A study on factors affecting service quality and loyalty intention in mobile banking

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ABSTRACT

Mobile banking (MB) is one of the most recent innovations for financial sectors which could have practical value to both users and banks. This study aims to explore the dimensions affecting mobile banking loyalty intention and examine their interrelationships and effects on service quality and loyalty. By referring to service quality model, customised factors affecting mobile banking service quality and loyalty intention were proposed. Survey data were collected from 224 mobile banking users and were analysed based on structural equation modelling (SEM). The results of SEM analysis directly or indirectly highlight the importance of the interface design, system quality, security assurance and service quality in mobile banking loyalty intention. Meanwhile, the implications of the findings on both theoretical and managerial are discussed, as well as the limitation of this study.

1. Introduction

User experience evaluation has been widely applied to explain users' behaviour on a product or service in existing scientific literature (Sharma, 2019; Martínez-Torres et al., 2015; Liébana-Cabanillas et al., 2014). The relationships between consumer satisfaction, service quality (SQ) and loyalty intention have been studied by many researchers (Zhou et al., 2007; Pappas et al., 2014; Liébana-Cabanillas et al., 2016; Hamidi and Safareeyeh, 2019). Loyalty intention and customer satisfaction is important in the assessment of the experience with regard to shopping, product or service usage, which will affect consumer's long-term behaviour (Grönroos, 1991). In order to evaluate users' satisfaction and loyalty intention, the study carried out by Liébana-Cabanillas et al. (2016) showed that a strong interest in fulfilling users' need determined their subsequent purchase behaviour.

Financial sectors have also paid growing attention to customer loyalty evaluation to increase their competitiveness. Since financial companies provide similar banking products and services, in order to increase the retention rate, different attempts have been made to find out user preference among different services (Bhattacherjee, 2001;

Ciciretti et al., 2009; Lee and Chung, 2009). Mobile banking has become one of the most promising innovations recently, which could be proved to have practical values to both banks and users (Baabdullah et al., 2019). The cashless transactions through mobile phones can improve the efficiency of banks and users' quality of life. More and more people make mobile banking as a part of daily life, they can use it for payment and transaction, inquiring the account, investment, linking with credit cards, and so on. Especially in China, mobile payment has become the most popular method of payment from high-end fashion outlet to the local newsstand, by using a QR code for customers to scan and make the payment. However, the user experience of mobile banking is far from fully understood. In order to attract and retain users and increase their use of financial and banking services, financial research institutes have made large efforts on mobile banking technologies. In this respect, a number of studies, for instance, those by Khan et al. (2016), Malaquias and Hwang (2016), Arcand et al. (2017), Chaouali et al. (2017), Shareef et al. (2018), Albashrawi and Motiwalla (2019), etc. have been conducted in the literature to examine mobile banking service.

Therefore, this study aims to evaluate the dimensions that affecting mobile banking service quality and loyalty intention, as well as to

evaluate the interrelationships among those dimensions and the connections between service quality (SQ) and loyalty intention in mobile banking in China. Customised factors affecting the SQ by combining the service quality model, SERVQUAL, dimensions were proposed, exploratory factor analysis was applied to evaluate the relationships among the proposed factors, the service quality perception and loyalty intention by applying confirmatory factor analysis (CFA) and structural equation modelling (SEM). The remaining parts of this paper are organised as follows. The following sections reviews the literature on service quality, especially service quality analysis in banking service, and mobile banking loyalty intention. The third section presents the research methodology, including customised factors discussion, data collection, as well as the research hypotheses. The next section presents the analysis of results and discussions, including respondent statistics, measurement analysis, structural model analysis and discussions, and SEM effect analysis. The conclusions with implications, limitations and recommendations for future study are also presented in the last part.

2. Literature review

Mobile banking (MB) empowers customers to do financial services by using handheld devices, such as mobile phone (Oliveira et al., 2014; Boor et al., 2014), which connects the customers to a server, to make payments and transactions, or to perform other services. Customers' attitudes and loyalty intentions on MB are important to the banks and application providers, which will help them to get a real advantage by enhancing the understandings of key factors affecting loyalty intention to use MB services (Mohammadi, 2015).

2.1. Service quality in banking industry

User's experience may be inconsistent due to the intangibility, inseparability, heterogeneity and perishability of services (Ladhari, 2009). Service quality (SQ) was decided by human attitudes and perception, which was argued to be difficult to be replicated (Yuen and Thai, 2015). Service quality involves different service dimensions or attributes which are desirable to users (Zeithaml et al., 1990). Those dimensions are different across business contexts and individuals, which cannot be directly measured or observed.

Subsequently, many researchers had paid attention to SQ model based on the revolutionary study by Parasuraman et al. (1985), who proposed SERVQUAL model. Originally, SERVQUAL model has 10 dimensions to measure service quality. The 10 dimensions were then reduced to five dimensions with 22 items afterwards, i.e. (1) Reliability; (2) Tangibles; (3) Responsiveness; (4) Empathy; (5) Assurance. Those dimensions were claimed to be generic and can be used in different scenarios (Yuen and Thai, 2015).

Service quality is an important dimension which affects customer satisfaction in banking industry. As discussed above, service quality model (SERVQUAL) can be applied to evaluate the quality of services, which has been applied and adapted by many academic researchers and service industries in various research fields, such as home appliances business, after-sales services (Murali et al., 2016; Shokouhyar et al., 2020), especially in banking service evaluation (Kumar et al., 2009, 2010; Islam, 2012; Amiri Aghdaie and Faghani, 2012; Ali and Raza, 2017). Moreover, some researchers argued that the SERVQUAL model may not be suitable in all contexts as the scenarios may be different. Thus, the original five dimensions of SERVQUAL model may not be appropriate to different scenarios (Gilmore, 2003).

Kumar et al. (2009) proposed four critical dimensions, i.e. tangibility, reliability, competence and convenience, to evaluate the level of bank service quality and revealed that there were significant differences between the participants' expectations and perception. The four critical dimensions are also applied to examine the relative importance of the dimensions between two types of banks (Kumar et al., 2010). Tsoukatos and Mastrojianni (2010) built a specific quality scale by combining

SERVQUAL and bank service quality dimensions. Amiri Aghdaie and Faghani (2012) applied SERVQUAL model to evaluate the relationship between mobile banking services and user satisfaction, and found that four variables, i.e. reliability, responsiveness, tangible and empathy, have significant correlations with satisfaction. Ali and Raza (2017) proposed an improved SERVQUAL model by using compliance dimension to evaluate the correlations between SQ and customer satisfaction. The results showed that there are positive and significant connections between the multidimensional SQ scale and the unidimensional scale of user satisfaction. Shareef et al. (2018) evaluated consumers' intentions to use mobile banking services in three adoption stages, i.e. static stage ("where consumers can only check account balances or view account and investment related information and interest"), interaction stage ("where consumers can communicate with service providers for two-way communication") and transactional stage ("where consumers can accomplish some sensitive financial operations such as money transfer from one account to another and payment of bills"), and found that driving factors of consumers' behavioural intentions to adopt mobile banking at the three stages are significantly different. Shokouhyar et al. (2020) applied SERVQUAL dimensions to categorise customer satisfaction elements and revealed that different after-sales services quality elements affect customer satisfaction.

2.2. Loyalty intention

The loyalty concept has been extensively investigated and defined using different dimensions by many scholars. Edvardsson et al. (2000) considered loyalty as a customer's predisposition or intention to rebuy from the same company. Loyalty has been considered as a determinant for a company to achieve success (Flavián et al., 2006). High customer loyalty enhances their future purchase intention (Flavián et al., 2006), which will help companies to obtain more business from the existing customers and increase the market share. The main objective of bank managers is to make the users increase usage of their MB services to improve customer loyalty. Thakur (2014) evaluated customer loyalty in mobile banking through PLS-SEM (partial least squares structural equation modelling) model, the results showed that satisfaction on mobile banking had a positive effect on user's loyalty. Avornyo et al. (2019) explored mobile banking discontinuous usage intentions based on the trait hierarchical model and the optimum stimulation level theory, the results supported most of the hypothesised paths in the study. Baabdullah et al. (2019) tested the main factors affecting the use of mobile banking and user loyalty in the context of Saudi Arabia, the results revealed that user behaviour and user satisfaction were noticed to have strong effect on customer loyalty. Sampaio et al. (2017) found that users who are satisfied with their experience in MB service were more likely to be loyal toward the banks.

The existing literature focused more on the relationship between customers' satisfaction and their loyalty. To the authors' knowledge, the relationship between SQ and loyalty intention in mobile banking with regard to the customised dimensions affecting the customers' perception has not been well evaluated in the existing studies. Since mobile banking service is one of the most popular technologies in recent years, in order to capture customer satisfaction and expectation of mobile banking service, this study aims to propose the dimensions to evaluate their interrelationships and effects on SQ and loyalty intention of mobile banking.

3. Methodology

3.1. Factors affecting customer satisfaction of mobile banking

Identifying the factors that affect the actual use level and customer satisfaction of a technique is an essential process, which can be used to change the characteristics of the technique to make it more attractive (Kuisma et al., 2007; Albashrawi et al., 2019). Banking environment

around the world is significantly influenced by the factors with regard to technological, structural and regulatory. In order to capture customer satisfaction and expectation of mobile banking, customised factors by combining the dimensions of SERVQUAL model are proposed to find out the factors affecting customer satisfaction and loyalty intention of mobile banking. This research first reviews the existing studies regarding to service quality indicators, especially the five dimensions of SERVQUAL model. In order to ensure the proposed indicators genuinely reflect SQ in mobile banking service, face-to-face interviews were carried out among the bank managers and mobile banking users. Subsequently, a survey was conducted by mobile banking users. Factor analysis was applied to analyse the collected data to extract meaningful dimension of SQ in mobile banking. Based on the general consensus proposed by the bank managers and mobile banking users, the indicators are shown in Table 1. In this study, MB interface design mainly refers to the interface layout and the ease of use of the application, as well as the navigation functions. MB system quality mainly refers to the performance of the application, such as the compatibility with mobile phone, the response

Table 1
Factors affecting user experience of mobile banking service.

Construct	ID	Measurement	Source
MB interface design (INT)	INT1	It is easy to use mobile banking.	Bharati and Chaudhury (2004); Schierz et al. (2010)
	INT2	The interface design of mobile banking application is of good appearance.	
	INT3	The Navigation design is easy to find out various functions.	
MB system quality (SYS)	SYS1	Mobile banking is of good compatibility, stable and smooth operation.	McKnight et al. (2002a & b)
	SYS2	Mobile banking response speed is fast.	
	SYS3	Online customer service is professional, timely and effective to solve problems.	
MB security assurance (SEC)	SEC1	Mobile banking is of high security, which can ensure the security of account and funds.	Luarn and Lin (2005);
	SEC2	The transaction process and data are transparent and traceable.	Gewald et al. (2006)
MB service quality (SER)	SER1	Mobile banking functions can fully meet the needs of daily business.	Cronin et al. (2000); McDougall and Levesque (2000); Petrick and Backman (2002); Shankar et al. (2020)
	SER2	I am satisfied with payment transaction business service.	
	SER3	I am satisfied with loan business service.	
	SER4	I am satisfied with inquire business service.	
	SER5	I am satisfied with investment business service.	
	SER6	I am satisfied with credit card business service.	
	SER7	I am satisfied with the diversity of business.	
	SER8	The service price is rationality.	
Loyalty intention (LOY)	LOY1	The bank improves the service experience of the mobile banking through service innovation.	Arcand et al. (2017); Lee and Chung (2009); Baabdullah et al. (2019)
	LOY2	The innovative service makes customers willing to use and recommend to others.	
	LOY3	There are good coordination and cooperation between the mobile banking and offline branches.	

speed, and so on. MB security assurance mainly refers to the safety and security when using the application, which is usually the top concern by the users. MB loyalty intention mainly refers to the innovations of the application, which makes customers willing to use and recommend to others. MB service quality mainly refers to the functions of the application, which can fulfil the needs of the users.

According to the findings from mobile banking users and bank managers, some factors affecting user experience of mobile banking service were proposed. In order to indicate the customised factors proposed in this study academically, related papers were surveyed by searching the key words of "mobile banking adoption" with "interface design", "system quality", "service quality" and "loyalty". Afterwards, 13 papers were selected to support the proposed factors as shown in Table 1.

3.2. Data collection

In this study, the surveys were conducted by targeting at the users of mobile banking services from a bank in China, as they are the most suitable respondents to evaluate service quality and loyalty intention of mobile banking as compared to the bank staff. An online survey questionnaire was created with a web link. The survey includes the background of the study, significance and objectives of the research, the proposed 19 factors to evaluate the interrelationships among the constructs, as well as the demographic of the participants. To evaluate the importance of each indicator, a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) was applied. The survey was conducted from July to September in 2019. During the survey conduction, the questionnaire web link was sent to the mobile banking users randomly by message. Meanwhile, the respondents can also access to the questionnaire survey through the official website, official WeChat public account, and the official mini programme of the bank.

3.3. Conceptual model and research hypotheses

3.3.1. Introduction of SEM

Structural equation modelling (SEM) is a popular statistical analysis technique which is widely applied in the behavioural sciences. It can be used to analyse the structural relationships among the variables and factors. To evaluate and test the adoption and user experience of mobile banking (MB) in various context, structural equation modelling (SEM) was applied in many studies, e.g. Lee and Chung (2009), Zhou et al. (2010), Bhatiasevi (2016) and Yu (2012), and Albashrawi et al. (2019). Lee and Chung (2009) applied SEM method on three proposed quality factors (system quality, interface design quality, and information quality) affecting users' trust and satisfaction on mobile banking in the context of South Korea, the results showed that system and information qualities significantly influenced users' satisfaction and trust. Zhou et al. (2010) proposed an MB user adoption model by combining the unified theory of acceptance and usage of technology (UTAUT) and task technology fit (TTF) to evaluate the user experience of the mobile banking in the context of China, the SEM results showed that performance expectancy, task technology fit, facilitating conditions and social influence have significant influence on user experience. Bhatiasevi (2016) extended the existing UTAUT model and applied SEM as the primary method to test model in the context of Thailand, the results showed a positive relationship between performance and effort expectancies, social influence, perceived credibility and convenience, behavioural intention and usage of mobile banking. Similar studies had been carried out by Yu (2012) and Albashrawi et al. (2019). Lee et al. (2019) applied SEM to analyse the factors affecting mobile payment services from the perspectives of both consumers and retailers. Chaouali and Souiden (2019) investigated mobile banking resistance among elderly people by SEM model and indicated that tradition and image barriers affect usage, value, and risk barriers. Therefore, in this study, SEM was applied to evaluate the interrelationships among the factors affecting SQ and

loyalty intention of mobile banking.

3.3.2. Research hypotheses

Mobile banking interface design examines how information is shown and displayed (Bharati and Chaudhury, 2004), as well as the perceived ease of using mobile banking (Davis, 1989). Wang and Liao (2008) assumed that ease of use of MB will affect the usage of MB, which will encourage customers to use it in their financial services. Furthermore, perceived ease of use of MB application will also affect the attitude towards the usefulness and service quality of MB (Schierz et al., 2010). Moreover, the interface is the first impression of MB by users, good and efficient design of mobile banking application will attract people's attention as customers will generate their impressions according to the initial information. Good interface design quality can enhance the formation of trust in the MB system quality and MB security assurance (Everard and Galletta, 2005). Improperly designed interfaces of mobile banking would cause unnecessary work and can negatively influence customers' utilisation of MB. Therefore, based on the above discussions, the following hypotheses are proposed:

H1: MB interface design has a positive effect on MB system quality.
H2: MB interface design has a positive effect on MB security assurance.
H3: MB interface design has a positive effect on MB service quality.

Mobile banking system quality is regarded as the quality of an application system's performance, which can be evaluated by the users' perception (Liu and Arnett, 2000; Delone and McLean, 2003). Perceived quality is considered to be an important factor and the key determinant for customer loyalty (Parasuraman and Grewal, 2000). In this study, MB system quality refers to the compatibility, stability and response speed of the system, as well as the online customer service of MB. High quality of mobile banking system will probably have high security assurance, and customers will have high level of trust and loyalty intention (McKnight et al., 2002a, b). Moreover, studies carried out by Wessels and Drennan (2010), Shaikh and Karjaluoto (2015), and Chen (2013) revealed that the compatibility of the application will be of significant influence on the adoption of MB. Obviously, high compatibility will lead to an increased chance of use and increase the loyalty intention.

MB security assurance is defined as mobile banking is of high security, which can ensure the security of account and funds, meanwhile, the transaction process and data are transparent and traceable in this study. Mobile banking offers customers to use financial services wherever and whenever they need it (Luarn and Lin, 2005). The perception risk of customers usually determined by the doubts with regard to the level of inconsistency between their judgement and real behaviour (Koenig-Lewis et al., 2010; Lee et al., 2007). Although the internet transaction service has been existing for a long period, risk may increase in transactions via mobile devices (Ndubisi and Sinti, 2006). Perceived security of MB application will have an impact on the service quality of mobile banking. Therefore:

H4: MB system quality has a positive effect on MB security assurance of mobile application.
H5: MB security assurance has a positive effect on MB service quality of mobile application.
H6: MB system quality has a positive effect on loyalty intention.

Service quality has been found to be a significant determinant of customer satisfaction and loyalty intentions (Cronin et al., 2000; McDougall and Levesque, 2000; Petrick and Backman, 2002). In this study, MB service quality refers to mobile banking functions that can fully meet the needs of customers. Those functions include payment transaction service, loan service, enquiry service, investment service, and credit card service. Moreover, mobile banking can provide various services with reasonable fees. The loyalty intention refers to the bank

improving the service experience of the mobile banking through service innovation, the innovative service makes customers willing to use and recommend to others, and there are good coordination and cooperation between the mobile banking and offline branches.

Therefore:

H7: MB service quality has a positive effect on loyalty intention.

Based on the above hypotheses, Fig. 1 presents the theoretical model with the hypotheses.

4. Results and discussions

4.1. Statistics of respondent

The survey questionnaire was conducted by mobile banking users of a bank in China, so the results and discussions are more applicable to the scenarios of banks in China. After the survey conduction, there were 397 respondents returned the survey questionnaires. After data cleaning, i.e. remove the samples with incomplete survey questionnaires and the same ratings for all questions, as well as remove the samples with a very short survey time, there were 224 respondents with completed and valid survey questionnaires, the valid response rate is 56.4%. Table 2 presents the profile and mobile banking using frequency of respondents. The majority of the respondents (78.6%) are frequent users (either every day or at least once per week) of mobile banking.

Since the number of respondents across age groups are different, Wilcoxon rank sum test was applied to determine the effect of age in the overall satisfaction on the mobile banking application (Zhou et al., 2020). The respondents' overall satisfactions were compared among the 4 age groups, as shown in Table 3. The comparisons of the different age groups did not find any significant difference in the overall satisfaction on the mobile banking application for respondents younger than or equal to 50 years old (all p's > 0.05). However, the comparisons of group 4 (greater than 50 years old) and the other groups are significant (all p's≤0.001), which suggests a significant transition of overall satisfaction at 50 years old. The sampled users who are 50 or younger are generally less satisfied with mobile banking than those who are older than 50.

Further analysis of gender difference of overall satisfaction by Wilcoxon rank sum test did not find any significance ($p = 0.294$), which suggests male and female respondents have similar overall satisfaction on the mobile banking application.

4.2. Measurement model

Before testing the hypotheses, the overall model fit of the scales was examined by a confirmatory factor analysis (CFA), as shown in Table 4. The CFA model evaluation results include the composite reliability (CR), the average variance extracted (AVE) and the standardised factor loadings. The AVE and CR can be calculated by Equations (1) and (2). The fit indices, i.e. the RMSEA (root mean square error of approximation), SRMR (standardised root mean square residual), the CFI (comparative fit index), the TLI (Tucker-Lewis fit index), and the GFI (goodness of fit), are used to assess the goodness of fit of the model. According to Hu and Bentler (1999), the RMSEA and SRMR should be lower than 0.08 and 0.10, respectively; the CFI and TLI should be greater than 0.95; the GFI should be greater than 0.90. As to the proposed research model, the fit indices satisfy the recommended cut-off values, which indicates the good fit of the measurement model. In addition, all of the standardised factor loadings are larger than 0.7, the AVE and CR of each construct are larger than 0.50, which indicates that comparing to the constructs' errors, the scales have better variance explanation (i.e. > 50%) (Hair et al., 2010; Yuen et al., 2020).

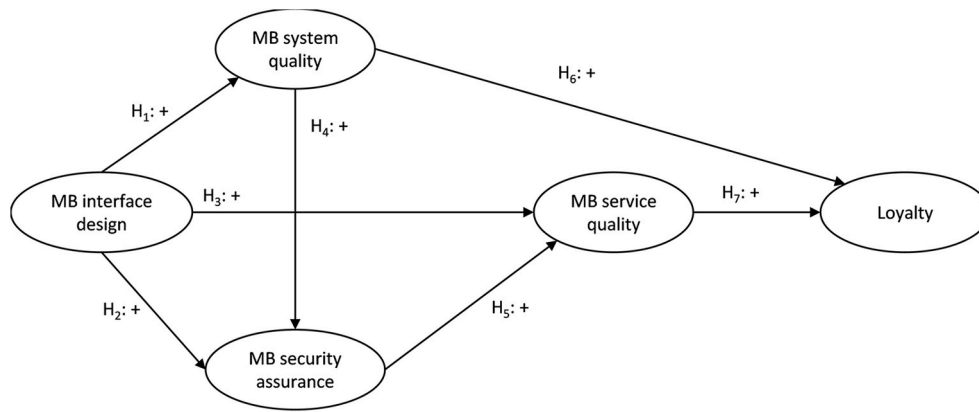$$AVE = \frac{\sum_{i=1}^{n} \lambda_i^2}{n} \tag{1}$$

Fig. 1. Theoretical model with the hypotheses.

Table 2
Profile of respondents.

	Number of respondents	Percentage
Gender		
Male	120	53.57%
Female	104	46.43%
Total	224	100%
Age group		
≤ 20	1	0.45%
20 - 30 (included)	58	25.89%
30 - 40 (included)	76	33.93%
40 - 50 (included)	41	18.30%
>50	48	21.43%
Total	224	100%
Mobile banking using frequency		
Everyday	91	40.63%
At least once per week	85	37.95%
At least once per month	29	12.95%
others	19	8.48%
Total	224	100%

Table 3
Age group difference of satisfaction with mobile banking.

Age range	Age group 1 ≤ 30	Age group 2 30 - 40 (included)	Age group 3 40 - 50 (included)	Age group 4 >50
≤ 30	–	$p = 0.316$	$p = 0.498$	$p < .000*$
30 - 40 (included)	–	–	$p = 0.861$	$p < .000*$
40 - 50 (included)	–	–	–	$p = .001*$
>50	–	–	–	–

* Significant difference at .05 level.

$$CR = \frac{\left(\sum_{i=1}^{n} \lambda_i\right)^2}{\left(\sum_{i=1}^{n} \lambda_i\right)^2 + \left(\sum_{i=1}^{n} (1 - \lambda_i)\right)} \qquad (2)$$

where λ_i is the factor loading of measurement i, n is the number of the measures in each construct.

The discriminant validity of the research model was evaluated by comparing the factor correlation coefficients to the square roots of the AVEs, as shown in Table 5. The square root AVEs (main diagonal values) are larger than the correlations (the values below the main diagonal), which indicates the good discriminant validity of the model (Gefen et al., 2000). SEM model was applied to estimate the proposed conceptual model as shown in Fig. 1.

Table 4
CFA evaluation results.

Construct	Measure	Standardised factor loadings	AVE	CR
MB interface design (INT)	INT1	0.82	0.73	0.89
	INT2	0.85		
	INT3	0.90		
MB system quality (SYS)	SYS1	0.96	0.91	0.97
	SYS2	0.95		
	SYS3	0.94		
MB security assurance (SEC)	SEC1	0.85	0.79	0.88
	SEC2	0.93		
Loyalty intention (LOY)	LOY1	0.93	0.80	0.92
	LOY2	0.93		
	LOY3	0.81		
MB service quality (SER)	SER1	0.85	0.71	0.82
	SER2	0.89		
	SER3	0.79		
	SER4	0.88		
	SER5	0.84		
	SER6	0.77		
	SER7	0.87		
	SER8	0.82		

Notes: CMIN/DF = 2.42 ($p < 0.01$); SRMR = 0.026; RMSEA = 0.080; CFI = 0.97; TLI = 0.95.

Table 5
Square root of Average variance extracted (AVE) and correlations of constructs.

	INT	SYS	SEC	LOY	SER
INT	0.86[a]				
SYS	0.78[b]	0.95			
SEC	0.45	0.64	0.89		
LOY	0.65	0.87	0.54	0.89	
SER	0.49	0.67	0.46	0.59	0.84

Notes.
[a] Main diagonal values: the square root of AVEs.
[b] Below main diagonal values: the correlations.

4.3. Structural model analysis and discussions

The structural equation modelling results of the conceptual model is shown in Fig. 2. The values of the model fit indices (RMSEA = 0.065; SRMR = 0.023; CFI = 0.98; TLI = 0.97) indicate the good fit of the proposed model. Moreover, the R^2 of the endogenous variables, i.e. MB system response, MB security assurance, MB service reliability and bank brand attachment, are above 0.6, which suggest adequate model fit in the context of behavioural science or psychology (Cohen et al., 2003). As shown in Fig. 2, MB interface design and MB system quality have significant, positive effects on MB security assurance, with the standardised
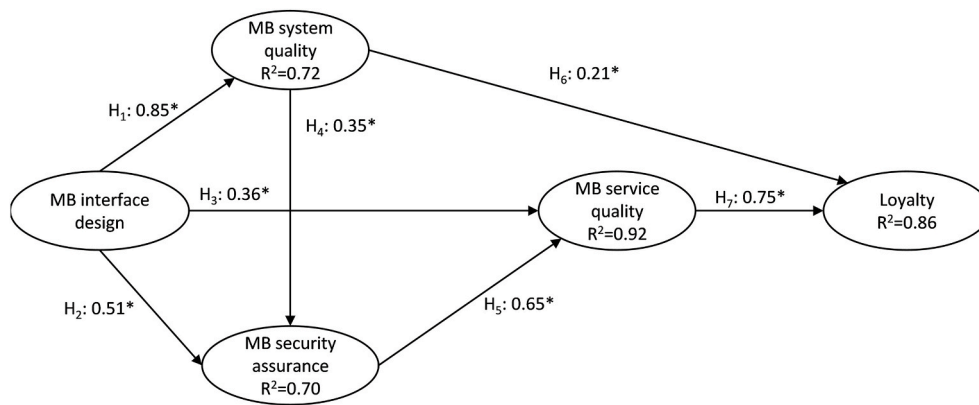
Fig. 2. SEM results of the proposed model. *indicates that the path estimate is significant ($p < 0.05$). Model fit indices: $\chi^2/df = 1.95$ ($p < 0.01$); SRMR = 0.023; RMSEA = 0.065; CFI = 0.98; TLI = 0.97.

effects of 0.51 and 0.35 accordingly. Therefore, H2 and H4 are supported by the findings. MB interface design has a relatively higher positive effect on MB security assurance ($\beta = 0.51$, $p < 0.05$). MB system quality have a relatively smaller positive effect on MB security assurance ($\beta = 0.35$, $p < 0.05$).

Moreover, MB interface design also has significant and positive effect on MB system quality ($\beta = 0.85$, $p < 0.05$) and MB service quality ($\beta = 0.36$, $p < 0.05$), which indicates the acceptance of H1 and H3. Interface design refers to good appearance and perceived ease of use of MB application, since the interface is the first point of contact in MB by users, good and efficient design of mobile banking application will make the users perceive good system quality and high security. Therefore, as supported by the results, MB interface design has a high effect on MB system quality ($\beta = 0.85$), the users are more likely to perceive high quality of the MB application based on their first impression of the application.

MB security assurance has a relatively high and positive effect on MB service quality ($\beta = 0.65$, $p < 0.05$), therefore, H5 is supported. MB security assurance refers to the safety guarantee of the application. Obviously, it is an important concern by MB customers, because it will ensure the security of their daily use of the mobile banking, which covers payment transaction service, loan service, enquiry service, investment service, credit card service, and so on. Therefore, this finding supports the previous research which suggested that perceived high security by users can make them feel good service quality (Chang and Thai, 2016).

It is noted that MB system and service qualities have significant, positive effects on loyalty intention, while MB service quality has a relatively high effect on loyalty intention ($\beta = 0.75$). Collectively, they account for 86% of the variance in loyalty intention of mobile banking ($R^2 = 0.86$). All banks have the challenge to keep their customers as loyal as possible. Nowadays, MB customers are more concerned on where, when and how they can use financial services, different novel mechanisms have been considered by banks to fulfil their customers' demands regarding to banking services (Leong et al., 2017; Baabdullah et al., 2019).

4.4. Effect analysis

According to the theoretical model, the effects of the exogenous variables on endogenous variables of the constructs are obtained, i.e. direct effect, indirect effect and total effect, as sown in Table 6. As to the direct effects, MB interface design ($a_{12} = 0.51$) has a higher effect on MB security assurance than that of MB system quality ($a_{22} = 0.36$). This is mainly due to the fact that the interface design is the first contact and impression of the MB by the users. MB security assurance has a high direct effect on MB service quality ($a_{33} = 0.65$). Safety is always a concern of the users when they use mobile banking services. Obviously,

Table 6
Direct, indirect and total effects.

Endogenous (j) Exogenous (i)	MB system quality (1)	MB security assurance (2)	MB service quality (3)	Loyalty intention (4)
Direct effects (a_{ij}) of				
MB interface design (1)	0.85	0.51	0.36	–
MB system quality (2)	–	0.36	–	0.21
MB security assurance (3)	–	–	0.65	–
MB service quality (4)	–	–	–	0.75
Indirect effects (b_{ij}) of				
MB interface design (1)	–	0.30	0.53	0.84
MB system quality (2)	–	–	0.23	0.17
MB security assurance (3)	–	–	–	0.49
MB service quality (4)	–	–	–	–
Total effects (c_{ij}) of				
MB interface design (1)	0.85	0.81	0.88	0.84
MB system quality (2)	–	0.36	0.23	0.38
MB security assurance (3)	–	–	0.65	0.49
MB service quality (4)	–	–	–	0.75

high security assurance of mobile banking applications will make the users perceive good service quality. Meanwhile, MB service quality has a high direct effect on loyalty intention ($a_{44} = 0.75$).

As to the indirect effects, although MB interface design has no direct effect on loyalty intention, it has the largest indirect effect on loyalty intention ($b_{14} = 0.84$), followed by MB security assurance ($b_{34} = 0.49$) and MB system quality ($b_{24} = 0.17$). This is mainly due to the presence of several indirect paths that MB interface design has on loyalty intention (1. MB interface design → MB system quality → loyalty intention; 2. MB interface design → MB service quality → loyalty intention; 3. MB interface design → MB security assurance → MB service quality → loyalty intention). The findings are consistent with the demonstrations by Cyr et al. (2006), who revealed that design/aesthetics of MB application indirectly affect users' loyalty intention. The results highlight the

importance of MB interface design. Moreover, MB interface design also has a relatively high indirect effect on MB service quality ($b_{13} = 0.53$).

For the total effects, MB interface design has the largest effect on MB service quality ($c_{13} = 0.88$), followed by MB security assurance ($c_{33} = 0.65$) and MB system quality ($c_{23} = 0.23$). The results present the importance of improving the interface design, system quality and security assurance of mobile banking applications which will enable the service quality of mobile banking. However, more attention can be paid to the interface design because it will also improve the perceptions of system quality ($c_{11} = 0.85$) and security assurance ($c_{12} = 0.81$) by the users. Furthermore, MB interface design has the largest total effect on loyalty intention ($c_{14} = 0.84$), followed by MB service quality ($c_{44} = 0.75$), MB security assurance ($c_{34} = 0.49$) and MB system quality ($c_{24} = 0.38$). These results highlight the importance of interface design and service quality of mobile banking application.

5. Conclusion

5.1. Summary

This study examines the determinants of mobile banking service quality and loyalty intention through customised factors by combining the SERVQUAL model. A theoretical model was developed to reveal the determinants of MB service quality and loyalty intention. The interrelationships among the determinants were analysed. Survey questionnaires were conducted on 224 mobile banking users, the obtained data were analysed based on SEM. The results are consistent with the aforementioned hypotheses. Collectively, MB interface design and MB security assurance have a very large explanation to the variance of MB service quality ($R^2 = 0.92$); MB system quality and MB service quality also have a large explanation to the variance of mobile banking loyalty intention ($R^2 = 0.86$). MB service quality has a high, positive direct effect on loyalty intention. MB interface design has the largest indirect and total effects on loyalty intention. The results directly or indirectly highlight the importance of interface design, system quality, security assurance and service quality in mobile banking loyalty intention.

5.2. Implications

This study has contributions on both theoretical and managerial applications. Theoretically, this study has enhanced the existing literature of MB loyalty SQ and loyalty intention in the context of China. Customised factors affecting the service quality and loyalty intention of mobile banking are proposed, including the interface design, system quality, security assurance and service quality which are consistent with SERVQUAL factors (reliability, assurance, tangibles, empathy and responsiveness). Based on SEM, descriptive and inferential statistics are obtained, as well as reliable findings. Collectively, those factors explain 86% of the variance in mobile banking loyalty intention, which is considered high enough in the field of behavioural/psychology study, which indicates that the customised factors have high explanation to the loyalty intention of mobile banking. Moreover, this study gives a better understanding of the constructs in the proposed model. The existing literature and theories have been interpreted and reviewed to specify and reveal the interrelationships of the constructs based on the proposed hypotheses.

This study also has implications on the banks' strategies to retain their mobile banking users, as well as explore new customers. Therefore, decision makers and financial institutions with regard to mobile banking applications should consider the roles of the interface design, system quality, security assurance and service quality to increase customer loyalty. According to the findings, MB application developers are suggested to develop the applications with customer-centric ideas by considering the safety, agility and flexibility of the applications. Provision of stable, secure and accurate mobile banking system, with fast response and efficient services (e.g. paying, transaction, credit card

services, etc.) can enable customers to trust their mobile banking. Meanwhile, the developers also need to provide multi-level security features to increase the users' perceived security when using MB applications. The banks should provide structural assurances with well-documented policy to users, to increase the privacy level and indicate the potential risks when using the MB services, such as transactions, investment and so on. The level of service quality needs to be increased by the banks to support the users at any time, which can enhance users' satisfaction and increase usage of MB services.

5.3. Limitations

Since this study applied survey data to evaluate and test the proposed conceptual model, although the data were of convergent validity and reliability, as well as discriminant validity, because of data were obtained through questionnaire surveys, the estimated results may not fully reflect the true parameters, but the findings can still be used by banks to retain their mobile banking users.

The sample data were collected from a big bank in China, which covers different kinds of financial services (e.g. loan, credit card, etc.), as some small banks in China may not provide some of the services, such as credit card and loan services, which may affect the generalisability of the results, and hence need to be interpreted with precaution. Based on the current data, the findings are more applicable to the scenarios of banks in China. Future research can be conducted in other countries and regions and may consider identifying other determinants affecting customer loyalty.

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