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Analyzing Factors Influencing Satisfaction with Mobile Banking Apps: An Adaptation of the DeLone & McLean IS Success Model

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Abstract. This study analyzed the factors influencing user satisfaction with mobile banking apps in Indonesia using a modified DeLone and McLean model. A survey was conducted with 236 mobile banking users of major Indonesian banks. PLS SEM analysis revealed system quality and information quality as significant drivers of trust, which along with complaint system and information quality impacted satisfaction. The findings provide insights into key mobile banking success factors, highlighting the need for banks to focus efforts on information quality, complaint systems, and trust-building. This study contributes by adapting a widely used IS model to a growing mobile banking context. It offers practical implications for banks seeking to improve customer satisfaction and provides a foundation for future research.

Keywords: DeLone & McLean, Mobile Banking Adoption, IS Success Model, IPMA.

1. Introduction

Information technology and system services are service offerings that leverage the collaboration of multiple software, hardware, and communication facilities to provide effective and efficient solutions. Banking services with the advancement of information technology are often implemented to enhance service convenience. Case in the banking sector demands the ability to develop products and services digitally, one of which is mobile banking services that can enhance flexibility, mobility, and user efficiency by providing services through mobile devices. With the advancement of time, the adoption of technology by a bank has become more diverse and complex, thereby affecting the services provided by the bank itself.

The digitalization of banking demands not only adjustments in banking products and services but also requires customers as users of banking services to adapt their behaviour and change their patterns regarding the Provision of Digital Baking Services by Commercial Banks digital banking services as electronically developed banking services that maximize the utilization of customer data to provide faster, easier, and more personalized customer experiences. According to a survey conducted by APJII, 5.7 respondents placed the category of online payment transactions using mobile banking applications in the third position. Regulation No.12/POJK.03/2021 explained that the classification of banks is divided based on the core capital possessed by each bank, and it is called KBMI. The classification of KBMI is divided into four categories based on core capital for each bank has more than Rp70 Trillion. Mobile banking helps customers transact through their devices (Purwanto & Loisa, 2020). The website Keuangan kontan.co.id, stated that mobile banking application usage growth increased yearly.

Mobile banking has transformed how customers engage with their financial institutions, enabling them to conveniently conduct bank transactions at their own convenience, regardless of time and location. Digital-based applications can help customers or prospective customers engage in banking activities through their respective devices (Purwanto & Loisa, 2020). Mobile banking enables customers to perform banking transactions anytime and anywhere using mobile banking features, thus playing a crucial role in the efficiency and effectiveness of banking tasks. Undoubtedly, many factors can influence the success of their mobile banking application usage.

The modified DeLone & McLean approach can provide valuable insights. According to Pasaribu (2021), mobile banking applications provide convenience and time-saving benefits. It can also be a banking medium to reduce direct contact during transactions. On the other hand, research presented by Tam & Oliveira (2017) suggests that in enhancing user satisfaction with digital banking applications, the quality of the system and the information received by users' needs to be considered. Additionally, an individual's trust in using a system can enhance consumer appeal and offer the potential for the utilization of mobile banking applications (Nuhu et al., 2022). Mobile banking has become a crucial tool in people's lives for doing some banking activities. Therefore, the researcher aimed to identify the factors that influence user satisfaction with mobile banking, how does trust as a mediating variable has an impact on user satisfaction, and which factors should be enhanced by the management of Bank KBMI IV through Matrix Importance Performance Analysis.

2. Literature Review

2.1. DeLone & McLean

The DeLone & McLean model is a theoretical framework used to evaluate the success and analyze the impact of an information system and technology on an organization. The model was initially used to assess the success of management information systems and has been expanded and adapted for various technology domains, including electronic commerce and mobile-based applications.

Based on research by Tam & Oliveira (2017), the research model designed by DeLone & McLean illustrates the interconnectedness of dimensions or factors to acknowledge that various factors influence the success of an IS. Over time, the model has been modified and extended to accommodate

technological changes and assess the success of various information systems, including mobile banking applications. The main factors or dimensions used in DeLone & McLean model include:

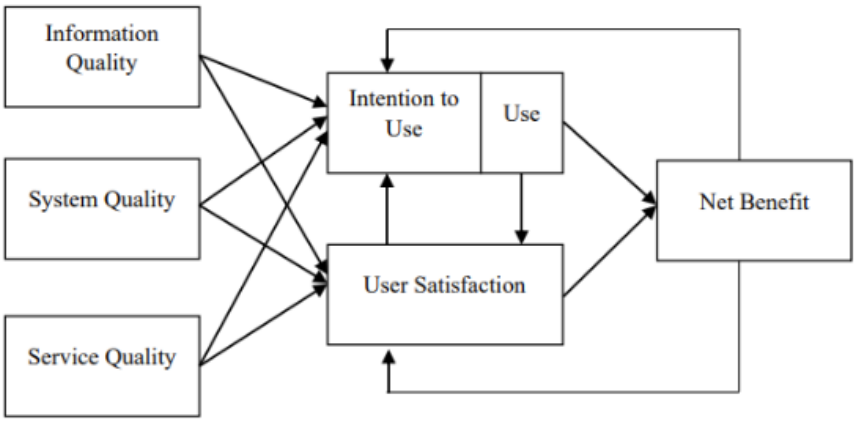

Fig.1: DeLone & McLean Model

a. System Quality

System quality describes the quality of the combination of hardware and software systems. Research by Gao & Waechter, 2017 said that it could assist users or potential users in navigating the devices that will be used. A reliable and transaction-capable system on mobile banking can have a point plus to increase the level of influencing a system (Purwati et al., 2021).

b. Service Quality

Service quality describes the service received by users, including information updates and responses from developers when the system encounters issues. They significantly impact the user experience, as noted by Tam & Oliveira (2017). Furthermore, Purwati et al. (2021) state that it plays a crucial role in determining user satisfaction especially for mobile banking application when there is an alignment between user expectations and perceptions of their desired outcomes.

c. Information Quality

Information quality depicts the quality of information that is generated by a system. Research by Mansour, M.M (2020) said that the quality of the Information Quality provided could affect user satisfaction of using some application, which means the Information quality has a significant role in influencing individuals' decision to use mobile banking.

d. Intention to Use

Intention to use represents the success of the information being used. According to Delone & McLean (2003), several factors contribute to understanding the intention to use an information system.

e. User Satisfaction

User satisfaction is an important dimension that reflects the level of satisfaction experienced when using an information system. According to Longaray et al., (2021), in a study on user satisfaction evaluation of i-banking and mobile banking, there are three main components in the acceptance of new systems: people, technology, and information.

f. Net Benefits

Net benefit is a dimension that describes the benefit or impact of using an information system on performance quality at an individual and organizational level. According to the previous study, when users are highly satisfied with an information system, it results in notable advantages for the overall net benefit of both organizations and individuals.

g. Complaint System

Complaint system is the variable that explains information, ideas, or input for the development of a system that is currently running. The presence of ideas and input can influence the assessment of the use of a system (Hayashi et al., 2018). According to Herawati & Sulistyowati (2019) they suggest that addressing issues can have a significant impact on customer satisfaction on using mobile banking application. Poromatikul et al., (2020) suggests that the complaint system can describe how a company handles problems and complaints obtained from its customers where it can determine the assessment and user experience from dissatisfied to satisfied and more loyal.

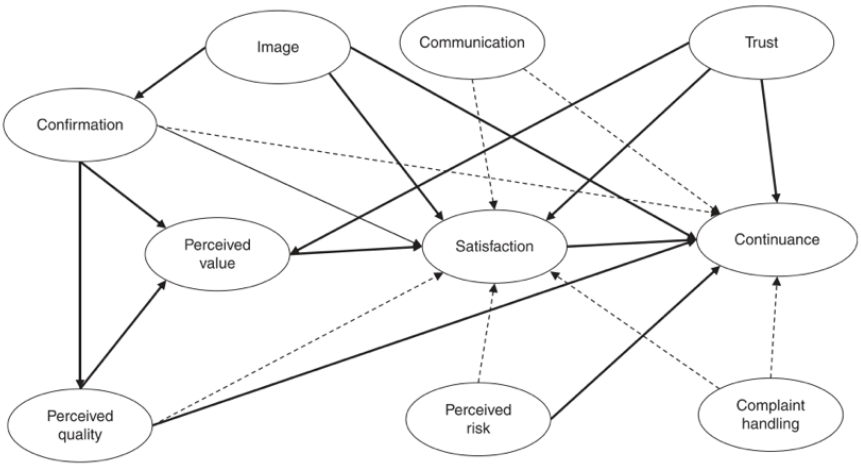

Fig.2: Complaint System – User Satisfaction (Poromatikul et al., 2020)

h. Trust

Trust is one of the internal factors that influences users' interest and satisfaction in using an application or system. User or customer trust is needed to maintain a good relationship with customers, instill confidence in users or customers so that they can offer product that benefit others (Alghwery & Bach, 2014). In the study by Damabi et al., (2018), they suggested that an individual's trust in using some application or system is influenced by the quality of information, the application system used, and the design of the application itself.

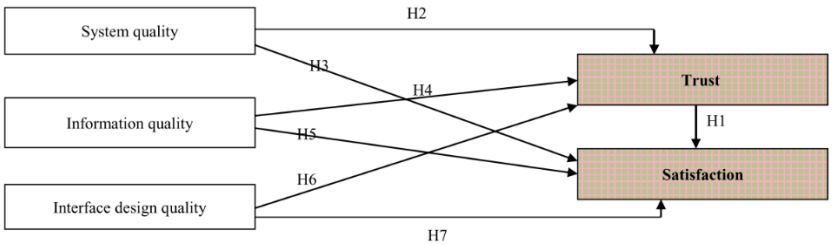

Fig.3: Trust – User Satisfaction (Damabi et al., 2018)

2.2. Importance Performance Matrix Analysis (IPMA)

The Importance Performance Matrix Analysis (IPMA) is one of several techniques utilized to illustrate levels of customer satisfaction, initially introduced by John A. This methodology assesses the connection between consumer perceptions and provides insights into the service factors that impact customer satisfaction and loyalty (Martilla & James, 1977). Tailab (2020) suggests that the IPMA approach does not solely evaluate an item's performance but also its significance. His study highlights

that the goal of employing the importance-performance matrix analysis is to comprehend and recognize the overall effects of the importance of its precursor constructs, utilizing PLS SEM and the IPMA method, within the banking sector in the United States.

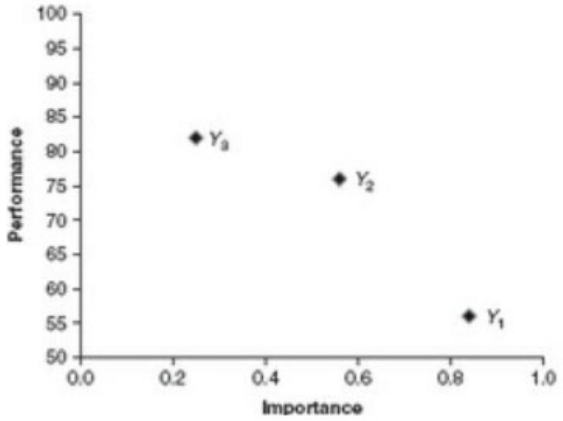

Fig.4: Importance Performance Matrix Analysis

3. Research Model

This research utilizes the DeLone and McLean research model developed in 2003, with the research variables being Information Quality, System Quality, Service Quality, Customer Satisfaction, User Satisfaction, and Net Benefit. Additionally, the researcher introduces two additional variables to address the hypotheses that will be tested in this study, namely the variables of customer trust and complaint system.

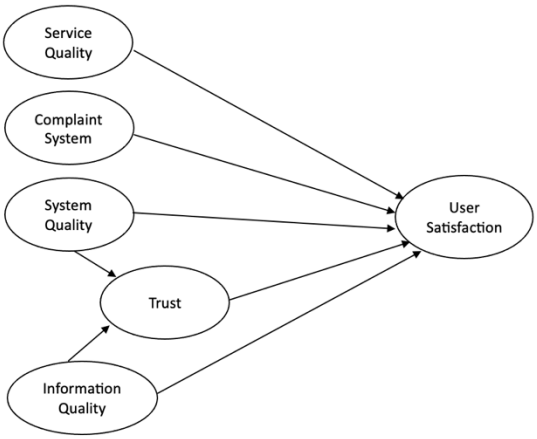

Fig.5: Research Model

From each variable used in this study, the researcher determined several indicators that reflect the respective research in detail as follows:

Table 1. Detail Variable & Indicator

Variabel	Kode Indikator	Indikator	Referensi
Information Quality (IQ)	IQ1	Accuracy of Information	Mansour, M. M. O. (2020), Sharma, S. K., & Sharma, M. (2019), Tam, C., & Oliveira, T. (2017)
	IQ2	Ease of Understanding Information	
	IQ3	Completeness of Informtion	
System Quality (SYQ)	SYQ1	Ease of Use	Mansour, M. M. O. (2020), Sharma, S. K., & Sharma, M. (2019), Tam, C., & Oliveira, T. (2017)
	SYQ2	Adequate system functionality	
	SYQ3	Structured System	
Trust (T)	T1	System Security	Sharma, S. K., & Sharma, M. (2019), Asnakew, Z. S. (2020), Almarashdeh, I., Aldhmour, K., Aljamaeen, R., Alsmadi, M., & Jaradat, G. (2019)
	T2	User Trust	
	T3	Data Security	
Service Quality (SEQ)	SEQ1	Fast Response Service	Mansour, M. M. O. (2020), Sharma, S. K., & Sharma, M. (2019), Tam, C., Oliveira, T. (2017) & Motiwalla, L. F., Albashrawi, M., & Kartal, H. B. (2019)
	SEQ2	Adequate Service	
	SEQ3	Availability of Service at all time	
Complaint System (CS)	CS1	System Complaint Speed	Sampaio, Cláudio Hoffmann; Ladeira, Wagner Junior; Santini, Fernando De Oliveira; Estelami, Hooman; Laukkanen, Tommi (2017), Poromatikul, C., De Maeyer, P., Leelapanyalert, K., & Zaby, S. (2020), Jun, M., & Palacios, S. (2016).
	CS2	Effectiveness of Complaint System	
	CS3	Availability of Complaint System	
User Satisfaction (US)	US1	Frequency of Usage	Sharma, S. K., & Sharma, M. (2019), Tam, C., & Oliveira, T. (2017), Richa Priya, Aradhana Vikas Gandhi, A. S. (2018)
	US2	User Satisfaction Level	
	US3	Level of User Effectiveness & Efficiency	

The hypotheses formulated to address this research are as follows:

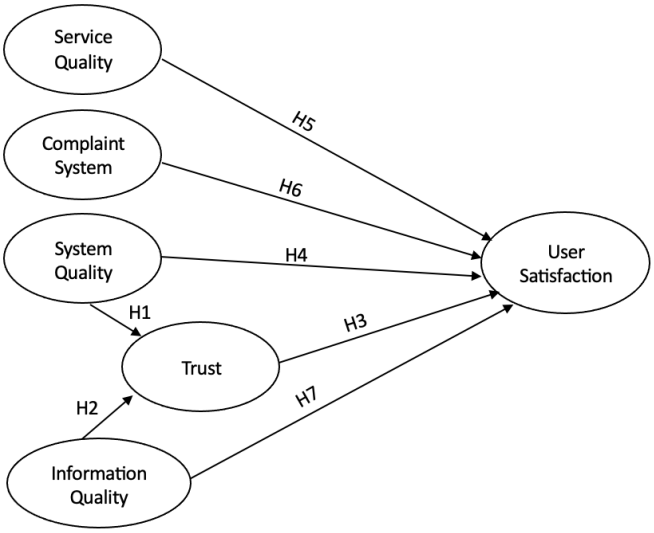

Fig.6: Research Hypothesis

H1: System Quality has an influence on Trust.

H2: Information Quality has an influence on Trust.

H3: Trust has an influence on User Satisfaction.

H4: System Quality has an influence on User Satisfaction.

H5: Service Quality has an influence on User Satisfaction.

H6: Complaint System has an influence on User Satisfaction.

H7: Information Quality has an influence on User Satisfaction.

4. Methodology

The methodology utilized in this study is quantitative, focusing on users active of the banks with a core capital of more than Rp70 trillion mobile banking application. The researcher likely designs a questionnaire with Likert scale-based questions related to the identified variables. Based on data from the questionnaire, researchers use the SmartPLS application to analyze the relationship between variables using structural equation modeling (SEM). It conducted path analysis and structural analysis based on PLS SEM. This model helps researchers analyze complex relationships between variables in their datasets, making it particularly useful for assessing models.

The population in this study is active users of mobile banking applications with the criteria of mobile banking applications BCA Mobile, BNI Mobile Banking, Livin' by Mandiri and BRImo BRI.In addition, researchers also use Roscoe theory to determine research samples. This is supported by the population of mobile banking application users is not known in detail the number of users increases in the last one month. Based on Roscoe's theory, researchers use a minimum of 120 samples in accordance with the theory conveyed that if the sample is divided into several subsamples, the minimum number of each subsample must reach 30.

Validity and reliability testing was carried out on this study. AVE values, cross loading values, and fornell larcker values are used for validity testing. The outer loading value and composite reliability value are used for reliability testing. As for hypothesis testing, researchers pay attention to the P-Value and T-Statistics values of each path correlations in the study.

To conduct Importance-Performance Analysis, the researcher utilized the IPMA method to analyze which factors need improvement by the management of bank that has more than Rp70 trillion core capital. This analysis visually represents how well different factors meet customer expectations and

where adjustments may be needed to enhance overall satisfaction and outcomes. IPMA is a valuable tool for decision-making and resource allocation, as it guides efforts toward optimizing areas with high importance but may not adequately meet expectations.

5. Results and Discussion

Based on the distribution of questionnaires regarding the usage of the mobile banking application, the researcher obtained 236 respondents and among the 225 respondents who are users of the bank mobile banking application, 63.6% of the respondents are female, and 36.4% are male.

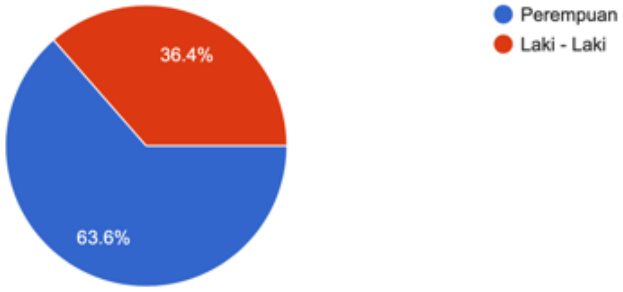

Fig.7: Diagram of Number Respondents by Gender

The percentage of bank that has more than Rp70 trillion core capital mobile banking application usage within one month is as follows:

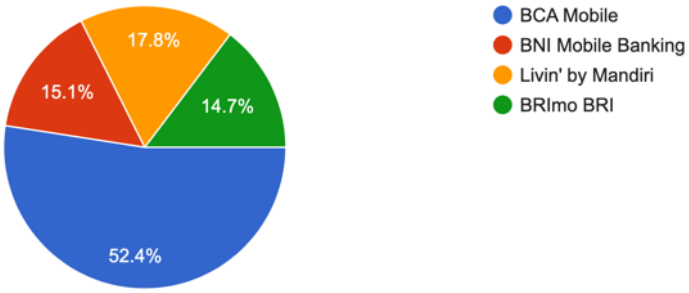

Fig.8: Diagram of The Number of Mobile Banking Application

To analyze the success of mobile banking application usage, the researcher created a path diagram illustrating the relationship between one variable and other variables.

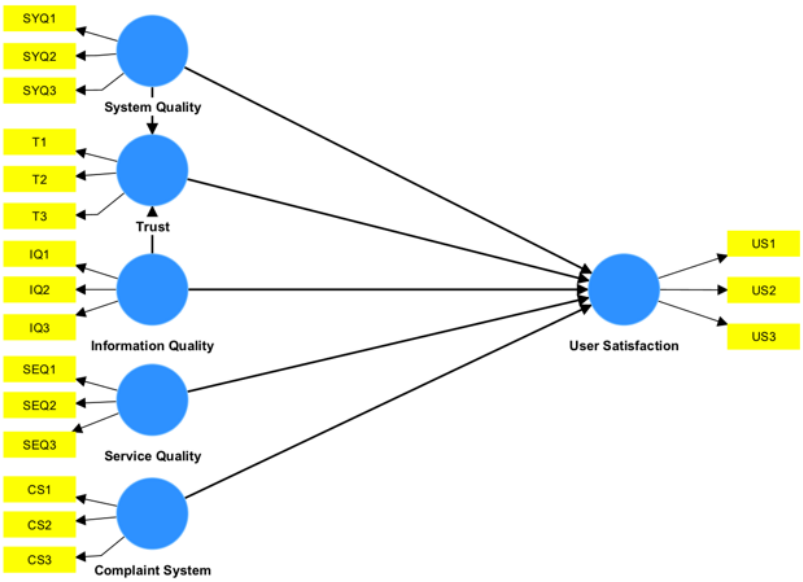

Fig.9: Relationship Between Variable

For validity testing, the results obtained from this study are for AVE values greater than or equal to 0.50. For cross loading values have met the standard, namely each indicator related to the variable itself has a greater value than other variables and the fornell larcker value in this study already has a standard value in accordance with Hair et al., (2014). As for reliability testing, it was found that the outer loading value of each indicator of the research variable was in accordance with the standard, which was greater or equal to 0.70.

Through PLS SEM calculations to address the hypotheses presented above, according to Hair et al. (2014), the standard criteria used to determine the acceptance or rejection of a hypothesis is by examining the path coefficient values and t-statistics (bootstrapping) with a P-Value < 0.05 and t-statistics value > 1.96. The results of the calculation for this research to answer the hypothesis are as follows:

Table 2. Detail Calculation Hypothesis

Hypothesis	Path Correlations	Original Sample (O)	T-Statistics (|O/STDEV|)	P - Value	Results
H1	SYQ → T	0,358	4,484	0,000	Significant
H2	IQ → T	0,488	6,104	0,000	Significant
H3	T → US	0,239	2,178	0,029	Significant
H4	SYQ → US	0,159	1,669	0,095	Not Significant
H5	SEQ → US	0,117	1,178	0,239	Not Significant
H6	CS →US	0,195	2,167	0,030	Significant
H7	IQ → US	0,326	4,067	0,000	Significant

Based on the results, it is found that there are five hypotheses with P-Value and T-Statistics values that meet the standard criteria for addressing the proposed hypothesis.

H1: System Quality → Trust.

Based on the P-Value and T-Statistics for H1, it can be concluded that System Quality significantly influences the Trust variable. In line with the research by Asnakew, Z.S (2020), the system quality factor influences users' trust. The trust variable plays a crucial role in adopting electronically based

information technology. With the ease of a banking system, users' confidence can be enhanced, encouraging them to continue using mobile banking applications.

H2: Information Quality → Trust.

Based on the P-Value and T-Statistics for H2, Information Quality significantly influences the Trust variable. In line with the research by Asnakew, Z.S. (2020) the information quality factor influences the trust of its users. With comprehensive and up-to-date information provided by a banking system, users can increase their trust that mobile banking applications are one of their banking solutions.

H3: Trust → User Satisfaction.

Based on the P-Value and T-Statistics for H3, it can be concluded that Trust significantly influences the User Satisfaction variable. In line with the research by Asnakew, Z.S. (2020) and Sharma, S.K & Sharma, M. (2019), a higher level of trust helps retain long-term mobile banking application users and can increase their interest in using the application.

H4: System Quality → User Satisfaction.

Based on the P-Value and T-Statistics for H4, it can be concluded that System Quality does not significantly influence the User Satisfaction variable. It is not related to the researcher finding from Damabi et al., (2018), Motiwalla et al., (2019), and Sharma, S.K & Sharma, M. (2019) that the quality of mobile banking applications does not significantly influence the increase in user satisfaction due to the presence of other supporting factors.

H5: Service Quality → User Satisfaction.

Based on the P-Value and T-Statistics for H5, the Service Quality does not significantly influence to the User Satisfaction variable. It is not related to the research conducted by Purwati et al., (2021), Damabi et al., (2018), and Sharma, S.K & Sharma, M. (2019) that the quality of service of mobile banking does not significantly influences the increase in user satisfaction due to the presence of other supporting factors that need further in-depth investigation.

H6: Complaint System → User Satisfaction.

Based on the P-Value and T-Statistics for H6, it can be concluded that the Complaint System significantly influences the User Satisfaction variable. This is in line with the research by Sampaio et al., (2017) that the complaint system factor can significantly influence user satisfaction. With an adequate complaint system in place, it can enhance user satisfaction with the mobile banking application when facing issues within the system.

H7: Information Quality → User Satisfaction.

Based on the P-Value and T-Statistics for H7, it can be concluded that the Information Quality significantly influences the User Satisfaction variable. It is consistent with the research by Motiwalla et al., (2019) that the information quality factor influences user satisfaction. The better the quality of an application's information, the more it will impact user satisfaction in conducting transactions through the mobile banking application. Furthermore, based on the study by Tam & Oliveira (2017), it is also mentioned that the information quality factor plays a crucial role in the use of mobile banking applications and undoubtedly impacts individual performance.

Referring to the purpose of the study, which is to find out what factors that affect user satisfaction in the use of mobile banking application, it's found that the information quality provided from

application, the provision of a complaint system to handle usage constraints, and trust factors affect user satisfaction. Trust (T) was employed as a mediating variable to assess user satisfaction with using their mobile banking application.

The results of the indirect effects analysis reveal that using trust as a mediating variable for information quality to measure user satisfaction in mobile banking does not exert a significant influence, as indicated by the t-statistic value for IQ -> US being larger than IQ -> T -> US. On the other hand, utilizing trust as a mediating variable for system quality significantly impacts user satisfaction, evidenced by the t-statistic value for SYQ -> T -> US being greater than SYQ -> US.

Table 3. Result Indirect Effect Trust

	Original Sample (O)	T-Statistic (|O/STDEV|)
IQ → T →US	0,110	1,899
IQ → US	0,326	2,480
SYQ → T → US	0,080	1,779
SYQ → US	0,159	0,755

The analysis of factors to be enhanced by the management of Bank, based on the Importance-Performance Matrix analysis (IPMA) suggests that there are several variables that need to be considered.

Table 4. Result Importance Performance Matrix Analysis

IPMA - Trust	BCAMobile	BNI Mobile Banking	BRImo BRI	Livin' by Mandiri
Information Quality	✓		✓	✓
System Quality		✓		
IPMA – User Satisfaction	**BCAMobile**	**BNI Mobile Banking**	**BRImo BRI**	**Livin' by Mandiri**
Complaint System	✓		✓	✓
Information Quality		✓		
Service Quality				
System Quality				
Trust				

According to table 4, based on the results of the Importance Performance Matrix Analysis there are some analyses to enhance user trust and user satisfaction in their mobile banking application. To enhance user trust, Bank BCA, Bank BRI, and Bank Mandiri can improve the information quality displayed on their respective mobile banking apps. As for Bank BNI, they can focus on and enhance the system quality of their mobile banking application. Additionally, to improve user satisfaction of mobile banking application, Bank BCA, Bank BRI, and Bank Mandiri can enhance their complaint systems. Similarly, Bank BNI can consider and enhance the information quality of its mobile banking application.

6. Conclusion

This study makes an important contribution by investigating mobile banking user satisfaction through a modified DeLone and McLean model adapted to a promising mobile services context. Analysis of survey data from 236 users of major Indonesian banks identified information quality, complaint systems, and trust as key drivers of satisfaction. The findings provide theoretical insights by revealing significant relationships between system quality, information quality, trust, and satisfaction in mobile banking adoption.

For banks, the results emphasize priority areas like improving information and complaint systems to enhance satisfaction. While focused on Indonesia, the research offers practical implications for mobile banking providers globally seeking to optimize user experience. Further studies can build on this work by testing additional success factors across diverse cultural contexts. Overall, this study advances understanding of satisfaction drivers in an increasingly prominent mobile banking domain and provides a valuable framework for future research.

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