

Evaluation of Customer Satisfaction on Indonesian Banking Chatbot Services During the COVID-19 Pandemic

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Abstract—The new normal lifestyle during the COVID-19 pandemic encourages every individual to change their behavior towards digital transformation. A banking chatbot is one of the financial technologies promoted by the banking industry to meet the needs of its customers during the pandemic. However, there is still a gap between the quality of the developed chatbot service and customer expectations. The research is conducted to evaluate the factors that affect customer satisfaction with Indonesian banking chatbot services during the COVID-19 pandemic. Data are collected through filling out questionnaires by 222 respondents using the snowball sampling technique. Only 100 respondents are selected and fit into the research criteria consisting of them who domicile in the JABODETABEK area and experience using Indonesian banking chatbot services. The number of respondents used as many as 100 people is also determined based on the ten times rule method and Slovin method. The variables analyzed in the research are system quality, information quality, service quality, trust, perceived value, situational factor, and personal factor. Each variable is observed for its effect on the intention to use and customer satisfaction in using Indonesian banking chatbot services. Then, the obtained data are analyzed using PLS-SEM. The results indicate that system quality, service quality, and information systems significantly positively affect customer satisfaction using Indonesian banking chatbot services. Moreover, information quality and personal factor also affect intention to use Indonesian banking chatbot services significantly and positively. The results are expected to recommend the banking industry to develop banking chatbot services to increase customer satisfaction and intention to use banking chatbot services.

Index Terms—Customer Satisfaction, Banking Chatbot, COVID-19 Pandemic

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I. INTRODUCTION

THE new normal lifestyle in the era of the COVID-19 pandemic that limits physical movement encourages every individual to change their behavior towards digital transformation. This trend will continue to change lives by increasing the need for adequate infrastructure in all fields. One of them is the banking sector, which is the pulse of all business activity. During the COVID-19 pandemic, financial service organizations must be more accommodating in responding to customers' needs. Banking companies must develop their technology because the technology sector is an adaptive tool to meet customer needs for banking services.

Innovation and implementation of Artificial Intelligent (AI) technology in banking services has the opportunity to be a solution to meet consumer expectations for contactless transactions during the COVID-19 pandemic. During this pandemic, as many as 78% of customers want touchless interactions, such as voice assistants, applications, or face recognition [1]. This opportunity has the potential for banks to accelerate the implementation of AI technology throughout the financial service chain. Nine out of ten financial services organizations globally think that the launch of this AI technology innovation aims to improve customer experience [2].

Indonesia encourages the banking sector to transform into a digital economy in its services, known as digital banking. This digital transformation is accelerating to meet stakeholders' expectations. It enters the all-digital era coupled with the millennial generation that dominates the current trend of lifestyle demands digital-based financial services with various advantages and high flexibility. The banking sector sees this situation as a challenge and an opportunity to improve the quality of its services, especially during the COVID-19

pandemic. The vast potential of the digital economy indicates that digital channels are crucial and have become one of the most influential factors of banking growth [3]. Moreover, every year, there is an increase in Internet customers as evidence of an increase in digital literacy among Indonesians.

The application of the health belief model, which is carried out in several studies related to the handling of COVID-19 cases in Indonesia, shows that most people have various perceptions regarding the spread of the COVID-19 virus [4]. In addition, the community also has compliance in following the applicable health protocols to suppress the spread of the COVID-19 virus. Health belief influences community compliance in following health protocols by 61.9% [5]. It can be seen from the tendency of changes in people's living behavior to reduce contact or crowds, which can be a factor in accelerating the spread of the COVID-19 virus. Moreover, the real impact is seen in banking activities where there is a decrease in conventional banking activities used by customers due to physical distancing protocol.

According to several factors, such as changes in customer behavior in facing the new normal lifestyle during the COVID-19 pandemic and the increase in customers' preference for digital services, the banking industry in Indonesia seeks to provide an ecosystem of digital-based banking services. As digital banking services are more in demand by customers, financial service companies try to launch various online service applications. So, they can provide information interactively and in real-time, such as virtual assistant chat banking (chatbot banking) developed through AI [6–8].

Globally, it is found that as many as 30% of customers tend to switch to financial technology services compared to continuing to use conventional bank services directly during the COVID-19 pandemic. Among these customers, 21% choose chatbot or automated voice services to help them connect to bank services. This artificial intelligence-based service product helps improve customer satisfaction. The benefits and conveniences obtained from AI technology increase customer interest in using AI-based services by 20–40% [1].

The chatbots are now common in customer service strategy. They can speak by simulating the language used by humans in general by using certain software programs. The application of chatbots for banking organizations certainly brings benefits in general. Banks can answer questions more quickly and communicate 24 hours with customers through their website and social media [9]. Chatbots are design to mimic the human language. They can also be designed using

different speech styles to develop their personality. Customers can communicate and interact with chatbots like communicating with ordinary humans through communication devices, such as smartphones [10]. Chatbots benefit customers personally because of their availability to meet customers' needs all the time [11].

According to the result of the Bank Indonesia assessment, several banks in Indonesia have started to adopt digital banking technology to service their customer. In Indonesia, several well-known banking companies have launched chatbot services that the customers can access through several online messenger applications like LINE, WhatsApp, and Facebook Messenger. Some of the chatbot names include Virtual Assistant Chat Banking BCA (VIRA), Mandiri Intelligent Assistant (MITA), BRI New Assistant (SABRINA), Chat with your Intelligent Advisor (CINTA), Mega Intelligent Assistant (MILA), and others. Along with the development of chatbot service in the banking financial service chain, its qualities and features continue to be refined to meet consumer expectations so that it can be an easy-to-use digital service. Some of the banking chatbot service features are information and promo, balance checks, the nearest ATM location, credit card information, account mutations, exchange rates, and other services. However, among the advantages of the latest technology that chatbots carry, chatbots are rarely adopted by other banking companies [12].

Moreover, the advantages of this banking technology are used mainly by the millennial generation, who prioritize aspects of convenience in reaching banking services anytime and anywhere. They are very much supported by Internet access achieved by 94.4% by millennials, with 98.2% of them able to get various activities on the Internet using smartphones [13]. However, entering the COVID-19 pandemic, customers from other age groups use financial technology products, especially those with a high risk of the COVID-19 virus [2].

Along with the increasing use of AI technology, consumer expectations for the quality of AI products are also increasing. The rapid innovation and implementation of AI chatbot technology need to be aligned with attention to customer experience and satisfaction. So, the service can meet customer expectations and accommodate needs during the COVID-19 pandemic. However, the Indonesian banking chatbot service still needs to be improved. Banking customers find that banking chatbots still cannot understand the messages conveyed by customers properly. As many as 45% of banking customers state that the value obtained from the interaction process with AI technology has not met their expectations. Banking companies also admit that 35% of interactions between customers and chatbots

are not the same as interactions with humans [14].

Moreover, some Indonesian banking chatbots cannot provide relevant information and solution. These issues may lead to reluctance to use banking chatbot services in the future [15]. Then, customer chatbot services widely used by customers are not considered customer-centric. There is still a gap between the quality of the developed chatbot service and customer expectations. It is in contrast to the advantages of AI chatbots which can understand various communication inputs and are respond well like communicating with real humans [2].

Banking companies need to be more innovative to develop the quality of their financial technology-based services. The factors influencing the acceptance of banking chatbot services among millennials in Indonesia are innovation, perceived benefits, and ease of use [16]. Those factors affect the level of customer acceptance of banking chatbot services. Similarly, ease of use, usability, brand image, and personality of chatbot technology positively correlate to the level of customer satisfaction in using Indonesian chatbot service [17]. The satisfaction level is one of the benchmarks for the success of an information system. The increasing level of satisfaction will positively affect customers' interest in continuing to use and recommend the products offered. There will be a good cooperative relationship between consumers and companies [18]. By analyzing factors that affect customer acceptance and satisfaction in using chatbot service, actual information can be obtained. Hence, it can also be recommendations for banking companies in developing the quality of chatbot services to accommodate the customers' needs.

Various studies have been carried out to analyze customer satisfaction, including evaluating the factors that affect its level. The information is beneficial to develop a product or service to meet customer expectations. There are several research topics previously conducted in analyzing the level of customer satisfaction with information system products. For example, a study on the level of satisfaction of e-commerce services during the COVID-19 pandemic shows that system quality, information quality, and service quality influence the level of use and user satisfaction [19]. Another analysis about satisfaction in using e-service chatbots with the assistance of neuro research illustrates that the use of chatbot services can increase customer satisfaction. This opportunity can arise when the customer has extensive digital knowledge and is ready to change the level of banking services [20].

A study about chatbot service is also conducted to examine the acceptance of chatbot technology in the banking industry in Indonesia with Technology Acceptance Model (TAM). It is found that innovative ability, perceived usefulness, attitude to use influence

behavioral intentions [16]. Through literature studies, there are opportunities in developing chatbot services in Indonesia. Further research is needed regarding factors that can increase customer satisfaction of chatbot services to meet customer expectations.

The research is conducted by looking at the opportunities for developing the quality of banking chatbot services to meet customers' needs and desires to get quality banking services during the COVID-19 pandemic. The evaluation of the success of the information system aims to determine the factors that can affect the level of customer satisfaction in using banking chatbot services. The research applies a modified information system success model of DeLone and McLean as a research instrument. The variables are system quality, information quality, service quality, trust, perceived value, personal factor, and situational factor of the COVID-19 pandemic. The background is then developed into the formation of the research hypothesis. Each variable used is suspected of influencing the level of customer satisfaction of banking chatbot services. The research results are expected to recommend Indonesian banking industries develop their banking chatbot services to meet customer expectations.

II. LITERATURE REVIEW

A. Customer Satisfaction

Customer satisfaction is an essential factor and the main goal for companies that provide products or services to have a competitive advantage that allows them to survive in the future. Customer satisfaction can also affect the customers' intentions to return to use the products or services provided. Conversely, if the customers experience disappointment or dissatisfaction, they will leave and give a bad review of the products or services. So, customer satisfaction is an answer to the satisfaction with services, products, and service quality obtained [21].

Customer satisfaction can also be interpreted as an expression of pleasure or disappointment resulting from comparing perceptions with expectations and the performance of the product or service received by the customers [22]. Based on this understanding, it can be concluded that the customer will feel satisfied if the performance of the product or service exceeds customer perception and expectation. Customers will feel neutral if the performance of the product or service meets the perceptions and expectations, and they will feel disappointed if the performance of the product or service cannot meet it. Hence, customer satisfaction can increase customer loyalty to the products and services [23]. With an increase in customer loyalty, the customer will unconsciously introduce the products

and services to other people around them. It can indirectly benefit the company because it can increase profits in the future.

Companies must measure customer satisfaction because it can be a benchmark for companies to stay ahead of other competitors and compete competitively in the future. Customer satisfaction with a system can be measured through system quality, information quality, service quality, usability intensity [24]. Other variables need to be measured, too, such as trust [25], perceived value [26], situational factors [27], and personal factors [22]. Then, customer satisfaction can also be analyzed using customer expectation, which compares what customers want to get and what the system has provided [28]. It can also be seen from the level of customer recommendations because the higher the recommendations given by customers to other customers, the higher the level of customer satisfaction is with the services or products [29].

B. System Quality

The system can be used as a reference to measure the success of the technology used. It also refers to the ability of the system to provide useful information to customers [24]. Then, system quality can be measured through several indicators. It consists of ease of learning, ease of use, availability, response time, system reliability, flexibility, personalization, system interactivity, and system security.

Each indicator in system quality has measurement criteria for an information system to have a good quality system. First, the ease of learning measures the level of ease in terms of learning provided by the information system for its customers in a short time. The easier it is for customers to learn the system, the better it will be. Second, ease of use aims to see the ease of using the designed information system to provide an effect of convenience for customers better than the manual method. The easier the use of information systems in helping the completion of the customers' works will certainly increase customer satisfaction. Third, the availability is used to ensure the availability of answers or solutions owned by the information system to solve customers' problems. The more solutions can be provided, the better the quality is in the system. Fourth, the response time measures the level of speed at which an information system can be accessed optimally and stably. A good quality system can be seen from the speed level of customers in accessing information systems which can also increase customer satisfaction. Fifth, the system reliability can see the resilience of information systems from damage and errors when used. The lower the chance of damage or errors when used by customers will increase

customer satisfaction in using it. Sixth, flexibility measures the ease of an information system that customers can access anytime or anywhere and make changes according to customer needs. Seventh, personalization analyzes the performance of the information system in providing answers to each customer's problems which may vary. Eighth, the system interactivity looks at how the language used in an information system is interactive while communicating with customers to give answers according to customers' needs. Ninth, information system security is used to measure the level of security possessed by an information system so that data are stored properly and kept confidentially.

C. Service Quality

Service quality is a critical assessment element of customer perceptions against products or information received [30]. Good service quality is customer-oriented to improve the quality of services provided. From this understanding, the researchers conclude a positive relationship between service quality and customer satisfaction. The higher the quality of customer service, the higher the customers will be satisfied. Service quality measurement can be done through several indicators such as responsiveness, service accuracy, and reliability. The responsiveness is an indicator to measure the speed or alertness of the system in providing services and delivering information to users clearly and suited to user needs. Meanwhile, accuracy sees the accuracy of the system in providing services to users. The services provided must be in accordance with the facts. Then, reliability is an indicator to measure the accuracy of the information provided by the system, so the information is appropriate and provides answers to the users' questions.

D. Situational Factor

Situational factor refers to all specific factors to the time and place of observation that do not follow personal knowledge (intraindividual) and stimuli (alternated choices) that have a demonstrable and systematic effect on current behavior. The situational factor is also the broad dimensions of the characteristics of the situation to describe and compare with any situation [31]. In general, the situational factor is often used to describe consumers' physical and social environment. For the measurement of situational factors, the factors that come from outside or external parties can be analyzed through the situation cues indicator [27]. Situational cues are contextual cues in the environment, signaling to a person that an action or event may occur. It can signal that someone needs to respond in a certain way.

E. Personal Factor

Personal factor is an attractive indicator of the uniqueness of a company. The attractiveness of these personal factors can influence the behavior of a person [32]. Each person certainly has unique and natural characteristics. These characteristics can be affected by factors within the person, such as age, life cycle, occupation, economic status, lifestyle, and personality [33]. It can also be explained as factors influencing a person's decision-making behavior. Since each person is unique, the level of satisfaction with something will differ. Therefore, it needs a specific measurement indicator to know the level of satisfaction of each individual through age and work [22].

F. Information Quality

Information quality is a result or output produced by an information system [24]. The quality of the information can be measured using several indicators. First, relevance measures the quality of information held by the system. The information can have good quality if it is relevant to the users' needs. Second, usefulness is an indicator to see the information quality owned by a system. It is good if the information can help to solve the users' questions. Third, understandability looks at the quality of the information provided by the system in terms of users' understanding levels. Fourth, accuracy is an indicator to measure the quality of the information in the system. The information provided by the system must be accurate to assist users in making decisions. Fifth, reliability analyzes the quality of the information system. A good information system is reliable to assist users in making decisions. Sixth, completeness is an indicator used to measure the quality of information owned by the system. Good information quality has complete information needed by its users. Seventh, timeliness also analyzes the quality of the information in the system. Submission of information to users must be punctual. If there is a delay in delivering information, it can be detrimental to users.

G. Intention to Use

Intention to use is an attempt to measure the level of customer confidence in using a system that can help to finish their work. The measurements are carried out using only a little effort or customers' effort to obtain the benefits offered by the system. In measuring customer intensity, several measurement indicators are needed [24]. First, the amount of use measures the number of users of an information system in a certain time. Second, frequency of use is an indicator for

measuring user intentions. It can be seen from how often the users use the system. Third, the purpose of use considers users' intent in using information systems.

H. Trust

Trust aims to measure the success of using the system. Without customers' trust, the system will not be used. Therefore, trust must be analyzed. It can be measured with several indicators [25]. First, system security is the main indicator of measuring the level of user confidence in using the system because some information system requires users' privacy or identity data. Second, reputation can give confidence to other parties in the ability and integrity of an information system company. Reputation is an essential factor in increasing customers' trust. Having a good reputation can help to convince others to trust the company even if they have never interacted with it before.

I. Perceived Value

The perceived value considers the profit value seen from the overall assessment given by the customers to the services that have been provided. It is measured by comparing the effort expended by the customers. It can be seen from emotional and social values [25]. Emotional value is the value of profits, measured by users' positive impact when using the system. Meanwhile, social value is the value of profits, seen from the beliefs and life guidelines considered good, right, and obeyed.

III. RESEARCH METHOD

A. Data Collection

The research applies a quantitative descriptive approach. The stage of determining the number of used samples applies the ten times rules method and the Slovin method. Ten times rule method is a method in PLS-SEM that determines the measurement of sample size using conditions that the sample size must be ten times larger than the largest number of formative indicators to measure one construct. It means ten times the largest number of structural paths directed at a particular construction in the inner model [34]. The number of samples is ten times the ten indicators in the research, so 100 respondents are obtained.

Then, the Slovin method is also used to determine the number of samples based on data from the total population of the JABODETABEK area of 6,572,307 people [35–39]. The data are processed using the Slovin formula, which uses an error tolerance limit of

10% or 0.1. So, it is concluded that the total number of samples to be used is 99.998 (≈ 100 people).

Correspondences come from several age groups from 20 to 59 years old who live in the JABODETABEK area and have experience using Indonesian bank chatbot services both before and during the COVID-19 pandemic. The primary data are obtained by collecting responses using online questionnaires. Then, the questionnaire is distributed using the snowball method through online form filling. As many as 222 responses are received from filling out the questionnaire. However, only 100 answers match the research criteria for the analysis. The remaining 122 responses do not meet the research criteria because they do not live in the JABODETABEK area and do not have any experience in using banking chatbot services.

Then, four banking chatbots are studied in the research. The four chatbots are VIRA from BCA, MITA from Bank Mandiri, SABRINA from BRI, and MILA from Bank Mega. The four chatbots are based on respondents who already have experience using the chatbot service.

B. Research Model

The research aims to determine the factors that affect customer satisfaction in using Indonesian banking chatbot services during the COVID-19 pandemic with a modified measurement model. It consists of nine constructs: system quality, information quality, service quality, intention to use, trust, perceived value, situational factor, personal factor, and customer satisfaction. The indicators of each variable can be seen in Table I.

The inner model in the research is a modification of the information system success model developed by DeLone and McLean to correspond to the scope of the research [24]. It is shown in Fig. 1. It shows the hypotheses proposed in the research.

C. Data Analysis

The respondents' primary data obtained through filling out the online questionnaire with the Likert scale. Data that meet the research criteria, such as respondents who live in JABODETABEK and have experience using chatbot services during the COVID-19 pandemic, are selected to be processed using SMART-PLS version 3 software. Then, the data are processed using SMART-PLS and divided into several stages. The outer model consists of a convergent validity test, validity test, reliability test, and discriminant validity test. Then, the inner model includes R-squared (R^2), f-squared (f^2), and path coefficient [40]. In the final stage, a hypothesis test is carried out.

TABLE I
RESEARCH VARIABLES AND INDICATORS.

Variables	Indicators	References
System Quality	Ease of Learning Ease of Use Availability Response Time System Reliability Flexibility Personalization System Interactivity Information System Security	[24]
Information Quality	Relevance Usefulness Understandability Information Accuracy Reliability Completeness Timeliness	[24]
Service Quality	Responsiveness Service Accuracy Reliability	[24]
Intention to use	Amount of Use Frequency of Use Purpose of Use	[24]
Trust	System Security Reputation	[25]
Perceived Value	Emotional Value Social Value	[26]
Situational Factor	Situational Classes	[27]
Personal Factor	Age Occupation	[22]
Customer Satisfaction	Customer Expectation Customer Recommendation	[28] [29]

IV. RESULTS AND DISCUSSION

A. The Assessment of Measurement Model

The measurement model in the research consists of nine constructs. They are system quality, information quality, service quality, intention to use, trust, perceived value, situational factor, personal factor, and customer satisfaction. The detail of the constructs can be seen in Appendix.

The evaluation of the measurement model is conducted by testing the validity and reliability of each latent variable in the model. Convergent validity shows the intensity of the convergent construct to explain the variance of the indicator. Based on the results of the convergent validity test, most of the calculated loading factors have a value above 0.70, so the test can proceed to the validity and reliability test stage. Then, each latent construct in the Average Variance Extracted (AVE) is calculated to verify the convergent validity of the variables. At least 50% of the lowest variance of the observed variables must be taken up by constructs in the model. It indicates that the AVE for all constructs must be above 0.5, so convergent validity can be confirmed for the research model [41].

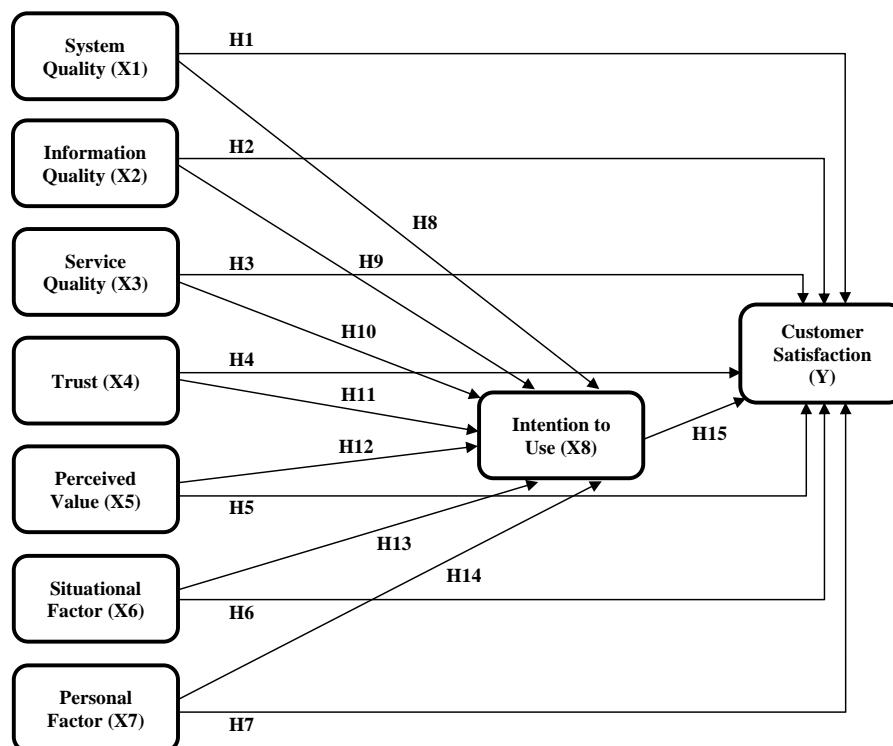


Fig. 1. The research model.

In the research, all the constructions have exceeded the threshold value.

Then, in testing the reliability of a model, it needs to calculate the loading score of each indicator with its latent variable and compare it with the required threshold score. It must test the consistency of all the constructs by using the CR test. The measurement of CR has a threshold value of 0.70. From the results of the CR test, each construct has exceeded the threshold value, so the measurement model has acceptable reliability [42].

Table II shows the loadings, CR, and AVE values for each construct. All research variables have a CR value greater than 0.70, meaning they are declared reliable. Then, the variables are convergently valid because the AVE values are greater than 0.5.

Next, a discriminant validity test is carried out by using the Heterotrait-Monotrait (HTMT) method. HTMT is defined the mean value of the indicator correlations across constructs relative to the mean of the average correlations for the indicators measuring the same construct. It allows to assess a reflectively measured construct's discriminant validity in comparison with other construct measures in the same model. If the value of the HTMT is higher than 1, it can be con-

cluded that there is a lack of discriminant validity [42]. It means that a construct or variable has invalid or not unique discriminant validity. Otherwise, if the HTMT value is lower than 1, a construct or variable has valid or unique discriminant validity [43]. The results of the discriminant validity test show that most of the variables have good discriminant validity, as seen in Table III.

B. Evaluation of Inner Model

The inner model test is carried out to analyze the hypothesis proposed in the research model conceptually. The PLS-SEM approach uses the SMART-PLS application, which provides a conventional assessment of the overall fit of the model. There are several basic steps: R-squared (R^2), t-statistic, and f-squared (f^2). The process of bootstrapping is carried out with 400 samples.

The R^2 value determines the variance in the construct described by the model. It can also be used to measure the predictive accuracy of the model. There are several criteria of the R^2 value: 0.75 as significant, 0.50 as moderate, and 0.26 as weak [41]. The results show that the customer satisfaction can be explained as

TABLE II
ASSESSMENT RESULTS OF THE MEASUREMENT MODEL.

Construct	Items	Loadings	CR	AVE
System Quality (SQ)			0.911	0.511
SQ1	Ease of Learning	0.670		
SQ2	Ease of Use	0.659		
SQ3	Availability	0.752		
SQ4	Response Time	0.663		
SQ5	System Reliability	0.760		
SQ6	Flexibility	0.763		
SQ7	Personalization	0.780		
SQ8	System Interactivity	0.655		
SQ9	System Security	0.784		
Information Quality (IQ)			0.902	0.528
IQ1	Relevance	0.780		
IQ2	Usefulness	0.709		
IQ3	Understandability	0.683		
IQ4	Accuracy	0.716		
IQ5	Reliability	0.683		
IQ6	Completeness	0.722		
IQ7	Timeliness	0.715		
Service Quality (SEQ)			0.826	0.535
SEQ1	Responsiveness	0.840		
SEQ2	Accuracy	0.678		
SEQ3	Reliability	0.714		
Intention to Use (IU)			0.806	0.546
IU1	Amount of Use	0.816		
IU2	Frequency of Use	0.786		
IU3	Purpose of Use	0.595		
Trust (TR)			0.888	0.726
TR1	System Security	0.866		
TR2	Reputation	0.809		
Perceived Value (PV)			0.856	0.666
PV1	Emotional Value	0.859		
PV2	Social Value	0.714		
Situational Factor (FS)			0.766	0.622
FS1	Situation Classes	0.737		
Personal Factor (FP)			0.861	0.538
FP1	Age	0.812		
FP2	Occupation	0.758		
Customer Satisfaction (CS)			0.898	0.816
CS1	Customer Expectation	0.890		
CS2	Customer Recommendation	0.916		

much as 73.1% using the system quality, information quality, service quality, intention to use, trust, profit value, situational factor, and personal factor. Table IV shows the detailed value of the R² test results and the category of each value on the variable. Customer satisfaction and intention to use variable have R² test results above 0.50, but below 0.75. Hence, it can be said that the independent variables are considered to have moderate ability to provide all the information needed to predict the dependent variable.

The f² value is also tested. It is an additional assessment of the endogenous constructs, seen from

TABLE III
THE RESULTS OF DISCRIMINANT VALIDITY USING HETEROTRAIT-MONOTRAIT.

	CS	IQ	IU	PV	FP	SEQ	FS	SQ	TR
CS									
IQ	0.703								
IU	0.869	1.070							
PV	0.924	0.932	0.981						
FP	0.757	0.750	1.067	0.726					
SEQ	0.936	0.968	0.936	0.999	0.935				
FS	0.767	0.600	0.638	0.952	0.950	0.636			
SQ	0.908	0.910	0.963	1.001	0.791	0.948	0.685		
TR	0.648	0.579	0.609	0.751	0.854	0.989	0.574	0.679	

Note: System Quality (SQ), Information Quality (IQ), Service Quality (SEQ), Intention to Use (IU), Trust (TR), Perceived Value (PV), Situational Factor (FS), Personal Factor (FP), Customer Satisfaction (CS).

TABLE IV
R-SQUARED TEST RESULTS.

Variable	Value of R-Squared	Description
Customer Satisfaction	0.731	Moderate
Intention to Use	0.709	Moderate

the extent of the exogenous substantive effect and the overall effect. There are three categories of value that are used in this test. The value of 0.02 has a small effect. The value of 0.15 has a medium effect and 0.5 means a large effect. If the value of f² is less than 0.02, there is no effect [44]. The results of the f² test can show the relationship between endogenous and exogenous constructs. Figure 2 shows the main impact on endogenous constructs in the research. It shows that information quality and system quality have moderate influence as exogenous latent variables on customer satisfaction. Similarly, information quality and personal factor also have moderate influence as exogenous latent variables on intention to use. Those variables have values of f² higher than 0.15 so that it appears as a green bar to describe their effect on the customer satisfaction and intention to use.

Table V shows the detailed value of the f² test results and the category of each value on the variable. Other variables have a small to no effect in influencing the level of customer satisfaction and intention in using banking chatbot services. Their values of f² are lower than 0.15.

The path coefficient test determines the t-statistic value and p-values that describe the relationship between each endogenous and exogenous variable. These values will be used to determine the level of path significance. From the path coefficient test results, the research finds the following results. In Table VI, it can be seen that the t-statistic value is greater than 1.96 or the p-value is less than 0.05. It means significant variables. Based on the results of path coefficient

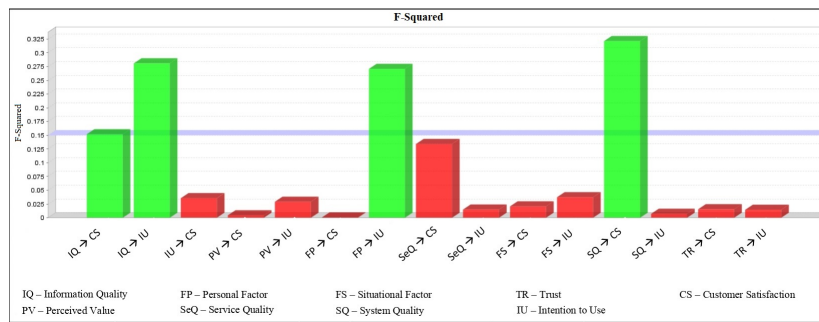


Fig. 2. F-squared test.

TABLE V
F-SQUARED TEST RESULTS.

Variable	Value of F-Squared	Description
Intention to Use → Customer Satisfaction	0.036	Small effect
Trust → Intention to Use	0.014	No Effect
Trust → Customer Satisfaction	0.015	No Effect
Information Quality → Intention to Use	0.281	Medium effect
Information Quality → Customer Satisfaction	0.152	Medium effect
Service Quality → Intention to Use	0.015	No Effect
Service Quality → Customer Satisfaction	0.134	Small effect
System Quality → Intention to Use	0.007	No Effect
System Quality → Customer Satisfaction	0.321	Medium effect
Perceived Value → Intention to Use	0.029	Small effect
Perceived Value → Customer Satisfaction	0.004	No Effect
Personal Factor → Intention to Use	0.271	Medium effect
Personal Factor → Customer Satisfaction	0.001	No Effect
Situational Factor → Intention to Use	0.037	Small effect
Situational Factor → Customer Satisfaction	0.021	Small effect

TABLE VI
PATH COEFFICIENT AND HYPOTHESIS TEST RESULTS.

Path	T-Statistics (STDEV)	P-Values	Description	Result
System Quality → Customer Satisfaction (H1)	4.987	0.000	Significant	Accepted
Information Quality → Customer Satisfaction (H2)	4.079	0.000	Significant	Accepted
Service Quality → Customer Satisfaction (H3)	3.064	0.002	Significant	Accepted
Trust → Customer Satisfaction (H4)	1.377	0.169	Not Significant	Not Accepted
Perceived Value → Customer Satisfaction (H5)	0.624	0.533	Not Significant	Not Accepted
Situational Factor → Customer Satisfaction (H6)	1.381	0.168	Not Significant	Not Accepted
Personal Factor → Customer Satisfaction (H7)	0.196	0.845	Not Significant	Not Accepted
System Quality → Intention to Use (H8)	0.722	0.471	Not Significant	Not Accepted
Information Quality → Intention to Use (H9)	4.389	0.000	Significant	Accepted
Service Quality → Intention to Use (H10)	1.197	0.232	Not Significant	Not Accepted
Trust → Intention to Use (H11)	0.937	0.349	Not Significant	Not Accepted
Perceived Value → Intention to Use (H12)	1.383	0.167	Not Significant	Not Accepted
Situational Factor → Intention to Use (H13)	1.717	0.087	Not Significant	Not Accepted
Personal Factor → Intention to Use (H14)	4.311	0.000	Significant	Accepted
Intention to Use → Customer Satisfaction (H15)	1.823	0.069	Not Significant	Not Accepted

testing, information quality, service quality, and system quality have a significant effect on customer satisfaction. Moreover, information quality and personal factor also significantly impact intention to use. Meanwhile, other variables with t-statistics below 1.96 or a p-value greater than 0.05 are insignificant.

Next, a hypothesis test compares the p-value with the significance value of 0.005. If the p-value is less than

0.005, the hypothesis can be accepted. Meanwhile, the hypothesis is rejected if the p-value is more significant than 0.005. The results of the hypothesis test show that several factors affect the intention to use and customer satisfaction of banking chatbot services.

Based on the path coefficient test, there are five relationships between variables with a significant influence. It consists of system quality, information

quality, and service quality that significantly affect the users' satisfaction with banking chatbot service. Moreover, information quality and personal factor have a significant influence on customers' intention to use. Similarly, it can also be seen from the results of the hypothesis test that system quality, information quality, and service quality influence customer satisfaction. In addition, information quality and personal factor influence intention to use.

C. Discussion

The results show that the value of R^2 in Table IV indicates an influence between exogenous variables on endogenous variables. The R^2 value of customer satisfaction is 0.731, and the intention to use is 0.709. Both variables can be described as moderate. From the results of the R^2 test, the variables in the research can only explain customer satisfaction as many as 73.1%. There are still 26.9% which other variables can explain. For the intention to use, the research variables can only describe as many as 70.9%, which the remaining (29.1%) is defined by other variables.

Moreover, the results of the f^2 test in Table V show that several variables have a different level of influence on customer satisfaction. Variables that have a medium effect on customer satisfaction are information quality (0.152) and system quality (0.321), Situational factor (0.021), intention to use (0.036), and service quality (0.134). Meanwhile, a variable with a small effect is customer satisfaction. Then, trust (0.015), perceived value (0.004), and personal factor (0.001) have no effect in influencing customer satisfaction.

The results from the f^2 test are also shown the varying level of influencing the intention to use. Information quality (0.281) and personal factor (0.271) affect the intention to use with a medium effect. Then, variables with a small effect are perceived value (0.029) and situational factor (0.037). However, the remaining variables have no effect in influencing the level of intention to use, namely trust (0.014), service quality (0.015), and system quality (0.007).

From the path coefficient test, the research uses t-statistics and the p-value of each variable to test the hypothesis. The hypothesis is accepted if the p-value is less than 0.005. The accepted hypothesis is as follows. First, it is H1 that states the effect of system quality on customer satisfaction. Based on the results of filling out the questionnaire, around 24% of respondents are very satisfied, 35% are satisfied, and 32% give neutral answers to the quality of the Indonesian banking chatbot system. The system quality can increase customer satisfaction. It shows that the quality of the Indonesian banking chatbot system can

provide answers and information quickly and precisely compared to offline channels [45]. It shows that the quality of the Indonesian banking chatbot system can provide answers and information quickly and precisely compared to offline channels. Respondents do not experience problems accessing chatbot services using their mobile devices. In addition, this is an advantage possessed by chatbots that can be accessed without being limited by space and time. They also find it easy to use and learn about the services provided by banking chatbots in Indonesia. The banking chatbot system needs to be developed so that the system can have good quality, reliable, flexible, integrated, and has high accessibility and security systems. It is also necessary to maintain the quality of the system to meet user expectations. Chatbot systems can use machine learning to adapt new information or user requests. This can improve the quality of chatbot system services to be more advanced [46].

Second, H2 about the relationship of information quality between customer satisfaction is accepted. Based on the questionnaire results, it shows 28% of very satisfied respondents, 38% of satisfied respondents, and 29% of neutral respondents about the information quality of Indonesian banking chatbots. They agree that information provided by Indonesian banking chatbots is accurate, precise, and easy to understand. It can assist them in solving the banking problems they are experiencing. This result is in accordance with the initial goal of implementing chatbot technology in banking, which is expected to answer customers' issues or constraints precisely and accurately. Moreover, customers can also get the latest information related to banking through the banking chatbot. Therefore, developers should improve the chatbot services to have the ability to provide accurate and relevant information desired by customers to be quickly received by customers. Then, customer satisfaction with banking chatbot services will increase. A measurement of customer satisfaction using the information quality has previously been carried out on banking chatbots in Vietnam which is helpful in determining the intention to continue using banking chatbot services. The information quality factor significantly influences customer satisfaction [47].

Third, H3 is supported. It states the effect of service quality on customer satisfaction. There are 30% of very satisfied respondents, 35% of satisfied respondents, and 25% of neutral respondents evaluating the quality of banking chatbot services. Respondents rate the quality of chatbot services to be responsive and reliable in responding to their banking problems. Moreover, other indicators that describe service quality, such as em-

pathy, responsiveness, security, and privacy assurance owned by the system, can encourage customer satisfaction. Hence, developers need to consider the most commonly used and easy-to-use platform that will be used to access the banking chatbot services to improve the accessibility of chatbot services.

The results are in line with previous research. In the development and testing of conceptual models for service quality and performance in chatbots, there is a strong influence on service quality on user satisfaction [48]. Moreover, in the research on banking chatbots to determine sustainable value, service quality affects customer satisfaction in using banking chatbot services in Vietnam [47].

Fourth, H9 is about information quality and intention to use. This hypothesis is supported. The quality of the information provided by banking chatbot services is always well maintained to provide precise and accurate information. Then, the information is easy to understand, so the respondents feel helped in making decisions about banking problems. The results are reflected by the response given by the respondent through the filling out questionnaire with 28% strongly agree, 37% agree, and 29% neutral to the information quality provided by banking chatbots. It can affect the respondents to use the banking chatbot service more often. The information quality of an information system must always be monitored and improved to meet customer expectations consistently. The available data in an information system can be easily adjusted, updated, and processed to meet customer needs. Therefore, if the information quality in banking chatbot services is continuously improved, it will increase customers' intention to use Indonesian banking chatbot services. The previous research supports the results [49].

Fifth, H14 stating the influence of personal factor on intention to use is also accepted. As many as 39% of respondents strongly agree, 38% agree, and 22% answer neutrally that they are satisfied. So, it increases their intention to use banking chatbot services. Based on data collected from filling out questionnaires, the age group with the highest use of chatbot services is 25–29 years. Most of them work as employees. Excellent chatbot service with flexibility can be easily accessed through social media and online messaging applications. The age of 25–34 years is also recorded as the largest age group of customers in social media networks on the Internet, with 34.1% at the beginning of the COVID-19 pandemic [50]. To encourage the influence of personal factors on intention to use, developers need to consider the diversity of customers in banking chatbot services to cover various backgrounds and customers' goals for using chatbot services. If the customers personally feel that the chatbot service can

help to solve their problems. This situation is certainly a driving force for customers' interest in using the chatbot service. The results are in line with previous research with personal factors to predict users' intentions. It shows a relative strength possessed by each personal factor that affects intention to use. In the research, personal variables are used to determine their effect on the intention to use banking chatbot services during the COVID-19 pandemic [46].

However, in the path coefficient testing that has been done previously, several hypotheses are found rejected as follows. First, H4 shows the effect of trust on customer satisfaction. The results indicate no relationship between trust and customer satisfaction. The respondents worry about the possibility of misusing personal information and data theft. Therefore, developing a good quality security system has an important role in increasing customer confidence in banking chatbot services. So, banking service developers need to be vigilant in considering the systematic risks and privacy [47].

Second, H5 about the effect of perceived value on customer satisfaction is rejected. Most of the respondents have not consistently experienced the benefits offered by banking chatbots. As many as 27% of respondents answer neutrally, and 8% of respondents have not felt the emotional and social values of Indonesian banking chatbot services. In this case, banks need to consider feedback submitted by customers to find out customer expectations and strive to get more profit value while using chatbot services, especially during the COVID-19 pandemic. If customers can feel the value of benefits obtained from using banking chatbot services, the level of customer satisfaction will increase. Providing customer value has a more effective value for retaining and making customers more satisfied consistently [51].

Third, H6 is also not supported. It is about the effect of a situational factor on customer satisfaction. There is no significant relationship between situational factor and customer satisfaction. The results of the f^2 test show that pandemic conditions have a small effect on customer satisfaction. As many as 35% of respondents answer neutrally, and 4% are not satisfied when using Indonesian banking chatbot services during the large-scale social restrictions (Pembatasan Sosial Berskala Besar (PSBB)).

Situational factor such as disaster situation has a positive influence on customer satisfaction in research on public service quality. It shows that situational factors have a relationship with customer satisfaction [52]. Hence, banks can actively find out customers' needs for banking services during this pandemic. The chatbot services can accommodate the various needs of cus-

tomers who experience limitations during the COVID-19 pandemic. The COVID-19 pandemic is an opportunity and a challenge for banks in developing and improving their services through this banking chatbot service. So, this service can have a positive influence on increasing customer satisfaction.

Fourth, H7 regarding personal factor and customer satisfaction is not supported. Based on the answers from respondents, there are various age levels with different expectations about banking chatbot services. Most of the respondents aged 20–39 years are the majority group of Internet customers. This age group is also a productive group with quite high digital literacy, so they have high expectations for this virtual-based service. The chatbot service application, which is a new technology among Indonesian banking, is still in the process of being perfected. It is possible that customer expectations have not been met. Then, it causes respondents to feel dissatisfied.

Research conducted on satisfaction factors that affect chatbot acceptance in Indonesia shows that personal factors influence Indonesian chatbot satisfaction. The level of someone's expectation to achieve satisfaction can vary. Hence, measuring customer satisfaction for Indonesian banking chatbots cannot only use age and occupation indicators [17].

Fifth, H8 is also rejected. Most respondents feel that the chatbot service system is good, but it does not have features that can increase the intention to use the banking chatbot service. There is no significant relationship between system quality and customer intention. The f^2 test result shows that system quality has a small effect on the intention to use. Based on the data, as many as 32% of respondents answer neutrally about this matter. Then, 5% of respondents agree that the system quality does not increase respondents' intensity in using banking chatbot services.

Moreover, the basic features of banking chatbot services are only in the form of an information menu. These features are only informative. The result is not in line with the previous research. The validation carried on the conceptual model as part of the information success model in Indonesian government agencies shows the positive influence of system quality on intention to use [53].

Sixth, there is no significant relationship between service quality and customer intention. H10 is also not supported. As many as 32% of respondents answer neutrally about the issue. Then, 4% of respondents answer that the service quality provided by banking chatbot services at this time has not increased the customers' intention to use. This situation can happen because the chatbot service can only answer questions related to banking problems. Hence, banking compa-

nies can develop chatbot services to the next level. They have other advantages to make customers feel comfortable with the services provided, such as improving the quality of responsiveness and developing the quality of chatbot communication to make it more interactive. The result is not supported by the previous research in a case study in Indonesian government agencies that service quality positively influences intention to use. The chatbot service observed causes this difference [52].

Seventh, H11 is about the effect of trust on intention to use. There is no significant relationship between those variables. Around 23% of respondents answer neutral, and 14% feel that they do not believe in providing personal data in online services. Data security is an issue and the focus of various banking service products. Moreover, the banking chatbot system is currently still in the process of being perfected. Hence, respondents cannot fully trust the security system in banking chatbot services even though banks have a good reputation for minimizing unwanted things. The result is not in line with the previous research that trust significantly influences customers' intention to use banking chatbots in Vietnam [47].

Eighth, there is no significant relationship between perceived value and intention to use. So, H12 is rejected. Around 32% of respondents are neutral, and the other 6% feel that they have not consistently received a profit value. The perceived value from using banking chatbot services cannot increase the intention to use chatbot services. Banking companies are expected to be more active in finding out the customer expectations of banking chatbot services. Then, to increase customers' intention to use in terms of perceived value, banking companies can implement a strategy by providing unique offers for customers to increase their interest. In the context of banking chatbot services, banking companies can use it to find out more information related to the motivation and expectation in using banking chatbot services. This effort can be seen as an advantage for the customers in utilizing banking chatbot services more than conventional banking services during the COVID-19 pandemic [54].

Ninth, H13 is regarding situational factor and intention to use. The results show no significant relationship between the situational factor and customer intention to use banking chatbot services. It is different from previous research [55]. Based on data obtained, most respondents have used banking chatbots since the time before the COVID-19 pandemic. The COVID-19 pandemic is a situational factor used in the research. During the COVID-19 pandemic, there is no significant feature or service development for customers to spend more time increasing their intention to use banking

chatbot services. Therefore, banking companies can adjust the banking chatbot service system to accommodate customers' needs during the COVID-19 pandemic. This chatbot service development is expected to increase customer interest in banking chatbot services.

Tenth, H15 about the intention to use and customer satisfaction is also rejected. Based on data, 30% of respondents are neutral, and 5% feel they do not often use banking chatbot services. Most respondents feel they only need to use a chatbot service application for a short duration and get the same feeling every time they use it. So, it can be concluded that when the customers' intention to use the banking chatbot service is high, the respondents are not necessarily satisfied with the banking chatbot service. Loyal customers are not necessarily feeling satisfied, even though most satisfied customers tend to be loyal in using the products on repeated time [56]. Most banking customers feel that the value obtained from banking chatbots services is not in accordance with their expectations. This is line with the results that intention to use influences customer satisfaction but insignificantly.

V. CONCLUSION

The research is conducted to evaluate the factors that affect customer satisfaction with Indonesian banking chatbot services during the COVID-19 pandemic. The results show that system quality, service quality, and information quality significantly affect customer satisfaction in using Indonesian banking chatbot services. Moreover, information quality and personal factor affect customers' intention to use Indonesian banking chatbot services significantly and positively. The sequence of variables based on their significant effect on customer satisfaction in using Indonesian banking chatbot services is system quality > information quality > service quality > intention to use > situational factor > trust > perceived value > personal factor. Meanwhile, the sequence of variables based on their significant effect on the intention to use Indonesian banking chatbots is information quality > personal factor > situational factor > perceived value > service quality > trust > system quality.

To increase customer satisfaction and customer intention in using banking chatbot services, developers need to pay attention to the system quality and information quality of banking chatbots. The banking chatbot has good quality and is reliable, flexible, integrated, and accessible with a high-security system. Moreover, the information quality provided by the service chatbots needs to be more accurate, relevant to the customers' needs, and quickly received by the customers. The features in the chatbot service should

cover various users' backgrounds to increase their intention to use.

Nevertheless, the banking chatbot service technology is a new product implemented by the banking industry. So, not many customers have taken advantage of the service despite increasing banking chatbot services used during the pandemic COVID-19. In addition, the features offered in the chatbot service are not diverse, so customers have not used the service intensively. These issues have become the limiting factors for researchers in exploring the research.

Based on the information obtained through literature studies and data analysis from the research results, there is still a gap between the users' expectations and the development of chatbot services in the banking industry. The development of chatbots is currently the focus of business organizations. However, it has not yet directed its goals to customer-centric, so users have not felt that their expectations have been fulfilled. Therefore, it is necessary to carry out further research that can deeply analyze the factors that can affect customer satisfaction to assist developers in understanding customer desires for the ideal chatbot service.

REFERENCES

- [1] S. M. D. R. D. Ledignan *et al.*, "Smart money," 2020. [Online]. Available: <https://www.capgemini.com/wp-content/uploads/2020/11/Report-AI-in-CX-FS.pdf>
- [2] S. Girard, D. Shankavaram, A. L. Thieullent, R. Tolido, G. Gadri, J. Buvat, A. Khadikar *et al.*, "The art of customer-centric artificial intelligence," 2020. [Online]. Available: https://www.capgemini.com/wp-content/uploads/2020/07/AI-in-CX_CRI-Report_16072020_V4.pdf
- [3] Otoritas Jasa Keuangan, "Roadmap pengembangan perbankan Indonesia 2020-2025," 2021. [Online]. Available: <https://bit.ly/35KUlcR>
- [4] A. O. Suryani and O. M. Purwodiharjo, "Aplikasi health belief model dalam penanganan pandemi COVID-19 di Provinsi DKI Jakarta," *Jurnal Perkotaan*, vol. 12, no. 1, pp. 21–38, 2020.
- [5] S. Lutpiah and M. I. Hatta, "Pengaruh health belief model terhadap kepatuhan mengikuti protokol kesehatan di masa pandemi covid-19," *Prosiding Psikologi*, vol. 7, no. 1, pp. 38–41, 2021.
- [6] Bank Mega, "Bank Mega luncurkan MILA, layanan digital customer service," 2020. [Online]. Available: <https://bit.ly/3CaGDw2>
- [7] BRI, "125 tahun BRI menyelamatkan UMKM: Mengubah kesulitan menjadi ketangguhan," 2020. [Online]. Available: <https://bri.co.id/documents/20123/56786/AnnualReportBRI2020verIndonesia.pdf>

- [8] BCA, "Beyond uncertainties: Managing the next normal," 2020. [Online]. Available: <https://www.bca.co.id/-/media/Feature/Report/File/S8/Laporan-Tahunan/20210226AR-2020-BCAIndonesia-Medium-Res.pdf>
- [9] S. Sarbabidya and T. Saha, "Role of chatbot in customer service: A study from the perspectives of the banking industry of Bangladesh," *International Review of Business Research Papers*, vol. 16, no. 1, pp. 231–248, 2020.
- [10] S. F. Suhel, V. K. Shukla, S. Vyas, and V. P. Mishra, "Conversation to automation in banking through Chatbot using artificial machine intelligence language," in *2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)(ICRITO)*. IEEE, 2020, pp. 611–618.
- [11] M. Chung, E. Ko, H. Joung, and S. J. Kim, "Chatbot e-service and customer satisfaction regarding luxury brands," *Journal of Business Research*, vol. 117, pp. 587–595, 2020.
- [12] Bank Indonesia, "Indonesia payment systems blueprint 2025: Bank Indonesia: Navigating the national payment systems in the digital era," 2019. [Online]. Available: <https://www.bi.go.id/en/publikasi/kajian/Documents/Indonesia-Payment-Systems-Blueprint-2025.pdf>
- [13] IDN Research Institute, "Indonesia millennial report 2019," 2019. [Online]. Available: <https://cdn.idntimes.com/content-documents/indonesia-millennial-report-2019-by-idn-times.pdf>
- [14] Marketing Research Indonesia, "Chatbot," 2020. [Online]. Available: <https://mri-research-ind.com/news/readnews/17/1234567890>
- [15] B. D. Bagana, M. Irsad, and I. H. Santoso, "Artificial intelligence as a human substitution? Customer's perception of the conversational user interface in banking industry based on UTAUT concept," *Review of Management and Entrepreneurship*, vol. 5, no. 1, pp. 33–44, 2021.
- [16] R. Richad, V. Vivensius, S. Sfenrianto, and E. R. Kaburuan, "Analysis of factors influencing millennial's technology acceptance of chatbot in the banking industry in Indonesia," *International Journal of Civil Engineering and Technology*, vol. 10, no. 4, pp. 1270–1281, 2019.
- [17] L. Sanny, A. C. Susastra, C. Roberts, and R. Y. Yusramdaleni, "The analysis of customer satisfaction factors which influence chatbot acceptance in indonesia," *Management Science Letters*, vol. 10, no. 6, pp. 1225–1232, 2020.
- [18] F. Buttle and S. Maklan, *Customer relationship management: Concepts and technologies*. Milton: Routledge, 2019.
- [19] P. D. Dirgantari, Y. M. Hidayat, M. H. Mahphoth, and R. Nugraheni, "Level of use and satisfaction of e-commerce customers in COVID-19 pandemic period: An Information System Success Model (ISSM) approach," *Indonesian Journal of Science and Technology*, vol. 5, no. 2, pp. 261–270, 2020.
- [20] A. Wiliam, Sasmoko, H. Prabowo, M. Hamsal, E. Princes, and Y. Indrianti, "Analysis of e-service chatbot and satisfaction of banking customers in Indonesia," *Asia Proceedings of Social Sciences*, vol. 4, no. 3, pp. 72–75, 2019.
- [21] P. N. N. Duy and T. M. Hoang, "Factors affecting customer satisfaction and customer loyalty the case of Binh Duong ceramic product," in *Proceedings of NIDA International Business Conference*, 2017, pp. 380–405.
- [22] P. Kotler and K. L. Keller, *Marketing management*. Boston: Pearson, 2016.
- [23] D. Chiguvi and P. T. Guruwo, "Impact of customer satisfaction on customer loyalty in the banking sector," *International Journal of Scientific Engineering and Research*, vol. 5, no. 2, pp. 55–63, 2017.
- [24] W. H. DeLone and E. R. McLean, "Information systems success measurement," *Foundations and Trends® in Information Systems*, vol. 2, no. 1, pp. 1–116, 2016.
- [25] O. Sembiring and D. T. H. Aruan, "Trust and commitment toward mobile payment platform," *Journal of Business and Behavioural Entrepreneurship*, vol. 4, no. 2, pp. 36–46, 2020.
- [26] H. T. Eryadi and E. Yulianna, "Pengaruh perceived value dan social influence terhadap purchase intention smartphone 4G pada pelanggan Bandung Electronic Center," *eProceedings of Management*, vol. 3, no. 1, pp. 86–92, 2016.
- [27] V. Zeigler-Hill and T. K. Shackelford, Eds., *Encyclopedia of personality and individual differences*. Cham: Springer, 2020.
- [28] N. Wilson and R. Christella, "An empirical research of factors affecting customer satisfaction: A case of the Indonesian e-commerce industry," *DeReMa Jurnal Manajemen*, vol. 14, no. 1, pp. 21–44, 2019.
- [29] S. H. Chun and A. Nyam Ochir, "The effects of fast food restaurant attributes on customer satisfaction, revisit intention, and recommendation using DINESERV scale," *Sustainability*, vol. 12, no. 18, pp. 1–19, 2020.

- [30] V. A. Zeithaml, M. J. Bitner, and D. D. Gremler, *Services marketing: Integrating customer focus across the firm*. New York: McGraw-Hill Education, 2018.
- [31] J. F. Rauthmann, "Situational factors," in *Encyclopedia of personality and individual differences*. Cham: Springer, 2020.
- [32] F. U. Rehman, R. B. M. Yusoff, S. B. M. Zabri, and F. B. Ismail, "Determinants of personal factors in influencing the buying behavior of consumers in sales promotion: A case of fashion industry," *Young Consumers*, vol. 18, no. 4, pp. 408–424, 2017.
- [33] M. Khaniwale, "Consumer buying behavior," *International Journal of Innovation and Scientific Research*, vol. 14, no. 2, pp. 278–286, 2015.
- [34] J. Hair, C. L. Hollingsworth, A. B. Randolph, and A. Y. L. Chong, "An updated and expanded assessment of PLS-SEM in information systems research," *Industrial Management & Data Systems*, vol. 117, no. 3, pp. 442–458, 2017.
- [35] Badan Pusat Statistik, "Kota Tangerang dalam angka 2020," 2020. [Online]. Available: <https://tangerangkota.bps.go.id/publication/2020/04/27/00450113b877b63df098a200/kota-tangerang-dalam-angka-2020.html>
- [36] —, "Jumlah penduduk provinsi DKI Jakarta menurut kelompok umur dan jenis kelamin 2018-2020," 2020. [Online]. Available: <https://bit.ly/3puXvs0>
- [37] —, "Kota Bogor dalam angka 2020," 2020. [Online]. Available: <https://bogorkota.bps.go.id/publication/2020/04/27/8be591177823581bbbf06bbb/kota-bogor-dalam-angka-2020.html>
- [38] —, "Jumlah penduduk menurut kelompok umur dan jenis kelamin di Kota Depok (jiwa), 2018-2020," 2020. [Online]. Available: <https://bit.ly/3syDbIc>
- [39] —, "Kota Bekasi dalam angka 2020," 2020. [Online]. Available: <https://bekasikota.bps.go.id/publication/2020/04/28/b3c9a8f66a47b925b30b81c8/kota-bekasi-dalam-angka-2020.html>
- [40] U. Narimawati, J. Sarwono, H. A. Affandi, and H. M. S. Priadana, *Ragam analisis dalam metode penelitian: Untuk penulisan skripsi, tesis, & disertasi*. Yogyakarta: Penerbit Andi, 2020.
- [41] J. F. Hair Jr, G. T. M. Hult, C. Ringle, and M. Sarstedt, *A primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks: SAGE publications, 2017.
- [42] J. F. Hair Jr, G. T. M. Hult, C. M. Ringle, M. Sarstedt, N. P. Danks, and S. Ray, *Partial Least Squares Structural Equation Modeling (PLS-SEM) using R: A workbook*. Springer Nature, 2021.
- [43] M. R. Ab Hamid, W. Sami, and M. H. Mohamad Sidek, "Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion," *Journal of Physics: Conference Series*, vol. 890, no. 1, pp. 1–5, 2017.
- [44] S. Setiawan, "Tutorial analisa parsial model persamaan struktural dengan software Smart-PLS versi 3," 2020. [Online]. Available: <https://bit.ly/36XHdBw>
- [45] A. A. Mohammad Salameh, H. Ahmad, F. Zulhumadi, and F. M. Abubakar, "Relationships between system quality, service quality, and customer satisfaction: M-commerce in the Jordanian context," *Journal of Systems and Information Technology*, vol. 20, no. 1, pp. 73–102, 2018.
- [46] J. T. S. Quah and Y. W. Chua, "Chatbot assisted marketing in financial service industry," in *International Conference on Services Computing*. Springer, 2019, pp. 107–114.
- [47] D. M. Nguyen, Y. T. H. Chiu, and H. D. Le, "Determinants of continuance intention towards banks' chatbot services in Vietnam: A necessity for sustainable development," *Sustainability*, vol. 13, no. 14, pp. 1–24, 2021.
- [48] A. Rossmann, A. Zimmermann, and D. Hertweck, "The impact of chatbots on customer service performance," in *International Conference on Applied Human Factors and Ergonomics*. Springer, 2020, pp. 237–243.
- [49] S. Rahi and M. Abd. Ghani, "Integration of DeLone and McLean and self-determination theory in internet banking continuance intention context," *International Journal of Accounting & Information Management*, vol. 27, no. 3, pp. 512–528, 2019.
- [50] S. Kemp, "Digital 2020: Indonesia," 2020. [Online]. Available: <https://datareportal.com/reports/digital-2020-indonesia>
- [51] L. G. Schiffman and J. L. Wisenblit, *Consumer behavior, global edition*. Harlow: Pearson Education Canada, 2019.
- [52] W. Chen, Y. Shi, L. Fan, L. Huang, and J. Gao, "Influencing factors of public satisfaction with COVID-19 prevention services based on Structural Equation Modeling (SEM): A study of Nanjing, China," *International Journal of Environmental Research and Public Health*, vol. 18, no. 24, pp. 1–18, 2021.

- [53] S. Mardiana, J. H. Tjakraatmadja, and A. Apri-aningsih, "Validating the conceptual model for predicting intention to use as part of information system success model: The case of an Indonesian government agency," *Procedia Computer Science*, vol. 72, pp. 353–360, 2015.
- [54] U. Basaran and R. Aksoy, "The effect of perceived value on behavioural intentions," *Journal of Management Marketing and Logistics*, vol. 4, no. 1, pp. 1–16, 2017.
- [55] N. T. M. Demoulin and S. Djelassi, "An integrated model of Self-Service Technology (SST) usage in a retail context," *International Journal of Retail & Distribution Management*, vol. 44, no. 5, pp. 540–559, 2016.
- [56] S. H. W. Chuah, P. A. Rauschnabel, M. Marimuthu, R. Thurasamy, and B. Nguyen, "Why do satisfied customers defect? A closer look at the simultaneous effects of switching barriers and inducements on customer loyalty," *Journal of Service Theory and Practice*, vol. 27, no. 3, pp. 616–641, 2017.

APPENDIX

The Appendix can be seen in the next page.

Questions

SQ1. I learn the service facilities owned by banking chatbots easily.
SQ2. I find the banking chatbot service easy to use without going through complicated steps.
SQ3. The chatbot offers several correct solutions to the banking problems I am currently facing.
SQ4. I get answers and information quickly and precisely compared to offline channels.
SQ5. I have never experienced significant problems when using banking chatbot services.
SQ6. I feel the flexibility in accessing banking chatbot services using my mobile device.
SQ7. I always get a suitable solution from the chatbot service regarding the banking problems that I am experiencing.
SQ8. I feel that the language used by banking chatbots is interactive and easy to understand.
SQ9. I feel safe in providing personal data when using banking chatbot services.

IQ1. I got relevant information from the chatbot service regarding the banking problems I am facing.
IQ2. I feel that the information provided by the banking chatbot service is very useful, answering, and solving the banking problems that I am facing.
IQ3. I feel that the information provided by the banking chatbot service is appropriate and easy to understand.
IQ4. I feel that the information provided by the banking chatbot service is correct and accurate.
IQ5. I feel that the information provided by the banking chatbot service is reliable and helps me to make decisions in determining solutions to my banking problems.
IQ6. I feel that various information that can be asked through the banking chatbot service regarding banking problems is complete.
IQ7. I feel that banking chatbot services are a solution when I quickly need information related to banking problems.

SEQ1. I feel that the chatbot service is quick to provide solutions to my banking problems.
SEQ2. I feel that banking chatbot services can provide accurate information regarding banking problems.
SEQ3. I feel that the quality of service provided by the banking chatbot service is reliable.

IU1. I have used banking chatbot services.
IU2. I often use banking chatbot services.
IU3. I access a chatbot service to get banking-related information services.

TR1. I believe that the personal data I provide when using the chatbot service is safe and will not be misused.
TR2. I put my trust in a bank's reputation in maintaining the security of its customer data.

PV1. I am satisfied with the services provided by the banking chatbot, so I will continue to use the chatbot service.
PV2. I am satisfied with the services provided by the banking chatbot, so I will share this experience with my relatives.

FP1. I do not think age is a barrier to use banking chatbot services.
FP2. I feel that the information provided by chatbots can help my work such as checking, mutations, and others.

FS1. I use a banking chatbot service during large-scale social restrictions (Pembatasan Sosial Berskala Besar (PSBB)) in my area.

CS1. I feel that the services provided by banking chatbots are in line with expectations.
CS2. I will recommend the chatbot service to my relatives.

Likert Scales
1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree
