Development of Dimensions and Indicators
for Quality Measurement of Mobile Banking Services

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Abstract

The acceleration of technology has changed the conventional banking service model to be electronic/digital based in the form of internet banking and mobile banking. The use of mobile banking applications in Indonesia experiences rapid growth. Throughout 2018, Bank Negara Indonesia recorded a significant transaction growth of 200%, Bank Central Asia at 66%, Bank Tabungan Indonesia 45%, and Bank CIMB Niaga 45%. This growth can not be separated from the development of smartphone technology, the Industrial Revolution 4.0 based on the Internet of Things (IoT), the need for easy and flexible banking services, as well as the vision and mission of digitization launched by the Financial Services Authority (OJK). This makes mobile banking as one of the banking resources in building a competitive advantage in its business.
Service quality is an important key in maintaining customer loyalty. Therefore, measuring the quality of mobile banking services is the first step to create a competitive advantage for banks. Through a literature study conducted in this study, a list of dimensions and indicators that can be used to measure the quality of mobile banking services will be generated, including: application aspect, complaint handling aspect, and economic benefit aspect.

Keywords
Technology, mobile banking, service quality

1. Introduction

Technological developments have changed the conventional banking service model to electronic/digital based in the form of internet banking and mobile banking. Electronic based banking services is known as e-banking. This change in service model provides various facilities for customers, including customers can access services from various locations so they do not have to visit bank branch offices (Driga and Isac 2014; Poon 2007). Other advantages are personal services, transaction security, transaction processing speed, and better service quality than conventional banking (Emad and Asem 2020). On the other hand, banks can increase competitiveness and expand market potential, which in turn can increase banking efficiency and productivity in the financial industry (Wirdiyanti 2018).

Banking services through electronic media (e-banking) include the banking transactions via ATM, Phone Banking, Electronic Fund Transfer, Internet Banking, and Mobile Phone (Bank Indonesia Regulation (PBI) Number: 9/15/PBI/2007). Digital banking services which are also defined as electronic banking services developed by optimizing the use of customer data in order to serve customers quicker and easier (customer experience), and can be operated independently by customers, with due regard to aspects of security (Financial Services Authority Regulation (POJK) Number 12/POJK.03/2018). Electronic/digital banking services are one of the keys for maintaining company excellence. Good electronic/digital servicesis an alternative to maintain good relationships with customers (Archan et al. 2015). This shows that electronic/digital services play an important role in maintaining the company's business sustainability.

Mobile banking is one of the solutions applied by banks to increase competitiveness in order to meet customer needs, as a new distribution channel, improve business image, and reduce costs (Aladwani 2001). The important role of mobile banking in meeting customer needs can be seen from the data on the number of large bank transactions in Indonesia such as Bank Negara Indonesia (BNI), Bank Central Asia (BCA), Bank Tabungan Negara (BTN), and Bank CIMB Niaga. Throughout 2018 Bank Negara Indonesia recorded mobile banking transaction

growth of 200% compared to 2017, Bank Central Asia at 66%, Bank Tabungan Indonesia at 45%, and Bank CIMB Niaga at 45%.

The number of mobile banking users will continue to grow in the future. This growth is supported by the advancement of smart phone technology, where the use of mobile banking has become easier and more practical than the internet and SMS banking (William and Sawyer 2011). The Industrial Revolution 4.0 which is synonymous with the use of the Internet of Things (IoT) is an important factor in the increasing use of mobile banking (Schwab 2016). The need for easy and flexible banking transactions (not limited by branch operating time), as well as customer demands that are on demand economy (once desired, when they are available) (Kasali 2017) are other factors that spur the growth of mobile banking users.

To improve the quality of e-banking services, banks need to determine the areas of improvement that have a significant impact. The first step that must be taken is to measure the quality of existing mobile banking services (Archan et al. 2015). Several previous studies regarding the quality of mobile banking services have been conducted by Asfour and Haddad (2014), Jun and Palacios (2015), Sharma and Sharma (2019).

Research by Zarifopoulos and Economides (2009) used the Mobile Banking Evaluation Framework (MoBEF) in which 164 criteria are obtained which are grouped into 6 categories: interface, navigation, content, offered services, reliability, and technical aspects. The strengths of this research are to include economic benefits (special offers) using mobile banking such as: discount / free money transfer fees, card payments, business services, and payments that are included in the criteria for offered services. This is an aspect that becomes a consideration for customers in choosing banking services. This study also measures mobile banking from the complaint handling aspect, but the drawback of this study is that it does not include the dimensions of process accuracy and continuous improvement so that the improvement process cannot be measured in terms of service quality performance. Asfour and Haddad's research (2014) measured the impact of using mobile banking services on customer e-satisfaction in terms of application aspects. The research used seven dimensions: reliability, flexibility, privacy, accessibility, ease of navigation, efficiency, safety, while complaint handling aspect and economic benefits aspect has not been measured. Jun and Palacios (2015) used the Critical Incident Technique (CIT) method to develop 17 dimensions of m-banking service quality in terms of application aspect and complaint handling aspect. The seventeen dimensions are m-banking application quality (content, accuracy, ease of use, speed, aesthetics, security, diverse mobile application service features, and mobile convenience), and m-banking customer service quality (reliability, responsiveness, competence, courtesy, credibility, access, communication, understanding the customer, and continuous improvement). The importance of this research is that it includes continuous improvement as a measurement dimension.

Meanwhile, Sharma and Sharma (2019) used a new research model by expanding the DeLone& McLean Information System (D&M IS) model to examine the influence of the dimensions of service quality, information quality, system quality, and trust on intention to use and satisfaction of m-banking (speed, aesthetics, security, diverse mobile application service features, and mobile convenience), and m-banking customer service quality (reliability, responsiveness, competence, courtesy, credibility, access, communication, understanding the customer, and continuous improvement). The strength of this research is to include continuous improvement as a measurement dimension.

The majority of previous studies only measure service quality from application aspects and complaint handling aspect. The weakness of this research is that it does not include the economic benefit aspect. This aspect is considered to be important by customers, so the ability to provide economic benefits must be used as a dimension in measuring the quality of mobile banking services. This study will combine aspects and dimensions of previous research that are relevant in measuring the quality of mobile banking services.

1.1 Objectives
This study aims to develop dimensions and indicators for measuring the quality of mobile banking services from the application aspect, complaint handling aspect, and economic benefit aspect based on literature review.

2. Literature Review

2.1 Service Quality Research Development
Research on service quality was first developed by Parasuraman et al. (1985). Maintaining service quality is a key for company in building competitive advantage (Han and Baek 2004). Service quality is the key to maintain the sustainability of a business (Santos 2003; Zeithaml et al. 2002). To provide excellence quality services, the first

step that must be taken by a company is to identify aspects and dimensions that affect the performance of service quality itself (Gronroos 1984; Cronin and Taylor 1992).

The best known research on the dimensions of service quality is SERVQUAL from Parasuraman et al. (1988) which consistof 5 dimensions: tangibles, reliability, responsiveness, assurance, empathy. The research was conducted by taking conventional services participants from banking, credit card companies, repair and maintenance services, as well as long distance telephone companies. Meanwhile, Bahia and Nantel (2000) specifically developed the dimensions of banking service quality as effectiveness and assurance, access, price, tangibles, service portfolio, reliability. As technology advances form conventional service models to electronic/digital (online) models, the dimensions of service quality have also undergone adjustments.

2.2 Research on Dimensions of E-Banking Service Quality

Prior research on the dimensions of the quality of e-banking services focused more on internet banking. This is because internet banking was developed earlier than mobile banking. However, along with the advancement of smartphone and internet technology, the use of mobile banking becomes increasingly prevalent, especially for individual customers.

Several previous studies regarding the development of dimensions used to measure service quality can be seen in Table 1.

Table 1. Dimensions of E-banking Service Quality (Source: elaborated by author)

Researcher	Dimensions	Context
Bauer et al. (2004)	Security & trust, basic service quality, cross-buying service quality, added values, transaction support, responsiveness	Internet banking
Ariff et al. (2012)	Efficiency-system availability, assurance-fulfillment, privacy, contact-responsiveness, website aesthetic and guide	Internet banking
Tharanikaran et al. (2017)	Efficiency, system availability, fulfillment, privacy, responsiveness, compensation, contact, content, accuracy, format, ease of use, timeless, safety	Internet banking
Aboobucker and Bao (2018)	Security & privacy, perceived trust, perceived risk, website usability	Internet banking
Zarifopoulos and Economides (2009)	Interface, navigation, content, offered services, reliability, technical aspects	Mobile banking
Asfour and Haddad (2014)	Reliability, flexibility, privacy, accessibility, ease of navigation, efficiency, safety	Mobile banking
Jun and Palacios (2015)	Mobile convenience, accuracy, service features, ease of use, content, speed, aesthetics, security, continuous improvement, competence, credibility, courtesy, understanding the customer, communication, reliability, access, responsiveness	Mobile banking
Sharma and Sharma (2019)	Service quality, information quality, system quality, trust	Mobile banking

3. Methods

In this study, the dimensions and indicators used to measure service quality of mobile banking were obtained by conducting a literature studies. The stages in conducting the literature study is mentioned below :

- Step 1 Identification. This is where the database is used to measure service quality of mobile banking. The databases used in this literature study are Scopus and Web of Science.
- Step 2 Screening. At this stage, a keyword search was used to assess or evaluate service quality on mobile banking or service quality on internet banking. Then screening was continued by reading the abstract. Articles were selected to be analyzed in depth.
- Step 3 Eligibility. At this stage, an in-depth analysis of the articles was carriedout based on the objectives of this study.
- Step 4 Included. At this stage, the articles that will be used in this research were selected and a summary was created from the analyzed articles.

The results of the literature study process can be seen in Table 2.

4. Data Collection

This study adopted the dimensions of service quality measurement that had been developed previously, both in the context of mobile banking and the relevant internet banking. Through previous research, there were 14 dimensions that will be tested for relevance as a dimension of the quality of mobile banking services. The dimensions were divided into 3 aspects, 8 dimensions of application aspects, 5 dimensions of complaint handling aspects, and 1 dimension of economical benefit aspects. The indicators that will be used to measure the quality of mobile banking services in this study can be seen in Table 2.

Table 2. Dimensions of Mobile Banking Service Quality (Source: elaborated by authors)

Code	Dimensions	Definition	Indicator	Ref *
Application Aspect				
SEC 1	*Security*	Referred to m-banking login security, transactions safety, and customer's privacy	Security login (login)	1,2,3,4,5,6,7,8
SEC 2			Transaction security	
SEC 3			Security of customer data privacy	
FEA 1	*Service Features*	Referred to the width of m-banking services and application features that can be delivered to customers through the diverse functions of mobile devices	Availability of standard service features such as: account and loan information, bill payments, fund transfers, etc.	1,2,5,7
FEA 2			Availability of e-commerce features such as: ticket buying and buying and selling online	
FEA 3			Availability of information features such as: currency exchange rates	
CON 1	*Content*	Referred to providing the customers with information they need through the bank's mobile application and greatly affects the satisfaction/dissatisfaction level of m-banking customers searching for useful information that is relevant to their banking needs	Current information	1,2,5,6,8
CON 2			Information is easy to understand	
CON 3			Complete information	
ACC 1	*Process Accuracy*	Concerned with the error-free content, interface, and financial transaction capability of the bank's mobile application	There are no errors in content/ data	3,4,5,6,7
ACC 2			There are no errors on the face display	
ACC 3			There are no errors in financial transactions	
ESY 1	*Easy of Use*	Related to the extent to which an m-banking application is perceived by customers as easy-to-understand, and/or easy-to-operate	Ease of use	1,2,3,4,5,6,7,8
ESY 2			Ease of access (login)	
ESY 3			Ease of navigation	
EFF 1	*Efficiency*	Site is simple to use, structured properly, and requires a minimum of information to be input by the customer. The ease	Ease of finding what is needed	1,2,3,4,5,6,7

			and speed of accessing and using the site		

Table 2. Dimensions of Mobile Banking Service Quality (Cont.)

Code	Dimensions	Definition	Indicator	Ref *
EFF 2			Transaction processing speed	1,2,3,4,5,6,7
EFF 3			Display and structured information well	
AES 1	*Aesthetics*	Associated with the attractiveness of m-banking applications including menu screen design	Visually attractive appearance	1,2,3,5,7
AES 2			Concise and relevant text	
AES 3			Graphics and multimedia help the navigation process	
CON 1	*Continuous Improvement*	The mechanism to keep an m-banking application up-to-date	Continuous improvement in product service	5
CON 2			Continuous improvement in customer service	
CON 3			Continuous improvements to the m-banking application	
Complaint Handling Aspect				
COM 1	*Competence*	Possesion of the required skills and knowledge to perform the service	Knowledge of staff in answering questions	1,2,5,8
COM 2			Staff confidence in providing services	
COM 3			The staff's ability to solve problems	
COU 1	*Courtesy / Communicat-ion*	Keeping customers informed in language they can understand and listening to them. Politeness, respect, consideration, and friendliness of contact personnel	Staff answers are clear	1.5
COU 2			Important information is conveyed	
COU 3			Courtesy of staff in communicating	
UND 1	*Understanding The Customer*	Making the effort to understand the customer's needs	Focus on customers	5.8
UND 2			Listen carefully to customers	
UND 3			Personal attention	
ACE 1	*Accessibility*	Approachability and ease of contact	Ease of submitting complaints via chat, email and telephone	1,2,3,4,5,6
ACE 2			Availability of toll free services	
ACE 3			Helpdesk availability	
RES 1	*Responsiveness*	The willingness or readiness of employee to provide service	Staff response is fast	1,3,5,6,8
RES 2			Troubleshooting by staff is fast	
RES 3			Provides information on what to do if a transaction cannot be processed	
Economical Benefit Aspect				
DIS 1	*Discount/ Compensation*	Special offers and economic benefits using mobile banking: without or small charge	Service fee discount	2,6
DIS 2		Compensation for problems	Compensation when transactions cannot be processed in a timely manner	

Ref *: 1 → *Bauer, Hammerschmidt, and Falk 2004, 2 → Zarifopoulos and Economides 2009, 3 → Ariff et al. 2012, 4 → Asfour and Haddad 2014, 5 → Jun and Palacios 2015, 6 → Tharanikaran et al. 2017, 7 → Aboobucker and Bao 2018, 8 → Sharma and Sharma 2019*

5. Results and Discussion

Based on literature studies that have been carried out, the quality of mobile banking services was measured using three aspects, namely: application aspects, complaint handling aspects, and economic benefit aspects. The total dimensions used to measure these three aspects were 14 dimensions, which consisted of 8 dimensions in the application aspect, 5 dimensions in the complaint handling aspect, and 1 dimension in the economical benefit aspect. The total of parameter used was 41, which consisted of 24 indicators to measure application aspects, 15 indicators to measure complaint handling aspects, and 2 indicators to measure economic benefit aspects.

Framework of results of the literature study that have been carried out are illustrated in Figure 1.
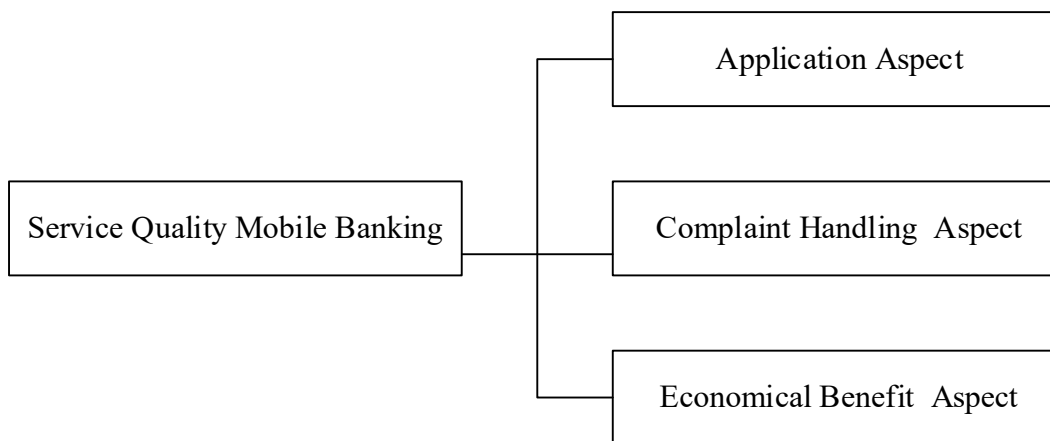

Figure 1. Mobile Banking Service Quality Measurement Framework

Service quality was seen as an alternative strategy to increase the company's competitive advantage. The first aspect used to measure the quality of mobile banking services was application aspect. This aspect relates to the capabilities of the application in providing services to customers. Measurement dimensions that were often used were security, service features, content, process accuracy, ease of use, efficiency, and aesthetics. Meanwhile, one dimension that had not been widely used was continuous improvement, which was only used in research of Jun and Palacios (2015). Continuous improvement needed to be included as a measurement dimension because product services, customer service, and mobile banking applications need to be continuously improved in order to meet customer needs and expectations. Continuous improvement represented a process or mechanism to keep the mobile banking application up-to-date in meeting customer needs. In the mobile banking application, an application update process was required which was inflexible and caused customers to experience difficulty. This dimension was important because application updates according to cellular technology which was developed on time could increase the company's competitive advantage. Therefore, this dimension must be present in measuring the quality of mobile banking services.

The second aspect used to measure service quality was the complaint handling aspect. This aspect was related to the competence of staff in providing services to customers. Measurement dimensions that were often used are competence, accessibility, responsiveness. The rarely dimensions were courtesy/communication and understanding the customer. Service staff must have good communication skills and be able to understand customer needs and difficulties. This was an important factor so that customers feel comfortable when submitting questions and complaints regarding mobile banking services.

The third aspect used to measure service quality was the economic benefit aspect. This aspect was rarely used to measure the quality of mobile banking services. This aspect was related to 1. Special promos/offers that are given when customers use mobile banking services (Zarifopoulos and Economides 2009) so that it is more attractive to customers 2. There is compensation when transactions cannot be processed in a timely manner (Tharanikaran et al. 2017). Special promos/offers included: free transfer fees after the customermade multiple transfer transactions, discounted purchases at certain merchants if customers make payments using QR Code mobile banking, etc. When the competition for mobile banking becomes increasingly fierce, this aspect will become a consideration for customers as well as a competitive advantage. This aspect was an important aspect that became a consideration for customers in

choosing services. Therefore, the economic benefit aspect was used to measure the quality of mobile banking services (Archan et al. 2015).

6. Conclusion

Based on a literature study that has been conducted, the quality of mobile banking services was measured using 3 aspects, 14 dimensions and 41 indicators. The three aspects were application aspect, complaint handling aspect, and economical benefit aspect. The dimensions used to measure the quality of mobile banking services are: security, service features, content, process accuracy, ease of use, efficiency, aesthetics, continuous improvement, competence, courtesy/communication, understanding the customer, accessibility, responsiveness, and discount /compensation.

This research can be continue by conducting a process of validity and reliability using dimensions and indicators that have been formulated through literature studies and then measuring using a survey of respondents using dimensions and indicators that have been tested for validity and reliability.

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