Research Article

Using Hunan industrial and commercial bank as a case study, this paper examines the factors that influence customer loyalty in mobile banking

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ABSTRACT

This research examined the factors that affect customer loyalty in mobile banking within the Hunan Province in China using quantitative research approaches. The TAM and UTAUT2 were used to test the hypotheses on the links between mobile app ambiance, perceived trust, perceived ease of use, perceived usefulness, perceived satisfaction, and perceived loyalty. In this study, mobile app ambiance specifically refers to elements like visual design, user interface quality, and feature integration. A cross-sectional survey involved 484 ICBC mobile banking users who completed self-administered questionnaires, and 20 in-depth interviews were conducted to provide qualitative insights into customer perceptions of loyalty. The study affirmed that mobile app ambiance had a significant influence on perceived usefulness, perceived trust, and perceived satisfaction and, therefore, customer loyalty. The findings of the present study provided practical solutions for enhancing customer loyalty in mobile banking.

Keywords: mobile banking; customer loyalty; technology acceptance model (TAM); mobile app ambiance; perceived trust; customer satisfaction.

1. Introduction

1.1. Background of the study

Mobile banking can be explained as the use of a mobile phone in conducting banking operations through mobile devices since there is a high adoption of mobile phones and advanced mobile technologies such as Smartphones[4]. The concept of portable device banking services was initiated in the late twentieth and early twenty first century when mobile phones transited from basic communication devices to more complex ones[19]. Mobile banking in its inception was basic and only included features such as balance check and transaction notifications by text. These basic services enabled the customers to know their account status at their convenience at any given time in their daily lives.

However, even as mobile devices grew more sophisticated, so did the mobile banking services that accompanied these devices. With the arrival of smart phones and the increasing use of the mobile internet, the creation of banking apps was advanced even more. As the usage of mobile phones grew, banks started launching their own applications for mobile banking, which not only included money transfer between banks, within the same bank accounts, to other third parties but also different tools of fund management[4]. The availability of these services made it possible for customers to perform more elaborate banking operations from their mobile devices which changed the way customers relate to the financial institutions[16] .

Users are now able to use mobile banking applications to verify their ledger entries and financial history, transact, and even set up instructions such as bill payment instructions that are continuously repeated. These services make customers enjoy the benefit of being served without having to physically visit the bank's physical location. Therefore, mobile banking has emerged as one of the most important segments of the current financial systems, allowing customers to perform various operations with their money, regardless of their location provided they have access to the Internet.

1.1.1. Research gaps

Prior research has highlighted the main issues and trends associated with the mobile banking apps and their usability and performance. The literature review has indicated that perceived ease of use is an important determinant of customer loyalty[46]. Nevertheless, issues concerning registration, interface design, and accessibility remain the major barriers to the effectiveness and satisfaction of the mobile banking platforms[52]. For example, in China, the registration for mobile banking is quite rigorous often involving several steps of verification and sometimes physical visits to the physical banking hall to conduct some forms of identification. This process takes a long time and is complicated and this can dissuade customers from fully taking advantage of mobile banking services[48].

In addition, the current mobile banking applications developed by different banks in China are not standardized and this may cause confusion to the customers. Various designs, symbols, and arrangement of menus also create confusion to the users in finding out some of the basic functions[51](pp.160-178). This lack of standardization hampers the overall functionality of the mobile banking applications especially to elderly customers and those with lower education standards [44](pp.89-106). Moreover, it also found that there is no accessibility feature for the disabled, which aggravates these problems and hinders the expansion of mobile banking services [50](pp.120-137).

Another factor that also influences customer loyalty is perceived usefulness. Mobile banking in China continues to offer few options for personalization to customers, which hinders the ability of customers to develop a preferred mobile banking experience [20](pp78-96). In addition, the lack of compatibility with other applications, for instance, accounting software minimizes the usefulness of such platforms [33](pp.98-120). As a result, the customers may consider these platforms as less helpful hence reducing their usage frequency [35](pp.87-100).

1.2. Research significance

1.2.1. Theoretical significance

This research is useful in the development of the theoretical model known as the Technology Acceptance Model (TAM), which identifies perceived usefulness and ease of use as determinants of technology acceptance by the user [2]. As a result, this study improves the theoretical knowledge of TAM and confirms its relevance in the mobile banking environment of Hunan, China [17] while considering how these factors affect the customer loyalty in mobile banking. In addition, the study builds on the UTAUT2 model,

specifically on performance expectancy, effort expectancy, social influence, and facilitating conditions to investigate user behavioral intention and actual technology use [30](pp.132-147).

1.2.2. Practical significance

From a practical point of view, identifying the antecedents of customers' behavioral intention to use mobile banking services especially with reference to ICBC in Hunan Province offers useful information to the bank's managers and policy makers. These understanding help the managers to formulate strategies that would better address the customers' needs and improve the mobile banking experience [2](5354-5373). Enhancing usability, perceived usefulness, and trust will go a long way in increasing customer loyalty of the financial institutions which is crucial for sustainable business and customer patronage[52](102-115).

In the case of policymakers, the research provides recommendations on enhancing the legal environment of mobile banking services. It also highlights the need to promote data security and privacy measures, which are critical for building customer trust in mobile banking applications [20](pp.78-96).

1.3. Research questions

The following research questions guide the investigation:

What is the relationship between the mobile application ambiance and customer loyalty?

What are the relationships between mobile application ambiance, perceived usefulness, perceived ease of use, satisfaction, perceived trust, and loyalty?

How does the mobile application ambiance influence customer loyalty?

1.4. Research objectives

The objectives of this study are:

To determine the relationship between mobile application ambiance and customer loyalty.

To identify the impact of mobile application ambiance, perceived usefulness, perceived ease of use, satisfaction, and perceived trust on loyalty.

To explore how mobile application ambiance influences customer loyalty.

To explore strategies for enhancing customer loyalty in mobile banking.

2. Literature review

2.1. Research content

The background of this research focuses on mobile financial management within the Hunan Provincial Branch of the Industrial and Commercial Bank of China (ICBC) to enhance customer loyalty. ICBC has consistently ranked first in the China Mobile Banking Competitiveness Top 100 Rating System, with a total score of 97.71 in 2022. This ranking underscores ICBC's leadership in mobile banking, positioning it as an ideal case for examining factors influencing customer loyalty. Hunan's financial development has grown rapidly, which has led to this development[40,49](pp117-130,pp125-145). This chapter focuses on the existing theories and antecedents of customer loyalty with reference to the TAM and the UTAUT2 models.

2.1.1 .Mobile banking customer loyalty

Customer loyalty refers to customers' strong preference and inclination toward a specific brand, product, or service. In the case of mobile banking, customer loyalty pertains to a consistent commitment to a bank's mobile banking services. It encompasses customer satisfaction and willingness to repeatedly use the services

of a particular bank over other competitors [40](117-130). Loyalty also generates intangible value through customer recommendations and brand advocacy, creating a competitive edge for financial institutions[51] 160-178). Mobile banking loyalty provides stability, enhances brand recommendations, and contributes to business growth by creating positive word-of-mouth.

The advantages of customer loyalty in mobile banking are immense. Loyal customers are likely to make repeated purchases, recommend the bank's products or services, and contribute to increased customer retention rates. By securing customer loyalty, mobile banking institutions can improve market competitiveness, enhance sales figures, and promote long-term sustainability. Moreover, loyal customers are less likely to be swayed by other competing brands, which ensures better customer retention [2](pp.5354-5373).

Despite its advantages, mobile banking customer loyalty faces significant challenges. For instance, intense competition in the mobile banking industry leads to frequent customer switching between services. Security risks related to mobile banking operations, such as illegal data collection, fraud, and data breaches, also erode customer loyalty [50]120-137). This challenge is heightened by technological barriers, such as poor user interface designs, complex navigation, and the absence of accessibility features, which limit usability for certain demographics. These factors are particularly challenging in the context of China, where financial education and digital literacy levels are low[52] (102-115).

2.1.2. Challenges to mobile banking customer loyalty

One of the major issues affecting mobile banking loyalty is high level of competition. Since many banks have developed mobile applications to enable customers to access their accounts and other related services, customers frequently transfer to other service providers who provide added services or superior offers. Also, the customers who are using mobile banking have often raised issues of security since information transmitted and received involves personal and financial details. This means that without proper security measures in place mobile banking is likely to suffer the loss of its users to other more secure platforms[2] (pp.5354-5373).

Another major challenge stems from poor user experience, which affects mobile banking loyalty. Customers expect a fast, convenient, and user-friendly interface. In cases where the banking platform lacks intuitive design, efficient navigation, or user support services, customers are likely to switch to other, more efficient options [53](pp.120-137). In rural areas, digital literacy and internet connectivity limitations further hinder adoption and retention, as customers may struggle to navigate digital banking platforms effectively [48](pp.165-180).

2.1.3. ICBC of Hunan province

Hunan Province has experienced a significant expansion in mobile banking adoption. In May 2023, Hunan ranked first nationwide for its growth rate of mobile banking users, which stood at 6.7% [45](pp.60-79). ICBC in Hunan leads the digital banking space, providing services such as personal savings, corporate loans, and international settlements. The bank's significant influence in the local economy makes it an ideal subject for studying customer loyalty trends in mobile banking. This study uses ICBC Hunan as a focal point to understand how loyalty can be cultivated and sustained in a competitive mobile banking environment. [52](pp.102-115)

2.1.4. Overview of perceived trust

Perceived trust can be described as the amount of confidence customers have in an organization regarding the organization's reliability, truthfulness, and security of their information. Security is the main reason customers are required to entrust the mobile banking platforms with their financial information. The

perceived trust of mobile banking services is the extent of confidence that the customer has in the institution and the credibility of the banking services in terms of data privacy and secure transactions. In mobile banking, trust is foundational; without it, customers are unlikely to adopt or remain loyal to digital financial services [52](102-115).

2.2. Parent disciplines

Two theoretical frameworks applied in this research are the Technology Acceptance Model and the UTAUT2 model. These models offer a clear and sharp dichotomy of user acceptance and adoption of mobile banking.

Fred Davis devised the Technology Acceptance Model (TAM) in 1989, which is grounded in technology usage. TAM has three main constructs: perceived usefulness, perceived ease of use, and usage behaviour intention [2](pp.5354-5373). In TAM, perceived usefulness is defined as the degree to which the user perceives that using a specific system will enhance their performance, while perceived ease of use measures how user-friendly the system is perceived to be. TAM is well accepted as an accurate measure of technology adoption across sectors, including mobile banking.

UTAUT model has been further expanded in UTAUT2 where performance expectancy, effort expectancy, and social influence are added factors. UTAUT2 integrates hedonic motivation, price value, and habit, which are especially important for studying continued use in mobile banking, as noted by [2](pp.5354-5373). In the context of mobile banking, UTAUT2 can explain continued use of services based on the perceived customer expectations, perceived social influence and perceived usefulness.

2.3. Direct disciplines

This research concluded that perceived ease of use is a predictor of mobile banking loyalty. Customer loyalty is directly affected by the complexity or difficulty in using the platforms, where customers turn elsewhere. The literature review highlighted the fact that customer perceived usefulness of the website contributes to customer satisfaction as well as customer loyalty [50](pp.120-137). Customers feel like using a platform that they found easy to use and one that meets their needs. Perceived usefulness may be defined as the extent to which customers believe that mobile banking helps them in addressing their financial transactions needs. The study establishes that usability of the mobile banking applications and quality of service increases satisfaction and loyalty. Hypothesis analysis sustains the fact that perceived usefulness has a positive impact on loyalty because the users are likely to remain loyal to the platforms that help in saving time and efforts to manage their finances [1](pp.503-519).

Perceived trust also significantly influences customer loyalty, particularly given the sensitive nature of mobile banking services. Research shows a positive correlation between security measures within mobile banking platforms and customer loyalty levels. Furthermore, the level of trust users have in a bank's brand, reputation, and customer support influences their commitment to the platform [2](pp.5354-5373).

2.4. Theoretical model and hypothesis statements

This research builds on two theoretical frameworks, namely the technology acceptance model and the updated technology acceptance and use of technology in everyday life model to investigate the factors affecting customer loyalty in mobile banking. The research postulates that mobile app ambiance, perceived usefulness, perceived ease of use, satisfaction, and perceived trust have significant impact on customer loyalty. The empirical model also brings out the direct and indirect links between these factors, giving a clear picture of the customer loyalty trends in the mobile banking context.

5

2.4.1. Direct impact hypotheses

Several hypotheses are drawn from the empirical model:

H1: Mobile app ambiance positively impacts customer loyalty.

H2: Perceived usefulness positively affects customer loyalty.

H3: Perceived ease of use significantly influences customer loyalty.

H4: Customer satisfaction directly contributes to customer loyalty.

H5: Perceived trust is positively associated with customer loyalty.

2.4.3. Indirect effects hypothesis

This section focuses on the mediated relationship between customer satisfaction and the mobile app ambiance and loyalty. Furthermore, perceived trust is expected to moderate the relationship between mobile app ambiance and loyalty, establishing the importance of trust in achieving customer loyalty to mobile banking services [51](pp.160-178).

2.5. Conclusion

The literature review shows that perceived ease of use, perceived usefulness, and perceived trust have a significant influence on customer loyalty in mobile banking. Moreover, the present study uses the TAM and UTAUT2 models as a solid theoretical background for assessing customer behavior and finding out the key drivers of loyalty. Hence, while mobile banking advances, it is imperative for banks to focus on improving the usability, security and perceived value in order to increase customer loyalty.

3. Methodology

3.1. Overview of research paradigm and theoretical basis

This research adopted a quantitative approach in establishing factors that affect customer loyalty in mobile banking in Hunan, China particularly on the users of ICBC. The research employed both the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) as theoretical frameworks. TAM focuses on perceived usefulness and perceived ease of use as the key factors influencing the user's acceptance of technology, on the other hand, UTAUT2 builds upon this with social influence, effort expectancy and facilitating conditions as other factors. The models used in this study include; Mobile application ambiance, perceived trust, perceived usefulness, satisfaction, and customer loyalty in mobile banking. The chosen research paradigm dictated the choice of the research techniques, data collection and analysis strategies that would yield empirical results consistent with the theoretical postulations on the determinants of customer loyalty.

3.2. Quantitative research

3.2.1. Research tools

Descriptive research design was used to validate study hypotheses through statistical testing of relationships between variables; mobile app ambiance, perceived trust, satisfaction, and loyalty. To avoid ambiguity in measuring these relationships, clear definitions and measures of each variable were developed. Mobile Ambiance can be described as attributes of the mobile context, which depend on such aspects as, for example, convenience of navigation and appearance. "Perceived usability" is the perceived ease with which the users can use the application while "Perceived utility" is the perceived relevance of the system to the user needs. "Perceived trust" is defined as the level of trust users have in the service and its reliability, security,

and integrity. Finally, "Customer Satisfaction" gauges the level of satisfaction of the customers with the service and the more satisfied customers are likely to be loyal. By operationalizing these variables it was possible to accurately measure and analyze the various aspects of customer loyalty.

3.2.2. Data collection

Data collection was centered around capturing the current levels of customer loyalty with the mobile banking services. The target population was the ICBC customers and managers in Hunan province so as to capture different views from the population. The participants for this study were purposively chosen with a view of having a rich experience in mobile banking. The survey collected data from 484 respondents, who are mobile banking users and branch managers, and 28 participants were interviewed for further information on loyalty. Survey data included variables of mobile ambiance, usability, utility, trust, and satisfaction. This mixed approach enhanced the credibility of the data collected as it did not only capture general user trends but also qualitative data from the experienced users enriched the study.

3.2.3. Data analysis

A set of procedures was followed to establish validity and reliability in quantitative data analysis. First, the survey was pretested for its reliability, and changes were made depending on participants' responses. Cronbach's Alpha was calculated to test for internal consistency; results above 0.7 are considered acceptable in terms of item reliability for the survey. Measurement models' construct validity was tested using Confirmatory Factor Analysis (CFA) while assessing the model fit by using; chi-square/degree of freedom ratio, RMSEA and CFI. These indices provided empirical evidence for the theoretical model by establishing that the data analyzed were consistent with the hypothesized correlations between mobile ambiance, perceived trust, usability, utility, satisfaction, and customer loyalty. It is noteworthy that such strict analysis procedures helped to guarantee the relevancy and significance of the obtained research outcomes.

3.4. Operationalization of variables

In order to assess the constructs of customer loyalty in mobile banking, each variable was defined by specific parameters. For instance, "Mobile Ambiance" was assessed in terms of perceived site navigation, site aesthetics, response time and organization of content. Perceived usability was measured by questions related to the accomplishment of tasks and the organization of information within the application. "Perceived Utility" assessed the app functions, for example, the value of transaction processing and account monitoring for the users. "Perceived Trust" involved rating security measures, data protection policies, and users' confidence in the system. Lastly, "Customer Satisfaction" was assessed by how well users felt the app and service met their needs. Operationalizing these variables facilitated precise data collection and analysis for loyalty measurement.

3.5. Sampling methodology

The sampling approach aimed to capture diverse user and managerial perspectives within Hunan Province. Participants were purposely selected based on their use of mobile banking services or management experience at ICBC branches. This approach allowed the study to gather a wide range of views from users with varied mobile banking experience, from one year to over ten years, and managers with insights into operational and strategic aspects of mobile banking. Such criteria ensured that participants possessed prior experience relevant to the study's focus on customer loyalty in mobile banking.

3.6. Pilot testing

To ensure the main survey questionnaire's validity and reliability, a pre-test was conducted. A small sample of participants meeting the study's inclusion criteria reviewed the survey, providing feedback on

question clarity and relevance to the research topic. Cronbach's Alpha was used to assess internal consistency, confirming that the scales measured constructs accurately and reliably.

4. Result

This chapter presents the findings of the quantitative survey which was conducted among 484 participants who were users of ICBC mobile banking in Hunan Province. The study aims at testing the hypotheses that mobile app ambiance is positively related with perceived usefulness, perceived ease of use, perceived trust, satisfaction, and customer loyalty. The data analysis was conducted with the use of SPSS and AMOS which included reliability tests, descriptive analysis, CFA and SEM.

4.1. Description statistical analysis

4.1.1. Sample description statistical analysis

The study's sample consisted of 484 valid respondents, representing a diverse demographic. The sample included both male (46%) and female (54%) participants, with ages ranging from under 20 to over 60 years old. Most respondents were between the ages of 21 and 30 (46%), followed by those under 20 (36%). The educational background of participants varied, with 48% holding a specialty degree, 24% a bachelor's degree, 27% a master's degree, and 1% holding a doctorate. The respondents also represented different cities across Hunan, ensuring geographic diversity in the sample. **Table 4.1** summarizes the demographic characteristics.

Table 4.1. Demographic characteristics of survey respondents.

Characteristics	Categories	Frequency	Percentage (%)
Gender	Male	221	46%
	Female	263	54%
Age	Under 20 years	174	36%
	21-30 years	221	46%
	31-59 years	61	12%
	Over 60 years	28	6%
Education Level	Specialty	115	48%
	Bachelor's	230	24%
	Master's	133	27%
	Doctorate	6	1%
Years of Mobile Banking Use	1-3 years	272	56%
	3-5 years	114	24%
	5-10 years	98	20%

4.1.2. Variable description statistical analysis

A five-point Likert scale was used in the survey to measure various constructs, including mobile app ambiance, perceived usefulness, perceived ease of use, perceived trust, satisfaction, and customer loyalty. The mean scores for each variable indicated positive responses, with scores above 3 suggesting an upper-middle level of agreement among participants. **Table 4.2** presents the descriptive statistics for each variable.

Table 4.2. Descriptive Statistics of Variables.

Variable	Number of Samples	Mean	Standard Deviation
Mobile App Atmosphere	484	3.480	0.755
Perceived Usefulness	484	3.436	0.712
Perceived Ease of Use	484	3.515	0.798
Perceived Trust	484	3.560	0.695
Satisfaction	484	3.509	0.732
Customer Loyalty	484	3.636	0.689

4.2. Reliability and validity analysis

To ensure the reliability and validity of the measurement model, Cronbach's Alpha and Confirmatory Factor Analysis (CFA) were conducted. Cronbach's Alpha coefficients for each construct exceeded the recommended threshold of 0.7, indicating good internal consistency.

4.2.1 Reliability analysis

The reliability of the survey instruments was established using Cronbach's Alpha. The findings revealed that all the constructs had high reliability as presented in **Table 4.3** below. The Cronbach's Alpha of each variable was more than 0.7, which supported the reliability of the responses as the multiple items capture the same construct.

Table 4.3. Reliability analysis of variables

Variable	Cronbach's Alpha	Number of Items
Mobile App Atmosphere	0.805	4
Perceived Usefulness	0.818	4
Perceived Ease of Use	0.873	4
Perceived Trust	0.920	5
Satisfaction	0.885	5
Customer Loyalty	0.876	5

4.2.2. Validity analysis (confirmatory factor analysis)

The construct validity of the measures used was tested using Confirmatory Factor Analysis (CFA). The fit of the proposed model was evaluated by CMIN/DF, RMSEA, SRMR, GFI, AGFI, NFI, IFI, TLI, and CFI.

The results showed satisfactory model fit: The values of CMIN/DF were less than 3, RMSEA was below 0.08 and other indices were greater than 0.9, which suggests a reasonable fit of the proposed theoretical model to the data collected. **Table 4.4** shows the fit indices corresponding to the measurement model.

Table 4.4. Model fit indices for CFA.

Fit Index	Recommended Standard	Observed Value
CMIN/DF	< 3.0	1.798
RMSEA	< 0.08	0.041
SRMR	< 0.08	0.013
GFI	> 0.9	0.921
AGFI	> 0.9	0.905

Table 4. (*Continued*)

Fit Index	Recommended Standard	Observed Value
NFI	> 0.9	0.910
IFI	> 0.9	0.915
TLI	> 0.9	0.912
CFI	> 0.9	0.924

4.3. Structural Equation Modelling (SEM) results

The structural equation modelling (SEM) analysis was carried out to confirm the proposed relationships between the variables: mobile app ambiance, perceived usefulness, perceived ease of use, perceived trust, satisfaction, and customer loyalty. The analysis of data obtained through SEM provided evidence for the proposed model and indicated that all the constructs were positively related.

4.3.1. Path Analysis

The path coefficients from the SEM analysis indicated the strength and direction of the relationships between the variables. Mobile app ambiance was found to have a direct positive effect on perceived ease of use ($\beta = 0.52$, $p < 0.001$), perceived usefulness ($\beta = 0.48$, $p < 0.001$), and perceived trust ($\beta = 0.54$, $p < 0.001$). These variables, in turn, had significant positive effects on customer satisfaction and loyalty. Satisfaction was also a significant mediator between perceived trust and customer loyalty. **Table 4.5** provides the path coefficients for the structural model.

Table 4.5: Model Fit Indices for CFA.

Path	Standardized Coefficient (β)	p-value
Mobile App Atmosphere → Ease of Use	0.52	<0.001
Mobile App Atmosphere → Usefulness	0.48	<0.001
Mobile App Atmosphere → Trust	0.54	<0.001
Ease of Use → Satisfaction	0.63	<0.001
Usefulness → Satisfaction	0.45	<0.001
Trust → Satisfaction	0.57	<0.001
Satisfaction → Customer Loyalty	0.68	<0.001

4.3.2. Mediation analysis

A mediation analysis was conducted to evaluate the indirect effects of mobile app ambiance on customer loyalty through perceived ease of use, perceived usefulness, perceived trust, and satisfaction. The results indicated significant indirect effects, confirming that satisfaction serves as a mediating variable between these constructs and customer loyalty. The indirect effect of mobile app ambiance on customer loyalty, mediated by satisfaction, was significant ($\beta = 0.45$, $p < 0.001$), suggesting that enhancing customer satisfaction can substantially increase loyalty.

4.4. Hypothesis testing

The study's hypotheses were tested based on the path coefficients obtained from the SEM analysis. All hypotheses were supported, indicating significant positive relationships among the key variables. The findings suggest that mobile app ambiance positively affects perceived usefulness, ease of use, and trust, which, in turn, positively influence satisfaction and loyalty.

H1: Mobile app ambiance positively influences perceived ease of use.

The hypothesis is supported, with a significant path coefficient (β = 0.52, p < 0.001), indicating that a well-designed mobile app ambiance contributes to users' perceptions of ease of use.

H2: The study also found that mobile app ambiance has a direct positive effect on the perceived usefulness of the app.

This is supported with a path coefficient of β = 0.48 (p < 0.001), which means that when the app ambiance is appealing and well-organized users find mobile banking more useful.

H3: Mobile application environment has a positive impact on perceived trust.

The above hypothesis is confirmed (β = 0.54, p < 0.001), which shows that the perceived ambiance of the app is instrumental to the level of trust that customers have in mobile banking services.

H4: Ease of use as perceived by the customer affects satisfaction.

The hypothesis is supported, and the path coefficient is found to be quite large (β = 0.63, p < 0.001). From this we can deduce that the more the ease of use of the app the more the satisfaction of the overall experience.

H5: The results show that perceived usefulness has a direct positive correlation with satisfaction.

Signifying that users who perceive that the app is useful to them will be satisfied, the path coefficient is β = 0.45, p < 0.001.

H6: Trust perceived has an impact on satisfaction.

The hypothesis is confirmed with a high path coefficient of (β = 0.57, p < 0.001) suggesting that perceived trust in the reliability and security of the app enhances user satisfaction.

H7: Customer satisfaction has a positive relationship with customer loyalty.

This hypothesis is fully supported by the present study with the path coefficient of β = 0.68, t = 9.18, p < 0.001 which indicates that increased satisfaction level results in increased customer loyalty.

4.5. Discussion of findings

The findings show that there are highly significant correlations between mobile app ambiance and other factors including perceived ease of use, perceived usefulness, and perceived trust. This shows that the positive influence of these factors on satisfaction strengthens the impact of these factors on customer loyalty. The results of the study are consistent with the TAM and the UTAUT2, where user perception of ease of use and usefulness of the technology, and social influences and facilitating condition are significant in the use of technology. Direct effect of mobile app ambiance on trust is quite high indicating that design factors are crucial in creating a safe and credible environment. This finding is especially important in the case of mobile banking since trust plays a crucial role in users' interactions. Second, satisfaction as a mediator is highly significant, which suggests that increasing the overall quality of the user experience is the way to increase loyalty.

4.6. Summary

The quantitative analysis gave the validity of the proposed relationships between mobile app ambiance, perceived ease of use, perceived usefulness, perceived trust, satisfaction, and customer loyalty. All the hypotheses were supported and the study showed how the mobile app ambiance influenced the perception and loyalty of users in mobile banking. The findings highlight the importance for financial organizations to

adopt user experience design, improve the interface, and consistently deliver trust and satisfaction to build customer loyalty.

5. Discussion

The quantitative analysis results reveal that several factors significantly affect customer loyalty in mobile banking, specifically mobile app ambiance, perceived ease of use, perceived usefulness, perceived trust, and satisfaction. The findings support the hypothesis that mobile app ambiance notably influences perceived ease of use, usefulness, and trust. These results highlight the crucial role of app design and features in shaping user experiences, particularly in mobile banking, where design factors heavily impact user perceptions.

The high correlation between perceived ease of use and satisfaction shows customers' appreciation of ease in using and accessing mobile banking. This is consistent with the TAM that argues that the likelihood of a technology being adopted is directly related to perceived ease of use. The high path coefficient between ease of use and satisfaction shows that usability is playing a major role in satisfaction of the customers in mobile banking.

Perceived usefulness also has a moderate and significant relationship with satisfaction supporting TAM that perceived usefulness influences both acceptance and satisfaction. Mobile banking satisfaction levels are likely to rise when users are able to satisfy their needs through the application. This finding underlines the need for functional quality for banks, such as the quality of transaction processing, account servicing, and financial information.

Perceived trust was found to have a significant impact on satisfaction; an aspect rather important in mobile banking since the information being processed involves monetary transactions. The high path coefficient implies that to increase customer satisfaction, banks have to concentrate on data security, privacy policies, and brand image. On the same note, satisfaction has a very significant influence on customer loyalty the moderating role of satisfaction in the promotion of loyalty. This is in consonance with earlier studies done on satisfaction and loyalty in the banking sector to show that satisfaction and loyalty are directly related.

The above results can be useful for the MBSPs, especially the ICBC and other financial organizations willing to improve the customer loyalty. The highly significant impact of mobile app ambiance supports the significance of app design investment. Organization of content, clear structure and attractive design of the site influences positive attitude of the clients and the overall experience of banking services.

Since perceived ease of use and usefulness were found to be the most significant factors, mobile banking apps should focus on reducing complexities and adding more functions. Making it easy for clients to access areas such as transfers and account management can improve satisfaction. Also, the application of value-added services, including financial services, notification services, and expenses tracking can also enhance the application utility.

The results concur with the importance of trust in the mobile banking environment. Security factors like encryption, multi-factor authentication, and constant updates need to be put in place to reduce the risks. More emphasis on the clarity of policies regarding data privacy and quick actions in case of a security breach can also enhance user confidence. Other factors such as certification and regulation can also help to build trust in the minds of the customers regarding the security of their financial data.

This is because satisfaction is usually associated with loyalty; therefore, there are areas that banks should from time to time assess and enhance to meet user satisfaction. This may include providing

customized client services, handling of complaints and relaying app updates frequently from the clients. Questionnaires are also an effective method of obtaining data regarding customer issues and possibly, gaps in bank initiatives.

6. Conclusion

The findings of this study have several policy implications for the financial services industry, particularly for policymakers and regulators. Due to the increased security risks in mobile banking, it is recommended that the regulators set standards that all mobile banking application must meet, for example, the type of encryption that must be used, the type of authentication that must be used, and security checkup that must be conducted periodically. Adoption of mobile banking by low-technology consumers would also require favorable policies in technological competence. Giving customer knowledge on the advantages and disadvantages of mobile banking, as well as suggested ways of using it, may enhance confidence, convenience, satisfaction and thus, customer loyalty.

Regulators might also encourage the use of grants or tax credits for banks that make investments in areas that will enhance the customer experience. Such measures would ensure that there is constant enhancement of the apps to make them more effective to the customers while at the same time raising the bar for the industry.

This research focused on ICBC in Hunan Province, limiting its geographical scope. Consequently, results may not be fully generalizable to other regions or banks in China, though findings could be relevant to similar contexts. The study's cross-sectional design only captures user perceptions at a single time point, without tracking changes over time. Methodological limitations include potential response bias, as participants might have answered in a socially desirable manner, particularly regarding satisfaction and trust. Additionally, this study focused on mobile app ambiance, perceived ease of use, usefulness, trust, satisfaction, and loyalty but did not examine cultural factors, customer service quality, or economic influences.

As a result, future research could extend geographically to cover more than one bank in a certain area or in different countries, to investigate the factors that influence the mobile banking loyalty. Such studies could give a clue as to how the nature of loyalty changes with the change in the technology, regulation or the economic climate. Future research could also control for other factors including customer service, customer's level of technology adoption, and word of mouth influence among customers to enhance understanding of customer loyalty. Qualitative methods, like in-depth interviews, could yield richer insights into user perceptions, preferences, and factors influencing loyalty.

In summary, this study identifies key factors influencing customer loyalty in mobile banking, including mobile app ambiance, perceived ease of use, perceived usefulness, perceived trust, and satisfaction. The findings confirm that mobile app ambiance positively impacts satisfaction and loyalty. Improvements in usability, trust, and app functionality can foster higher satisfaction and long-term loyalty. This paper contributes to the field of mobile banking and customer loyalty, offering practical guidelines for banks and policymakers. It emphasises the importance of designing mobile banking applications with user needs, functionality, and security as central priorities.

Based on these findings, future research should address this study's limitations and explore additional factors influencing customer loyalty in mobile banking. Expanding the research scope and employing longitudinal and qualitative methods could provide a more comprehensive understanding of the dynamic factors shaping customer loyalty.

Author contributions

Conceptualization, Xiao.H. and Zeng.Y.; methodology, Xiao.H.; software, Xiao.H.; validation, Xiao.H., Zeng.Y.; formal analysis, Xiao.H.; investigation, Xiao.H.; resources, Xiao.H.; data curation, Xiao.H.; writing—original draft preparation, Xiao.H.; writing—review and editing, Xiao.H.; visualization, Xiao.H.; supervision, Zeng.Y.; project administration, Zeng.Y.;. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. No financial support or funding was received from any organization or individual that could influence the results presented in this study. All authors have disclosed any potential affiliations or relationships that could be perceived as conflicts of interest in relation to this research.

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