Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

Customers' value co-creation behaviors on mobile banking service in China: Investigating the antecedent roles of service quality, Gamification, customer engagement, and generation cohort

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Article Info

Article history:
Received 10 July 2024
Revised 10 November 2024
Accepted 12 December 2024
Available online 18 March 2026

Keywords:
customer engagement,
Gamification,
generation cohort,
service quality,
value co-creation

Abstract

This research aimed to examine antecedent factors' effects on customer value co-creation behaviors in Chinese banking industry by adopting Cognitive-Motivational-Relational theory and Broaden-and-Build theory. It investigates the moderating effects of Gamification and generational differences on customer engagement and CVCB, respectively basing on Gamified Learning Theory and generational theory. This study elucidates the advantage of exploring antecedent factors that influences CVCB from holistic viewpoint. From 690 gathered online survey questionnaires, statistical analysis results from this research confirmed the positive effects of mobile banking service quality, customer engagement and generation cohort differences' on CVCB under Chinese mobile banking context. These research findings provide valuable information for policy makers and assist them in creating competitive marketing tactics that maintain and engage customers under Chinese cultural context.

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Introduction

Since the global breakout of COVID-19 pandemic in 2019, major changes and transformations in many industries have been witnessed, and customers are progressively embracing digital and electronic technologies as the chosen method to cope with the activities in daily life during the pandemic (Zhao & Bacao, 2021). In the finance sector, for instance, this phenomenon has enabled consumers to shift from the conventional method of conducting financial activities to a new approach characterized by adopting contactless transactions such as mobile banking (M-banking), which refers to services provided to customers by financial banks via portable devices (smartphones or tablets), with the expediency of remotely conducting various financial transactions such as account inquires, money transfer, bill payment, and so on (Arcand et al., 2017). M-banking can benefit both service providers and customers alike, for instance, it helps service providers expand operations scope, reach underserved population, lower operating costs, and improve performance, and for customers,

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https://doi.org/10.34044/j.kjss.2026.47.1.19
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it offers customized services, time and cost saving, easy access to banking information, allowing paying utility expenses, and managing asset portfolios (Aws et al., 2021). In 2023, the global M-banking market size exceeded $1,700 million, and is expected to reach $3.47 billion by 2030 globally, with South Korea having the highest M-banking penetration rate (82%) while China had the most registered M-banking users (970 million) (Turner, 2023). Chines M-banking grew rapidly since being introduced in 1999, and its monthly active users exceeded 530 million in 2023 according to China Financial Certification Center (Yifan, 2023). Meanwhile, the digital finance revolution has also brought about financial technology companies that are posing challenges to traditional banking by introducing digital disruptions such as third party mobile payment (M-payment) service. To date, M-payment's market size surpassed $2,276 billion in 2023 equaling 1,338 times of the market size of M-banking, and it is estimated to exceed $9,821 billion in 2032 indicating that it will continue outgrowing M-banking in the future (Turner , 2023). In China, the largest state-owned banks including Industrial and Commercial Bank of China (ICBC) and Bank of China (BOC) are completely being dominated by Alipay and WeChat Pay, who currently each own over 900 million users, thus causing Chinese M-banking's penetration rate to drop to 68 percent in 2023 from 71 percent in 2021 (Yifan, 2023).

Therefore, considering the uprising competition M-banking is facing and the significant role it plays in financial ecosystem, M-banking drew attention from academics and practitioners alike. However, early studies indicated that existing researches on M-banking predominantly focus on examining factors that prompt M-banking service adoption with limited studies investigating post-adoption behaviors such as loyalty, individual performance, and relationship quality (Alsmadi et al., 2022; Mostafa, 2020), and yet no research has been conducted on customer value co-creation behaviors (CVCB), which refers to the actors of company/customer relationships dynamically collaborating for producing mutually beneficial values, or its antecedent factors' influences in M-banking service under Chinese context. As marketing academics have emphasized, CVCB allows companies to collect information on understanding the sources of customer value when designing products and services that cater for customers' needs, thus it is essential for achieving operational efficiency, performance and sustaining profitable customer relationships (Taghizadeh et al., 2022). For that reason, this research answers the call for exploration beyond M-banking adoption to examining post service adoption behavior such as CVCB, a theme that still necessitates further investigation under banking service context (Hijazi, 2022). The importance of value co-creation (VCC) lies in its resource integration ability for companies to develop service offering by involving customers, inspiring their creativeness and creating sense of belonging and faithfulness that allow companies to access a wide array of customers' ideas and information (Vargo & Lusch, 2012). As M-banking reshaped the fundamental bank-customer relationship and customers are recognized as co-producers of service value, VCC is essential for collaborative relationships with customers, maintaining customer loyalty, improving financial performance and surviving competition (Hijazi, 2022). Mobile banking service quality (MBSQ) is a fundamental facet of product and service improvement which enables it become an important antecedent factor of CVCB; however, due to its complex nature, researchers have not reached consensus on MBSQ's universal dimensions or its impact on CVCB in literature (Arcand et al., 2017). Additionally, although MBSQ can ensure M-banking service functions well, it does not necessarily generate emotional sense of brand belonging, which is essential for building customer loyalty and CVCB. Thus, previous studies also advocated customer engagement, which refers to customer's motivational status that leads to behaviors that do not necessarily encompass purchasing, as a vital antecedent factor that can motivate CVCB such as knowledge sharing, providing appraisals and advocacy. However, its effects as both antecedents and outcomes factors of CVCB under M-banking contexts remain inconclusive (Hijazi, 2022). Moreover, with digital communication technology emerging and enabling the occurrence of interface and collaborations among multiple customers and service providers simultaneously, mobile applications created with game elements have become an exemplary of such platform-based technology and marketing strategy that allows technology to connect customers, companies, and resources in a collaborating environment where value can be created and delivered (Spagnoletti et al., 2015). The flourishing of Gamification adoption in the business contexts is swiftly and it is reported that its total worldwide investments will exceed $32 billion by 2025 (Czeszejko & Öfverström, 2021). As Gamification has become an prevalently effective marketing tactic and been applied to evoke customer's emotions and influence behaviors, researches advocated that Gamification can enhance customer's perceived service quality and engaging behaviors (Bical & Ispir, 2021), but its moderating effects on customer engagement in Chinese M-Banking context is yet unknown.

Furthermore, as the introduction of information and communication technology into people's lives in the digital era has imposed various influences on characteristic and behavior change of customers from different generation cohorts, it attracts more companies' attention and resources to examine these generations' engagement and value co-creation related behaviors so as to improve collaboration efforts in enhancing products and services through direct communication (Wallace et al., 2022). Additionally, researchers also suggested that as a growing number of the older generation customers are joining the post pandemic digital economy boom, generational behaviors difference's impact on CVCB difference cannot be neglected (Alhassan & Adam, 2021). Therefore, the objectives of this study are, firstly, to attempt to pragmatically examine antecedent roles of MBSQ and engagement in motivating CVCB under M-banking context; secondly, to validate moderator role of Gamification in enhancing customer engagement in M-banking; thirdly, to investigate the moderating effect of generational difference in encouraging CVCB. The results of the study are beneficial for policy makers at various levels to improve financial performance via increased transaction volume and advance economic development through enhanced financial inclusion.

Literature Review

CVCB & MBSQ & Customer Engagement

Founded on service-dominant logic, CVCB concept advocates that players in service process can dynamically share resources such as information, knowledge, capital and technology, to cooperatively discover resolutions to mounting market needs, where customers are regarded as dynamic operating resources instead of the static operant resources a company owns (Vargo & Lusch, 2012). CVCB concept has been examined using several pragmatic and theoretical models in literature, such as facility-transformation-usage model, consumer value co-creation styles model and supplier-customer mapping model. Moreover, Yi and Gong (2013) proposed a multidimensional construct that encompasses two higher order aspects including customer participation behaviors and customer citizen behaviors, where participation behaviors contain four sub-dimensional behaviors including information seeking, defined as a customer's search for information to obtain desired information/resources and achieve anticipated outcome (Kellogg et al., 1997), information sharing, that refers to the interchange of information between actors in service process (Lengnick-Hall, 1996), personal interaction, defined as the personal interplay between customers and the service supplier's staff (Kelley et al., 1992), and responsible behavior, that refers to actors' inclination to carry out responsibility and perform expected duties (Ennew and Binks, 1999). In addition, customer citizen behaviors contain four sub-dimensions, which include helping, that denotes assisting those who are in need of support (Groth, 2005), advocacy, defined as customers' intent to recommend and defend the service providers from criticisms, feedback, that refers to providing evaluation information to service providers (Bettencourt, 1997) and tolerance, that refers to customers' inclination to accept services below expected standards (Tat Keh and Wei Teo, 2001). Owing to the extensive validation from earlier researches, this model will be adopted in this study to investigate CVCB in M-banking service (Mostafa, 2020). Furthermore, as researchers advocated that the traditional banking services characterized by personal interaction could no longer be adequately applied to the human-machine service platforms, where customers interact with technology instead of people, thus personal interaction became relatively irrelevant or unnecessary during electronic service encounters such as mobile banking (Arcand et al., 2017). Additionally, some studies even suggested that customers intentionally adopted mobile banking so as to avoid the personal interaction provider by service firms (Wessels & Drennan, 2010), which was also supported by other scholars (Hanafizadeh et al., 2014). Therefore, to be congruent with early research, this study excluded personal interaction dimension to circumvent potential controversy (Mostafa, 2020).

MBSQ refers to customer's overall appraisal on the supremacy and characteristics of mobile content delivery encompassing facets such as safety, expediency, ease of use, accessibility, consistency, and so on (Rajaobelina et al., 2021). The measurement of MBSQ varies greatly from using only a few indicators to multifaceted dimensions scale, or from directly adopting a prevailing scale such as service quality (SERVQUAL) model to applying a modified version of an existing model such as self-service technology service quality (SSTQUAL) (Rajaobelina et al., 2021). Researchers argued that excessive attention on evaluating technological elements may be necessary for understanding MBSQ at service adoption stage, but it is inadequate for appraising its impact on post adoption behaviors. This viewpoint resulted in an alternate approach in assessing MBSQ from perceived value perspective including utilitarian value and hedonic values. Utilitarian value relates to the benefits a customer

receives relevant to task or rational buying behavior, while hedonic value relates to the instantaneous gains a customer perceived in the form of subject emotional experience of fun and playfulness as a result of a product or activity (Arcand et al., 2017), and customers are able to perceive either or both types of values from the same product and service experience, where accordingly, Arcand et al. (2017) proposed an impromptu MBSQ framework founded on both web-based and mobile contexts including security/privacy, practicality, design/aesthetics, sociality and enjoyment. Thus, this previously validated MBSQ framework is adopted in this study.

Customer engagement concept refers to the psychosomatic state which befalls through collaborative customer experiences within service network to incorporate resources where all partaking players act with co-creative responsibilities (Van Doorn et al., 2010). It can be conceptualized using various constructs, for instance, Bowden (2009) measured engagement in three dimensions consisting of cognitive, emotional, and behavioral components while Van Doorn et al. (2010) suggested five behavioral dimensions consisting of valence, modality, scope, impact nature, and objectives. Among various conceptual constructs, the one proposed by Bowden (2009) has been extensively validated by previous studies in literature. Such includes cognitive, emotional, and behavioral dimensions. However, as researchers argued that the behavioral dimension can be inherently implicit due to various underlying causes (Hijazi, 2022), thus, this study will only adopt cognitive and emotional dimensions to assess customer engagement.

Gamification & Generation Cohorts

Gamification concept is described as utilizing game mechanism and design elements under non-game circumstances (Buckley et al., 2019), which has been evaluated by various models, for example, Hunicke et al. (2004) developed the MDA model consisting of three parts including mechanics, dynamics, and aesthetics while Werbach et al. (2012) proposed the D6 Model that involves six phases including defining target objectives, delineating desired behaviors, describing users, device activity loops, not forgetting the joy, deploy instrument. Moreover, Chou (2015) proposed the Octalysis Model based on fundamental human motivation such as meaning, empowerment, social influence, ownership and accomplishment. Gamification is a tactic and proven technique that can be applied to accomplish desired consequences owing that it is more than inputting games to company's offering or making tasks more entertaining. It often aims to enhance customer commitment by offering or jointly creating value (Buckley et al., 2019).

Generation is defined as a collection of individuals born during a particular time period, sharing alike experiences, outlooks, and principles that remain fairly constant during their life course, and four commonly discussed generation cohorts in literature include Baby-Boomers, Generation X, Generation Y, Generation Z. Baby-Boomers, born roughly between 1946 and 1960, are described as dedicated, diligent, idiosyncratic, skeptical, possessing good social networking skills but relatively lacking technical expertise (Moise et al., 2020). Generation X were born approximately between 1960 and 1980 and grew up witnessing the presence and prevalence of internet, globalization, and culture integration (Moore & Carpenter, 2008). They are considered as choosy and tough to persuade because of their cynical outlook towards passive marketing promotional stimuli, thus they favor companies and products exceling in quality and innovation instead of modern technology fads (Moore & Carpenter, 2008). Generation Y or Millennials were born roughly between 1980 and 1995. They engaged with advanced customer-based technologies and Internet from young age, seek recognition and interaction from others, thus favor interacting with brands (Stewart et al., 2017). Generation Z or Post-Millennials, born between 1995 and 2010 roughly, have grown up with information technology, electronic gadgets, modern communication tools, social media expertise, so they are self-assured, enjoy team spirit, likely being swayed by peers in purchase (Stewart et al., 2017).

Theoretical Support

In this study, Cognitive-Motivational-Relational (CMR) theory provides theoretical support for the relationship between MBSQ and customer engagement. In CMR theory, Relational explains that emotional stress resulted from person-environment interactions that vary over time and situations, Motivational explains that emotions are responses to the status of objectives during our adjustable encounters in everyday lives, and Cognitive explains the knowledge and appraisal of what is taking place during adaptable encounters (Lazarus & Smith, 1988). Thus, in this study, perceived MBSQ can be viewed as the cues presented in M-banking environment on which customers are able to cognitively appraise in CMR theory, while customer engagement can be viewed as individual's intricate consequential cognitive and emotional reaction to a consumption experience

when customers compare experiences with prior ones (Sivapalan & Jebarajakirthy, 2017). BB theory provides theoretical support for the relationship between customer's engagement and CVCB. Broaden-and-Build (BB) theory explains that psychosomatic positive emotions such as pleasure, happiness, interest, and affection possess the capability of expanding an individual's temporary thought-action inventories, building durable personal resources range from physical and intellectual capacity to communal and psychological resources. In turn, expanded mentalities build long-term personal resources that work as reserved assets from where individual can draw to deal in future adverse circumstances (Fredrickson, 1998). In this study, engaged customers will evoke positive affective reactions, such as the feelings of happiness, contentment, which according to BB theory can encourage collaborative participation behaviors (Bowden-Everson et al., 2013). Gamified Learning Theory (GLT) provides theoretical support for the moderating effect of Gamification on the relationship between MBSQ and customer engagement. GLT explains that integrating game-like attributes into service can positively stimulate engagement, inspiration, and knowledge acquisition among learners via game elements such as points, badges, leaderboards by means of mediating or moderating process, where Gamification either inspires actions or attitude enhancing learning or augments existing instructional contents that inspire learning-associated behavior (Zaric et al., 2021). In marketing, management and customer behavior fields, GLT has also been influential in explaining how Gamification strategy can be applied to enhance customers' and organizational workforce's learning effectiveness (Nair & Mathew, 2023). By comprehending the intricate influences of Gamification strategy on user's behaviors, GLT can provide an inclusive lens over which academics and practitioners can explore the effectiveness of Gamification inspired behaviors in various contexts. In this research, MBSQ can be viewed as the instructional contents in M-banking service that Gamification features can influence to motivate M-banking service learning and engagement behavior outcomes. And based on the above stated theoretical backgrounds, the hypotheses regarding the relationships among CVCB and each of its identified antecedent factors in this research are presented in the next section.

Hypotheses Development

MBSQ & customer engagement

This research proposes that Chinese customers' perceiving MBSQ positively influences their engagement. This conception is evident in literature as MBSQ is regarded as a vital antecedent of customers' post-interaction behaviors such as involvement and value creation. According to CMR theory, emotion arises from an individual's primary appraisal or cognitive processing on his/her stake and sensory feelings such as pain and pleasure during consumption encounter. If objectives and well-being are tied up by the transaction, then the incurred emotion such as contentment, satisfaction and its intensity will be affiliated to the significance of such objective and feelings, which are utilitarian and hedonic values (Li et al., 2022). For instance, Vayghan et al. (2023) found that hedonic values had significant impact on customer's affective engagement, and Zhao and Bacao (2021) applied CMR theory and found that utilitarian values indirectly affected customer affective engagement via trust in M-banking. Similarly, using CMR theory, Bhatt (2021) found that sensory feelings such as pain and pleasure can be converted into emotive anguish or satisfaction, thus hedonic value positively impacted customer's affective response towards M-banking service. Therefore, based on the above mentioned empirical evidence, we propose the following hypothesis: H1: Utilitarian value Chinese customers perceived positively influences engagement in M-banking service. H2: Hedonic value Chinese customers perceived positively influences engagement in M-banking service.

Customer engagement & CVCB

This research proposes that Chinese customers' engagement positively influences their engagement CVCB, as based on BB theory, positive emotional response such as contentment and satisfaction facilitate conducts, behaviors and continuous deed, thus such positive experiences engage individuals with situations and encourage participation (Hijazi, 2022). This assumption is evident as early studies found that based on BB theory, contended customers tended to display affective reactions enhancing the prospect of reciprocal CVCB action such as offering feedback (Pang, 2021). For example, Ahn and Rho (2021) found affective engagement associated with customer's participation behaviors such as providing comment and facts that are constructive to companies. Similarly, Pang (2021) concluded that Chinese customer's positive affective responses towards social media network technological service significantly impact their participation behaviors, which is consistent with the research results from Hijazi (2022), who found that consumer's affective responses towards M-banking service positively impacted on CVCB. Therefore, this research proposes the following hypothesis: H3: Chinese customer's engagement positively influences their CVCB in M-banking service.

The moderating role of Gamification & generation cohorts

This research proposes that Gamification features in M-banking service have a moderating effect on the relationship between MBSQ and customer engagement. This proposition is evident as according to GLT, Gamification tactic aims to evoke and intensify feelings and attitudes pertinent to learning behaviors through mediation or moderation effects (Landers, 2014). For example, Lu and Ho (2020) found that Gamification can enhance customer's perceived hedonic value such as fun by amusing and letting them escape from tedious daily chores, and enhance utilitarian value in service such as usefulness and convenience by offering feedback on performance. Similarly, based on GLT, Bical and Ispir (2021) found that Gamification moderated user's perceived values and engagement. Therefore, based on the above stated pragmatic support, we can reasonably propose the following hypotheses: H4: Gamification moderates the relationship between Chinese customer's perceived hedonic value and engagement in M-banking service. H5: Gamification moderates the relationship between Chinese customer's perceived utilitarian value and engagement in M-banking service.

This research also hypothesizes that generational differences among Chinese customers' moderates the relationship between their engagement and CVCB. This is evident as prior studies claimed that based on generational theory, generation cohorts' distinctive life experiences will attribute to purchase behaviors such as motivation and engagement, for instance, Moise et al. (2020) found that customer engagement behaviors among baby boomer, generation X, Y, Z were different in Spanish hospitality industry, and Vayghan et al. (2023) concluded that generation X and generation Y customers differed in their engagement behaviors in mobile application service. Therefore, this research proposes its sixth hypothesis as follows: H6: Generational cohort difference among Chinese customers' moderates the relationship between engagement and CVCB in M-banking service. The proposed CVCB model includes all hypotheses as shown in Figure 1.

Methodology

Participants and Data Collection

The target population of this research are Chinese customers with M-banking service experience, which was reported as 1,012,226,660 and roughly evenly distributed across city tiers in China, with new first-tier cities having the largest percentage (22.32%) (Yifan, 2023), which makes it inpractical to apply probability sampling method and choose any particular city in China as a representative sampling frame in this research. Therefore, by adopting purposive sampling method, this proposed study selected the largest first-tier city in northeast China (Shenyang city) as an initial sample collection location, as it had relatively equal gender distribution (male/female = 0.98/1), higher-than-national economic growth (5.9%), lowest provincial illiterate rate (0.46%), and 22 percent migrated population from other provinces in China (Municipal Statistics Bureau, 2022). Participants were firstly recruited from Shenyang city, then snowballling technique was applied in data collection. In order to overcome the limitations of the adopted sampling technique such as the potential issue of introduced bias and results generalizability, the initially recruited participants were purposively selected from various geo-locations and social networks. Moreover, to further promote greater sample diversity and prevent sample participants being drawn from any overly clustered network or group, the number of referrals that each recruited participant could make was limited to two or three. To obtain minimum sample size of 400 (Yamane, 1973), more than 400 questionnaires were distributed. After a pilot study of 100 collected responses,

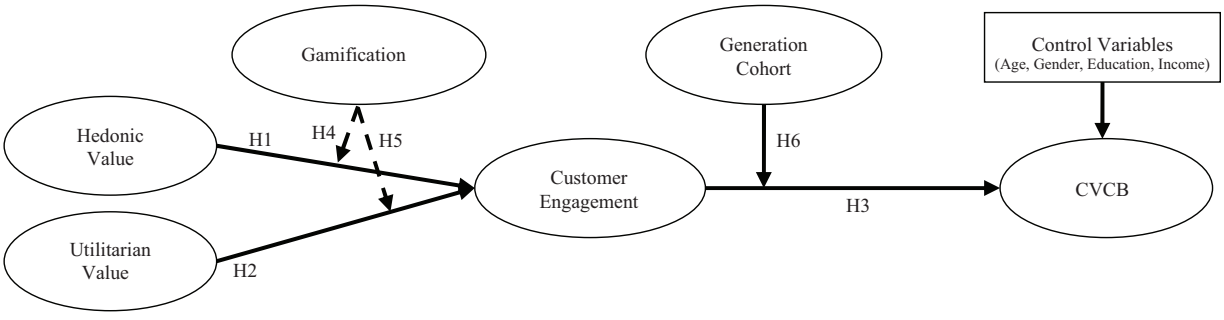


Figure 1 Proposed CVCB model

the proposed measurement instrument's parameters all met threshold criteria signifying a larger scale study was viable. After explaining research objectives, online questionnaire links were forwarded to participants via email, and QR code was sent to them via WeChat application. Self-administered questionnaires were distributed through MS Form online application with cover letters explaining study purpose, and respondents were informed that their responses would be kept confidential. The data collection process took four weeks to complete and yielded 690 usable respondents.

Measures and Data Analysis

The measurement scales applied in this research were adopted from prevailing literature, where MBSQ scale was adopted from Arcand et al. (2017) including utilitarian value dimension (eight items) and hedonic value dimension (five items). Sample items were "It is quicker to complete my banking activities on mobile than in physical bank branch" and "The design (e.g. colors, font size, graphics, animations, etc.) of the mobile banking application/site is professional", respectively. Customer engagement scale was adopted from Hollebeek et al. (2014) including cognitive processing and affect dimensions. Sample items were "Using mobile banking service stimulates my interest to learn more about this mobile banking application." and "I enjoy using this mobile banking application to complete my financial tasks", respectively. CVCB scale was adopted from Yi and Gong (2013) including 29 items such as "When I have a useful idea on how to improve service, I usually let the mobile banking service provider know" and "I usually encourage friends and relatives to use this mobile banking application". All items were measured by a 7-point Likert scale to assess respondents' level of the agreement ranging from 1 (strongly disagree) to 7 (strongly agree). The original questions were translated into Chinese language for participants and the back-translation was then conducted by bilingual experts to ensure the validity of translated texts. The demographic profile summarized by Table 1 showed that the majority of respondents were male (56.2%), aged between 27 and 58 years old (51.6%). It also illustrated that majority sampled participants in this research had a Bachelor degree (31.9%) and income level between 6,000 and 10,000 RMB (45.5%). The statistical analysis began with normality test, validity and reliability tests and common method bias test, followed by multicollinearity test. Hypothesis testing was performed by structural equation modeling (SEM), path analysis and moderation tests using SPSS and AMOS. The control variables that may affect CVCB include age, gender, education and income, for example, Zhu et al. (2022) found that gender and age affect customers in utilizing innovative or advanced application features in M-banking that resulted in CVCB. Also, Zhu et al. (2022)

Table 1 Sample Respondents' Profile

Variable	Category	Frequency	Percent
Gender			
	Female	302	43.8
	Male	388	56.2
Age			
	18-26	121	17.5
	27-42	163	23.6
	43-58	193	28
	59 or above	213	30.9
Education Level			
	Below Bachelor	182	26.4
	Bachelor	220	31.9
	Master	143	20.7
	Doctoral	32	4.6
	Above Doctoral	113	16.4
Income Level (in RMB)			
	Below 3000	45	6.5
	3000-5000	234	33.9
	6000-10000	314	45.5
	Above 10000	97	14.1
Gamification Feature			
	Have	585	84.8
	Not Have	105	15.2

concluded that education enhances communication abilities in providing feedback, assistance, and engaging in CVCB under M-banking context. Moreover, income was associated with individual's economic resources, access to financial literacy and educational services, thus, higher income customers were more enthusiastic towards CVCB in M-banking (Mohan & Potnis, 2015).

Results & Discussion

The normality test was conducted before measurement model testing, and the respective skewness and kurtosis values ranged from 0.085 to -1.257 and -0.71 and 1.705, which both fell within the acceptable ranges (Hair et al., 2019), signifying that data were normally distributed. The convergent validity was assessed by evaluating all items' factor loadings (Hair et al., 2019) while items with lower than threshold factor loadings value of 0.5 were omitted, thus, only Affect dimension remained in CE construct, and five dimensions remained in CVCB construct (Table 2). The composite reliability values were all above or close to acceptable threshold (0.6) and all AVE values were also above or close to minimum values criteria (0.4) (Hair et al., 2019). Although discriminant validity testing in Table 3 showed some concern when comparing square root of the average variance calculated from latent variables with correlations among latent variables, HTMT ratios in Table 4 were all below the ideal threshold values of 0.95 (Henseler et al., 2015) indicating the scale's discriminant validity was acceptable. Reliability was evaluated using Cronbach's alpha coefficients, and all values exceeded threshold value of 0.6 (Henseler et al., 2015), thus the measurement scale's reliability were acceptable. Multicollinearity was assessed using variance inflation factor (VIF) values for all predictor variables including hedonic value (1.584), utilitarian value (1.549), and affect (1.584), which were all below threshold value of 3.3; (Petter et al., 2007) indicated that multicollinearity issue did not present. The common method bias (CMB) test conducted by Harman's one-factor method showed that the highest loading of a single factor was less than 50 percent (31.6%) signifying that CMB was not a concern.

Table 2 Convergent Validity and Reliability Testing

The table presents the results of the convergent validity and reliability testing in SEM model, showing factor loadings for each construct in the measurement model.

Items	Design	Sociality	Practicity	Security	Affect	Cronbach's α
Design_1	(.789)					.908
Design_2	(.804)					
Design_3	(.843)					
Sociality_1		(.802)				.833
Sociality_2		(.780)				
Practicity_1			(.835)			.908
Practicity_2			(.550)			
Practicity_3			(.853)			
Practicity_4			(.742)			
Practicity_5			(.850)			
Security_1				(.776)		.762
Security_2				(.570)		
Security_3				(.798)		
Affect_1					(.521)	.867
Affect_2					(.462)	
Affect_3					(.510)	
	ISR	RB	FEB	HEP	TOL	
ISR_1	(.699)					.812
ISR_3	(.790)					
ISR_4	(.802)					
RB_1		(.596)				.758
RB_2		(.562)				
RB_3		(.707)				
RB_4		(.766)				
FEB_1			(.678)			.754
FEB_2			(.655)			
FEB_3			(.806)			
HEP_1				(.707)		.788
HEP_2				(.531)		
HEP_3				(.738)		

Table 2 Continued

Items	Design	Sociality	Practicity	Security	Affect	Cronbach's α
HEP_4				(.773)		
TOL_1					(.779)	.862
TOL_2					(.705)	
TOL_3					(.777)	

Note: ISR - Information sharing; RB –Responsible behavior; FEB – Feedback; HEP – Helping; TOL – Tolerance

Table 3 Discriminant Validity Testing

The table shows the results of composite reliability and average variance extracted (AVE), and for each construct in the measurement model.

	CR	AVE	AFF	HV	UV	CVCB
AFF	.876	.703	.839			
HV	.558	.387	.768	.622		
UV	.736	.584	.533	.717	.764	
CVCB	.813	.465	.674	.946	.603	.682

Note: CVCB – Customer's value co-creation; HV – Hedonic value; UV – Utilitarian value; AFF – Affect

Table 4 HTMT Ratio

This table presents HTMT ratio values for pairs of constructs in a SEM analysis, comparing them against the threshold value of 0.95 to assess discriminant validity.

	CVCB	UV	HV
CVCB			
UV	.606		
HV	.945	.848	

Note: CVCB – Customer's value co-creation; HV – Hedonic value; UV – Utilitarian value

The SEM analysis results in Table 5 revealed that the fit indices of adjusted CVCB framework (Figure 2) including chi-square statistic, chi-square to degrees of freedom ratio, comparative fit index (CFI), goodness-of-fit Index (GFI), normed fit index (NFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA) were all within threshold ranges signifying that the research framework had good model fit (Kline, 2011). P-values of regression estimates in Table 5 revealed that five indicator factors had significant effect on dependent variables, while utilitarian value and education factors had insignificant effects. Among all positive correlations, hedonic value had the strongest impact on customer engagement (β= .816), which also had strong positive influence on CVCB (β= .604). Moreover, while age factor had a relatively weak inverse effect on CVCB (β= -.138), income factor was found having the strongest positive effect (β= .288) on CVCB among all four control variables included in this study. Therefore, Hypothesis 1 and 3 were supported, Hypothesis 2 was not supported. The moderation effect of Gamification feature was assessed using multiple group analysis method, and results in Table 6 showed that the constrained model specifying the equivalent path coefficients (when Gamification features were present and absent in M-banking service) between hedonic value and customer engagement did not show significant difference when compared with unconstrained model (p=.813), and the same result was also shown between utilitarian value and customer engagement (p=.732). Thus, Hypothesis 4 and 5 were not supported. The moderation effect of generation cohort was evaluated using hierarchical regression analysis method, and after creating centralized variables (Affect_CC, Generation_CC) and interaction term (AFF_CC*GEN_CC), test results in Table 7 indicated that models with and without interactions terms were both statistically significant (p=.000), with 4.4 percent introduced R square change. As interactions term showed significant effect on CVCB in Table 8 (p=.000), the moderating effect of generation difference was confirmed. Thus, Hypothesis 6 was supported.

Table 5 Regression Weight Estimate

This table displays the regression weight estimates for the SEM model, indicating the relationship between variables.

			Estimate	S.E.	C.R.	*P*
AFF	<---	HV	.816	.197	5.495	***
AFF	<---	UV	-.020	.131	-.180	.857
CVCB	<---	AFF	.604	.028	10.04	***
CVCB	<---	AGE	-.138	.017	-3.849	***
CVCB	<---	GENDER	.126	.037	3.596	***
CVCB	<---	EDUCATION	.040	.013	1.167	.243
CVCB	<---	INCOME	.288	.026	7.126	***

Model fit indices: χ^2 = 1098.965 (P < .00), df = 596, χ^2/df = 1.844, CFI = .962, GFI = .922, NFI = .921, TLI =. 957, RMSEA = .035, *** = .001 significance level

Note: CVCB – customer's value co-creation; HV – hedonic value; UV – utilitarian value; AFF – affect.

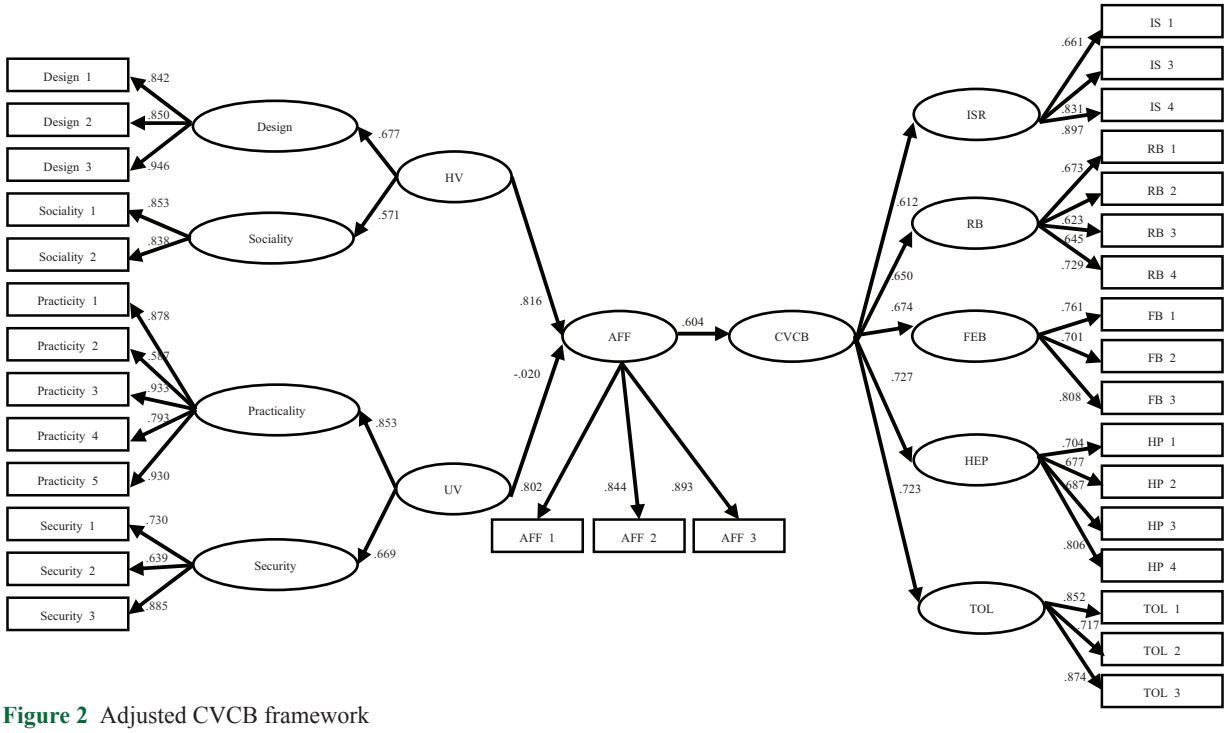


Figure 2 Adjusted CVCB framework

Note: HV – hedonic value; UV – utilitarian value; AFF – affect; ISR - Information sharing; RB –Responsible behavior; FEB – Feedback; HEP – Helping; TOL – Tolerance

Table 6 Constraint Model Comparison

This table presents the results of a Gamification's moderation analysis comparing the performance of two constraint models.

Model	DF	CMIN	*P*	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	23	42.781	.007	.003	.003	.001	.001
Structural weights	36	61.774	.005	.004	.005	.001	.001
Constraint HV	1	.056	.813	.000	.000	.000	.000
Measurement weights	23	42.781	.007	.003	.003	.001	.001
Structural weights	36	61.774	.005	.004	.005	.001	.001
Constraint UV	1	.118	.732	.000	.000	.000	.000

Table 7 Summary of Hierarchical Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
1	.360a	.129	.128	.697	.129	*102.282*	*0*
2	.416b	.173	.170	.680	.043	*36.055*	*0*

a. Predictors: (Constant), AFF_CC

b. Predictors: (Constant), AFF_CC, AFF_CC*GEN_CC

Table 8 Regression Table Summary

This table shows the results of the hierarchical regression analysis examining the moderating effect of generational differences on the relationship between engagement and CVCB.

Model		Unstandardized Coefficient		Standardized Coefficient	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.115	0.027		192.78	0		
	AFF_CC	0.214	0.021	0.36	10.113	0	1	1
2	(Constant)	5.132	0.026		197.13	0		
	AFF_CC	0.189	0.021	0.317	8.937	0	0.959	1.04
	AFF_CC*GEN_CC	0.115	0.019	0.213	6.005	0	0.959	1.04

Dependent Variable: CVCB

Findings from this study showed that perceived hedonic values in MBSQ showed significant impact ($p < .001$) on customer affective engagement, which was consistent with earlier study results claiming that hedonic values can positively impact affective engagement (Vayghan et al., 2023). On the other hand, the findings of this research did not support the hypothesized positive relationship between Chinese customers' perceived utilitarian value and service engagement in M-banking ($p = .857$). Although this evidence contradicts the study results advocated by other researchers (Kim et al., 2013), it should be noted that this research was conducted under M-banking application service context instead of mobile websites service in hospitality settings that was carried out by other scholars (Kim et al., 2013), thus, the contextual variances may contribute to such incongruous results. Moreover, another potential justification for these contradictory conclusions may be the dissimilarities between the recruited samples in these two studies, where Kim et al. (2013) selected a sample comprising mainly younger customers while the recruited sample in this research consisted of various generation cohorts. Although findings from this study did not indicate that customers' perceived utilitarian value positively enhances their engagement in M-banking, this conclusion was also supported by other researchers claiming that utilitarian values may not be adequate in motivating engagement (Vayghan et al., 2023). Also, study results provided empirical support to validate customer's affective engagement's significant positive effect ($p < .001$) on CVCB under M-banking context, which was in line with earlier researches suggesting that customer's positive affective engagement had direct significant impacts on CVCB (Ahn & Rho, 2021). Similarly, results in this research confirmed generation cohorts' moderating effect on customer's engagement (Figure 3), which coincided with prior studies claiming that customers of different age groups displayed dissimilar CVCB (Moise et al., 2020).

Moreover, this study did not find evidence to support Gamification's moderating effect due to the insignificant differences between constrained and unconstrained models; however, such findings did not contradict prior studies explaining that Gamification's moderating effect were determined by a mixture of uncontrollable variables such as instructional content, service quality, or Gamification feature designs, not with one single factor (Kam & Umar, 2023). As Xi and Hamari (2020) explained that, basing on the game mechanics and design related gaming motivations, there are general distinctions among primary categories of Gamification, which includes immersion-related (role-playing and storytelling mechanics), achievement-related (badges, challenges and mission mechanics), and social interaction-related dimensions (competition and team mechanics) that intuitively associated with the customers' intrinsic need satisfaction. And, Xi and Hamari (2020) further found in their empirical research that not all Gamification features positively related to customer service engagement, for instance, immersion-related Gamification features were not related to emotional or cognitive engagement. Koivisto & Hamari (2014) also found in their research study

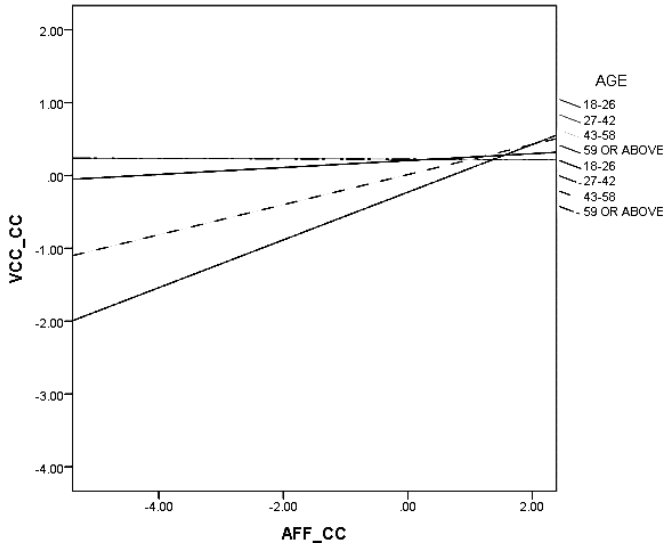


Figure 3 Moderation effect of generational cohorts

that the demographic factors can influence the perceived benefits from gamified service, which may consequently affect customers' service engagement. For example, Koivisto & Hamari (2014) suggested that women appeared to value social aspects of Gamification in service more than males, and females also reported higher perceived convenience and playfulness than males in gamified service. Furthermore, previous studies suggested that Gamification's positive impacts on customers' engagement were likely to lessen over time due to the fact that Gamification features' external rewards including badges and points appeared to become less attractive after their initial novelty (Looyestyn et al., 2017), which was in line with the findings from other researches claiming that Gamified service could experience swift decline in engagement around six months after its initial introduction (Carlson, 2012).

Conclusion and Recommendation

This research extends the body of knowledge on CVCB by bridging several discrepancies remaining in relevant research works. Its theoretical contributions include, firstly, it offers added empirical evidence to validate various direct and indirect effects of four identified antecedent factors on CVCB in a holistic proposed conceptual framework. Secondly, it validated the application of CMR theory and BB theory in explaining the antecedent role that MBSQ and customer engagement played in promoting CVCB in M-banking context, which has not yet been attempted in existing literature. Thirdly, this research found contradicting evidence to question Gamification's moderator role in enhancing customers' engagement in M-banking service, although it can serve as moderator to enhance service experience in various contexts under GLT. Lastly, this study validated the use of generation theory to justify CVCB differences among various Chinese generation groups in M-banking setting. Based on the above stated theoretical contribution of this research and its study findings, this study also offers practical contributions to policy makers at various levels for improving organizational and financial performances. Firstly, given utilitarian values' insignificant effect on customer engagement, Chinese banks' management ought to understand that focusing on functional aspects or utilitarian features (such as convenience and security) in M-banking service can only establish the baseline for customer expectations in a crowded fast-pace digital space, it can no longer distinguish a bank's service in a competitive digital banking market or effectively boost deeper immersive experience and engaging behaviors. That is because apart from the widespread adoption of digital payment service in China, consumers also have access to highly competitive Fintech market where companies (such as Ant Group and Tencent Group) continually innovate to provide smoother, faster experiences that set high standards for all traditional banks and pressure them to offer similarly competent services. Therefore, seamless utility is no longer a differentiating factor in Chinese M-banking sector, instead, it has become customers' baseline demand of service. And to captivate customer interest, Chinese banks now need to go beyond utility functions. Secondly, given the positive effect of perceived hedonic values on customer engagement, bank management in China should pay close attention to the importance of hedonic aspects of M-banking platforms, both the design elements (vivid colors, stylish visual graphics, user-friendly design) that simplifies tasks and streamlines navigation, and the social elements (online staff representatives, customer testimony, supporting community) that reduce customers' financial anxiety and increase their emotional well-being.

Thirdly, considering generation cohort differences' influence on CVCB, both Chinese bank management and the Chinese government should pay attention to customers' behavior differences among different generation cohorts in M-banking service as such the difference not only related to customer's physical condition or cognitive functional abilities, but also that which can be contributed to socio-emotional factors such as perceived value, affective engagement, and significance of interactive digital service in supporting social relations in daily life. Thus, policy makers at various levels should carefully examine their key niche customer groups and consider adopting generation oriented measures such as user-friendly application graphic designs, personalized information and service to meet unique needs of customers from different age groups so as to improve engagement and CVCB. For instance, while mobile banking service with simplified navigation, larger text fonts, basic biometric authentication and easier accessible customer service alternatives are recommended for older customer groups, younger customers would require advanced services such as two-factor authentication and blockchain-based functionality with more interactive, gamified experiences that incorporate various innovative features and solutions such as investment tools, personal assets management, crowd-funding platforms, peer-to-peer lending and integration with social media platforms (WeChat or Alipay), which would significantly enhance younger customers' CVCB in mobile banking service.

Fourthly, considering Gamification feature's insignificant moderation effect on customer engagement found in this study, Chinese banks' management are advised to carefully evaluate the application feasibility and effectiveness of such intricate marketing strategy in M-banking service. As Gamification's design and mechanics are intuitively associated with the customers' intrinsic needs, banks' management must be able to differentiate such customers' service motivations and consider the contextual differences in customer engagement when implementing Gamification features in service. For instance, customer engagement operates differently in utilitarian services context such as healthcare and banking that are more instrumental and outcome-oriented when comparing with hedonic services context such as social media or entertainment, that generally promote greater emotional and affective engagement (Barrett et al., 2024). Therefore, Chinese banks' management must precisely align their Gamification design in M-banking with customers' goal expectations, so as to prevent banks' non-instrumental or ill-fitting Gamification features from creating negative sentiment or reduce customer engagement and CVCB. While although the above recommendations for improving customer engagement and CVCB are tailored to Chinese cultural settings, some elements may also be adapted for other national contexts that are similar to Chinese's collectivist philosophies, such as in many Asia and Latin America countries where customers may respond favorably to social benefits and group-oriented goals.

Despite the significant findings, this study has a few limitations that need to be addressed. Firstly, its study results were based on a rather small sample of Chinese customers recruited using non-probability sampling method at the time of this study from only one of the cities in China. Considering China's substantial cultural and economic diversity across its regions, the customer behaviors can vary significantly between, for instance, more developed coastal regions and less developed inland regions, so the chosen sampling design and sample size of this study may lead to higher sampling error or not accurately capture the diverse behaviors, attitudes, and demographics of the broader population of Chinese M-banking users, thus limiting the generalization of research findings to the entire Chinese population. Moreover, the M-banking technology in China evolves swiftly with new features and emerging applications, which implies that findings from one sample drawn at a single point in time may quickly become obsolete and limit the research results generalizability to future behaviors. Therefore, to overcome the methodological and temporal limitations as well as validating the research findings accuracy of this study, future similar researches should consider adopting probability sampling technique to investigate larger and diverse customer groups in longitudinal studies so as to improve the robustness and applicability of findings and capture a more comprehensive and evolving view of CVCB in M-banking. Second, the research instrument applied in this research was structured questionnaire surveys, which may contain personal bias in the collected responses. Third, this research measured CVCB with first-order construct, although it can also be further divided into sub-dimensions such as participation and citizen behaviors using higher order construct as suggested in literature for further investigation. Fourth, this research was cross-sectional in design, so the causal relations among variables requires confirmation through longitudinal studies due to technological advancement and the dynamic M-banking industry environment. Finally, this study applied a broad parsimonious higher order research model with aggregated indices aiming to represent and measure a holistic CVCB framework and lay groundwork for future research. However, the absence of granular details in disaggregated indices will inevitably lead to the missing of detailed and precise measurements of specific CVCB antecedent factor dimensions, which may hinder the accurate recommendations provided for academics and practitioners. Therefore, future research can alternatively attempt to apply lower order construct model with disaggregated indices, as well as the integration of more CVCB antecedents such as customer trust, motivation, and other relevant emotional factors in the framework to develop a more robust CVCB model.

Conflict of Interest

The author declares that there is no conflict of interest.

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Appendix

Table 9 Measurement items adopted in research

Dimensions	Measurement Items	Sources
Hedonic Value		
Design / Aesthetics	The design (e.g. colors, font size, graphics, animations, etc.) of the mobile banking application/site is professional.	Arcand et al. (2017)
	The design of the mobile banking application/site is creative.	
	Overall, the design of the mobile application/site is visually appealing.	
Sociality	I can chat online with a customer service representative of the bank when I need it on my mobile.	
	The bank offers relevant customers' testimonials on mobile banking application.	
Utilitarian Value		
Practicity	It is quicker to complete my banking activities on mobile than in physical bank branch.	Arcand et al. (2017)
	Banking is convenient on mobile.	
	The effectiveness of my banking activities is enhanced on mobile.	
	On mobile, it is easy to find what I am looking for.	
	Overall, mobile banking is very easy to use.	
Security / Privacy	I think that the personal information that I provide on mobile is well protected.	
	I think that online transactions carried out on mobile are secure.	
	I think that the confidentiality and privacy of my personal information is assured when I do mobile banking.	
Cognitive Processing	When I use mobile banking service, I often tend to use this mobile banking application than using other companies' application.	Brodie (2014)
	Using mobile banking service stimulates my interest to learn more about this mobile banking application.	
	Anything relevant to this mobile banking application seeks my attention.	
Affect	It feels good when someone say nice things about this mobile banking application.	
	I feel enthusiastic about features (e.g. real-time information, new tech functions, rewards, etc.) provided on this mobile banking application.	
	I enjoy using this mobile banking application to complete my financial tasks.	
Information seeking	I ask others (e.g. friends, family members, co-workers, etc.) for information on what this mobile banking application offers.	Yi & Gong (2013)
	I search for information on where this mobile banking application is offered.	
	I pay attention to how others (e.g. friends, family members, co-workers, etc.) behave to use this mobile banking application well.	
Information Sharing	I clearly explain what I want the bank employee to do via this mobile banking application.	
	I provide the proper information on this mobile banking application.	
	I provide necessary information so that mobile banking performs efficiently.	
	I answer all the mobile banking's service-related questions.	
Responsible behavior	I perform all the tasks (e.g. setting secure password, regularly updating application, logging out after use, etc.) that are required on this mobile banking application.	
	I adequately complete all the expected behaviors (e.g. safeguard personal information, monitoring account activity, etc.) on this mobile banking application.	
	I fulfill responsibilities to the business on this mobile banking application.	
	I follow the directions or orders on this mobile banking application.	
Feedback	When I have a useful idea on how to improve service, I usually let the mobile banking service provider know.	
	When I receive good service from mobile banking application, I usually comment about it.	
	When I experience a problem, I usually let the mobile banking service provider know.	
Advocacy	I usually say positive things about this mobile banking application and the mobile banking service provider to others.	
	I usually recommend this mobile banking application and the mobile banking service provider to others.	
	I usually encourage friends and relatives to use this mobile banking application.	
Helping	I assist other customers if they need my help.	
	I help other customers if they seem to have problems.	
	I teach other customers to use this mobile banking application correctly.	
	I give advice to other customers.	
Tolerance	If mobile banking service is not delivered as expected, I usually put up with it.	
	If there is a mistake during mobile banking service delivery, I can usually be patient.	
	If I have to wait longer than I normally expect to receive the banking service, I can usually adapt.	