satisfaction are organized from high to low following: system quality, information quality, trust, service quality. Moreover, the results also showed that trust was positively influenced by 3 factors of system quality, information quality, and service quality. From the above research results, the authors also showed some recommendations to help commercial banks increase customer satisfaction in Mobile Banking services.

Keywords: *Mobile Banking, individual customer, satisfaction*

JEL Classifications: *M10*

DOI: *10.54404/JTS.2022.10.04.08*

1.Introduction

Nowadays, the Internet and smartphone have become embedded in every aspect of our day-to-day lives with more than 4.66 billion people using the Internet and 96.6% of Internet users aged 16 to 64 who owed smartphones at the beginning of 2021 (We Are Social and Hootsuite, 2021). In particular, in Vietnam, about 68.72 million people were using the Internet, and 96.9% of Internet users aged 16 to 64 owed smartphones (We Are Social and Hootsuite, 2021). In the context of the current outbreak and spread of the Covid-19 pandemic, the World Health Organization warns that the risk of infection from cash is very large and advises people to turn to digital payment. According to financial experts in the workshop "Towards a cashless country" being celebrated in HCM City on November 19th, because of the current complicated epidemic, it is time for Vietnamese to increase the use of digital payment instead of the habit of using cash (A. Hong et. Al, 2021). In Vietnam, one of the popular digital payments is Mobile Banking. Mobile Banking is also an electronic banking service, allowing customers to use mobile phones to make transactions with the bank. This is a form of online payment via mobile phone (customers do not need to go to the bank but can still access all services 24/7 and everywhere). (Vu Hong Thanh & Vu Duy Linh,

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2016). The Payment Department of the State Bank of Vietnam shows that as of the end of April 2021, the number of organizations providing payments via mobile phones is 44; transactions via smartphone increased by 86.3% in quantity and 123.1% in value respectively over the same period in 2020 (Bang Tam, 2021). Therefore, with the development trend of the Mobile Banking service, commercial banks currently focus on how to satisfy their Mobile Banking customers to continue to develop and increase the market share of this service in the future, as result they affirm that currently increasing customer satisfaction is an urgent requirement of Mobile Banking service.

In recent years, some researchers have been aware of customer satisfaction with Mobile Banking services. They have conducted a survey of customers using Mobile Banking services based on the theoretical model SERVQUAL to identify factors affecting customer satisfaction with the quality of Mobile Banking services, including factors such as tangibles, reliability, responsiveness, assurance, and empathy (Amiri Aghdaie & Faghani, 2012); convenience, job suitability, reliability (Do Thanh Tung, 2015). Moreover, some authors bases on the Information System Success (ISS) Model of DeLone and McLean (2003) and indicated that some factors impact customer satisfaction, including system quality, information quality, interface design quality, and trust (Lee & Chung, 2009); trust and user interface design (Damabi et al., 2018), system quality and perceived usefulness.

However, in the Information System Success (ISS) Model, DeLone and McLean (2003) indicated that services based on the foundation of the information technology system needed 3 key factors to increase customer satisfaction: system quality, service quality, and information quality. Besides, customer satisfaction is also influenced by trust (Lee and Chung, 2009; Damabi et al., 2018). The impact of these three new factors (system quality, information quality, and trust) for Mobile Banking has not been analyzed by researchers in Vietnam. Therefore, our paper is an effort to fill the gap and is very necessary and meaningful.

In this paper, we firstly proposed a new theoretical model about factors affecting individual customer satisfaction with the Mobile Banking service for commercial banks. Secondly, basing the collected data, we analyzed the exploratory factor analysis EFA, confirmatory factor analysis CFA, structural equation modeling SEM to test hypotheses and evaluate determinants impacting individual customer satisfaction with Mobile Banking services. Finally, we some recommendations to help commercial banks increase individual customer satisfaction in the Mobile Banking service to develop and exploit their potential market for this service.

2. Literature review

2.1. The Information System Success (ISS) model of DeLone and McLean (2003)

In 1992, DeLone and McLean proposed the ISS model for six information success factors: information quality, system quality, use, user satisfaction, individual impact, and organizational impact. After that, they updated their ISS model in 2003 by adding service quality factor and net benefit which is replaced for individual and organizational impact (figure 1). This new ISS model measures multidimensional and multivariate: information system, system quality, and service quality affecting customer satisfaction and intention to use/use, and there is a correlation between intention to use/use and satisfaction. Information quality refers to the output's information system characteristics such as timeliness, completeness, relevance, currency, and accuracy. System quality concerns the reliable, convenient, easy to use, functional information system's performance and other metrics of the system. Service quality refers to the customer training, system maintenance, and troubleshooting that the information system provider will perform during its service provision. Service quality has an impact on customer satisfaction as well as on their intention to use the service. As a result of the intention to use/use and customer satisfaction refers to the net benefit. The net benefit is the most important success measure because of the balance capture of positive and negative impacts on customers and the organization. If the services based on an information system are to be continued, the net benefit from the owner's perspective, and then this leads to the use and customer satisfaction.

ISSN 1859-3666
E-ISSN 2815-5726

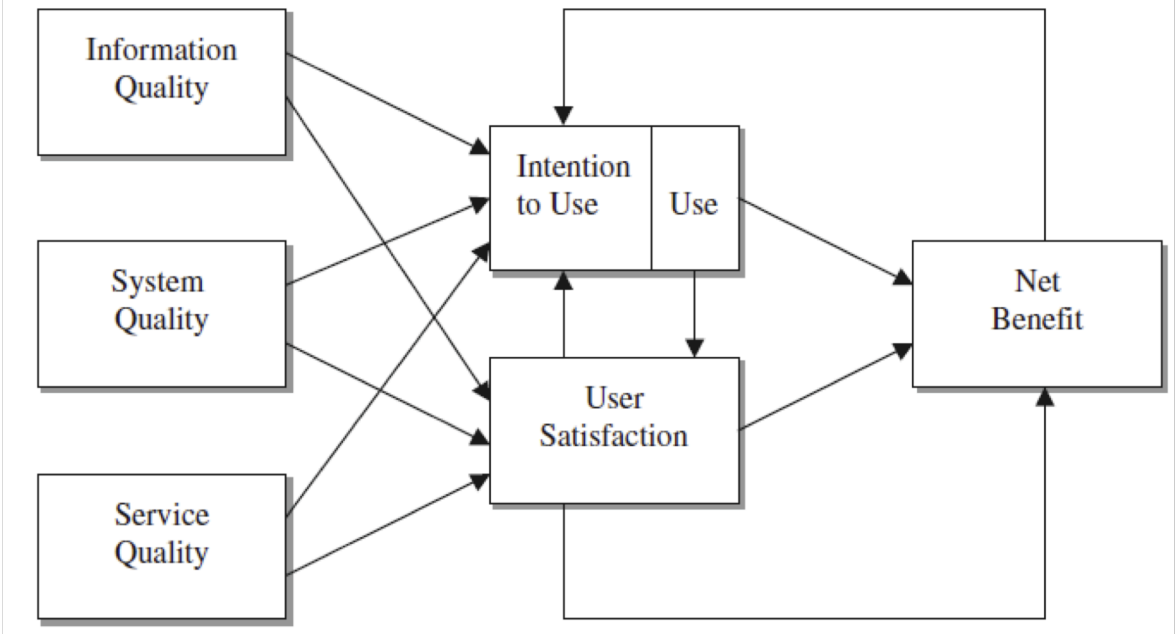

Figure 1: *The ISS model of DeLone and McLean (2003)*

2.2. The Applicability of the ISS model for Mobile Banking

Our study was based on the ISS model of DeLone and McLean (2003) and integrated customer trust in our model. Following was an explanation of why the ISS model was introduced and why customer trust was a key factor in Mobile Banking. Mobile Banking is also an electronic banking service, allowing customers to use mobile phones to make transactions with the bank (Vu Hong Thanh & Vu Duy Linh, 2016) and it requires internet access. Thus, Mobile Banking services are based on the foundation of the information technology system and can be applied to the ISS model.

According to the ISS model (DeLone and McLean, 2003), customer satisfaction was a common measure of the ISS model and it was impacted by system quality, information quality, and service quality. System quality is based on the productivity model, which evaluates the extent of information system resource and investment utilization (Lee and Chung, 2009). It is measured by reliability, convenience, ease of use, etc (DeLone and McLean, 2003). Information quality concerns information output quality of the system, and not only what is presented, but also how the information is organized on the limited interface is important in a mobile environment (Lee and Chung, 2009). Because of not involving face-to-face contact, customers need customer support services from commercial banks when they use Mobile Banking services. Therefore, system quality, information quality, and service quality are important factors in the Internet and mobile environments, particularly Mobile Banking services.

The key success in e-banking depends on customer trust through transaction processes, and the commercial banks establish trust for the customer by creating an environment in which a prospective consumer can be relaxed and confident about any prospective transaction (Koo et al., 2013) because, in e-banking environments like Mobile Banking services, customers interact with the banks' system instead of banks' agents. Lee and Chung (2009) found that system quality, trust, interface design quality, and information quality accounted for 56.5% of the variance in customer satisfaction with Mobile banking services in Korea. They also indicated that information quality, system quality, and interface design quality accounted for 40.9% of the variance in customer trust. Furthermore, Widiatmika and Subawa (2017) proven that the effect of service quality on customer trust in Mobile

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Banking services in Bank BPD Bali was positive and significant. Therefore, we decided to integrate customer trust in our model as a factor affecting customer satisfaction and also considered the effects of system quality, information quality, and service quality on customer trust with Mobile Banking services in HCM city.

2.3. The research model and Hypotheses

The ISS model of DeLone and McLean in 2003 focused on information systems' impact at 2 levels: organization and individual. We built our model on the individual levels including information quality, system quality, service quality, and their subsequent impact on trust and customer satisfaction (figure 2).

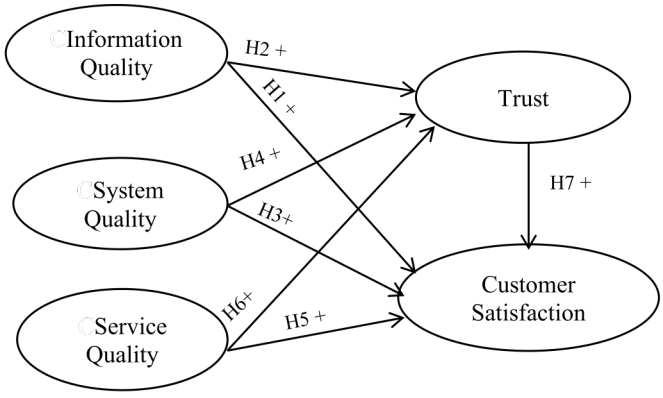

Figure 2: *The proposed research model*

- Information quality: Delone and Mclean (2003) showed that information quality is an important factor that positively affects customer satisfaction. Lee and Chung (2009) demonstrated that information quality positively affects customer satisfaction and trust in Mobile Banking services. Similarly, Damani et al. (2018) also proved that information quality significantly and positively affected customer trust in the Mobile Banking service. Therefore, we hypothesize:

H1: Information quality has a positive relationship with customer satisfaction.

H2: Information quality has a positive relationship with trust.

- System quality: Delone and Mclean (1992, 2003) indicated that system quality is an important factor that strongly influences customer satisfaction. It is measured by four main factors: ease of use (Iivari, 2005; Gable et al., 2008), transaction speed (Iivari, 2005; Liao and Cheung, 2002), security (Madu and Madu, 2002; Hsu, 2008), and interface design (Liu et al., 2008; Zviran et al., 2006). Moreover, Lee and Chung (2009) showed that system quality positively impacts customer satisfaction and trust in Mobile Banking services. Similarly, the positive and significant effect of system quality on trust in the Mobile Banking service was proved by Damabi et al. (2018) and the positive influence of system quality on customer satisfaction with the Mobile Banking service was indicated by Koo et al. (2013). Thus, the hypothesis is as follow:

H3: System quality has a positive relationship with customer satisfaction.

H4: System quality has a positive relationship with trust.

- Service quality: service quality is related to the quality of customer support services and is a key factor that positively affects customer satisfaction (Delone and Mclean, 2003). Besides, Widiatmika and Subawa (2017) demonstrated that service quality positively affects the trust and satisfaction of customers in Mobile Banking services. Hence, we hypothesize:

H5: Service quality has a positive relationship with customer satisfaction.

H6: Service quality has a positive relationship with trust.

- Trust: Yousafzai et al (2003) indicated that trust is seen as a catalyst in many transactions between

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E-ISSN 2815-5726

sellers and buyers so that increased customer satisfaction can be achieved as expected. It arises when customers trust the integrity and reliability of suppliers (Morgan and Hunt,1994). In this paper, the concept of trust is the trust of customers in the organization that provides Mobile Banking services, as well as the trust of customers in the mechanism of organizing transactions. Moreover, Lee and Chung (2009) and Damabi et al. (2018) stated that trust is a factor that positively affects customer satisfaction with the Mobile Banking service. Thus, the hypothesis is as follow:

H7: Trust has a positive relationship with customer satisfaction.

3. Research methodology

Our study combines qualitative research and quantitative research. For qualitative research, we firstly built and strengthen a theoretical research model by referring to the same field researches previously published as well as direct discussions with two experts in the field of Mobile Banking services, three academics, and one statistician to adjust the key factors and measurement scales suitable with commercial banks' Mobile Banking services in HCM city. For quantitative research, we identify and measure factors affecting individual customer satisfaction with Mobile Banking (MB) services. All scales in this study are multivariate scales. We use a 5-point Likert: 1 being completely disagreed, up to 5 completely agreed. The scale in the study is presented in detail in Table 1 below.

Our research data is surveyed through detailed questionnaires in a convenient method, with the survey subjects being customers who have used Mobile Banking and are currently living and working in Ho Chi Minh City. The data was collected by the online survey via social networks. To ensure the survey subjects, the first requirement for respondents was they have used Mobile Banking services. The size of the sample applied in the study is based on the requirements of exploratory factor analysis (EFA) and structural equation model (SEM). Hair et al (1998) indicated that the sample size applied for EFA analysis must be at least 5 times the number of observed variables. With our model having 28 observed variables, the minimum sample size is 140 samples. On the other hand, the sample size needs to be considered to the number of parameters to be estimated, and if ML (Maximum Likelihood) estimation method is used, the minimum sample size should be between 100 and 150 and so that the indicators such as TLI, CFI are relatively stable and consistent based on the ML estimation method at sample size 250 or larger (Hair et al., 2010). Therefore, the sample size applied to this study is 430 to prevent invalid sample collection. After surveying, we had approximately 97.67% of the collected data. Of those returned, approximately 1.19% were incomplete. Thus, the analysis is based on the 415 usable surveys and represents a response rate of 96.51% of the distributed survey. All data were coded and analyzed data using SPSS 25.0 and AMOS 20.0 software.

4. Results and discussion

4.1. Sample Description

Table 2 shows our official sample description (415 responses). The female amounted for 213 out of 415 participants or 51.33% of the total answers and 202 male participants accounted for 48.67% of the total answers. The majority of participants used Mobile Banking service under 2 times per week (38.8%) and from 2 to 3 times per week (36.63%). The majority of the respondents graduated from university (79.04%) and the minority of the respondents did from high school (0.24%). Most of them had experience in using the Mobile Banking service for 4 to 6 years (61.20%).

4.2. Cronbach's Alpha test for reliability of the scale and exploratory factors analysis (EFA)

Table 3 showed that MB's scales met reliability requirements with the value of Cronbach's Alpha from 0.837 to 0.887 (>0.6) and Corrected item-total Correlation greater than 0.5 (at least 0.560). After eliminating INQ5 and SYQ6, 26 observed variables consistently measured specific, statistically, and analytically significant.

Table 4 showed the results of the second test for EFA. All 25 items loaded on five factors with Eigenvalues greater than 1; the cumulative percent of 57.643% and KMO values = 0.931>0.5 (SYQ2 was eliminated). Bartlett's test is significant at p = 0.000<0.05 for the variables measuring five factors, including information quality, system quality, service quality, customer satisfaction, and trust.

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Table 1: *Summary of research scale*

Variables	Items	Measurement	Sources
Information Quality (INQ)	INQ1	MB provides me with all the useful information	Delone and Mclean (2003), Lee and Chung (2009), Koo et al. (2013), and Damani et al. (2018)
	INQ2	MB provides me with all the complete information that I need	
	INQ3	MB provides me information concerning transactions	
	INQ4	MB provides all the current information	
	INQ5	MB quickly provides me the information	
	INQ6	MB provides all the information being well format and clear	
	INQ7	MB provides me with all the exact information	
System Quality (SYQ)	SYQ1	The app of MB is easy to use	Delone and Mclean (2003), Lee and Chung (2009), and Koo et al. (2013)
	SYQ2	The procedure of registration of MB is simple	
	SYQ3	MB has a reliable security system	
	SYQ4	The speed of transaction processing is quick	
	SYQ5	The speed to connect to App is quickly	
	SYQ6	The interface of MB is designed to ease to use	
	SYQ7	The interface of MB is designed well	
Service Quality (SEQ)	SEQ1	MB's staff is available to assist the customer	Delone and Mclean (2003) and Widiatmika and Subawa (2017)
	SEQ2	MB's staff is dedicated to assisting and helping the customer	
	SEQ3	MB provides services safety	
	SEQ4	Customers' questions or complaints are always resolved satisfactorily	
	SEQ5	MB's service fees are always stable and competitive	
Trust (TRUST)	TRUST1	I feel that MB always care about the benefit of the customer	Lee and Chung (2009), Koo et al. (2013)
	TRUST2	I feel that MB provides me with good service	
	TRUST3	I feel confident in providing personal information during the transaction process	
	TRUST4	Overall, I trust MB	
Customer satisfaction (SAT)	SAT1	I'm satisfied with the MB transaction processing	Delone and Mclean (2003), Lee and Chung (2009), Koo et al. (2013)
	SAT2	I'm satisfied with the MB's services	
	SAT3	I think I made the right decision to use MB	
	SAT4	MB provides all services that I expected	
	SAT5	Overall, I satisfy MB	

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Table 2: *Sample description*

Items		Frequency	Percentage
Gender	Female	213	51.33
	Male	202	48.67
Usage time (per week)	Under 2	161	38.80
	2-3	152	36.63
	Over 3	102	24.57
Education level	High School	1	0.24
	Intermediate	11	2.65
	College	25	6.02
	University	328	79.04
	Over university	50	12.05
Time for using (year)	Under 1	28	6.75
	1-3	63	15.18
	4-6	254	61.20
	Over 6	78	16.87

Source: The researcher's data analysis

Table 3: *The result of the scale reliability test*

Variables	Number of observed variables	Number of observed variables after test	Minimum Corrected item-total Correlation	Cronbach's Alpha
Information Quality (INQ)	7	6	0.669	0.887
System Quality (SYQ)	7	6	0.560	0.855
Service Quality (SEQ)	5	5	0.586	0.837
Trust (TRUST)	4	4	0.692	0.865
Customer satisfaction (SAT)	5	5	0.595	0.875

Source: The researcher's data analysis

The observed variables of factors were strongly correlated.

4.3. Confirmatory Factor Analysis (CFA)

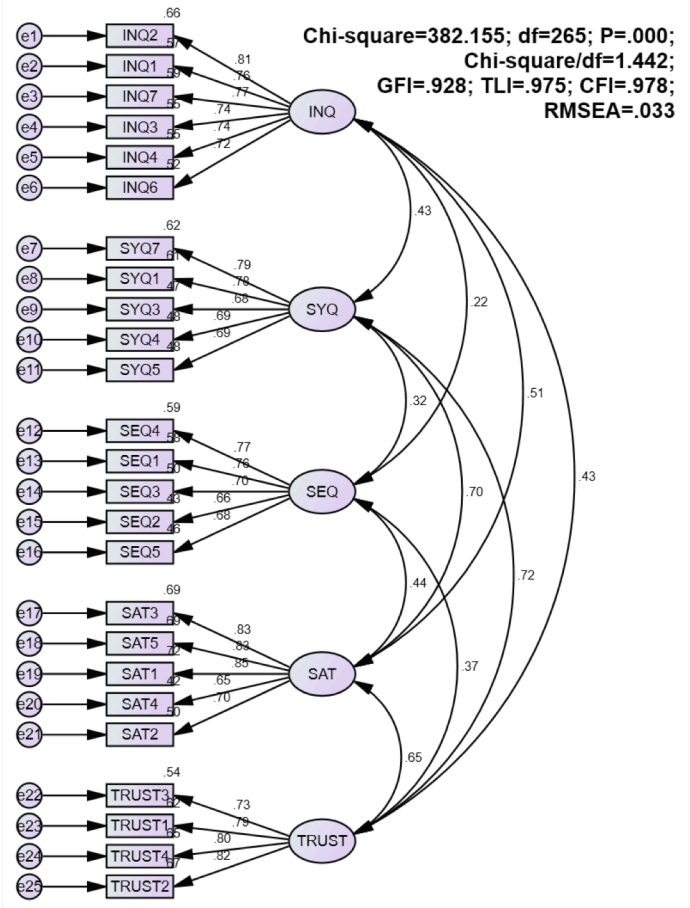
From the result of CFA in figure 3, the model fit was acceptable with the data collected (Chi-square=382.155; df=265; p=0.000 <0.05; chi-square/df=1.442<2; GFI= 0.928>0.9; TLI=0.975>0.9; CFI=0.978>0.9; RMSEA=0.033 < 0.08). All the standardized regression weights were over 0.5 (p - value = 0,000), so all observed variables were convergent validity.

Besides, all the composite reliability (CR) scores were well (over 0.840) and the average variance extracted (AVE) values were over 51.4%. Therefore, all the scales were high reliability and convergent (Hair et al., 2010). Moreover, discriminant validity was satisfied because all square roots of the AVE for each factor were greater than the inter-construct cor-

Table 4: *The results of exploratory factors analysis (EFA)*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.931
Bartlett's Test of Sphericity	Approx. Chi-Square	5458.095
	Df	300
	Sig.	0.000
Extraction Sums of Squared Loadings	Cumulative %	57.643

Source: The researcher's data analysis



Source: The researcher's data analysis

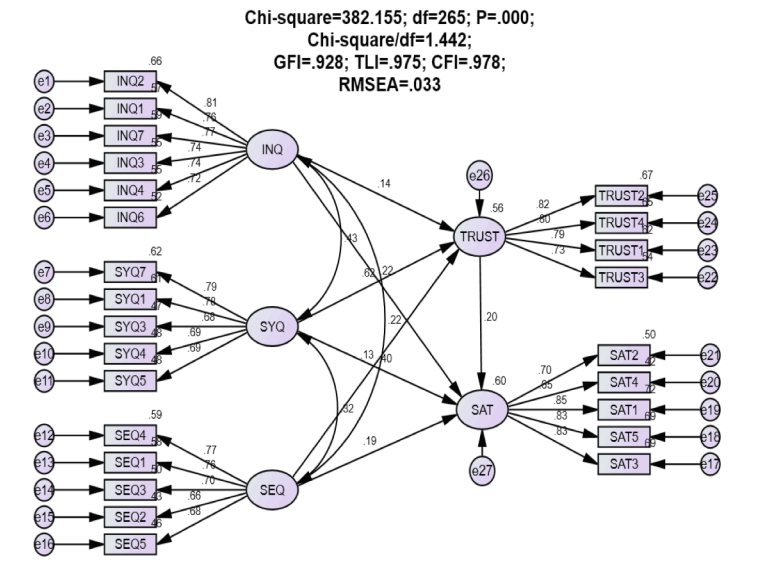
Figure 3: *The results of the confirmatory factor analysis (CFA)*

relations and all maximum shared variance MSV were smaller than AVE(Hair et al., 2010).

4.4. The Structural Equation Model (SEM) and hypothesis test of model

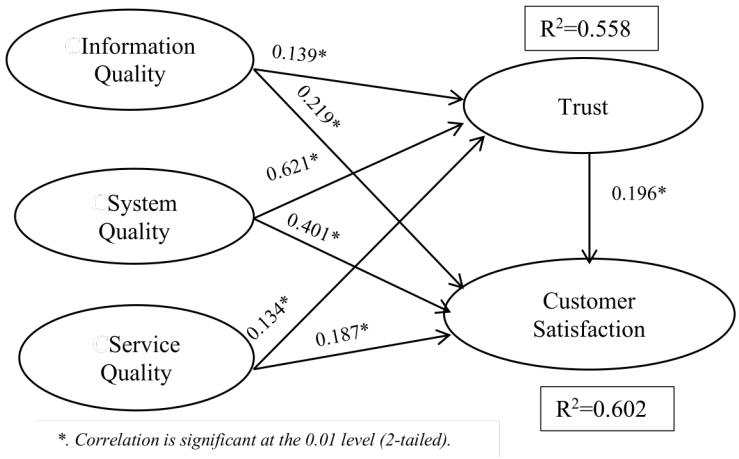
Figure 4 showed the SEM was a good fit for Mobile Banking service with Chi-square =382.155; df=265; p=0.000<0.01; Chi-square/df=1.442<2; GFI= 0.928>0.9; TLI=0.975>0.9, CFI=0.978>0.9 and RMSEA=0.033<0.08. Therefore, we can conclude that the research model was completely consistent with the collected data and statistical significance at a 99% confidence level (p < 0.01).

ISSN 1859-3666
E-ISSN 2815-5726



Source: The researcher's data analysis

Figure 4: *The results of the structural equation model (SEM) analysis*



Source: The researcher's data analysis

Figure 5: *The SEM's results about standardized regression weights and the squared multiple correlations*

R^2 in figure 5 indicated that information quality, system quality, and service quality accounted for 55.8% of the variance of trust. Moreover, information quality, system quality, service quality, and trust accounted for 60.2% of the variance of customer satisfaction. Because all R^2 was over 50%, these results provided strong support for the posited relationships between information system, system quality, services quality, trust, and customer satisfaction with the Mobile Banking services in HCM city.

Based on the results of the SEM analysis, the result of hypothesis testing was shown in table 5.

Table 5 showed that all hypotheses (H1, H2, H3, H4, H5, H6, H7) are accepted. These results also suggest that if commerce bankings increase system quality, information quality, and service quality, the customer wou

ISSN 1859-3666
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Table 5: *Results of the hypothesis test*

		P	Standardized Regression Weights	Result
H1 +	INQ --> SAT	0.000	0.219	Accepted
H2 +	INQ --> TRUST	0.005	0.139	Accepted
H3 +	SYQ --> SAT	0.000	0.401	Accepted
H4 +	SYQ --> TRUST	0.000	0.621	Accepted
H5 +	SEQ --> SAT	0.000	0.187	Accepted
H6 +	SEQ --> TRUST	0.005	0.134	Accepted
H7+	TRUST --> SAT	0.004	0.196	Accepted

Source: The researcher's data analysis

ld increase their satisfaction and trust in Mobile Banking service. Moreover, more trust in the Mobile Banking service leads to more satisfaction with this service.

The hypothesis H1, H3, H7 was supported, so the effects of information quality, system quality, and customer trust on customer satisfaction were significant and positive, similar to previous research of Lee and Chung (2009). We proved that the relationship between information quality and customer satisfaction with Mobile Banking services, while Koo et al. (2013) didn't find that. Furthermore, hypotheses H2 and H4 indicated that information quality and system quality significantly and positively impacted customer trust in Mobile Banking services, in line with the results of Lee and Chung (2009) and Damani et al. (2018). Finally, hypotheses H5 and H6 were accepted. This reinforced the previous results of Widiatmika and Subawa (2017).

5. Conclusions and recommendations

By extending the Information System Success Model (ISS) of Delone and Mclean (2003), our paper proposed a model for Mobile Banking services to identify determinants affecting individual customer satisfaction in HCM city. We surveyed 415 individual customers and used SPSS 25 and AMOS 20 software for analyzing our collected data. The results affirmed that this model was suitable for Mobile Banking service, completely consistent with the collected data, and was statistically significant at a 99% confidence level ($p<0.01$). All hypotheses were accepted, as a result, factors impacting positively customer satisfaction are organized from high to low: system quality, information quality, trust, service quality. Besides, trust was positively influenced by 3 factors of system quality, information quality, and service quality. Therefore, system quality was a key variable in customer satisfaction and trust for the environment of Mobile Banking. Furthermore, the quality of Mobile Banking (system quality, information quality, and service quality) and the levels of customer trust in this service impact the level of satisfaction when customers use Mobile Banking service. In the theoretical contribution, our proposed model used in this paper was highlights findings and can be applied further as the reference or literature in regards to customer satisfaction with e-banking in Vietnam as well as other countries.

Based on empirical results, we propose some recommendations for commercial banks to increase individual customer satisfaction with their Mobile Banking services in the future:

Firstly, commercial banks need to improve the quality system towards increasing the level of quality of their systems because system quality was the most important factor affecting customer satisfaction and trust in our model for Mobile Banking service. They need to focus on improving the design of the Mobile Banking application such as easy to use, good interface design, and logical technical aspects in applications so that any customer can also use it without any barrier. They also improve the configuration of the server of their system to increase the transaction access speed of the service to avoid cus-

ISSN 1859-3666
E-ISSN 2815-5726

tomers being wasted waiting time. Moreover, commercial banks need to ensure customers' safety in financial transactions by overcoming weaknesses in their systems to avoid hackers' attacks.

Secondly, commercial banks need to increase the information quality of the Mobile Banking application by establishing a professional team to control and manage the information displayed. By providing useful, exact, clear, and current information, customers would increase their satisfaction with the Mobile Banking service and may continue to use this service.

Thirdly, commercial banks need to enhance the service quality, setting standards for customer support services towards maximizing their overall support for Mobile Banking customers at any time, at any point, and under any situation, especially focusing on quickly answering customers' questions and complaints, and solving them satisfactorily worth. Moreover, they need to remain or decrease Mobile Banking services' fees to attract customers' use.

Finally, commercial banks need to enhance customers' trust. Because of the positive relationship between trust and the 3 above factors (system quality, information quality, and service quality), if the commercial banks increase both these factors, customers' trust in Mobile Banking services will also increase.

However, this study has some limitations. First of all, the survey sample has been limited to 415 observations conducted in HCM City, so further research can broaden this study to cover some other provinces and cities of Vietnam or the whole country. Moreover, this study only researched some factors affecting customer satisfaction with Mobile Banking services. Finally, this study has emphasized key factors influencing the success of Mobile Banking from the perspective of the individual customer.◆

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Summary

Mục tiêu của bài báo này nhằm xác định các yếu tố ảnh hưởng đến sự hài lòng của khách hàng cá nhân đối với dịch vụ Mobile Banking tại Thành phố Hồ Chí Minh. Mô hình nghiên cứu của chúng tôi dựa trên Mô hình Thành công Hệ thống Thông tin (ISS) của Delone và Mclean (2003) với cỡ mẫu chính thức là 415. Bằng cách áp dụng phân tích nhân tố khám phá EFA, phân tích nhân tố khẳng định CFA, mô hình tuyến tính cấu trúc SEM, các tác giả đã khám phá ra rằng chất lượng hệ thống, chất lượng thông tin, sự tin tưởng và chất lượng dịch vụ tác động cùng chiều đến sự hài lòng của khách hàng về dịch vụ Mobile Banking. Ngoài ra, kết quả cũng cho thấy sự tin tưởng cũng chịu ảnh hưởng cùng chiều bởi chất lượng hệ thống, chất lượng thông tin và chất lượng dịch vụ. Từ kết quả nghiên cứu trên, nhóm tác giả cũng đưa ra một số khuyến nghị nhằm giúp các ngân hàng thương mại gia tăng mức độ hài lòng của khách hàng đối với dịch vụ Mobile Banking.

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ACKNOWLEDGMENT

Our paper was conducted with the financial support received from the research project (CS-CB21-KT-11) of Nong Lam University.