



Enhancing E-Loyalty through AI-Powered Mobile Banking: Trust and Perceived Efficiency as Key Mediators

Bounthot Soukanya¹, Yaqubov Abdullojon^{2*}

Zhejiang Gongshang University, China^{1,2}

Email: mei.bounthot21@gmail.com¹, ekubov.100@list.ru^{2*}

KEYWORDS

Artificial intelligence, Trust, Perceived efficiency, Loyalty, E-Service quality

ABSTRACT

The rapid development of technology has significantly impacted the banking sector, including the advent of mobile banking. This study examines the relationship between the quality of service delivered by mobile banking (e-service quality) and user loyalty (e-loyalty), focusing on the roles of e-trust and perceived efficiency. Data were collected through an electronic questionnaire distributed to 388 international students in Hangzhou, China, who are active mobile banking users conducting monthly transactions, including deposits and withdrawals. Regression analysis was used to analyze the data. The findings indicate that e-service quality positively impacts e-trust, perceived efficiency, and e-loyalty. Additionally, e-trust and perceived efficiency mediate the relationship between e-service quality and e-loyalty. This research highlights the importance of e-trust and perceived efficiency in fostering user loyalty in mobile banking.

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INTRODUCTION

In recent years, the banking sector has undergone a major transformation. Technological and information development, as well as innovation in services, also support this (Nichkassova & Shmarlouskaya, 2020; Nurjanah et al., 2024). This type of innovation creates a new attitude in the use of banking services, changes how people interact with one another, and customers such as clients do not go to banks for transactions, complaints and so on. Svoboda (2024) stated that the banking sector, which controls the cash flow to mobilise capital credit, manage risks, and facilitate effective payments and transactions, is a key driver of economic development in this country. So, the banking sector plays a major role in the economy's movement.

The technology changes the business model of the banking industry, giving ease, efficiency, and new experience to their customers (Yip & Bocken, 2018). The introduction of mobile banking, a platform from the bank that can be used to perform transactions, and other functions, is one such innovation. In addition, to maintain convenience and services, AI (artificial intelligence) has also been developed in mobile banking. AI automates and customizes consumer interactions through the use of cutting-edge technologies like chatbots, and machine learning, providing faster response times and more efficient service (Mehrotra, 2019). Finding the users' information in the database to learn about their preferences, actions, and past is one step in the process. In addition, mobile banking minimizes in-person interactions with tellers, saves money on comparable services, and is accessible anywhere, at any time. Artificial intelligence is being used by many financial organizations to assist in optimising costs. Indeed, according to an NVIDIA survey conducted in 2023, 36% of financial industry participants stated that AI support might reduce their yearly expenses by over 10 percent (<https://biztechmagazine.com/>).

AI-driven chatbots and assistants facilitate accessibility for the users, and they must guarantee the users are able to get service in 24 hours (George & George, 2023). Nevertheless, several problems

associated with introducing artificial intelligence in banking include data privacy concerns, security, and job displacement. This opportunity to commit fraud and cyber-crime is used by some irresponsible persons (Javaid et al., 2023). Another problem arises when users think that the display of mobile banking on their phone is too complicated to use. These issues will affect users' trust in the use of Mobile Banking (Trawnih et al., 2022). The AI-powered mobile banking service plays a vital role in building user loyalty by providing them with new experiences, increasing the efficiency of their services, and giving them confidence.

The empirical study also examines AI's impact on service quality and loyalty. Singh and Singh (2024) found that AI-powered customer service has a positive impact on customer loyalty, also perceived efficiency is able to be mediation between them. The other finding was done by Haghkhah et al. (2020), who examined the effects of service quality on customer loyalty and trust as the mediator in the B2B context. The results show that service quality positively impacts trust and customer loyalty. Trust also has a positive impact on customer loyalty. These previous studies reflected the relationship of the variables used in this research.

Nowadays, mobile banking is being used on the phone to make transactions easier, and people are registering first with a related bank before they use it (Kala Kamdjoug et al., 2021a). In this research, the target is international students who use mobile banking to do important transactions such as purchasing daily needs, paying tuition fees to the university, putting money, or doing business, remembering they should open an account at that time. The person who trusts and thinks about the efficiency of mobile banking should be a loyal user of mobile banking. Based on the explanation above, the research question is how mobile banking powered by AI influences international students' loyalty to use mobile banking by using trust and perceived effectiveness as the mediators (Kala Kamdjoug et al., 2021b). Based on the explanation above, this research aims to investigate how AI-powered mobile banking influences the loyalty of international students, with trust and perceived effectiveness acting as mediating factors.

METHODS

This study used quantitative methods with data collected through electronic questionnaires to measure the quality of electronic services, user trust, perceived efficiency, and user loyalty (Rasheed & Abadi, 2014). Each answer in the questionnaire was measured using a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). This questionnaire is recorded electronically through Google Forms. The objectives of this study include the quality of electronic services, user trust, perceived efficiency, and user loyalty in the context of mobile banking. The study was conducted in Hangzhou City, China, focusing on international students as the main respondents (Zhang et al., 2022). The population in this study is actively studying international students in Hangzhou City, where there are about 13,187 international students. The sample was determined using the Slovin formula with an error rate of 5%, resulting in a sample size of 388 respondents. The criteria for respondents included active students in Hangzhou City, mobile banking users, authorized mobile banking users, and making active transactions every month (Yiming, 2023).

The study used an electronic questionnaire specifically designed to collect data, with questions measured on a 5-point Likert scale and recorded through Google Forms. This study investigated the relationship between the quality of services provided by mobile banking using artificial intelligence (AI) and user loyalty. The independent variable is service quality measured through platform design, customer service, security, and privacy. In contrast, the dependent variable is user loyalty measured through loyalty behavior towards using mobile banking platforms that use AI. This study also used two mediation variables, namely trust and perceived efficiency. Trust is measured through the level of trust, reliability, and fulfillment of user expectations, while perceived efficiency is measured through user perception of the efficiency of AI-powered mobile banking (Ashfaq et al., 2020). Data analysis determined the relationship between AI-powered service quality and user loyalty, mediated by perceived trust and efficiency. Regression analysis is used to test direct and indirect effects in mediation models. Mediation analysis was conducted to test the mediating effect of perceived trust and efficiency.

RESULTS

Demographic of Respondents

The characteristics of respondents in this research are grouped into three factors: gender, age, and education. The details of the demographic profile are shown in Table 1 below.

Table 1. Demographic Profile

Demographics	Categories	Frequency	Percent
Gender	Male	209	53.9
	Female	179	46.1
Age	17 – 20	114	29.4
	21 – 24	183	47.2
	25 – 28	74	19.1
	> 28	17	4.4
Education	Bachelor's Degree	271	69.8
	Master's Degree	76	19.6
	Ph.D. Degree	22	5.7
	Other	19	4.9

A total of 388 respondents gave responses to the electronic questionnaire. Among these respondents, 53.9 percent are males, and the rest 46.1 percent are females. As for the age group, 21 – 24 years old respondents dominated in this research with a percentage of 47.2 percent, followed by 29.4 percent of respondents in the group of 17 – 20 years old, 19.1 percent of respondents 25 – 28 years old, and 4.4 percent more than years old. When in the education level, 69.8 percent of respondents are studying for a Bachelor's Degree, 19.6 percent for a Master's Degree, and 5.7 percent for as Ph.D. Degree, and some other education such as language programs 4.9 percent. Based on the response, this research is dominated by male respondents with Bachelor's Degrees and an age range of 21 – 24 years old.

Validity and Reliability

To determine consistency, Cronbach's Alpha is used in the reliability test. Then, validity is also tested by comparing the R-value with the R-table in the Pearson Correlation table. The requirement for the reliability test is that Cronbach's Alpha be above 0.60. In the validity test, the questionnaire items are valid when the R-value is higher than the R-table. The results of the validity and reliability tests are shown in Tables 2 and 3 below.

Table 2. Result of Validity Test

Items	R-Value	Items	R-Value
E-SQ1	0.651	E-TR4	0.723
E-SQ2	0.729	EF1	0.621
E-SQ3	0.674	EF2	0.692
E-SQ4	0.680	EF3	0.707
E-SQ5	0.693	EF4	0.669
E-SQ6	0.678	EF5	0.588
E-SQ7	0.467	E-LOY1	0.649
E-SQ8	0.504	E-LOY2	0.711
E-TR1	0.714	E-LOY3	0.731
E-TR2	0.617	E-LOY4	0.735
E-TR3	0.698	E-LOY5	0.513

Notes: E-SQ: e-service quality, E-TR: e-trust, EF: perceived efficiency, E-LOY: e-loyalty

Validity is tested using SPSS. The R-table of this research is obtained from the Pearson Correlation table, with Df (Degree of Freedom) being $n-2$, which is 386. From this Df, with a

significance of 0.025, the value of the R-table is 0.1181. Based on Table 2, all of the R-values for each item from the questionnaire are greater than the R-table (R-value > 0.1181), so all items are valid.

Table 3. Result of Reliability Test

Variable	Cronbach's Alpha
E-Service Quality	0.875
E-Trust	0.849
Perceived Efficiency	0.820
E-Loyalty	0.854

Table 3 above shows the value of Cronbach's Alpha of each variable. In that table, the value of Cronbach's Alpha is higher than 0.60 for each variable: e-service quality (0.875 > 0.60), e-trust (0.849 > 0.60), perceived efficiency (0.820 > 0.60); and e-loyalty (0.854 > 0.60). So, all of the items, including variables, are reliable.

Correlation Analysis

The statistical technique called correlation is used to determine the relationship among variables. This analysis is conducted by Pearson Correlation, in which the value of the correlation coefficient ranges from +1 to -1. The positive symbol means there is a positive relationship between both variables. Conversely, the negative symbol indicates a negative correlation. The nearer the value to 1, the stronger the correlation between them. Table 4 shows the matrix of correlation among the variables in this research.

Table 4. Correlation Coefficient Matrix

	E-SQ	E-TR	EF	E-LOY
E-SQ	1			
E-TR	0.658	1		
EF	0.864	0.642	1	
E-LOY	0.652	0.788	0.667	1

Notes: E-SQ: e-service quality, E-TR: e-trust, EF: perceived efficiency, E-LOY: e-loyalty

In this research, Table 4 shows a strong and positive correlation among these variables. The highest correlation occurs between e-service quality and perceived efficiency. Overall, these variables are significantly and positively correlated with each other.

Regression Analysis

Regression analysis is conducted to determine the effect and relationship between independent variables and the dependent variable. In this research, regression analysis is used to find the impact of e-service quality on e-loyalty towards using mobile banking, which is supported by AI. When the p-value is below 0.05, it means the independent variable impacts the dependent variable. The result of the regression analysis is shown in Table 5 below.

Table 5. Regression Analysis Between E-service Quality and E-trust

Variable	Unst, andardized Coefficients		St, andardized Coefficients Beta	t	p-value
	B	Std. Error			
E-Service Quality	0.384	0.022	0.658	17.182	0.000

Dependent Variable: E-trust

Table 5 represents the regression analysis for e-trust as the dependent variable and e-service quality. The result shows that the p-value is 0.000, and this value is below 0.05, which means that there is a significant and positive impact of e-service quality on e-trust. So, H1 is accepted.

Table 6. Regression Analysis Between E-service Quality and Perceived Efficiency

Variable	Unst, andardized Coefficients		St, andardized	t	Sig.
	B	Std. Error	Coefficients Beta		
E-Service Quality	0.559	0.017	0.864	33.720	0.000

Dependent Variable: Perceived Efficiency

Based on Table 6 above, regression analysis is conducted for perceived efficiency as the dependent variable and e-service quality as the independent variable. The p-value is 0.000, and it is less than 0.05. So, H2 is accepted. It states that e-service quality has a positive and significant impact on perceived efficiency.

Table 7. Regression Analysis Between E-service Quality, and E-loyalty

Variable	Unst, andardized Coefficients		St, andardized	t	Sig.
	B	Std. Error	Coefficients Beta		
E-Service Quality	0.442	0.026	0.652	16.914	0.000

Dependent Variable: E-loyalty

According to Table 7, the p-value from regression analysis for e-service quality as the independent variable and e-loyalty as the dependent variable is 0.000. The third hypothesis, H3, concerns the positive relationship between e-service quality and e-loyalty. The result shows that 0.000 is lower than 0.05, so H3 is also accepted.

Table 8. Regression Analysis Between E-trust, and Perceived Efficiency to E-loyalty

Variable	Unst, andardized Coefficients		St, andardized	t	Sig.
	B	Std. Error	Coefficients Beta		
E-trust	0.710	0.045	0.612	15.888	0.000
Perceived Efficiency	0.286	0.040	0.274	7.101	0.000

Dependent Variable: E-loyalty

Table 8 shows two independent variables, e-trust and perceived efficiency, and one dependent variable, e-loyalty. Likewise, the fourth hypothesis (H4) states that e-trust positively influences e-loyalty, and H5 states that perceived efficiency has a positive influence on e-loyalty. The result for the relationship between e-trust and perceived efficiency is positive and significant with a $p < 0.05$. So, H4 and H5 are accepted.

Mediation Effect with Sobel Test

The Sobel test will be used to test the mediation effect of e-trust and perceived efficiency. When the p-value in the Sobel test is below 0.05, it means the mediation variable can mediate the effect of e-service quality and e-trust. The result of the Sobel test is shown in Table 9 below.

Table 9. Mediation Effect of E-trust and Perceived Efficiency by Using Sobel Test

Mediating Variable	Sobel Test Statistic	p-value
E-trust	12.713	0.000
Perceived Efficiency	6.790	0.000

The first mediation effect represents mediation from e-trust to the relationship between e-service quality to e-loyalty of using mobile banking which is powered by AI. From Table 9 above, the Sobel test statistic for e-trust as a mediation variable is 12.713, with an associated p-value of 0.000. This result confirms that e-trust can mediate the relationship between e-service quality and e-loyalty. Similarly, the Sobel test also tested the mediation effect of perceived efficiency. Perceived efficiency by using AI-powered mobile banking successfully mediates e-service and e-loyalty. This mediation effect is supported by the Sobel test statistic of 6.790 and p-value 0.000. In summary, the results show that both e-trust, and perceived efficiency are able to do mediation. Hence, H6a, and H6b are accepted.

Table 10. Summary of Hypothesis Testing

Hypothesis	t	p-value	Results
H1: E-service quality → E-trust	17.182	0.000	Accepted
H2: E-service quality → Perceived Efficiency	33.720	0.000	Accepted
H3: E-service quality → E-loyalty	16.914	0.000	Accepted
H4: E-trust → E-loyalty	15.888	0.000	Accepted
H5: Perceived Efficiency → E-loyalty	7.101	0.000	Accepted
H6a: E-service quality → E-trust → E-loyalty	12.713	0.000	Accepted
H6b: E-service quality → Perceived Efficiency → E-loyalty	6.790	0.000	Accepted

Discussion

The findings of this research reveal the understanding of how e-service quality influences to the user of mobile banking, which is powered by AI. The mediation variables used to support the influence between dependent and independent variables are e-trust and perceived efficiency (Alnaim et al., 2022). The first three hypotheses proposed a positive, and significant relationship between e-service quality towards e-trust, perceived efficiency, and also e-loyalty. The results strongly support all of the hypotheses. This implies that AI-powered mobile banking is expected to improve users' trust and efficiency in doing transactions. The mobile banking users feel convenience, safe, and satisfied with the service provided in mobile banking, which supported by AI. On the other h, hand, these results also supported by a previous study by Haghkhah et al (2020). He found that trust had positively influenced customer loyalty. Singh and Singh (2024), who find the positive and significant influence between service quality, and perceived efficiency, also give the similar finding.

The fourth and fifth hypotheses postulated the positive and significant relationship between e-trust and e-loyalty, as well as perceived efficiency to e-loyalty (Wong et al., 2019). The result shows that e-trust positively and significantly influence e-loyalty with a t statistic of 15.888. It means that mobile banking users believe in the security system and think that AI-powered mobile banking is trustworthy. This will increase the loyalty of mobile banking user. Similarly, the t statistic of perceived efficiency on e-loyalty is 7.101, and the p-value of 0.000, it highlights the strong, and positive impact of perceived efficiency to e-loyalty. These findings imply that e-trust, and perceived efficiency in using mobile banking powered by AI are more likely exhibit their loyalty.

Furthermore, the last analysis reveals the mediation impact of e-trust, and perceived efficiency towards e-loyalty. The first mediation is conducted from AI-powered mobile banking on service quality to e-trust to e-loyalty. The second mediation effect is from e-service quality to perceived efficiency to e-quality (Zehir & Narcıkara, 2016). Both of them are tested by using Sobel test. The result of mediation test shows that both of e-trust, and perceived efficiency are able to do mediation from e-service quality to e-loyalty in the usage of mobile banking which is powered by AI. This is supported by Sobel test statistics of e-trust is 12.713 (p-value 0.000), and perceived efficiency is 6.790 (p-value 0.000).

Conclusion

This research gives explanation about the importance of e-service quality, how it interacts with e-trust, and perceived efficiency to achieve e-loyalty by their users. The results show that e-trust, and

perceived efficiency are influencing the loyalty of consumers, with an ability to mediate a relationship between quality of services for using mobile banking. From a practical point of view, the association between independent, and dependent variables is shown in the mediation of e-trust. Mobile banking users are aware of the benefits of artificial intelligence in supporting mobile banking, and making it easier to use. In the case of mobile banking, perceived quality plays an important role in making it easier for users to use.

Some limitations are found in this research, and believed can be improved in the future research. First, the research is limited to the population, and sample. Nevertheless, mobile banking may used differ among demographic such as workers which have more daily transactions. Secondly, loyalty of mobile banking users also can be measured by other variables such as usefulness of AI or using customer attitudes towards AI. The perception, and impact of AI adoption in technology also might be influenced by their expectation in performance in various industries. Nevertheless, there still has potential variable that predicted able to mediate e-loyalty.

References

- Alnaim, A. F., Sobaih, A. E. E., & Elshaer, I. A. (2022). Measuring the Mediating Roles of E-Trust and E-Satisfaction in the Relationship between E-Service Quality and E-Loyalty: A Structural Modeling Approach. *Mathematics*, *10*(13), 2328.
- Ashfaq, M., Yun, J., Yu, S., & Loureiro, S. M. C. (2020). I, Chatbot: Modeling the determinants of users' satisfaction and continuance intention of AI-powered service agents. *Telematics and Informatics*, *54*, 101473. <https://doi.org/10.1016/j.tele.2020.101473>
- George, A. S., & George, A. S. H. (2023). A review of ChatGPT AI's impact on several business sectors. *Partners Universal International Innovation Journal*, *1*(1), 9–23.
- Haghkhah, A., Rasoolimanesh, S. M., & Asgari, A. A. (2020). Effects Of Customer Value And Service Quality On Customer Loyalty: Mediation Role Of Trust And Commitment In Business-To-Business Context. *Management Research & Practice*, *12*(1).
- Javaid, M., Haleem, A., Khan, I. H., & Suman, R. (2023). Understanding the potential applications of Artificial Intelligence in Agriculture Sector. *Advanced Agrochem*, *2*(1), 15–30. <https://doi.org/10.1016/j.aac.2022.10.001>
- Kala Kamdjoug, J. R., Wamba-Taguimdje, S.-L., Wamba, S. F., & Kake, I. B. (2021a). Determining factors and impacts of the intention to adopt mobile banking app in Cameroon: Case of SARA by afriland First Bank. *Journal of Retailing and Consumer Services*, *61*, 102509. <https://doi.org/10.1016/j.jretconser.2021.102509>
- Kala Kamdjoug, J. R., Wamba-Taguimdje, S.-L., Wamba, S. F., & Kake, I. B. (2021b). Determining factors and impacts of the intention to adopt mobile banking app in Cameroon: Case of SARA by afriland First Bank. *Journal of Retailing and Consumer Services*, *61*, 102509. <https://doi.org/10.1016/j.jretconser.2021.102509>
- Mehrotra, A. (2019). Artificial intelligence in financial services—need to blend automation with human touch. *2019 International Conference on Automation, Computational and Technology Management (ICACTM)*, 342–347.
- Nichkasova, Y., & Shmarlouskaya, H. (2020). Financial technologies as a driving force for business model transformation in the banking sector. *International Journal of Business and Globalisation*, *25*(4), 419–447.
- Nurjanah, A., Salsabila, I. N., Azzahra, A., Rahayu, R., & Marlina, N. (2024). Artificial Intelligence (AI) Usage In Today's Teaching And Learning Process: A Review. *Syntax Idea*, *6*(3), 1517–1523. <https://doi.org/10.46799/syntax-idea.v6i3.3126>
- Rasheed, F. A., & Abadi, M. F. (2014). Impact of Service Quality, Trust and Perceived Value on Customer Loyalty in Malaysia Services Industries. *Procedia - Social and Behavioral Sciences*, *164*, 298–304. <https://doi.org/10.1016/j.sbspro.2014.11.080>
- Singh, P., & Singh, V. (2024). The power of AI: enhancing customer loyalty through satisfaction and efficiency. *Cogent Business & Management*, *11*(1), 2326107.

- Trawnih, A., Al-Masaeed, S., Alsoud, M., & Alkufahy, A. (2022). Understanding artificial intelligence experience: A customer perspective. *International Journal of Data and Network Science*, 6(4), 1471–1484.
- Wong, W. P.-M., Tan, K.-L., & Lim, B. C.-Y. (2019). The effect of technology trust on customer e-loyalty in online shopping and the mediating effect of trustworthiness. Wong, WPM, Tan, KL, Ida, AK, & Lim, BCY (2019). *The Effect of Technology Trust on Customer E-Loyalty in Online Shopping and The Mediating Effect of Trustworthiness*. *Journal of Marketing Advances and Practices*, 1(2), 38–51.
- Yiming, R. (2023). *The impact of demographic characteristics, media gratification and programmes satisfaction among Chinese audience: A case study of Hangzhou Traffic Radio, China*.
- Yip, A. W. H., & Bocken, N. M. P. (2018). Sustainable business model archetypes for the banking industry. *Journal of Cleaner Production*, 174, 150–169. <https://doi.org/10.1016/j.jclepro.2017.10.190>
- Zehir, C., & Narcikara, E. (2016). E-Service Quality and E-Recovery Service Quality: Effects on Value Perceptions and Loyalty Intentions. *Procedia - Social and Behavioral Sciences*, 229, 427–443. <https://doi.org/10.1016/j.sbspro.2016.07.153>
- Zhang, L., Zhu, L., Shi, D., & Hui, E. C. (2022). Urban residential space differentiation and the influence of accessibility in Hangzhou, China. *Habitat International*, 124, 102556. <https://doi.org/10.1016/j.habitatint.2022.102556>
- Zhu, H., Vigren, O., & Söderberg, I.-L. (2024). Implementing artificial intelligence empowered financial advisory services: A literature review and critical research agenda. *Journal of Business Research*, 174, 114494. <https://doi.org/10.1016/j.jbusres.2023.114494>



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